การสำรวจปัจจัยขับเคลื่อนหลักการยอมรับหุ่นยนต์บริการส่วนหน้า
ในบริบทการบริการค้าปลีกในประเทศไทย: การศึกษาเชิงคุณภาพ

EXPLORING KEY DRIVERS OF FRONTLINE SERVICE ROBOT ACCEPTANCE
IN THAI RETAIL SERVICE CONTEXT: A QUALITATIVE STUDY

อดิศร ฉายแสง[1] จิราวรรณ ฉายสุวรรณ[2] และ นฤมล กิมภากรณ์[3]
Adisorn Chaysang[1] Chirawan Chaisuwan[2] and Narumon Kimpakorn[3]

บทคัดย่อ

การศึกษาเชิงคุณภาพนี้สำรวจปัจจัยที่เกี่ยวข้องกับการยอมรับหุ่นยนต์บริการส่วนหน้าของลูกค้าในบริบทของบริการค้าปลีกในประเทศไทย โดยใช้การสัมภาษณ์เชิงลึกกับกลุ่มตัวอย่างจำนวน 30 คน ผู้ซึ่งมีประสบการณ์ตรงในการรับบริการกับหุ่นยนต์บริการส่วนหน้า และวิเคราะห์ข้อมูลโดยใช้การวิเคราะห์แก่นสาระ ผลการวิจัยพบ 5 องค์ประกอบหลักที่เกี่ยวข้องกับการยอมรับหุ่นยนต์บริการส่วนหน้า ได้แก่ 1) ปัจจัยความแตกต่างส่วนบุคคล คือการรับรู้ความสามารถของบุคคลในด้านเทคโนโลยี 2) องค์ประกอบด้านการปฏิบัติหน้าที่ คือประสิทธิภาพการให้บริการและการรับคำสั่งของหุ่นยนต์บริการส่วนหน้า 3) องค์ประกอบทางสังคมและอารมณ์ คือการแสดงออกทางสีหน้าและน้ำเสียงของหุ่นยนต์บริการส่วนหน้า 4) ปัจจัยความสบายทางจิตวิทยา คือความรู้สึกสะดวกทางใจและความน่าเชื่อถือ และ5) องค์ประกอบด้านคุณค่า คือการรับรู้คุณค่าด้านการให้บริการและความสุขกับการรับบริการกับหุ่นยนต์บริการส่วนหน้า การศึกษาเผยว่ากลุ่มตัวอย่างที่ตัดสินใจเข้ารับบริการกับหุ่นยนต์บริการส่วนหน้ามีการรับรู้ความสามารถของตนเองสูง ความกังวลด้านเทคโนโลยีในต่ำ และเป็นผู้ที่เปิดรับนวัตกรรม นอกจากนี้ยังพบว่าขณะที่คุณสมบัติด้านการทำงาน เช่น การให้บริการที่รวดเร็ว ให้บริการได้อย่างถูกต้อง และ ด้านสังคมและอารมณ์ เช่น มีแสดงออกทางสีหน้าและการพูดที่นอมน้อม มีความเกี่ยวข้องกับการรับรู้คุณค่าเชิงอรรถประโยชน์ คุณค่าทางสุนทรียรส และความสบายทางจิตวิทยาซึ่งจะมีผลต่อการยอมรับหุ่นยนต์บริการส่วนหน้า

คำสำคัญ: หุ่นยนต์บริการส่วนหน้า บริการค้าปลีก การยอมรับของลูกค้า การศึกษาเชิงคุณภาพ

---

[1] นักศึกษาปรัชญาดุษฎีบัณฑิต, คณะบริหารธุรกิจ มหาวิทยาลัยเชียงใหม่, ประเทศไทย
   Ph.D. Candidate, Doctor of Philosophy Program in Business Administration, Chiang Mai University Business School, Thailand.

[2,3] รองศาสตราจารย์, ดร., สาขาวิชาการตลาด คณะบริหารธุรกิจ มหาวิทยาลัยเชียงใหม่ ประเทศไทย
   Associate Professor, Ph.D., Department of Marketing Chiang Mai University Business School Thailand.
   Corresponding author Email address: narumon.k@cmu.ac.th

Abstract

This qualitative study explores the factors associated to the acceptance of frontline service robots (FSRs) in the context of retail services in Thailand. In-depth interviews were conducted with a sample of 30 participants who had direct experience with FSRs. The data was analyzed using thematic analysis. The findings revealed five key elements associated with the acceptance of FSRs: individual heterogeneity factors, functional elements, social-emotional elements, psychological comfort elements, and value elements.

The research findings revealed five key elements associated with the acceptance of FSR: 1) Individual heterogeneity factors, which refers to the perception of an individual's technological capability; 2) Functional elements, which includes the efficiency of service delivery and command reception of the FSR; 3) Social-emotional elements, which involves the facial expressions and tone of voice of the FSR; 4) Psychological comfort elements, which positive feelings of mental ease and reliability; and 5) Value elements, which pertains to the perceived value in the service delivery provided by the FSR. The study indicated that individuals who chose to interact with FSRs exhibited high self-efficacy, low technology anxiety, and a high level of customer innovativeness. Additionally, it was found that functional attributes, such as providing quick and accurate services, along with social and emotional aspects, including facial expressions and polite manners, were related to perceived utilitarian value, hedonic value, and psychological comfort, all of which associated the acceptance of FSRs.

Keywords: Frontline Service Robots, Retail Service, Customer Acceptance, Qualitative Study.

1. Introduction

The advancements in artificial intelligence (AI) and machine learning have introduced both opportunities and challenges within service-based industries. The rapid progress in AI, along with the emergence of novel digital technologies and devices such as smartphones, the Internet of Things (IoT), and robotics, is fundamentally transforming the interactions between customers and service providers (Huang & Rust, 2018). The transformations were influenced by the physical and social distancing required to control the COVID-19 pandemic, for example in hospitals (Seyitoğlu & Ivanov, 2020) retail stores (Grewal et al., 2018) and hotels (Lin & Mattila, 2021; Qiu et al., 2020). Furthermore, there are advantages of using service robots in both professional and personal applications owing to benefits such as enhanced usability, delivery of accurate and high-quality services, reliability, reduced operational costs and human error (Gursoy et al., 2019) while providing a new service experience to the customer (Huang & Rust, 2018). Some service robots, however, were withdrawn from the service setting due to the failure of the robot or objections from customers. For instance, Henn-na hotel in Japan has withdrawn service robots from the check-in counter and in-room service because of customer complaints regarding service robot failures (Bhimasta & Kuo, 2019).

