An Examination of Frontline Service Workers' Empathy in a Cobot Team

Emily Anne Broker
University of Central Florida

Part of the Hospitality Administration and Management Commons
Find similar works at: https://stars.library.ucf.edu/etd2023
University of Central Florida Libraries http://library.ucf.edu

This Masters Thesis (Open Access) is brought to you for free and open access by STARS. It has been accepted for inclusion in Graduate Thesis and Dissertation 2023-2024 by an authorized administrator of STARS. For more information, please contact STARS@ucf.edu.

STARS Citation
Broker, Emily Anne, "An Examination of Frontline Service Workers' Empathy in a Cobot Team" (2024). Graduate Thesis and Dissertation 2023-2024. 168.
https://stars.library.ucf.edu/etd2023/168
AN EXAMINATION OF FRONTLINE SERVICE WORKERS' EMPATHY IN A COBOT TEAM

by

EMILY BROKER
B.S. in Psychology, University of Central Florida, 2022

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in the Department of Hospitality and Tourism Management in the Rosen College of Hospitality Management at the University of Central Florida Orlando, Florida

Spring Term 2024

Major Professor: Cynthia Mejia
ABSTRACT

Service robots are an emerging technological advancement increasingly utilized in the hospitality industry. In return, service workers are required to use them during their interactions with customers. This study sought to examine how the service robot-worker team affects cognitive and affective empathy present in a service encounter. Using the empathy attribute part of the SERVQUAL model, this study aimed to examine and differentiate the server’s empathy impact in the presence of a service robot. This study utilized semi-structured qualitative interviews to collect data from service workers employed in two restaurants characterized by distinct service environments. The interviews were qualitatively analyzed through identifying common patterns and emergent themes. The findings exhibit how cognitive and affective empathy was perceived differently amongst service robot-worker teams and provides implications on the implementation of well-being practices for workers and further service robot collaboration.
ACKNOWLEDGMENTS

First and foremost, I want to thank my committee chair, Dr. Cynthia Mejia. Thank you for the endless support, knowledge, kindness, patience, and insight throughout the course of this journey. You are an incredible mentor, and I am not able to convey my gratitude in enough words. I would like to thank Dr. Denver Severt, Dr. Valeriya Shapoval, and Dr. Mindy Shoss for their guidance and support as wonderful committee members. You made this possible, and I am forever grateful.

I want to thank my family for supporting me through this journey, being my biggest cheerleaders and lifting me up on the days when I needed it most. Thank you for believing in me, especially the times when I didn’t believe in myself.

I would like to thank all my college friends, though we all may come from different disciplines, I am thankful for your encouragement and care. You are some of the most driven and creative people I know, and I continue to learn from you all each and every day.
FUNDING AND SUPPORT

This research was supported by grant number T42OH008438, funded by the National Institute for Occupational Safety and Health (NIOSH) under the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIOSH or CDC or the Department of Health and Human Services. The researcher thanks Bear Robotics for their support in this study.
TABLE OF CONTENTS

ABSTRACT.......................................................................................................................... iii
ACKNOWLEDGMENTS ......................................................................................................... iv
FUNDING AND SUPPORT ................................................................................................. v
LIST OF FIGURES .............................................................................................................. ix
LIST OF TABLES ................................................................................................................ x

CHAPTER ONE: INTRODUCTION......................................................................................... 1
   Proliferation of Service Robots in the Hospitality Industry.............................................. 1
   Utilitarian or Hedonic Service Robot Value................................................................. 2
   Anthropomorphism ...................................................................................................... 3
   Significance of the Study .............................................................................................. 5
   Purpose Statement and Research Objectives............................................................... 6
   Theoretical Background ............................................................................................... 6
   Potential Contribution ................................................................................................ 7
   Scope ............................................................................................................................. 8
   Definitions ................................................................................................................... 9

