MARKET DYNAMICS AND CUSTOMER ADOPTION OF SOLAR (PANELS) ENERGY PRODUCTS: AN ANALYTICAL STUDY OF AKOLA REGION

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Abstract

The increasing focus on renewable energy and scarcity of energy has established solar power as a practical solution for sustainable electricity generation. However, patterns of adoption vary significantly based on consumer demographics, financial incentives, and levels of awareness. This research paper investigates the market dynamics and customer adoption of solar energy products in the Akola region, utilizing survey responses from residential consumers, commercial businesses, and solar distributors. The findings indicate that residential adoption is on the rise, particularly in urban areas, where heightened awareness drives interest in solar solutions. In contrast, commercial consumers remain largely unaffected by government incentives due to the absence of subsidies for their segment. Additionally, responses from distributors reveal a notable disparity in awareness levels between urban and rural consumers, with rural adoption impeded by limited information and accessibility. A mixed-methods approach was employed to analyse consumer behaviour, financial barriers, and policy recommendations. The study utilizes the UTAUT 2 model to explore factors influencing solar energy adoption, while the Industry Life Cycle model assesses the current stage of the solar industry in Akola. The findings provide strategic recommendations to enhance awareness, broaden incentives, and streamline regulations, thereby facilitating a more rapid transition to renewable energy. Keywords: Solar Energy Adoption, Akola Region, Economic Incentives, Consumer Behaviour, Market Dynamics, UTAUT 2 Model, Industry Life Cycle Model, Policy Support, Renewable Energy.

Introduction

Recent global shifts towards sustainable energy sources have been motivated by concerns about climate change and resource depletion, positioning solar power as a leading alternative to fossil fuels. Solar energy offers a clean, stable, and abundant power source, especially with advancements in technology, such as rooftop solar panels. Countries like China, the United States, and Germany are significant investments making in solar infrastructure, while international agreements like the Paris Agreement have accelerated the adoption of renewable energy, resulting in global solar capacity reaching 1 terawatt by 2022. In India, the solar sector has grown rapidly, aided by government policies that support both urban and rural adoption. Initiatives like the Jawaharlal Nehru National Solar Mission (JNNSM) and Goods and Services Tax (GST) incentives have been instrumental in promoting solar energy.

Additionally, the Production Linked Incentive (PLI) Scheme encourages local production of highefficiency solar modules.

The Akola region from Maharashtra, presents a unique case for examining the adoption of solar energy. With its diverse population and varying access to resources and infrastructure, Akola faces specific challenges and opportunities in adopting solar rooftop panels, reflecting broader trends in India's commitment to renewable energy.

Justification of the Study

Justification of this study on the Market Dynamics and Customer Adoption of Solar Energy Products in Akola is justified by the region's unique climate, energy needs, and economic factors. Akola's high temperatures and abundant solar irradiance create significant potential for solar energy adoption. With rising electricity costs and power shortages, both households and businesses increasingly seek sustainable, cost-effective energy solutions. This research will explore how these factors influence consumer perceptions, economic incentives, and technological adoption in Akola's urban and rural areas. The findings will inform local policy development and contribute valuable insights to the broader solar energy market.

Product Selection: Solar Panels

The solar panel is an electrical device that converts sunlight into electricity. Many solar panels consist of photovoltaic cells, which are semiconductors usually made of silicon-based material that triggers an electrical current on striking by sunlight.

Objectives

1. To Assess Market Dynamics of Solar Energy in the Akola Region

 To Evaluate the Economic Factors Influencing Solar Energy Adoption
 To Investigate Consumer Perspectives and Adoption Patterns

Hypotheses for the Study:

- **H1** (**Causal**): Economic incentives and advancements in solar technology will lead to a significant increase in the adoption of solar energy in the Akola region.
- H2 (Descriptive): Residents in urban areas of Akola are more likely to adopt solar energy compared to those in rural areas due to better access to resources and infrastructure.
- **H3** (**Correlational**): Higher levels of awareness about solar energy and favourable policy support are positively correlated with higher adoption rates among businesses in Akola.