Thailand is an emerging market adopting frontline service robots (FSRs) which is one of the rising stars of advanced AI rated by the Gartner hype cycle for AI 2020 (Gartner, 2020). FSRs are defined as being system-based autonomous and are designed to interact with customers like frontline staff with the ability of adaptive interfaces that interact, communicate and deliver service to customers (Gursoy et al., 2019; Wirtz et al., 2018). The FSRs appear in public places in Thailand, such as shopping malls, hospitals and restaurants and private dwellings (Maneewarn, 2014). In the early stage of frontline service robots (FSRs) adoption, research on the acceptance of FSRs requires more rigorous empirical evidence due to the distinctive characteristics of these robots. The literature indicates a significant scholarly interest in the acceptance of service robots; however, the majority of prior studies in this area have been predominantly conceptual (Huang & Rust, 2018; Wirtz et al., 2018; Xiao & Kumar, 2019). Similarly, we observed that recent studies often lack empirical examination within real-world business settings. Many of these studies do not involve actual robots or are conducted in laboratory environments rather than in practical, real-world contexts. Additionally, most research employs cross-sectional data collection methods, which are limited by both time and sample size (Whelan et al., 2018). As a result of participants having no first-hand experiences with robots to encourage them to evaluate service robots, they had to rely on their social representation (scenarios) or mental images of FSRs. This introduces bias into the study (Savela et al., 2018).

The purpose of the study was to explore factors associating in customers' frontline service robot (FSR) acceptance in a real-world retail service setting of Thai retail service context in addition to what the previous literature has indicated, particularly when it has been at the initial stage of its introduction. Specifically, we aim to answer the following research question: Based on the customers' first-hand experiences with an FSR, what relevant factors of customers' experiences associating with their FSR acceptance? In addition, our research can be considered as a pioneer empirical study in the FSR context since it collects data from customers who have had a real experience with an FSR in a retail business setting. Service industries could benefit from this study since the study design uses a real-world business setting, its results will provide authentic insight into the relevant factors that associate with customers' service robot acceptance.

This paper first reviews relevant theories and prior FSR research studies. Then, the research methodology was explained, followed by research results, discussion and implications. Lastly the paper presents conclusion, limitations, and recommendations for future research.

2. Theoretical background and literature review

2.1 Role theory

The origins of role theory were derived from social penetration theory (Altman & Taylor, 1973) social interaction approaches to sociological thinking (Goffman, 1967) and the dyadic elements of social exchange theory (Blau, 1968; Kelley & Thibaut, 1978). A role

theoretic approach emphasizes the nature of people as social actors who learn behaviors appropriate to the position they occupy in society. Although the actors in a service setting may be very different individuals in their leisure time, they must adopt a relatively standardized set of behavior when they come to work or enter the marketplace (Solomon et al., 1985). In fact, people are often defined by the service role they play. When an individual is labelled doctor, hairstylist, or flight attendant, one can generate a profile of this person based on the characteristics which might be expected to covey with this title. Role theory posits that both actors should act in accord with socially defined roles so that role congruency emerges.

In the current study, parties in service encounter are frontline service robots (FSR) and customers. It seems reasonable to propose that consumer acceptance of FSRs depends on how well FSRs can deliver functional needs, and the social-emotional and relational needs to achieve role congruency. In addition, a customer's adoption of a new technology depends on the cognitive evaluation of its perceived usefulness. However, the service must deliver social-emotional elements such as warmth as core dimensions of social perception (Fiske et al., 2007). This view is consistent with the conceptual model of service robot acceptance model (sRAM) (Wirtz et al., 2018) and the degree of robotics adoption (DRA) (Xiao & Kumar, 2019) which combine both functional, social-emotional and relational elements.

2.2 Transformation of technology acceptance to service robot acceptance

The Technology Acceptance Model (TAM), developed by Davis (1989) and The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) are widely used models for predicting technology acceptance. Recent studies have extended TAM to include additional factors relevant to service robots, such as perceived anthropomorphism and perceived enjoyment. Perceived anthropomorphism refers to the human-like characteristics of the robot, which can influence users' emotional responses and acceptance (Chi et al., 2022). Perceived enjoyment or the pleasure derived from interacting with the robot has also been identified as a significant predictor of acceptance, especially in hospitality and retail settings where customer experience is critical (Said et al., 2024).

Moreover, Researchers have adapted UTAUT to better fit the specific context of service robots by incorporating factors such as perceived trust, perceived safety, and emotional attachment. For example, a study by Lu et al. (2019) found that perceived trust and emotional attachment significantly moderated the relationship between social influence and customers' behavioral intentions to use service robots in hotels and restaurants. Besides, social influence involves the impact of others' opinions on the customer's intention to use the robot, while facilitating conditions refer to the infrastructure and support available to use the robot (Dwivedi et al., 2019).

In a service robot context, the social-emotional dimensions, relational dimensions and perceived value (i.e., utilitarian and hedonic values) should be examined in any service robot customer acceptance model. Human-robot interaction (HRI) is unique and different from other non-intelligent technologies such as personal computers and self-service technology (SST) (Breazeal, 2004; Lee & Cranage, 2018). As a result of the unique characteristics of FSR, Wirtz et al. (2018) proposed a service robots acceptance model (sRAM) which is presented in more detail in the next part.

Wirtz et al. (2018) proposed a conceptual model of frontline service robot acceptance model (sRAM). Functional dimensions and subjective social norms of technology acceptance were employed in sRAM. Wirtz et al. (2018) believed that customers will adapt to service robots when the robot performs well on its tasks. In addition, ease of use, usefulness, and subjective social norms were used to evaluate service robots' functional dimension. Schepers and Wetzels (2007) found that functional elements have a positive impact on customer acceptance by increasing ease of use, usefulness, and congruency with social norms which is similarly to Andreassen et al., (2018) who found that customers would be more adopting of service robots after starting to interact with the robot and perceiving the robots' usefulness. Furthermore, Xiao and Kumar (2019) applied the concept of the degree of robotics adoption (DRA) and proposed corporates' robot acceptance model, they added that perceived ease of use and perceived usefulness have a positive relationship on customer acceptance of service robot. Besides, a Service Robot Integration Willingness (SRIW) Scale discovered that performance efficacy of the robot played a role in service robot acceptance (Lu et al., 2019).

