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Service Robotics Beyond Privacy Concerns: An Investigation of the Role of Learning Abilities on Technological Adoption

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The rapid expansion of AI technology has led service robotics to become an increasingly adopted tool to complement and reduce human inputs in diverse service sector settings (Bohr and Memarzadeh, 2020; Chiang and Trimi 2020; Fosch-Villaronga and Drukarch, 2021). In this paper, we investigate their application in the context of personal care services. We specifically contribute to knowledge in the domain by investigating the effects of consumers' learning style on their adoption of AI assisted technologies and on implications for consumers' privacy.

Prior research into service robotics, has identified a long list of challenges that need further investigation from the perspectives of privacy, security, financial risk, product risk and information risk (Lenca and Villaronga, 2019; Bhatnagar et al.,

2000; Tsu et al., 2009; Dinev and Hart, 2006). In the context of robotic care assistants, there are divided views ranging from fear to awe, with research currently emphasising a perspective that users prefer to use an anthropomorphic robot due to a high degree of empathy (Akdim et al., 2021; Christou et al., 2020; Tussyadiah & Park, 2018). More generally within service sectors, especially the educational and hospitality sectors (Paluch et al., 2020), it has been noted that humanoid robots can evoke insecurity and negative responses. Security concerns are a prominent issue with consumers still showing a reluctance to accept Intelligent Assistive Technologies (IATs), primarily due to privacy concerns (Lutz, and Tamo-Larriueux, 2020; Lenca and Villaronga, 2019; Pavlou, 2001), and therefore, the perceived risk of adopting these new technologies emerges as a prominent barrier to consumer acceptance of advanced robotics. Furthermore, Jia et al. (2021) studied the complexities of human-likeness of robots within the hotel sector and found individuals are less receptive towards anthropomorphic robots due to safety and simulation of human behaviours. Previous studies provide contradictory findings and indicate the complexities of consumer behaviours with novel robotic technologies across the education and travel & tourism sectors (Chuah et al., 2021). However, little is known about how consumers evaluate new technologies for potential adoption and how they learn these new technologies through picking out moments associated with prior experiences. A better understanding of how service robots can be used to connect families, provide ongoing support from hospitals to residential environments and achieve acceptance rates over assistive technologies is an important social issue (Bogue, 2020; Murphy et al., 2020; Seyitoglu and Ivanov, 2020).

Bauer (1960) was an early scholar to associate perceived risks with consumer behaviour. A definition of perceived risk within the context of electronic commerce is given by Pavlou (2003), as “the user’s subjective expectation of suffering a loss in pursuit of a desired outcome”. Siau and Shen (2003) point out that both security and privacy risk are part of the essential factors that hinder user acceptance. Tsu et al. (2009) agreed that both security and privacy influence consumers’ decisions to use new forms of technology. With the purpose of focusing on consumers’ privacy concerns and use of new technology context, the UTAUT2 model is thus adapted as the underpinning theoretical framework of this research. A theoretically and empirically important aim of this study is to clarify the constructs that internally affect the acceptance and behaviours of consumers for service robotics adoption, and other future potential innovations. Therefore, insights of individual’s cognitive and affective learning ability are studied in order to identify how the learning styles of consumers have impacted the adoption of new technologies across consumer’s acceptance and behaviours. The way consumers learn and structure information is a strategic concern for business practice in the context of implementation of service robots.

Methodological Approach

This research aims to investigate consumers' acceptance and behavioural intention of new technologies in the UK, with a specific focus upon service robotics and privacy. Additionally, as service robotics are still novel in many countries, including the UK, insights into behavioural intentions are limited and a general population sample garners wider insight. Thus, the target population of this quantitative study is focused on adult consumers residing in the UK regardless of gender, marital status, education level and other background contexts. This study used online data collection, which incorporated panel data for the purpose of aiding University research studies and rewards participants with a fee for their participation. More researchers in the social sciences domain are turning to online panel data collections for research purposes (Lovett et al., 2018). To achieve the objectives of this study, an analytical framework is constructed for deriving factors for the prediction of an individual's acceptance and behavioural intention of service robotics. Furthermore, this research implemented a quantitative questionnaire, with 400 completed responses. Thereafter, the quantitative analysis was conducted using SPSS and SmartPLS 3.0 software on the basis of the Structural Equation Modelling technique (SEM). After a thorough review of literature and studies related to the UTAUT and UTAUT2 model, the instruments were developed accordingly. Six key constructs were adopted from the second generation of the UTAUT2 model (Venkatesh et al., 2012). The items for measuring utilitarian motivation in this research were partially adopted from Babin et al. (1994) and Kim (2006); four relevant items of the TRI scale were selected in this study for technology readiness due to the length of the measurement (Parasuraman, 2000; Liljander et al., 2006); seven measurement items were adapted from Featherman and Pavlou (2003), reflecting the perception of seven dimensions of risk with the focus of privacy risk; The Acceptance of Change Scale (ACS) was adapted to examine the tendency of individuals to accept or move toward change (Di Fabio and Gori, 2016). To measure consumer cognitive learning ability, three measuring items of the Need for Cognition Scale (NCS) and three measuring items of the Cognitive Load Questionnaire (CLQ) were adapted for this research. As for affective learning ability, this research adapted from the research from McCroskey (1994) and Mottet and Richmond (1998) and, nonetheless, modified the wordings to keep a consistency with other statements in a service robotic context.

Findings

We show that the relationship between utilitarian motivation and intention of acceptance of service robots is mediated by the degree of performance expectancy, and has no direct relationship with effort expectancy. A similar relationship was found for technology readiness and perceived risk. For both antecedents, the relationship with intention of acceptance is also mediated by performance expectancy. We also found a direct relationship between perceived risk and

intention of acceptance. The implication of these findings suggests that understanding the expectations consumers have of these robots to perform different tasks is central to the intention to adopt service robot technologies. Furthermore, in terms of the moderating role of learning abilities, our findings suggest that there is a significantly negative moderation effect of cognitive learning ability on the relationship between utilitarian motivation and performance expectancy. In other words, for those consumers who have lower cognitive learning ability, utilitarian motivation positively affects their performance expectancy more than those with higher cognitive learning ability. Furthermore, affective learning ability has a positive moderation effect on the relationship between technology readiness and performance expectancy. Therefore, for those consumers who have higher affective learning ability, technology readiness positively affects their performance expectancy more than those with lower affective learning ability. Due to the crucial role that performance expectancy has as a mediator in the adoption of service robots, tailoring the features that allow service robots to perform tasks based on the learning ability of the user can facilitate further the intentions to adopt them.

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