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Behavioural Intention and Smart Home Technology Adoption:

The Role of Technophobia and Psychological Needs Across Cultures and Genders

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ABSTRACT

Despite being available for over two decades, the acceptance of Smart Home Technology (SHT) remains slower than anticipated, with technophobia acting as a significant barrier. This study integrates the Technology Acceptance Model (TAM) and Self-Determination Theory (SDT) to investigate how psychological and cultural factors influence SHT acceptance. A mediation analysis involving English (N = 284) and Spanish (N = 230) participants assessed whether technophobia, perceived ease of use, and perceived usefulness mediate the relationship between the frustration of psychological needs and behavioural intention. The findings suggest indirect effects through technophobia and usability factors, with Spanish participants reporting greater frustration yet a higher intention to adopt. These results underscore the need for culturally tailored interventions, such as localised education and improved usability, to enhance confidence and support broader SHT adoption.

KEYWORDS

Smart Home Technology, Cross-Cultural Analysis, Technophobia, Psychological Needs Frustration, Technology Acceptance Frameworks

INTRODUCTION

Despite the increasing availability of Internet of Things (IoT) smart home technology (SHT), fully integrated smart homes remain uncommon. Digital technology profoundly influences societal interactions, mediating tasks such as shopping, booking holidays, and managing household chores (Garcia et al., 2022). At the heart of SHT lies the IoT, which connects devices via sensors and cloud systems for seamless data exchange. The IoT facilitates autonomous or remotely controlled devices, like thermostats, lights, and appliances, accessible through platforms such as Alexa or Google Assistant (Cook, 2012). These systems incorporate sensors and interfaces to create intelligent environments, with machine-to-machine communication supported by 5G broadband (Jasim et al., 2024). Nevertheless, achieving an entirely intuitive smart home remains rare.

Barriers to adoption encompass design flaws, technical skill gaps, and functionality misunderstandings (de Boer et al., 2019). Additionally, high costs, lengthy product lifecycles (Yang et al., 2018), and SHT's status as a luxury item (Buabbas et al., 2020) further impede widespread use. Privacy concerns (Hubert et al., 2019), security vulnerabilities (Stoyanova et al., 2020), and

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compatibility issues (Ricquebourg et al., 2006) also hinder adoption. Despite optimistic growth forecasts (Fortune Business Insights, 2024), adoption remains confined mainly to affluent technophiles (Daruwala, 2024). Moreover, purchasing and sales figures do not necessarily translate to consistent or actual use (Shuhaiber et al., 2019), as consumers may experience buyer's remorse due to the complexities associated with using SHT (Marikyan et al., 2021). Addressing these barriers is crucial for the mainstream acceptance of SHT for broader societal benefit.

THE TECHNOLOGY ACCEPTANCE MODEL

The technology acceptance model (TAM) suggests that the intention to use technology is influenced by perceived usefulness (PU) and perceived ease of use (PEU; Davis et al., 1989). In the SHT context, PU denotes the extent to which individuals believe using the technology will enhance their performance. Simultaneously, PEU reflects their perception of the minimal effort required to interact with the system. Collectively, these constructs determine users' acceptance and continued use of SHT.

PU consistently ranks as the most significant factor influencing SHT acceptance (Gimpel et al., 2020). It highlights technology's ability to enhance convenience, comfort, and overall quality of life (Balta-Ozkan et al., 2013). PU has been extensively validated in studies across various technological domains, including e-government services (Chen & Aklikokou, 2020), generative artificial intelligence (AI; Alzoubi, 2024), and digital consumerism (Moslehpour et al., 2018). In the smart home context, PU supports manufacturers' goals to enhance home living through improved efficiency and personalized features. PU is also linked to compatibility and trialability (Nikou, 2019) and directly influences behavioral intention (BI) and long-term usage (Shuhaiber & Mashal, 2019).

Similarly, PEU is crucial for adopting SHT. PEU, defined as the extent to which technology is considered effortless (Davis, 1989), deals with user frustration and the rejection of SHT stemming from device complexity (Balta-Ozkan et al., 2013). PEU directly affects the BI to use technology (Green, 2024; Sohn & Kwon, 2020) and indirectly influences it through perceived usefulness (PU; Marikyan et al., 2021). Intuitive user interfaces and minimal disruption to daily routines enhance satisfaction and encourage long-term acceptance (Gomez et al., 2019).

Empirical findings strongly support the relevance of the TAM in assessing the acceptance of SHT, emphasizing the significant influence of PU and PEU. These constructs drive BIs and encourage long-term usage by addressing users' expectations for performance and ease of use (Aldossari & Sidorova, 2018; Van Hung et al., 2021). Recent studies further reinforce these relationships, particularly within the IoT. Yap and Kamaruddin (2023) found that PU and PEU significantly predict the intention to use IoT-based smart home technologies among Generation Y, highlighting their increasing accessibility and role in enhancing personal experience. Similarly, Nguyen et al. (2024) demonstrated that PU strongly influences purchase intentions, with usage attitude mediating its effect. These findings underscore the enduring relevance of TAM in smart home adoption, particularly as IoT integration advances.

Psychological Needs

The self-determination theory (SDT) emphasizes autonomy, competence, and relatedness as fundamental psychological needs that influence motivation, engagement, and well-being (Ryan & Deci, 2000a). When these needs are satisfied, individuals experience growth and satisfaction; when frustrated, they encounter distress and disengagement (Ameloot et al., 2024). As technology increasingly integrates into daily life, these psychological factors are crucial in shaping user acceptance and interaction with emerging innovations, including SHT.

SHT, human enhancement technologies, and automation give users greater environmental control. This is consistent with technological self-determination, which involves using technology to enhance autonomy and personal agency (Luppicini, 2018). As these technologies evolve, they offer potential