Social-emotional dimensions are one of the most important factors for service robot acceptance due to a unique characteristic of FSR. An FSR is designed to interact with customers with the ability of adaptive interfaces that interact to communicate and deliver customer service (Gursoy et al., 2019; Wirtz et al., 2018). Human-robot interaction (HRI) is unique and different from other non-intelligent technologies such as personal computers and self-service technology (SST) (Breazeal, 2004; Lee & Cranage, 2008). In addition, the FSR can provide some degree of automated social presence during a service encounter, which influences customers expectation to receive not only functional performance, but also anticipate the social and emotional capabilities of the FSR (Lu et al., 2019; Van Doorn et al., 2017). Wirtz et al. (2018) has added perceived humanness, perceived social interactivity, and perceived social presence to sRAM. In the context of face-to-face human-robot interaction, robots' physical appearance has both a positive and negative effect on the customer. In addition, FSRs with strong anthropomorphic qualities lead to customers having overly optimistic expectations. By contrast, the uncanny valley theory posits that customer feel uncomfortable or even revulsion in accepting to humanoid robots that are too highly realistic (Mori, MacDorman, & Kageki, 2012). In terms of social skills, robots need to present socially

appropriate manners and emotion during a service encounter (Heerink et al., 2010; Van Doorn et al., 2017; Wirtz et al., 2018). A robot's social skills are important to customers' service robot acceptance.

Trust and rapport dimensions have introduced in sRAM (Wirtz et al., 2018). The previous studies found that the relationship between trust and behavioral intention to use electronic banking is stronger in higher power distance society (Zhang et al., 2018).

Furthermore, there are some conceptual model of FSR acceptance. For instance, Xiao and Kumar (2019) proposed the conceptual framework of firms' robotic acceptance.The conceptual model suggested that customers' robot acceptance is one of the major causes of firms adopting robotics. In addition, clients still prefer to interact with human staff rather than service robots (Andreassen et al., 2018). Moreover, Xiao and Kumar (2019) added that customer characteristics including self-efficacy, role clarity, and motivation associated with customers service robot acceptance. Besides, Li et al. (2015) found that consumer innovativeness is a key explaining and predicting customer's new product adoption by using innovativeness as a personality trait.

Heerink et al. (2010) introduced the Almere model, the elderly robot acceptance model. They identified constructs effecting the intention to use a robot such as perceived usefulness, perceived ease of use, perceived enjoyment, anxiety, and facilitating condition. Four experiments and a longitudinal study were conducted. The results showed that perceived usefulness, perceived ease of use, social influence, perceived enjoyment, and attitude have an impact on the intention to use a robot.

According to the robot acceptance model mentioned above, most of them are conceptual models which need to be empirically tested. Likewise, we found that the recent studies were experimental research and lacked empirical examination in a real-world business setting. Some do not involve an actual robot setting or are conducted in a laboratory rather than in a real-world environment and most employ cross-sectional data collection limited by time and sample size. As a result, the participants had no first-hand experiences with robots to encourage them to evaluate service robots. They had to rely on their social representation (scenarios) or mental images of FSRs. This introduces bias into the study (Savela et al., 2018) and therefore lacks external validity.

According to the literature mentioned above, table1 shows the summary of relevant factors associated with FSR acceptance.

Table1 The summary of relevant factors associated with FSR acceptance

Categories	Variables
Functional Dimensions	Perceived Usefulness (Davis, 1989; Wirtz et al., 2018; Schepers & Wetzels, 2007; Andreassen et al., 2018; Xiao & Kumar, 2019; Heerink et al., 2010)
	Perceived Ease of Use (Davis, 1989; Wirtz et al., 2018; Schepers & Wetzels, 2007; Xiao & Kumar, 2019; Heerink et al., 2010)
	Performance Efficacy (Lu et al., 2019)

Table1 The summary of relevant factors associated with FSR acceptance (Cont.)

Categories	Variables
Social-Emotional Dimensions	Warmth (Wirtz et al., 2018)
	Competence (Wirtz et al., 2018)
	Perceived Humanness (Gursoy et al., 2019; Wirtz et al., 2018)
	Perceived Social Interactivity (Gursoy et al., 2019; Wirtz et al., 2018)
	Perceived Social Presence (Gursoy et al., 2019; Wirtz et al., 2018)
	Social Skills (Heerink et al., 2010; Van Doorn et al., 2017; Wirtz et al., 2018)
	Perceived Enjoyment (Heerink et al., 2010)
Customer Characteristics	Self-efficacy (Xiao & Kumar, 2019)
	Role Clarity (Xiao & Kumar, 2019)
	Motivation (Xiao & Kumar, 2019)
	Attitude (Heerink et al., 2010)
	Anxiety (Heerink et al., 2010)
	Customer Innovativeness (Li et al., 2015)
Trust and Rapport	Psychological comfort (Spake et al., 2003)
	Trust (Zhang et al., 2018)
Contextual Factors	Subjective Social Norms (Schepers & Wetzels, 2007)
	Facilitating Condition (Heerink et al., 2010)
	Social Representation, Scenarios, Mental Images (Savela et al., 2018)
	Physical Appearance (Mori et al., 2012)

3. Methodology

A qualitative research approach was used in this study to answer the main research question, what relevant factors of customers' experiences associating with their FSR acceptance? Qualitative research is essential as it allows for a deep exploration of complex phenomena, providing rich, contextual insights that quantitative methods may overlook. It captures the lived experiences, emotions, and social interactions of participants, offering a nuanced understanding of their perspectives (Creswell & Poth, 2018; Patton, 2015).

In this study, we focus on physical AI service robots working as frontline employees in a retail setting that have an analytical intelligence level (Huang & Rust, 2018) the ability to analyze information for problem solving, and to learn from their previous tasks. The research field took place at a major telecommunication service provider (telco) which employs an FSR with an analytical intelligence level. The FSR is designed with a shape resembling that of a bowling pin and stands 1.5 meters tall. The front section of the robot features an LED screen. The upper third of this screen displays a facial interface capable of expressing emotions, including smiling, blinking, and moving its mouth during speech. The FSR is equipped with

functionalities to offer the latest promotional packages, assist customers with in-store navigation, and provide entertainment through dancing and video playback.

3.1 Participants

The key informants for this study were carefully selected from the Thai customer base of the collaborated telecommunications company, specifically targeting those who had direct interactions with the FSR. These customers were granted the autonomy to choose between the FSR and human staff for service, thereby providing an authentic context for evaluating their preferences and experiences. Notably, all 30 participants in the research sample voluntarily chose to engage with the FSR, underscoring a significant inclination towards automated service solutions. This choice offers valuable insights into customer behavior and the evolving acceptance of FSR in the telecommunications industry.