CHAPTER TWO: LITERATURE REVIEW ............................................................................. 10
   Service Robots in the Hospitality Industry ................................................................. 10
   Service Quality and SERVQUAL ............................................................................. 11
   Empathy in the Worker-Robot Service Encounter ...................................................... 13
   Customer Experience with Service Robots ................................................................. 15
      Emotional Recognition ............................................................................................. 16
      Emotional Response ................................................................................................ 17
      Trust .......................................................................................................................... 18
      Anthropomorphism ................................................................................................. 19
CHAPTER THREE: METHODOLOGY .................................................................................................................. 21
Context and background of the study .................................................................................................................. 21
Protocol Development ......................................................................................................................................... 21
Sampling Frame .................................................................................................................................................. 22
Data Collection .................................................................................................................................................. 24
Data Analyses .................................................................................................................................................... 25
CHAPTER FOUR: RESULTS AND DISCUSSIONS ................................................................................................. 27
Demographics .................................................................................................................................................... 27
Emergent Themes ............................................................................................................................................... 29
Cognitive Empathy ............................................................................................................................................. 30
  Impacts on Worker Productivity ....................................................................................................................... 30
Customer Reactions .......................................................................................................................................... 31
Impacts on Well-Being ........................................................................................................................................ 32
Feelings of Enjoyment ....................................................................................................................................... 33
Analytic Empathy ............................................................................................................................................... 34
Personal Service Attention ................................................................................................................................. 35
Affective Empathy .............................................................................................................................................. 36
  Feelings of dread, anger, and frustration ........................................................................................................... 37
Emotional Empathy ............................................................................................................................................ 38
CHAPTER FIVE: CONCLUSION .......................................................................................................................... 40
  Service Robot as a Tool (Utilitarian) vs. Co-Worker (Hedonic) ........................................................................ 41
Theoretical Implications .................................................................................................................................... 42
Practical Implications ........................................................................................................................................ 43
Limitations and Future Research ........................................................................................................................ 44
APPENDIX A: IRB APPROVAL LETTER ............................................................................................................. 46
LIST OF FIGURES

Figure 1. Conceptual model of the relationships between the service worker and customer when a service robot is introduced. ................................................................. 4

Figure 2. Utilitarian-designed "Servi" robot used by participants in the study. .................. 24

Figure 3. Results map of emergent themes with code clusters. ........................................ 29
LIST OF TABLES

Table 1. Adapted SERVQUAL interview questions................................................................. 22
Table 2. Demographics of participants (n = 42)........................................................................ 28
Table 3. Emergent themes from the data including frequencies and code percentages.............. 30
CHAPTER ONE: INTRODUCTION

The hospitality industry has one of the highest turnover rates of any service industry, worsened by the impact of the COVID-19 pandemic (Bajrami et al, 2021). Hospitality workers were furloughed or terminated during this time, which generated resentment, and ultimately led to an apprehension to return to the industry (Abdalla t al., 2021). As one of the solutions to fill the recruitment and retention gap in the aftermath of the pandemic, there has been a notable rise in the adoption of service robots, particularly in the restaurant sector (Qiu et al. 2020). While the increasing use of service robots may appear an advantageous strategy for restaurant owners, operators, and customers, there are potentially unforeseen consequences on employees’ well-being (Odekerken-Schröder et al., 2021).

Proliferation of Service Robots in the Hospitality Industry

Service robots are technological interfaces that either function with the aid of a service worker or can serve on their own (Tuomi et al., 2021). Due to the nature of the pandemic and the need for reduction in face-to-face contact, in order to open restaurants and other service businesses, owners and operators became receptive to the use of service robots, thus establishing a window for their increased implementation to operate business at full capacity while providing optimal service (Odekerken-Schröder et al., 2020). After the COVID-19 fallout, a large post-pandemic gap in labor ensued and as a response, organizations began adopting technological advancements to ease the labor gap relying on service robots to augment the workforce (Parvez et al., 2022).

While service robot implementation invigorates and excites hospitality organizations, the full impact these robots have on service workers presents an understudied area of research
(Zemke et al., 2020). Primarily focused on consumers, service robot research has not delved much into studying the employees who work with them. There is a small research stream that has revealed apprehension and feelings of insecurity among service workers who collaborate with service robots (Parvez et al, 2022); however, their acceptance within a mandated use framework needs to be studied to understand the implications of service robot use on employee well-being. Service robots can improve operational efficiencies by reducing the physical burdens on service staff, however their mandated use among an apprehensive service team can elicit feelings of job displacement, threaten data privacy, and negatively impact the guest service experience (McCartney & McCartney, 2020; McLeay et al., 2021).

