Schemes for Flexibility Provision Among Residential Consumers: Value Propositions for Automated Flexibility

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Abstract-

Purpose

This study explores consumer perceptions of Automated Flexibility (AF) in demand response (DR) schemes, examining how automation mitigates consumer burdens in energy use and management. While traditional DR schemes have been extensively studied, the role of automation in enhancing consumer participation remains underexplored.

Design/methodology/approach

An interpretive qualitative study was conducted with nineteen consumers from Spain, Italy, and France. The research focused on understanding how automation influences consumer engagement by reducing manual effort, uncertainty, and perceived loss of control.

Findings

The results indicate that consumers are more likely to participate in DR schemes when automation alleviates the challenges of manual adjustments. Key factors include reduced cognitive load, improved convenience, and increased trust in the system. Automated flexibility provides a seamless experience compared to traditional DR schemes, making participation more attractive.Research limitations/implications:The study is limited to a small sample of European consumers, which may restrict the generalizability of the findings. Future research should explore larger and more diverse populations, as well as quantitative assessments of consumer preferences for automated flexibility.

Practical implications

Understanding consumer preferences for AF can guide the design of user-centric DR schemes, improving participation rates. Policymakers and aggregators can leverage these insights to create more effective incentive structures and enhance grid flexibility.

Social implications

By facilitating consumer engagement in DR schemes, automation contributes to a more sustainable energy system, increasing the uptake of renewable energy and improving grid stability.

Originality/value

This study fills a gap in the DR literature by shifting the focus from manual engagement to automation-driven participation. The findings highlight the value propositions that make DR more accessible and appealing to residential consumers.

Index Terms- Automated flexibility (AF), consumer participation, demand response (DR), PV systems (PVS), electric vehicles (EV), electrical heating and cooling.

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