3.2 Data collection

In-depth interviews were used to gather data. This method are crucial in qualitative research as they provide a deeper understanding of participants' experiences, beliefs, and motivations (Palinkas et al., 2015). Additionally, in-depth interviews facilitate the exploration of sensitive topics, allowing respondents to share their perspectives in a more comfortable setting (Rubin & Rubin, 2012). The aim of these interviews was to explore and gain insights from customers who had interacted with a robot in a real-world setting. The cooperating telco had only two FSRs: one located in Bangkok and the other in Phuket. Data was collected simultaneously from both branches due to a limited using an FSR with an analytical intelligence level.

The interview guide was developed using the Service Robot Acceptance Model (sRAM), as proposed by Wirtz et al. (2018). The sRAM framework emphasizes the importance of considering three key dimensions that influence the acceptance of service robots: functional, social-emotional, and relational dimensions. These dimensions were meticulously integrated into the semi-structured interview protocol, which was carefully designed to elicit comprehensive insights from participants. The finalized interview protocol, detailed in Appendix 1, reflects these dimensions and aims to gather nuanced data on associating in the acceptance of FSR.

The study employed purposive sampling by selecting participants who met specific criteria: they were Thai nationals, aged 18 years or older, and had had experience interacting with a frontline service robot (FSR) at the selected telecommunication service branches. For the research fieldwork, the researchers targeted customers immediately after they completed their transaction with the robot, requesting their consent to participate in an interview. Additionally, participants were asked for their permission to audio-record the interview. We introduced ourselves as frontline service staff, this approach ensured that customers perceived us as service staff rather than researchers. Additionally, we received strong cooperation from the branch manager and staff, who accompanied and introduced us to their customers, facilitating

the establishment of a good relationship with the participants. Creswell and Miller (2000) mentioned that credible data arises from close collaboration with informants throughout the research process. By building a good relationship with participants. We were able to create an environment where they felt comfortable and openly shared information with us.

        3.3 Data analysis

           The data analysis in this study adhered to Braun and Clarke's (2006) six-step process, ensuring a systematic approach to thematic analysis. Initially, all interviews were meticulously transcribed and repeatedly re-read to familiarize the researcher with the data and to verify accuracy against the original audio recordings, focusing on identifying meaningful patterns. Subsequently, initial codes were generated through a detailed line-by-line analysis, capturing significant phenomena or experiences articulated by participants. These codes were then collated and examined for commonalities, leading to the identification of broader themes. A critical review phase followed, where the themes were reassessed in the context of the entire data set, allowing for natural emergence of relevant directions. The themes were further refined and defined to capture the nuances of participant behavior, particularly in relation to customer acceptance of FSRs.

Table2 The five key themes

Themes	Sub-themes	Definition	Keywords
Theme 1: Individual heterogeneity factors	1. Self-efficacy	The extent to which an individual's belief in his or her ability to communicate with an FSR during the service encounter.	-Self-confident -Ability to control -Believe in ability of using technology
	2. Technology anxiety	The degree of anxiety or emotional reaction evoked in the customer's state of mind regarding their ability and willingness to interact with technology-related tools.	Positive: -Love new technology Negative: -Fear -Shaking arms -Anxious feeling
	3.Customer innovativeness	The extent to which a customer is motivated to be the innovator and willing to interact with service robot during service encounter.	-Buying new technology -Enthusiasm

Table2 The five key themes (Cont.)

Themes	Sub-themes	Definition	Keywords
Theme 2: Functional elements	1. Perceived usefulness	The extent to which customers perceive that an FSR gives an excellent performance during the service encounter.	Positive: -A faster service -Complete task effectively Negative: -Don't understand
	2. Perceived autonomy	Customers believe in their competency to control an FSR during the service encounter.	-Control -Command
Theme 3: Social-emotional elements	1. Social presence	What customers perceive as sociability from an FSR.	-Greeting -Smiling face -Kindness -Friendly
	2. Perceived humanness	The level of an object's humanlike characteristics, both psychological features (e.g., self-consciousness, personal ability, emotion, etc.) and non-psychological features (Keeley, 2004; Kim & McGill, 2018)	-Automated robot -Human-like -Having face -Eyes contact -Facial expression
Theme 4: Psychological comfort element	1.Psychological comfort	A positive emotion (Daniels, 2000) a feeling of security, reassurance, ease, relief of mental distress, peace of mind, and reduced anxiety (Lloyd & Luk, 2011; Simmons, 2001; Spake et al., 2003) when interacting with FSRs.	-Happy -Relax -Worry free -Unawkward -Feel comfortable
	2. Trust	The belief that the robot performs with personal integrity and reliability (Whelan et al., 2018)	-Fairness -Confident -Trust -Don't lie

Table2 The five key themes (Cont.)

Themes	Sub-themes	Definition	Keywords
Theme 5: Value elements	1. Utilitarian value	The goal-oriented, rational, and functional purpose when one is using a product (Dhar & Wertenbroch, 2000). In the robot context (Heerink, 2011) utilitarian value means the extent to which a user believes a robot will be helpful in service activities.	-Intelligent -Helpful
	2. Hedonic value	A consequence related to spontaneous responses of highly subjective and individual perception (Babin et al., 1994) and the feeling of joy or pleasure the users receives when using AI devices or robots in a service encounter (Heerink, 2011; Venkatesh et al., 2012)	-Enjoy -Entertain -Impress

To ensure the reliability of the themes, an inter judge reliability was determined (Webber, 1990). Two judges, a qualitative research specialist and a linguistics specialist, evaluated the data according to Table 1 by deciding whether they agree or disagree with the themes provided by the researcher. The results showed an acceptable level, a reliability level of 92%. Finally, the analysis was comprehensively reported, highlighting the key factors influencing customer acceptance of service robots, grounded in the rich data collected.

4. Findings

This section presents the data from in-depth interviews regarding the reflection of factors associated with FSR in a retail service context. The total number of 30 informants, 17 were female (56.7%) and 13 were male (43.3%). The majority of informants' age ranged from 20 to 30 years old (34.3%) and had a bachelor's degree (59.3%). Notably, 75% of the participants had no previous experience with an FSR. However, 35% of the informants stated they had some experiences with advanced technology such as companion robot,

cleaning robot, chatbot. Moreover, the customers came to the branch in order to buy a new gadget, change promotion package, register for a new sim card, and to pay a monthly bill.