Literature Review

This source in the form of the solar rooftop panels generated so much interest made by several researchers and therefore addressed the possibility of changing everything to do with future consumption of energy in this world. In every aspect of study, the problems multiply at different alleged influences that include technological factors, economic incentives, consumer attitudes, and policy frameworks amongst others. This review combines recent literature information and general perception of market forces and consumption of solar energy particularly as it relates to the solar rooftop panel.

1. Adoption of Solar Energy: International Views

This paper "Rural Household Energy Transitions in India: Lighting as a Focal Point" was presented by E. Harrington, A. Athavankar and D. Hsu. 2020. This means several factors that intervene in the transition of sources of energy, such as **cost**, **accessibility, and retention** of old energy systems. Therefore, this means complexity in the process of energy transition because households always use single or combined energy sources, which could be an enabler or inhibitor of adopting new solar technologies. From such trends, one may trace the ways that such trends may be unfolding in the Akola region with populations of various energy requirement from both the cities and villages.

2. Global solar industry-from technological breakthroughs

Philip G. Jordan contributes towards a more general discussion on the global solar industry-from technological breakthroughs to financing trends, and covering regional case studies. He presented his market analysis of solar energy mapping strategic roles that would be taken up by

government policies, technological progress, and public-private partnerships in terms of the adoption of solar energy. His book provided an excellent overview of the global solar industry which forms an important ground for gaining understanding of the existing local market dynamics in Akola. Thus, if one needs to find an answer in the light of some comparative better world trends and regional context then it would very much be apt to see where Akola stands in the larger scheme of solar energy.

3. National Context: Solar Energy in India

The Indian solar market is gaining pace dramatically of late. This "India Solar Energy Market Size & Share Analysis," (P&S Intelligence, 2024) has further deep factors for this growth on behalf of government incentives, falling prices of solar panels, and increased public awareness. This has been further divided into technology and application, giving an insight into the scope for the application of solar energy in various sectors of residences, industries, and commercial sectors. Critical points refer to some key reasons that could be among the reasons not to install the solar rooftop panels in the Akola region, for instance, and among them is cost and availability. Motivations and barriers to consumers' adoption of solar renewable energy products in India: Richa Agarwal investigates to have deeper understanding into motivations as well as barriers acting as interference in adoption. The study further gave cause to the environment and cost-benefit analysis as a robust determinant to buy in the customers' perceptions toward solar energy. This would be relevant to the city of Akola to the extent that proper awareness and financial abilities at various levels subject consumers to possible susceptibility or greater sensitivity toward the adoption of solar rooftop panels.

4. Economic and policy push toward adopting solar power

This aside, by 2024, Zonghan Li is addressing the case whereby local economic growth will rise or fall depending on the viability of solar energy within the major regions such as China, the EU and the US. According to his findings, favourable terms in the easy term solar energy do complement favourable terms in regards to GDP growth and higher job rates. It will be used as a basis for the comparison and understanding of the probable effects on the economic activities due to the solarization that is happening in the Akola district. In doing so, it brings some disadvantages of the interpretation of the wage effects and consumption effects that can act as base studies for the case of Akola.

5. Factors that can determine consumer's adoption of renewable energy

Bilal Khalid et al., conducted a 2021 Poland study on factors that can determine consumer's adoption of renewable energy. Among the factors that the pioneers themselves reported to be important in determining their case on deciding to use the technology were cost of renewable technologies, simplicity and inducement. Pretty interesting, actually relating the similarities in some cases with respect to the two markets for solar in Poland and India. Of course, some of these are, however, bound with economic barriers working for both countries and will enable the two to work together in developing better solutions that improve the adoption scale. This way, learnings could be applied there and one would get a better understanding of those economic challenges that may either hasten or retard the adoption of solar rooftop panels there.

