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Financial Viability and Investment Analysis of Rooftop Solar Power in Maharashtra

Mr. Sahil Kawle
PG Student, Department Of Accountancy, Jai Hind College - Empowered Autonomous, "A" Road, Churchgate, Mumbai - 400020
Research Guide, Dr. Reshma Jaisinghani, Vice Principal, (Commerce) Department Of Accountancy, Jai Hind College - Empowered Autonomous, "A" Road, Churchgate, Mumbai - 400020

Abstract: Rooftop solar is gaining attention in Maharashtra as a way to reduce power bills and support clean energy. Our survey found high awareness, but many hesitate due to high initial costs and confusing subsidy processes.
People want easier loans, clear government support, and simpler procedures.
Those who installed solar panels save money and recover costs in 4–8 years.
Most agree it's a smart long-term investment.
With better policies and awareness, adoption can grow rapidly across the state.
Keywords: Rooftop Solar, Cost Savings, Subsidy Challenges

I. INTRODUCTION

India's rising energy demands, climate concerns, and dependency on fossil fuels have pushed the adoption of renewables. Among them, rooftop solar holds high potential, especially in a sun-rich state like Maharashtra. Rooftop solar offers cost savings, decentralization, and environmental benefits. However, its financial viability is influenced by costs, subsidies, tariffs, and financing challenges. Despite falling prices, adoption remains slow due to upfront investment, complex subsidy procedures, and limited awareness.

II. RESEARCH OBJECTIVES

A. This Study Examines
1) Initial costs and system affordability
2) Payback period, ROI, and IRR
3) Impact of subsidies and net metering
4) Comparison with other energy sources
5) Financial and behavioural barriers
6) Policy implications and adoption potential

B. Hypothesis
1) H_0: Rooftop solar is not financially viable in Maharashtra.
2) H_1: Rooftop solar is financially viable and offers significant long-term benefits.

III. REVIEW OF LITERATURE

Studies highlight rooftop solar's financial and environmental promise, while also pointing out barriers like unclear policies, inadequate financing, and technical issues. Adoption has grown due to falling panel costs and government initiatives like PM Surya Ghar and Grid-Connected Rooftop Solar Programme. Yet, lack of awareness, complex procedures, and financing hurdles remain.

1) Indu Bhagat (2025)
The Maharashtra Electricity Regulatory Commission has rejected the TOD billing proposal, easing concerns for rooftop solar users. This decision protects solar savings and encourages more households to adopt solar energy. It's seen as a win for clean energy and aligns with India's renewable goals.

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2) Vidhi Tyagi (2023)
This paper promotes a service-based approach to rooftop solar in India through models like leasing and PPAs. It aims to lower upfront costs and share risks between consumers and providers. Policy support and smart contracts are key to boosting adoption and investor confidence.

3) Arjita B, J.S. Sudarsan (2023)
This case study analyzes the financial viability of rooftop solar for a residential apartment in Pune. With subsidies and net metering, payback periods shorten and long-term savings improve. Despite its benefits, adoption faces hurdles like upfront costs, maintenance, and grid issues.

4) Veepin K, Jeevan K, Lalit B (2023)
This paper reviews rooftop solar projects in India, focusing on environmental and economic benefits. It identifies policy and financial challenges, including financing gaps and grid integration issues, while evaluating government schemes. The study calls for improved policies, better financial support, and increased awareness to boost large-scale adoption.

5) Pooja S, Mohan Lal Kolhe, Stina T, Arvind S (2022)
This study examines how government subsidies impact rooftop solar adoption in India by reducing investment costs and shortening payback periods. It highlights issues like delays and inefficiencies in subsidy disbursement while comparing different subsidy models. The paper recommends faster subsidy processing and policy stability to drive large-scale solar adoption.

6) Atul Kumar Singh, V.R. Prasath Kumar, L. Krishnaraj (2022)
This study explores the use of Building-Integrated Photovoltaics (BIPV) in the C&I rooftop solar market, highlighting its energy efficiency and cost savings. It compares BIPV with conventional solar systems, focusing on benefits like reduced cooling costs and energy generation. The paper concludes that BIPV has strong potential in India but needs policy support and financial incentives for broader adoption.

IV. DATA ANALYSIS (SURVEY INSIGHTS)

The survey focused on young, working respondents across Maharashtra. Key findings:

1) 65% find rooftop solar financially viable; awareness is moderate.
2) Most estimate system costs at ₹1-2 lakhs.
3) 70% report moderate maintenance costs and viable financing options.
4) Main adoption motivators: lower bills (40%) and environmental benefits (35%).
5) Payback periods range from 3–5 years for most users.
6) Net metering benefits are recognized, but adoption is uneven.
7) High tariffs support viability; policy barriers still exist.
8) 98% believe adoption is growing, though many cite slow growth due to finance and regulatory hurdles.