According to the thematic analysis, the following section presents the research findings. These findings are organized into five themes, as outlined in Table 2.

Theme1: Individual Heterogeneity Factors

Almost all participants exhibited similar personal characteristics, demonstrating traits such as self-efficacy, technology anxiety and customer innovativeness. In addition, customers with high self-confidence on using technology, low fear of using technology, and a high level of customer innovativeness are more likely to engage in services provided by FSR.

Almost all informants reflected high **self-efficacy**. For instance, they mentioned that they had self-confident on their ability dealing with advanced technology. A 22-year-old first jobber reflected his high self-efficacy to dealing with FSR that *"...I have been growing with technology which makes me a self-confidence on using it...The shop is very busy today; I go directly to have a service with the FSR. I believe in myself that I can communicate and control over it..."* Similarly, a 55-year-old male mentioned that he has an enthusiasm of learning a new technology, *"...I am a young at heart person. Moreover, I have never ignored to learn and have an experience with new technology....Personally, I think dealing service robot is an easy thing for me..."*

Technology anxiety. The participants who reflected low fear in technology is a majority group interacting with FSR. A 22-year-old male said that "*When I saw the robot, I really wanted to use it...I didn't fear about it*". Besides, A 35-year-old male did mention that *"I dare to have a new experience with innovation technology... At the beginning step, it might not be smooth, but it will be better when you have more experience with technology... I interacted with the robot at the first that I saw her...."*

Customer innovativeness. The informants who interacted with FSR reflected their customer innovativeness as an early adopter for new gadget "*I normally try and buy a new technology such as a new smartphone and new gadgets.*" (38-year-old female employee). Moreover, some participants identified themselves as an innovator, a 35-year-old male did mention that *"I classify myself as an innovator because I love having a new experience with innovation technology..."*

In contrast, the finding found that only a small number of participants reported low self-efficacy in using technology. One participant noted that older adults with limited technological literacy may struggle to learn how to use new technologies effectively, *"I am sure that I would have had a service with human staff, if I came here alone...I have a poor technology literacy and I am too old to learn how to use a new technology..."* (a 52-year-old female). Besides, there are some key informants reflecting their fear when dealing with robot and/or new technology. *"...My arms are shaking during the interaction with the FSR..."*

(A 42-year-old female) *"I always feel anxious when dealing with a new technology."* (52-year-old female). According to these traits, low self-confidence on using technology, high fear of using technology a low lead customer to reject of using FSR in the future.

Theme2: Functional elements

Nearly all participants shared positive feedback regarding FSR functional performance. The majority highlighted the usefulness of the FSR, with some noting that it assisted them in completing tasks. A 38-year-old male reflected that, "*I prefer to be serviced by the robot because she provides me a faster service by reducing my waiting time...Human staffs are very busy*" Similarly, a 21-year-old female stated, "*I approached the robot because I was too lazy to wait in line for human staff. Today, I was serviced by a robot. It was nice. I did not have to look for a SIM card selling point because the robot navigated me there.*" Moreover, most participants indicated that the functional benefits are one of the main factors associated with their use of FSRs. A 38-year-old female employee added that she avoided further interaction with a robot when it cannot complete his or her general requirement such as a navigation service "*I would be annoyed and do not want to interact with a robot if it does not understand what I say.*" These responses clearly reflected **Perceived usefulness**.

The next sub-dimension is **Perceived autonomy**. Almost all participants reflected on their ability to command over the FSR. They believed that they could manage and command the FSR. A 38-year-old male with experience of robots also said, "*I know how to communicate with the service robot. Customers do not need to speak in a full sentence. We can use a keyword or just one word to ask the robot. If you know this trick, you will surely get the right service like I have. Talking and Controlling service robot is an easy thing for me.*"

Theme 3: Social-emotional elements

Due to the FSRs' unique characteristics, providing some degree of automated social presence during a service encounter, allowing customers to experience not only functional performance, but also the social and emotional capabilities of the FSR (Lu et al., 2019; Van Doorn et al., 2017). Nearly half of the participants indicated a lack of initial interest in receiving services from the FSR. However, the FSR's social expression by greeting and showing a smiling face impressed them and encouraged interaction. "*The first moment I saw the robot, she looked at me and smiled. I was surprised when she greeted me "Sawasdee Kha" with a smiling face. That made me want to interact with her. She looked kind and friendly.*" (Female university student). Moreover, informants perceived social expression from the FSR through conversation and its facial expressions during the service encounter, "*I love her voice. The robot has an appropriate voice tone and tempo, not too fast or too slow. Her beautiful voice and smiling face got me in a good mood. Especially her*

manner, I really felt she was willing to give the best service to me." (42-year-old female). These responses related to **social presence**.

The second sub-dimension **Perceived humanness.** Frontline service robots (FSR) are designed to interact with customers through adaptive interfaces to communicate and deliver customer service (Gursoy et al., 2019; Wirtz et al., 2018). Participants reflected that interacting with FSR is like interacting with human staff in terms of cognitive engagement and appearance. For instance, a 51-year-old male business owner said, "*It is such a good idea that the robot has facial screen like a human. It makes me feel like I am talking to a real human, having eye contact and seeing her facial expression.*"

Theme 4: Psychological comfort elements

The FSR has been employed in the service encounter to do the same work as service staff. Some participants mentioned that they had some negative experiences with human staff such as double standard service and improper manners. "*I have had a negative experience with a service staff. He did a 'hard sell' on me by forcing me to buy products.*" (34-year-old female). The same participants added that "*I do not feel awkward when interacting with the robot...She smiling made me feel comfortable to walk around the store and ask the robot for more information as long as I want. However, I could not do the same thing with human.*"

On the contrary, some participants noted a decline in comfort levels when the FSR failed to perform adequately in terms of functional elements. For instance, a female vocational college student reflected that "*The robot gives slow response, making me feel uneasy. It is different from human staff who respond quickly. I think at present it is not worth using service robots. They must be made smarter and able to do more complicated tasks because there are a variety of customers' problems.*" These responses are related to **psychological comfort** and the finding indicates a link between psychological comfort and functional elements and social-emotional elements.