6. Comparative Regional Case Studies

Report on "India-Solar Power Market by Application and End-user" 2023 to 2027 will analyse an overview of the Indian solar market in a survey covering all applications and end-users of this solar market and gives identification based on empirical studies of which sector of the area it is likely to use the solar rooftop panels, residential, commercial, or industrial. It would need comparison of area with that one from Akola from the above facts and other areas before it, which offers their best adaptation of solar. This literature encompasses a very large set of factors that would influence adoption-from economic incentives and technological developments to attitudes of consumers toward solar energy, as well as roles of government policies. To such an extent, studies must provide very solid grounds for understanding the dynamics of the market and the consumer adoption pattern of the solar rooftop panels in the region of Akola. However, gaps exist on local conditions that may influence adoption, and this study aims to fill them.

7. Theoretical Framework: UTAUT 2 Model

The most influential model that might be used in understanding adoption and use of technology is the Unified Theory of Acceptance and Use of Technology developed by Venkatesh et al. 2003. For this reason, to better capture the consumer context, the theory was extended into UTAUT 2, adding some constructs relevant to consumer behaviour, such as hedonic motivation, price value, and habit (Venkatesh, Thong, & Xu, 2012). The heart of the UTAUT model focuses around four basic constructs—**performance expectancy, effort expectancy, social influence, and facilitating** conditions-which are assumed to have a direct effect on behavioural intention to use and ultimately actual use of technology. The extension to UTAUT 2 incorporates critical elements that tend to represent distinct aspects consumers face when they want to adopt new technologies and, therefore is well-suited for analysing the factors influencing the adoption of solar energy. This is directly confirmed with empirical validation by Venkatesh et al. (2012), as the UTAUT 2 model was found to explain a much greater percentage of variance in consumer intentions and technology use compared to the parent version. The additional constructs of price value and hedonic motivation gave greater insight into how consumers weigh perceived enjoyment or satisfaction with the use of new technology against its cost and perceived value. In addition, the habit construct accounted for past behaviour and its influence on future use of technology in a specific industry-specific case like solar energy, wherein experience with or use of renewable technology in the past could greatly influence adoption decisions.

8.Market Dynamics Through the Lens of the Industry Life Cycle Model

The Industry Life Cycle (ILC) model, as posited by Michael Gort and Steven Klepper in their seminal article of 1982, "Time Paths in the Diffusion of Product Innovations," has been the synthesis through which the change of industries over time has been studied and understood. It categorises the industrial cycle into four stages: normal Introduction, Growth, Maturity, and Decline-with characteristics of associated innovation. competition, and market activities in each stage. Thus, what Gort and Klepper contributed was a diffusion of innovation dynamics in an industry context that they found was conditioned by technological change, entry and exit of firms, and fluctuations in demand. These stages are mapped in the ILC model to predict how outside stimuli, such as innovation, competition, and regulatory forces, shape the industry's general evolution.

Methodology Method of Data Collection

This study adopted a mixed-methods approach comprising quantitative and qualitative methods. Data was collected through structured questionnaires using a stratified random sampling technique. Respondents included residential, commercial users and distributors or installers in rural and urban parts of Akola. Key stakeholders are interviewed to gather insights on policy, market conditions, and consumer attitudes toward solar energy. Tools such as Likert scale analysis and cross-tabulation were used to interpret the data.

Field Observations

Sample Size	190 (No. of Respondent)	Solar Panel Installed	Not Installed	Urban	Rural	Both Regions for Distributors
Residential consumers	100	72	28	55	45	-
Commercial consumers	70	50	20	-	-	-
Distributors and Installers	20	-	-	9	7	4

Sampling	Stratified
Techniques	sampling

Data analysis:

1] Market Dynamics of Solar Energy in the Akola Region From the study of distributors and installers:

A] The analysis of the current demand for solar energy solutions in the Akola region

Table: Analysis of Solar Energy Demand in Akola

Response Category	Number of Respondents	Percentage (%)	Key Insights
High Demand	7	35%	Indicates strong interest; consumers recognize benefits.
Moderate Demand	7	35%	Potential adopters exist but face barriers such as cost or lack of information.
Low Demand	6	30%	Financial constraints, infrastructure issues, and lack of awareness impact adoption.