**Utilitarian or Hedonic Service Robot Value**

Empathy is an essential component of service work, and as the hospitality industry requires a great deal of emotional intelligence to interact with guests, empathy plays a large role (Lim, 2017; Scott-Halsell et al., 2008). Empathy is important in the service encounter because it aids in the caring and personalized attention of customers, assists in balancing workers’ and consumers’ expectations, and affords the ability to imagine and understand customers’ circumstances (Chiu, 2002; Jung et al., 2023). Prior empathy research in the hospitality discipline focused on service recovery and improved response in service encounters (Lv et al., 2022). Research in other areas has explored the impact of empathy on employees, finding empathetic service requires emotional intelligence and emotional labor (Pelau, Dabija, & Ene, 2021). Empathy can be linked to perceptions of a service robot’s utilitarian or hedonic value, but overall is dependent on the specific needs of an organization and how the robot functions within those needs.
Depending on the model and intended use of a service robot, its role will be shaped by both workers and customers as serving as either a tool (utilitarian value) or a coworker (hedonic value), or both (Odekerken-Schröder et al., 2021). With utilitarian value, the robot will do tasks such as carrying food, lessening the physical burden on workers. However, from the customer’s perspective, a service robot as a tool will be limited in expressing emotional communication. In comparison, the hedonic value of a service robot can be demonstrated as entertainment and fun throughout a service encounter. Such tasks of hedonic value have included examples of communicating through jokes, engaging guests in fun conversation, and enabling tricks to curate delight from customers. These activities require special pre-programming for more emotional engagement with guests. Within these perspectives, the role of a service robot can vary from organization to organization, where often it has not been clearly defined to workers (See Figure 1) (Belanche et al., 2020; Paluch et al., 2022).

**Anthropomorphism**

Service robots range in design from utilitarian to anthropomorphic (human-like) to zoomorphic (animal-like) (McCartney & MacCartney, 2020), with a variety of different models to tailor to certain service tasks. Previous literature has found that the level of a robot’s anthropomorphism may influence the role that service robots have in the workforce, with utilitarian robots used for physical tasks, and hedonic robots used for service tasks (Odekerken-Schröder et al., 2021; Mende et al., 2019). Therefore, the amount of human-likeness may eventually contribute to the increased use and proliferation of robots in the service sector in the absence of service workers. Relatedly, research has found that the higher a robot’s anthropomorphism, the more likely customers will trust the service robot emotionally (Van Pinxteren et al., 2019). However, much of this anthropomorphic capability is still conceptual,
and the level of emotional engagement and empathy cannot truly be measured. Still an emergent area of research in the services industries, the impact a service robot has on workers within a service encounter is sparsely studied (Odekerken-Schröder et al., 2021; Zemke et al. 2020), particularly with respect to workers’ well-being and empathy.

*Figure 1. Conceptual model of the relationships between the service worker and customer when a service robot is introduced.*
Significance of the Study

The impact of service robots on hospitality workers is an emergent phenomenon in the service industries, and is under-researched (Odekerken-Schröder et al., 2021; Zemke et al. 2020). As the hospitality industry demands high emotional labor and engagement, this study examined the employee responses to service robot implementation on employees’ performance and wellbeing. Through focusing specifically on empathy as a component within the expected service quality based on SERVQUAL (Parasuraman et al., 1988), this study illustrates employee responses and interactions between the cobot team and the customer. Based on qualitative interviews and analysis, the significance of the emergent themes can improve service robot implementation and encourage methods to reduce stress and increase employee wellbeing. Specifically, identifying the differences between cognitive and affective empathy within a joint worker-robot service encounter will contribute to the service quality literature in the context of worker well-being.

Studying worker wellbeing together with the increasing use of service robots in the hospitality industry allows for a better understanding of employees’ concerns with technological job displacement (McLeay et al., 2021), how the increased use of technological innovations will change the landscape of service work (Belanche et al., 2020), and how service robots can potentially lower employees’ physical work burdens and lessen repetitive work (McCartery & McCartney, 2020). Alongside technological adoption and advancement in the service-centered hospitality industry, efforts should be made to prioritize worker well-being to ensure that service robot use maximizes benefits for the organization, the worker, and the customer. The significance of this study enables a better understanding of rapid service robot adoption in the current industry situation.
Purpose Statement and Research Objectives

Collaborative robots (or cobots) are interactive and designed to assist human workers and their job duties (Peshkin & Colgate, 1999), yet questions remain about the impact that service robots have on workers’ capabilities to demonstrate empathy in the service encounter. Prior research in the hospitality literature on cobots focused on collaboration or competition with service robots (Khoa et al., 2023) and general customer reactions (Ho et al., 2020). While literature has begun to explore empathy and its interaction with service robots (Do et al., 2023), the empathetic response directly within the service encounter remains unexamined. Therefore, the purpose of this study was to determine the extent that working with a service robot impacted a frontline restaurant worker’s ability to demonstrate empathy during a service encounter. The objectives of the study were to: (1) Utilize a qualitative methodology to explore an understudied phenomenon with a focus on frontline service workers’ role in the cobot service delivery; and (2) Distinguish the nuances of the cognitive and affective dimensions of front-line service workers internalized and demonstrated empathy.