The second sub-dimension is **Trust**. Most participants expressed confidence in the service standard provided by FSR. They indicated more trust in the FSR compared to human staff in terms of integrity. "*...I am trusted when interacting with her (FSR)... She didn't judge me on my appearance or my attitude as human staff did*" (42-year-old male). Participants added that they trust in FSR that the FSR will service all customers fairly and equally. "*I was sure 100% that the robot provides service for everyone equally.*" (40-year-old female) These responses related to **trust.**

Theme 5: Value elements

Based on participants voices showed that they perceived values after interacting with the FSR. In fact, the perceived value was formed after participant appraisal the benefits of FSR based on functional and social-emotional elements (Lu et al., 2019) which is called

psychological pathway of evaluation (Gursoy et al., 2019). Almost all participants indicated that robots could meet their usage needs, such as improving service quality, increasing speed, or performing tasks effectively. They perceive that robots have functional value, in other words, **utilitarian value.** For instance, a 27-year-old female graduate student mentioned that "*The robot navigated me to find an iPhone case which was located inside the store. I found what I wanted to buy faster. I realized that the FSR is helpful*" Besides, a 33-year-old female also reflected that, "*I asked the robot to provide me the latest promotion package. She gave me useful and correct information that helped me make the right decision.*"

Most participants reported experiencing enjoyment and fun during interactions with FSRs in service encounters, attributed to the FSRs' social expressiveness and good manners. These positive interactions contribute to the formation of **hedonic value.** "*I have never been serviced by a robot before and I never thought that the robot could talk to me like this. I was so excited and enjoyed my time with her. I was impressed with her voice and appearance.*" (20-year-old female university student)

More interestingly, the findings from the interviews show that perceiving utilitarian value is the most important element in creating FSR long-term acceptance. "*For me, the functional benefits are the most concerning point of using FSR. I won't use it if it does not help customers or improve service encounter.*" (38-year-old male). Furthermore, some participants indicated that utilitarian value is more important than hedonic value on FSR acceptance "*In my opinion, today the robot can only be an entertainer. She is not intelligent enough to provide all types of services to the customers the same way human can. I might talk to the robot for fun at first but next time I expect the robot to be able to solve my problems. Not just for fun.*" (55-year-old male)

In summary, the qualitative findings unveiled five themes of the crucial factors associated with FSR acceptance including the Individual heterogeneity factors (i.e., self-efficacy, technology anxiety and customer innovativeness), functional elements (i.e., perceived usefulness and perceived autonomy), social-emotional elements (i.e., social presence, perceived humanness), Psychological comfort elements (i.e., psychological comfort and trust) and value elements (i.e., utilitarian value and hedonic value).

5. Discussion and implication

The results unveil the five themes of the crucial factors associated with FSR acceptance including the Individual heterogeneity factors (i.e., self-efficacy, technology anxiety and customer innovativeness), functional elements (i.e., perceived usefulness and perceived autonomy), social-emotional elements (i.e., social presence, perceived humanness), Psychological comfort elements (i.e., psychological comfort and trust) and value elements (i.e., utilitarian value and hedonic value). Furthermore, Individual heterogeneity factors serve as the primary drivers influencing customers' interactions with FSRs. Moreover, the findings revealed significant

relationships among functional, social-emotional, psychological comfort, and value elements. Specifically, participants perceived functional and social-emotional elements from the FSRs, which were closely associated with their experiences of psychological comfort and perceived value.

5.1 Theoretical implications

Firstly, this study provides a deeper theoretical understanding of frontline service robot acceptance in a retail context. The empirical study by and large supports the role theory (Solomon et al., 1985), and the technology acceptance model (TAM) (Davis, 1989). In other words, the empirical findings show that functional dimensions (perceived usefulness and perceived autonomy) and social-emotional dimensions (social presence and perceived humanness) are associated attributes for the FSR acceptance.

Interestingly, the results unveil the two emerging themes, psychological comfort element and value elements. This finding aligns with research by Molnar et al. (2018) on automated vehicles also found that individuals claiming to be highly comfortable with other drivers behind the wheel were likely to trust automated technology. That means customers would accept the FSR when they feel secure, reassured, at ease, relieved of mental distress, as well as having peace of mind and reduced anxiety (Lloyd & Luk, 2011; Simmons, 2001; Spake et al., 2003) during a service encounter with a service robot.

Secondly, this study is an empirical study on FSR acceptance in retail service in a real-world setting and so exhibits external validity. Recent studies are either conceptual (e.g., Wirtz et al., 2018) or have lacked empirical examination in a real-world business setting. Some do not employ an actual robot setting while some are conducted in a laboratory instead of a real-world environment. The current study provided an opportunity to gain real insights from customers interacting with an FSR in a real-world context.

5.2 Managerial implications

Service business sectors with a plan to implement FSRs in their service process could benefit from this insightful information. Based on the individual heterogeneity findings, retail service businesses should tailor their approaches to accommodate varying levels of customer self-efficacy, technology anxiety, and innovativeness. For customers with high self-efficacy and low technology anxiety, businesses can emphasize the benefits of using FSRs to enhance their experience. However, for those with low self-confidence and higher anxiety, offering additional support, such as personalized assistance or simplified interfaces, can reduce fear and encourage adoption. Training staff to recognize and address these individual differences can improve overall customer satisfaction and foster a more inclusive service environment, ultimately leading to broader acceptance of FSRs.

The findings of this study can be utilized by FSR developers and service providers to enhance both the development and implementation of frontline service robots (FSRs).

In addition, retail businesses should emphasize the efficiency and convenience of FSRs in reducing wait times and providing accurate assistance to clients. Ensuring that FSRs are equipped with communication capabilities will enhance customer satisfaction.

Additionally, retail businesses should provide clear instructions on how to interact with FSRs to maximize perceived autonomy, making customers feel confident in their ability to control and utilize the technology effectively. Regularly updating FSRs based on customer feedback can further improve their functionality and user experience. Furthermore, service businesses should enhance the social and emotional capabilities of FSRs by incorporating more advanced social expressions, such as greetings and facial animations, to foster customer engagement. Training FSRs to mimic human-like interactions, including appropriate voice tones and facial expressions, can increase perceived humanness, making customers feel more comfortable and connected. These elements can significantly improve customer satisfaction and encourage repeat interactions with FSRs.

Furthermore, our results found that Individual heterogeneity factors associate with FSR acceptance such as self-efficacy and technology anxiety. They should also provide communication programs or activities. For instance, to increase customers' self-efficacy, firms should offer workshops or demo sessions in-store where customers can learn how to use FSRs. These sessions could be targeted at different demographic groups, such as seniors or first-time users, to build their confidence and reduce anxiety about interacting with the FSR. Moreover, use customer heterogeneity factors, such as age and technology literacy, to segment the market and target communication efforts more effectively. Tailored marketing messages can better address the specific needs and concerns of different customer groups.