The analysis of the current demand for solar energy solutions in the Akola region reveals a mixed response. Among the respondents, 35% (7 individuals) reported high demand, indicating strong interest and awareness about solar energy benefits. Another 35% (7 individuals) described the demand as moderate, suggesting potential adopters who might be facing barriers such as cost, accessibility, or limited information. Meanwhile, 30% (6 individuals) perceived demand as low, which points to financial constraints, lack of awareness, or inadequate infrastructure as major deterrents. This distribution highlights that while solar energy is gaining recognition, significant obstacles still hinder its widespread adoption.

B] The analysis of future market growth for solar energy in the Akola region

lable: Expected Growth of Solar Energy Market in Akola					
Response	Number of	Percentage	Key Insights		
Category	Respondents	(%)			
Grow	10	50%	Indicates strong confidence in market		
Significantly			expansion.		
Grow Moderately	10	50%	Growth is expected but may face certain		
			limitations.		

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The analysis of future market growth for solar energy in the Akola region shows a highly positive outlook. Out of the respondents, 50% (10 individuals) believe the market will grow significantly, indicating strong optimism about increasing adoption due to advancing technology, declining costs, and supportive policies. The remaining 50% (10 individuals) predict moderate growth, suggesting that while expansion is expected, certain challenges like financial constraints, infrastructure limitations, or policy gaps may slow down rapid development. This balanced perspective reflects a general consensus on growth, but at varying speeds depending on external factors.

2] Evaluating the Economic Factors Influencing Solar Energy Adoption From the study of residential consumers:

A] How important were financial incentives in your decision to adopt solar energy? (On a scale of 1 to 5, where 1 = Not at all important and 5 = Extremely important) Table: Analysis of Likert Scale Responses

Likert Scale Rating	Interpretation	Frequency
1	Not at all important	1
2	Slightly important	1
3	Moderately important	21
4	Very important	39
5	Extremely important	10
Total		72

The majority of respondents rated financial incentives as a very important factor in their decision to adopt solar energy. Specifically, **39 respondents (54.2%)** selected a score of **4**, indicating strong influence. Another **10 respondents (13.9%)** rated it as extremely important with a score of **5**. Meanwhile, **21 respondents (29.2%)** viewed it as moderately important. Very few participants found financial incentives unimportant, with only 1 person each selecting scores **1** and **2** respectively.

B] The analysis of the factors influencing the decision to adopt solar energy.

The analysis of the factors influencing the decision to adopt solar energy among commercial customers in the Akola region shows that **cost savings** is the most influential factor. All 50 respondents (100%) identified cost savings as a key motivator in their decision to adopt solar energy solutions. This finding suggests that for commercial customers, the financial benefit of reducing energy costs outweighs other considerations, especially in the absence of government incentives or subsidies. The focus on financial savings indicates that commercial customers are primarily driven by the potential to reduce operating expenses and improve their bottom line.

3] Investigating Consumer Perspectives and Adoption Patterns

From the study of residential consumers:

A] Analysis of barriers to Solar Energy Adoption

Response Category	Rural Respondents (45)	Rural Percentage (%)	Urban Respondents (55)	Urban Percentage (%)	Key Insights
High costs	12	26.67%	15	27.27%	Financial barriers remain significant in both areas, though slightly less in rural areas.
Lack of awareness	24	53.33%	20	36.36%	Awareness is the most prominent barrier in rural areas, but still a notable issue in urban areas.
Lack of support	8	17.78%	14	25.45%	Support remains important in both rural and urban areas, with a greater need for it in urban areas.
Other	1	2.22%	4	7.27%	Minimal concern in rural areas, but slightly more in urban areas.
Technical complexity	0	0%	2	3.64%	A slight concern in urban areas, potentially related to installation challenges.

The analysis reveals that lack of awareness is the most significant barrier to solar energy adoption in rural areas, with 53.33% of respondents citing it as the main issue. In urban areas, lack of awareness is still a concern but at a lower rate of 36.36%. While high costs remain a challenge in both regions, they are more prominent in urban areas at 27.27%, compared to 26.67% in rural areas. Lack of support also plays a notable role, particularly in urban areas (25.45%), suggesting that both regions require enhanced support systems and infrastructure. The findings highlight the need for targeted interventions: rural areas need

focused education and awareness campaigns, while urban areas would benefit from improved financial incentives and better support services to overcome the barriers to adoption.