Theoretical Background

There is a noticeable change in the server-customer dynamic due to the introduction of service robots into the restaurant dining room. Previous hospitality research has focused on the impact service robots had on customers, and their reactions to the robot from an organizational perspective (Lu et al, 2020). The service robot adoption phenomenon is understudied from the employee perspective both in theory and in practice (Yang & Gao, 2023). The theoretical basis of this study was grounded in the principles of service quality as defined and validated by SERVQUAL, of which the five dimensions of service quality include reliability, assurance, tangibles, empathy, and responsiveness (Parasuraman et al., 1988). With a primary focus on
empathy, this study analyzed those perceptions from a worker point of view. While the empathy subscales of SERVQUAL focus on the delivery of individualized and personalized caring service to guests (Parasuraman et al., 1988), in this study SERVQUAL empathy measures were adapted to focus on the cognitive and affective components of empathy. In addition, empathetic intelligence was taken into consideration given that typical service standards focus on human-human interactions, further delineating the dimensions of empathy in human-robot interactions (Rosete et al. 2020).

Linked to this research was the incorporation of utilitarian versus hedonic values of working with a service robot (Ozturk et al., 2023), alongside the expectations of the consumer. In a service-intensive industry, the increased use of technology has an impact on guests’ functional and hedonic expectations (Pizam, 2010). Used in prior research to understand how service robots impacted customer acceptance (Ozturk et al, 2023), utilitarian and hedonic values were woven into this study as a framework to understand how these simultaneously competing and complimenting values affected employees’ self-assessment of their service empathy.

**Potential Contribution**

This study will contribute to the service literature through providing a different insight into service quality and the SERVQUAL empathy dimension. By distinguishing empathy into cognitive and affective empathy as components of the service encounter from the perspective of service workers, this could contribute an updated understanding of empathetic service and the impacts of engagement from the service worker. Furthermore, this study could potentially contribute a clarity on how service workers’ methods of empathetic service varies with the presence of a service robot (Yang & Gao, 2023). This in turn can help managers, owners, operators, and hospitality organizations understand service employees, and the roles service
robots can best fill in the service encounter. Through understanding empathetic service, service robots in the work environment, and its impact within a cobot team, this study contributes and increased awareness of employee wellbeing, and the nature of empathetic service with the rise of technological adoption.

**Scope**

To ensure a comprehensive understanding of the impacts of service robots on workers’ empathy and wellbeing, the scope of this qualitative work focused on several sub-topics including the perspectives of service workers in a mandated service robot use situation, their emotional impact, the complex utilitarian and hedonic values between the worker and the customer, whether or not anthropomorphism was a factor, emotional responses, and trust.
Definitions

Affective Empathy: a response or internalized feeling that considers or prioritizes another individual’s situation ahead of one's own situation.

Anthropomorphism: robot designed with human-like features.

Cobot: The combination of a server and a robot (colloquial).

Cognitive Empathy: the ability to “know” something, rather than to “feel” something.

Service Robot: machines in which pre-programmed technological interfaces interact and serve external customers either alone or in the presence of a worker.

Service Quality: customer perceptions and expectations of a certain product or experience offered by different organizations.

SERVQUAL: A measure of service quality analyzing the gap between an expected service and the service received; measured by reliability, assurance, tangibles, empathy, and responsiveness.

Simulation Perspective: involuntary reaction to other’s emotional responses.

Theory of Mind Perspective: when individuals aim to understand other’s emotional status through the application of their personal experiences.

Uncanny Valley Hypothesis: “creepy/eerie” feelings resulting from a lack of trust in robots that they plan to gain more autonomy in order to exercise self-control.

Well-Being: the emotional, physical, and mental health of oneself.