Retail service businesses should prioritize enhancing the utilitarian value of FSRs by focusing on their functional capabilities to meet customer needs effectively. While hedonic value contributes to initial engagement, long-term acceptance depends on the robot's ability to solve problems and improve service quality. Regular updates and advancements in FSR functionality are essential for sustained customer satisfaction.

6. Limitation and further research

Although this study enriches understanding of customers' acceptance of FSRs in a retail context, there still are some limitations. Firstly, the study collected data exclusively from the participants that decided to utilize FSR services. Therefore, future research should include data collection from both those who choose to utilize FSR services and those who decide not to, in order to gain a better understanding of the perspectives that influence the acceptance or rejection of FSR services.

Secondly, the data were collected from retail business during the introduction of FSR implementation in Thailand.There was only one telecommunication service provider employing an intelligent FSR during the research period. Nowadays, more service providers in

Thailand such as hotels, department stores, and restaurants are using FSRs in their service encounters with customers. Further research should conduct research studies in a different category of service firms or by spanning the service industry in different cultures.

APPENDIX

Appendix1 Interview guide

Interview Guide
Objectives: To explore customers' insight on FSR acceptance.
Key informants   Thai customers who were above 18 years of age, who had an interaction with a FSR at the selected telecommunication shop. The researcher would approach the customers after they finished their transaction, asking if they were interested to participate in the study.
Pre-interview - Thank the interviewee for agreeing to participate in the study. - Explain the purpose of the study is to understand customer acceptance of social robot technologies. - Explain that the interview will be (digital) recorded and confirm that the interviewee's identity will be kept confidential. - Explain that the interview will last 15-20 minutes. - Consent: present the Participant Information Statement (highlight it is university research) and get the participant to sign the Consent Form (including consent for audio recording).
Interview Guide (Protocol) **Background and experience using technologies** - Tell me about the technology devices or gadgets that you use in your daily life. (PROMPT on smartphone, buying on internet, internet banking, etc.) - Would you say that you are one of the first innovative groups in adopting new technology? [PROBE] - Do you ever feel anxious when faced with new technology? [PROBE] - Have you ever encountered a social robot?
Introducing Frontline Service Robot (FSR)- Following an interaction with the robot the following points of discussion were performed. Points for Discussion: - Describe the interaction you had with the robot today. - Did the robot achieve its purpose? (PROBE)

Interview Guide
- Did you enjoy your interaction with the robot? [PROBE]   - How do you feel about the robot – her advantages and disadvantages? [PROBE and PROMPT]   *Prompts: Utilitarian value, Hedonic value.*   - What are your thoughts after interacting with the robot? [PROBE Extensively]   *Prompts: Usefulness, Autonomy, Social Presence, Humanness, Social interactivity.*   - Which aspect(s) of the robot did you like most and which aspect(s) did you dislike most? [PROBE]   *Prompts: Usefulness, Autonomy, Social Presence, Humanness, Social interactivity.*   - Would you say that you are comfortable/uncomfortable when using/interacting with the robot? Why?   - What is the most important element on your FSR acceptance? [PROBE *Usefulness, Autonomy, Social Presence, Humanness, Social interactivity*]
Future conditions   - Next time you come to this shop, would you be ok to deal with the robot again? (PROMPT)   - Do you think you would interact with an FSR in the future? Why or why not?   - Whether it (an FSR) would influence your preferred mode of retailing? Why or why not?   - In your opinion, how would the robot affect your perception towards this telecommunication company? [PROBE]
Wrap-up   - Our discussion was very insightful. Is there anything further that you would like to add or think that is relevant to the study?   - (That concludes the interview). Thank you for agreeing to participate in the study. Give the participant a souvenir (Thai northern style keyring).

References

Altman, I., & Taylor, D. A. (1973). *Social penetration: The development of interpersonal relationships.* Rinehart & Winston.

Andreassen, T. W., van Oest, R. D., & Lervik-Olsen, L. (2018). Customer inconvenience and price compensation: A multiperiod approach to labor-automation trade-offs in services. *Journal of Service Research, 21*(2), 173-183.

Babin, B. J., Darden, W. R., & Griffin, M. (1994). Work and/or fun: Measuring hedonic and utilitarian shopping value. *Journal of Consumer Research, 20*(4), 644-656.

Bhimasta, R. A., & Kuo, P.-Y. (2019). What causes the adoption failure of service robots?

A case of Henn-na Hotel in Japan. In *Adjunct proceedings of the 2019 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2019 ACM International Symposium on Wearable Computers* (pp. 1107-1112). ACM.

Blau, P. (1968). Interaction: Social exchange. In *The International Encyclopedia of the Social Sciences* (pp. 452-458). Free Press and Macmillan.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101.

Breazeal, C. (2004). Social interactions in HRI: The robot view. *IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews), 34*(2), 181-186.

Chi, O. H., Gursoy, D., & Chi, C. G. (2022). Tourists' Attitudes toward the Use of Artificially Intelligent (AI) devices in tourism service delivery: Moderating role of service value seeking. *Journal of Travel Research*, 61(1), 170-185.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory Into Practice, 39*(3), 124-130.

Daniels, K. (2000). Measures of five aspects of affective well-being at work. *Human Relations, 53*(2), 275-294.

Davis, F. D. (1989). Explaining internet banking behavior: Theory of reasoned action, theory of planned behavior, or technology acceptance model. *MIS Quarterly, 13*, 319-340.

Dhar, R., & Wertenbroch, K. (2000). Consumer choice between hedonic and utilitarian goods. *Journal of Marketing Research, 37*(1), 60-71.

Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M., & Williams, M. D. (2019). Re-examining the unified theory of acceptance and use of technology (UTAUT): Towards a revised theoretical model. *Information Systems Frontiers*, 22(4), 719-734.

Fiske, S. T., Cuddy, A. J., & Glick, P. (2007). Universal dimensions of social cognition: Warmth and competence. *Trends in Cognitive Sciences, 11*(2), 77-83.

Gartner. (2020). *2 Megatrends Dominate the Gartner Hype Cycle for Artificial Intelligence, 2020.* Retrieved from https://www.gartner.com.au/en/articles/2-megatrends-dominate-the-gartner-hype-cycle-for-artificial-intelligence-2020

Goffman, E. (1967). *Interaction ritual: Essays on face-to-face interaction*. Routledge.

