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Residential rooftop solar panel adoption behavior: Bibliometric analysis of the past and future trends

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ABSTRACT

This study reviews residents' behavioral adoption of rooftop solar photovoltaics (solar PV). Solar PV imparts many benefits towards the environment, economic and social development. However, there has been no comprehensive understanding of knowledge structure in solar PV adoption among households in the literature. Through a bibliometric approach, 564 publications on residents' adoption of solar PV were retrieved from the Web of Science (WoS). A co-citation and co-word analysis were performed to uncover past and predict future trends in this regard. The analysis produces significant themes related to residents' diffusion innovation adoption and motivation/predictors toward solar PV. This review contributes to the fundamental understanding of residents' critical determinants of solar PV adoption. Theory and practical implications are discussed.

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1. Introduction

Environmental issues are plaguing the earth due to excessive energy consumption. Climate change and resource depletion today are more rampant than ever due to the overconsumption of energy. The world has turned and relied on renewable energy to address these pertinent issues. The main player in renewable energy pursuit is solar photovoltaic (PV) technology. Solar energy is the most abundant form of natural resource that can be generated from sunlight into electrical and thermal energy [56]. The annual growth rate of solar panels has increased by 35% from 1996–2019 [55]. Solar PV energy usage could dampen the dependence on fossil fuels, decrease greenhouse gas emissions, and provide opportunities for renewable energy to meet energy demands [16].

Many sectors have adopted solar PV technology, especially in the public domain, such as buildings, street lighting, concentrated solar power systems and floating systems [25]. Meanwhile, other forms of solar PV, such as rooftop PV systems, fail to achieve market acceptance [9]. This evidence reflects that solar PV received considerable acceptance in business and corporate entities but

not from end-user consumers. Several reasons encourage residential users to adopt rooftop solar PV [3]. Past studies show that consumers see the potential benefits of solar PV, such as environmental benefits [78], reduced local pollution [65], positive net energy life cycle [66], and as a symbol of social status [61,6]. The authorities have seriously encouraged house owners to install solar PV. It includes rebates, grants, Feed-in Tariff (FiT) schemes and tax exemption to promote the uptake of solar PV [9]. Despite these initiatives, such policies' success or failure largely depends on household behavior that decides to accept or reject solar PV. It does not necessarily reflect consumers who opt to produce their own energy, termed as prosumers, but corresponds to the wider community. Stakeholders and policymakers need to understand how the general public accepts solar PV that can subsequently purchase solar PV to retrofit their households.

Energy demand is increasing yearly due to intensive economic development and a growing population [67,37]. Today, fossil fuels are still the main source towards energy sector [84]. An estimated 39% of global electricity production is produced by coal and 23% by natural gas [36]. Its consumption is unsustainable and contributes to severe health problems and detrimental environmental impact through its emission of greenhouse gas in huge quantities during the combustion process [62]. These two-fossil energies emit a significant amount of CO₂, the deadly greenhouse gas (GHG) and the main contributor to the earth's temperature increase. Due to such

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