From the study of Distributors and Installers:

B] Analysis of awareness for solar energy among the customers Table: Awareness of Solar Energy Among Customers by Region

Region	Very High	High	Moderate	Low	Total Responses
Urban	4 (44.44%)	5 (55.56%)	0	0	9
Rural	1 (14.29%)	1 (14.29%)	5 (71.43%)	0	7
Both	1 (25%)	2 (50%)	1 (25%)	0	4
Grand Total	6 (30%)	8 (40%)	6 (30%)	0	20

The data reveals that **urban areas** have a high level of awareness about solar energy, with **44.44%** reporting **very high** awareness and **55.56%** reporting **high** awareness. In contrast, **rural areas** show **71.43%** with **moderate** awareness and only **14.29%** with **high** awareness, indicating a need for more education in these areas. Regions with a mix of urban and rural populations show a balanced awareness level. Overall, while urban areas are well-informed, rural regions require targeted awareness campaigns to increase solar energy adoption.

Evaluation of Hypothesis Based on Survey Response:

Hypothesis H1 Analysis: "Economic incentives and advancements in solar technology will lead to a significant increase in the adoption of solar energy in the Akola region."

Reference from the customers who have adopted solar energy products.

Summary: The majority of respondents (49 out of 72) rated financial incentives as either "Very important" or "Extremely important," showing that economic incentives are a key driver. Moreover, 87% believe that technological advancements will ease solar adoption.

Hypothesis H2 Analysis: "Residents in urban areas of Akola are more likely to adopt solar energy compared to those in rural areas due to better access to resources and infrastructure."

Reference from the questions related to the attributes.

Summary: The analysis indicates that urban areas had a higher current adoption rate (76.36%) compared to rural areas (66.67%), rural areas showed a higher willingness to adopt solar panels in the next two years (73.33% vs. 53.85%). The columns of encouraging factors for adoption indicates that economic factors, particularly lower electricity bills and financial incentives, drive

willingness in rural areas even they have lower awareness.

Hypothesis H3 Analysis: "Higher levels of awareness about solar energy and favourable policy support are positively correlated with higher adoption rates among businesses in Akola."

Reference from the questions related to the attributes.

Summary: While commercial consumers acknowledge the importance of government incentives, their primary motivation is cost savings (55/70). Also, a large portion (39/70) is unsatisfied with current policy support.

Findings of the Study:

A] Market Dynamics of Solar Energy in Akola:

The data reveals that the solar energy market in Akola is developing steadily. Urban areas currently show a higher adoption rate (76.36%), indicating that better infrastructure and accessibility to technology have facilitated implementation. However, rural areas demonstrate growing interest, especially in terms of willingness to adopt solar solutions in the near future (73.33%). The market appears to be transitioning from early adoption to a more widespread acceptance stage.

B] Economic Influences on Solar Adoption:

Economic considerations play a dominant role in influencing adoption. Among residential users, 49 out of 72 rated financial incentives as "very" to "extremely" important, and 87% believe that advancements in solar technology will make future adoption easier. In the commercial sector, although 42 out of 70 rated government incentives as important (scale 4 or 5), the strongest motivator remains **cost savings** (55 out of 70). Notably, many commercial respondents (39 out of 70) expressed dissatisfaction with current government support, highlighting a policy gap.

C] Consumer Perspectives and Patterns:

Awareness levels are higher in urban areas than rural ones. Among urban participants, 100% displayed high or very high awareness, compared to 28.58% in rural areas. Despite this, rural respondents showed a higher **future intent** to adopt solar technology. This shows that **financial savings, not awareness,** is the key driving force in rural areas. Commercial customers also showed clear expectations—while they acknowledged the role of incentives, their primary interest was economic benefit.

Hypothesis Testing and Discussion: H1

"Economic incentives and advancements in solar technology will lead to a significant increase in the adoption of solar energy in the Akola region."

