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Modeling Consumer Participation in Rooftop Solar Panel Waste Management: An Extended TPB Approach

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ABSTRACT

As the adoption of rooftop solar panel systems continues to increase in Indonesia, the issue of waste management at the end of its life cycle becomes more critical, particularly due to the absence of clear regulatory frameworks and public awareness. While previous studies on solar panel waste have largely centered on government and producer roles, there remains a research gap in understanding the behavioral factors that drive consumer involvement in solar panel waste management practices. This study aims to construct a conceptual model that explains the intention of rooftop solar panel users to participate in solar panel waste management using an extended Theory of Planned Behavior (TPB). The TPB framework consisting of attitude, subjective norm, and perceived behavioral control is well-established for predicting intention-based behavior. However, given the technical nature of solar panels, consumer knowledge is considered a vital antecedent that shapes consumer beliefs and influences their intention to act. Through a systematic literature review, this study incorporates knowledge as an additional variable to develop a more comprehensive model tailored to the context of solar panel waste in Indonesia. This paper presents the conceptual development process, including variable selection, framework construction, and indicator formulation. Each indicator was defined based on previous literature and refined through validity and reliability testing conducted with preliminary data from 30 respondents to ensure contextual relevance. The resulting conceptual mode model contributes to both theory and practice by providing a behavioral lens for designing more effective consumer-focused policies and interventions in solar panel waste management. It also offers a foundation for further empirical research on sustainable behavior in renewable energy systems.

Keywords: *Rooftop Solar Panel; Waste Management; Theory of Planned Behavior*