V. FINDINGS

1) Awareness vs. Adoption Gap: While over 60% are aware of solar power, actual adoption lags.
2) Cost Barriers: High upfront cost is the biggest hurdle, especially for middle-income groups.
3) Financing & Subsidies: Government support is crucial, but many face delays and lack understanding of benefits.
4) ROI & Savings: Users report 4–8 years payback and notable monthly savings.
5) Challenges: Policy complexity, maintenance fears, space limitations, and inconsistent implementation hinder wider adoption.

VI. CONCLUSION & RECOMMENDATIONS

Rooftop solar is economically viable and environmentally essential, but its growth in Maharashtra is restrained by financial and regulatory factors. Recommendations include:

1) Simplify subsidy disbursement and net metering processes.
2) Expand access to low-interest loans and EMI options.
3) Launch awareness campaigns on financial and environmental benefits.
4) Encourage business models like PPAs and solar leasing to ease entry barriers.
5) Improve grid support and technical infrastructure.

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A. Final Thought

With the right policy, financial, and awareness support, rooftop solar can become a mainstream solution in Maharashtra—reducing energy bills, supporting sustainability, and transforming the energy landscape.

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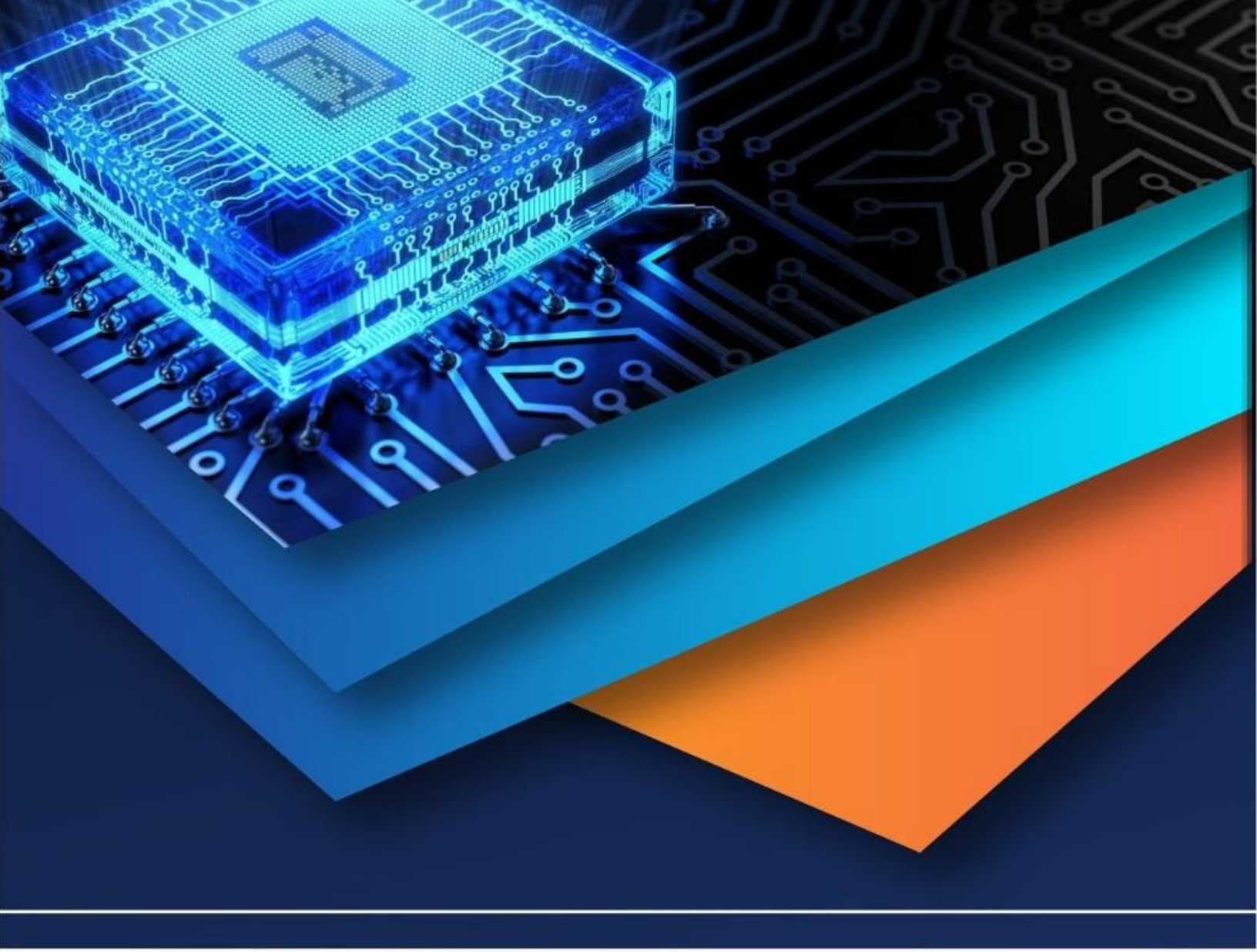
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