Across both residential and commercial consumers, economic motivations and belief in advancing technology were dominant. Among residential users, 87% agreed that technological improvements will ease adoption, and 49 of 72 considered financial incentives very important. Commercial consumers, though underserved by policy, still indicated strong adoption due to anticipated cost savings. Thus, **H1 is well supported**.

H2

"Residents in urban areas of Akola are more likely to adopt solar energy compared to those in rural areas due to better access to resources and infrastructure."

While urban areas currently show higher adoption (76.36%), rural areas showed greater willingness to adopt in the future (73.33%). This indicates that infrastructure and awareness in urban regions facilitate adoption. Whereas **economic factors**, particularly lower electricity bills and financial incentives, drive willingness in rural areas despite lesser infrastructure and awareness. Therefore, H2 is **partially unsupported**.

H3

"Higher levels of awareness about solar energy and favourable policy support are positively correlated with higher adoption rates among businesses in Akola."

Although awareness is present among businesses, dissatisfaction with government support (39/70 unsatisfied) weakens the impact of policies. Furthermore, cost savings—not policy support was the main reason behind adoption (55/70). Thus, **H3 is not supported**, as policy favourability does not significantly correlate with actual adoption.

Reflection of Extended UTAUT 2 Model in Context of the Study:

1. Performance Expectancy (Reflected Strongly): Consumers expected cost savings and efficiency improvements. Among commercial consumers, 55 out of 70 cited cost savings as their top benefit. Among residential consumers, high financial incentive importance further reinforced this.

2. Effort Expectancy (Reflected): 87% of respondents believed that technological advancements will make solar adoption easier, indicating a perception that solar panels are or will become easier to use and install.

3. Social Influence (Partially Reflected): While not directly asked in the questionnaires, commercial respondents mentioning customer reputation (7/70) suggest that peer or societal expectations may influence adoption decisions in business contexts.

4. Facilitating Conditions (Clearly Reflected): Urban consumers had better access to infrastructure, while rural respondents indicated that despite less access, they were still highly willing to adopt due to financial support, showcasing that enabling resources influence adoption readiness.

5. Price Value (Strongly Reflected): This was the most dominant factor. Residential and rural consumers cited financial incentives as very important (49/72 rated it 4 or 5 on importance), and even commercial consumers agreed that government incentives are important, showing economic value is central.

6. Hedonic Motivation (Not Reflected in This Context): There was no evidence of emotional or pleasure-driven motivation. Decisions were practical, economic, and environmentally aware, rather than hedonic.

7. Environmental Concerns (Partially Reflected): Only 8 out of 70 commercia users mentioned environmental impact as a benefit. Among residential consumers, environmental factors were not highlighted as key drivers. While there is awareness but not a primary motivator.

8. Behavioural Intention (Clearly Evident): High willingness to adopt solar energy in the next 2 years was seen among rural (73.33%) and urban (53.85%) residential respondents, demonstrating strong behavioural intention especially when paired with financial motivation.

9. Adoption of Solar Panels (Partially Achieved): Adoption rates are higher in urban areas (76.36%). However, rural areas show stronger future intention, indicating the adoption process is in progress and growing, especially if economic barriers are addressed.

The findings emphasize that economic and infrastructural factors, rather than emotional or reputational drivers, are critical to promoting solar energy adoption in the Akola region. Conclusion:

The study demonstrates that economic factors are the primary drivers of solar energy adoption in Akola, surpassing infrastructural access and policy support. Both residential and commercial consumers are motivated by the financial benefits, including cost savings from reduced electricity bills, and the continuous improvements in solar technology. While urban areas currently lead in adoption due to better infrastructure, awareness, and access to financial incentives, rural areas exhibit significant future intent to adopt solar energy, primarily driven by cost-related advantages. However, a notable disconnect exists between awareness and actual adoption, especially in the commercial sector, where policy support and awareness have not yet translated into widespread uptake. The findings indicate that, to accelerate adoption across both urban and rural areas, economic incentives and simplified technology implementation should be prioritized. Thus, while awareness campaigns and policy rhetoric play a role, the primary focus should be on reducing financial barriers and facilitating easier access to solar technology.