Grewal, D., Motyka, S., & Levy, M. (2018). The evolution and future of retailing and retailing education. *Journal of Marketing Education, 40*(1), 85-93.

Gursoy, D., Chi, O. H., Lu, L., & Nunkoo, R. (2019). Consumers acceptance of artificially intelligent (AI) device use in service delivery. *International Journal of Information Management, 49*, 157-169.

Heerink, M. (2011, March). Exploring the influence of age, gender, education and computer

experience on robot acceptance by older adults. In *Proceedings of the 6th international conference on Human-robot interaction* (pp. 147-148).

Heerink, M., Kröse, B., Evers, V., & Wielinga, B. (2010). Assessing acceptance of assistive social agent technology by older adults: The almere model. *International Journal of Social Robotics, 2*(4), 361-375.

Huang, M.-H., & Rust, R. T. (2018). Artificial intelligence in service. *Journal of Service Research, 21*(1), 155-172.

Keeley, B. L. (2004). Anthropomorphism, primatomorphism, mammalomorphism: Understanding cross-species comparisons. *Biology and Philosophy, 19*(4), 521-540.

Kelley, H. H., & Thibaut, J. (1978). *Interpersonal relations: A theory of interdependence.* New York: Wiley.

Kim, H.-Y., & McGill, A. L. (2018). Minions for the rich? Financial status changes how consumers see products with anthropomorphic features. *Journal of Consumer Research, 45*(2), 429-450.

Lee, B., & Cranage, D. A. (2018). Causal attributions and overall blame of self-service technology (SST) failure: Different from service failures by employee and policy. *Journal of Hospitality Marketing & Management, 27*(1), 61-84.

Li, G., Zhang, R., & Wang, C. (2015). The role of product originality, usefulness and motivated consumer innovativeness in new product adoption intentions. *Journal of Product Innovation Management, 32*(2), 214-223.

Lin, I. Y., & Mattila, A. (2021). The value of service robots from the hotel guest's perspective: A mixed-method approach. *International Journal of Hospitality Management, 94*(2). http://doi.org/10.1016/j.ijhm.2021.102876

Lloyd, A. E., & Luk, S. T. (2011). Interaction behaviors leading to comfort in the service encounter. *Journal of Services Marketing, 25*(3), 176-189.

Lu, L., Cai, R., & Gursoy, D. (2019). Developing and validating a service robot integration willingness scale. *International Journal of Hospitality Management, 80(1)*, 36-51.

Maneewarn, T. (2014, March). Survey of social robots in Thailand. In *2014 International Electrical Engineering Congress (iEECON)* (pp. 1-4). IEEE.

Molnar, L. J., Ryan, L. H., Pradhan, A. K., Eby, D. W., Louis, R. M. S., & Zakrajsek, J. S. (2018). Understanding trust and acceptance of automated vehicles: An exploratory simulator study of transfer of control between automated and manual driving. *Transportation Research Part F: Traffic Psychology and Behaviour, 58*, 319-328.

Mori, M., MacDorman, K. F., & Kageki, N. (2012). The uncanny valley [from the field]. *IEEE Robotics & Automation Magazine, 19*(2), 98-100.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental*

Health Services Research, 42(5), 533-544.

Patton, M. Q. (2015). Qualitative research & evaluation methods: Integrating theory and practice. Sage publications.

Qiu, H., Li, M., Shu, B., & Bai, B. (2020). Enhancing hospitality experience with service robots: The mediating role of rapport building. Journal of Hospitality Marketing & Management, 29(3), 247-268.

Rubin, H. J., & Rubin, I. S. (2012). Qualitative interviewing: The art of hearing data. Sage publications.

Said, N., Ben Mansour, K., Bahri-Ammari, N., Yousaf, A., & Mishra, A. (2024). Customer acceptance of humanoid service robots in hotels: Moderating effects of service voluntariness and culture. International Journal of Contemporary Hospitality Management, 36(6). http://doi.org/10.1108/IJCHM-12-2022-1523

Savela, N., Turja, T., & Oksanen, A. (2018). Social acceptance of robots in different occupational fields: A systematic literature review. International Journal of Social Robotics, 10, 493-502.

Schepers, J., & Wetzels, M. (2007). A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. Information & management, 44(1), 90-103.

Seyitoğlu, F., & Ivanov, S. (2020). A conceptual framework of the service delivery system design for hospitality firms in the (post-) viral world: The role of service robots. International Journal of Hospitality Management, 91. https://doi.org/10.1016/j.ijhm.2020.102661

Simmons, R. G. (2001). Comfort with the self. Extending self-esteem theory and research: Sociological and psychological currents, 198-222.

Solomon, M. R., Surprenant, C., Czepiel, J. A., & Gutman, E. G. (1985). A role theory perspective on dyadic interactions: The service encounter. Journal of Marketing, 49(1), 99-111.

Spake, D. F., Beatty, S. E., Brockman, B. K., & Crutchfield, T. N. (2003). Consumer comfort in service relationships: Measurement and importance. Journal of Service Research, 5(4), 316-332.

Van Doorn, J., Mende, M., Noble, S. M., Hulland, J., Ostrom, A. L., Grewal, D., & Petersen, J. A. (2017). Domo arigato Mr. Roboto: Emergence of automated social presence in organizational frontlines and customers' service experiences. Journal of Service Research, 20(1), 43-58.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425-478. Retrieved from http://www.jstor.org/stable/30036540

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology.

MIS Quarterly: Management Information Systems, 36(1), 157-178.

Weber, R. P. (1990). *Basic content analysis*. Sage publications.

Whelan, S., Murphy, K., Barrett, E., Krusche, C., Santorelli, A., & Casey, D. (2018). Factors affecting the acceptability of social robots by older adults including people with dementia or cognitive impairment: A literature review. *International Journal of Social Robotics, 10*(5), 643-668.

Wirtz, J., Patterson, P. G., Kunz, W. H., Gruber, T., Lu, V. N., Paluch, S., & Martins, A. (2018). Brave new world: Service robots in the frontline. *Journal of Service Management, 29*(5), 907-931.

Xiao, L., & Kumar, V. (2021). Robotics for customer service: A useful complement or an ultimate substitute?. *Journal of Service Research, 24*(1), 9-29.

Zhang, Y., Weng, Q., & Zhu, N. (2018). The relationships between electronic banking adoption and its antecedents: A meta-analytic study of the role of national culture. *International Journal of Information Management, 40*, 76-87.