Implications for Policy and Practice:

The results suggest that to accelerate solar energy adoption across Akola, especially in underserved rural areas and the commercial sector, the focus should shift toward strengthening economic incentives and streamlining the technological adoption process. While awareness and policy support remain important, their impact is diminished if not paired with financially attractive solutions, such as reduced upfront costs, accessible financing options, and simplified installation processes. Addressing these economic barriers will be crucial to fostering a more sustainable energy transition in the region.

Suggestions for Improvement:

Expand Economic Incentives to Commercial Sector: Since commercial consumers are not currently offered subsidies like residential users, extending targeted incentives (tax breaks, credit schemes) can close the adoption gap and increase satisfaction.

Strengthen Awareness in Rural Areas: Despite low awareness, rural willingness to adopt is high. Awareness campaigns focusing on cost savings and real-world testimonials could catalyse higher adoption rates.

Bridge the Policy-Expectation Gap: A large portion of commercial consumers are dissatisfied with current support. Government schemes must become more visible, accessible, and tailored for business users.

Leverage Technological Advancement: Emphasize the ease of installation and long-term savings through simplified messaging. Technology upgrades should be communicated effectively through public platforms and partnerships with local distributors.

Monitor Adoption Life Cycle by Region: The Industry Life Cycle model indicates urban regions are in a growth phase, while rural regions are transitioning from introduction to growth. Strategic support should be provided accordingly to nurture both segments.

Future Scope of the Study:

Use of SPSS for Data Analysis: In future studies, tools like SPSS can be used to analyse data more accurately through techniques such as regression, chi-square, and correlation analysis.

Hypothesis Testing Through Statistical Methods: Hypotheses can be tested using formal statistical methods like t-tests or chi-square tests to get more reliable and valid results.

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Annexures

Data Analysis 2] B]					
From the stu	dy of commercial	consumers:			
Response Category	Number of Respondents	Percentage (%)	Key Insights		
Cost savings	50	100%	Financial savings are the primary motivator for adoption in the absence of government incentives.		

Table for H1: Importance of Financial Incentives for Residential Consumers

Likert Scale Rating	Interpretation	Frequency
1	Not at all important	1
2	Slightly important	1
3	Moderately important	21
4	Very important	39
5	Extremely important	10
Total		72

Table for H1: Belief in Technological Advancement

Response	Frequency
Yes	87
No	13
Total	100

Table for H3: Awareness Among Regions (From Distributors & Installers view)

Region	Very High	High	Moderate	Total
Urban	4	5	0	9
Rural	1	1	5	7
Both	1	2	1	4
Total	6	8	6	20

Table for H3: Satisfaction with Government Support (Commercial Users)

Satisfaction Level	Frequency
Very satisfied	3
Satisfied	28
Unsatisfied	39
Total	70

Table for H3: Expected Benefits from Solar (Commercial)

Benefit	Frequency
Cost savings	55
Environmental impact	8
Customer reputation	7
Total	70

Table for H3: Importance of Government Incentives for Commercial UsersLikert ScaleFrequency

1	6
2	8
3	14
4	35
5	7
Total	70

Table for H2: Table: Analysis of Solar Panel Installation, Willingness to Install Solar Panels, and Factors Encouraging Adoption by Area of Residence

						Factors Encouraging adoption			
Area of Residence	Have Installed Solar Panels (Yes)	Not Installed Solar Panels (No)	Willing to Install in Next 2 Years (Yes)	Willing to Install in Next 2 Years (No)	Willing to Install in Next 2 Years (Unsure)	Environmental Impact	Financial Incentives	Lower Electricity Bills	
Rural	30 (66.67%)	15 (33.33%)	11 (73.33%)	4 (26.67%)	0 (0%)	0 (0%)	5 (33.33%)	10 (66.67%)	
Urban	42 (76.36%)	13 (23.64%)	7 (53.85%)	3 (23.08%)	3 (23.08%)	2 (15.38%)	4 (30.77%)	7 (53.85%)	
Grand Total	72 (72%)	28 (28%)	18 (64.29%)	7 (25%)	3 (10.71%)	2 (7.14%)	9 (32.14%)	17 (60.71%)	