Zoomorphism: robot designed with animal-like features.
CHAPTER TWO: LITERATURE REVIEW

Service Robots in the Hospitality Industry

Service robots are becoming increasingly implemented in hospitality workplaces, where in many cases they are being used to fill a post-pandemic labor gap to reduce costs in service businesses (Parvez et al., 2022). Service robots are machines in which pre-programmed technological interfaces interact and serve external customers either alone or in the presence of a worker (Tuomi et al., 2021). These machines encourage innovative progress in the hospitality industry and appear to be a favorable trend in the service workplace (Do et al., 2023). As service robots are increasingly adopted, the impact they have on employees and customers is becoming more observable.

How an employee perceives the usefulness of a service robot and their prior experience with technology can impact their own well-being (Lu et al., 2020) due to technology skepticism, apprehension of use, and the stress caused by having to impact their service routine (Yang & Gao, 2023). Moreover, the emergence of service robots within the restaurant industry has created workplace tension and fears of threatened job security (Parvez et al, 2022), and it is estimated that service robots could adversely impact more than 100 million workers by the year 2025 (McCartney & McCartney, 2020). Even though service robot adoption is increasing in service organizations, the research is limited concerning employees’ internalization in the aftermath of mandated use and collaboration on the job (Yu et al., 2022; Vatan and Dogan, 2021). Furthermore, the implications of the potential adverse impacts of robot adoption may-threaten both workers’ well-being and customer satisfaction (Phillips et al., 2023), which warrants investigation as robot adoption rapidly proliferates throughout the industry sector.
Service Quality and SERVQUAL

Service quality is an essential component for successful business practice within any hospitality organization, that when optimally executed, results in long-lasting and competitive success for a business (Zeithaml & Parasuraman, 2004). Service quality is derived from customer perceptions and expectations of a product or experience offered by different organizations. Factors that contribute to these customer expectations include word-of-mouth communications and recommendations, personal needs, past experiences, and external communications from the business or its advertisers (Zeithaml, Parasuraman, & Berry, 1990). Consistent management of a customer’s expectation and experience is led through different systems and leadership within an organization (Zeithaml, Parasuraman, & Berry, 1990). Service quality is complex and multi-faceted, and the extensive literature regarding its connection to customer expectation has been debated. One example of this debate is whether service quality should be measured by perception or by disconfirmation (Choi et al., 2020; Robinson, 1999). Another criticism involves the validity of service quality research design (i.e., longitudinal vs. cross-sectional) to measure customer expectation throughout the service experience (Dabholkar, Shepherd & Thorpe, 2000). When used, service quality findings have a long-lasting impact on internal and external marketing strategies, and so it is critical across all stakeholders reliant on dependable information that service quality measurement be reliable and valid (Asubonteng, McCleary, & Swan, 1996).

Service marketing research focuses on the tangible experiences of the service encounter; however, many facets of service quality are intangible (Parasuraman et al., 1988; Karamustafa & Ulker, 2020). Service quality can be recognized and quantified through different means, such as the SERVQUAL model, which focuses on identifying the gap between perceptions of expected
service and the actual service received. Within SERVQUAL, five attributes of service quality include reliability, assurance, tangibles, empathy, and responsiveness (RATER) (Parasuraman et al., 1988). This scale has been adapted and validated in many contexts such as Dineserv for dining room service (Stevens et al., 1995), HEALTHQUAL for service quality within the healthcare industry (Lee, 2017), and e-servqual for online customer service (Santos, 2003). However, even with these many adaptations, the SERVQUAL-based models primarily measure the gaps from an external customer perspective. There is a need for an internal customer view, or self-reported assessment for frontline workers to evaluate service quality (Chiu, 2002).

The intersection of service quality, the SERVQUAL framework, and service robots constitutes an emergent research phenomenon due to the increase in robot adoption in the hospitality industry. Previous research examining the service quality of robots using the SERVQUAL framework has found that customer expectation for robots involves an emphasis on assurance and reliability, not necessarily tangibility and empathy (Chiang & Trimi, 2020). Other research has found that expectations may vary depending on the customer, where some people expect the robot to provide service different from a human employee, while others expect the same level of service that a human employee gives (Byrd et al., 2021). This difference in service expectations among customers has generated a line of thinking among stakeholders who pose the question if a robot is a tool or a co-worker (Paluch et al., 2022). A service robot can invoke different relationships with customers and employees, and therefore different service expectations may arise depending on this perceived relationship. For example, employees can envision a service robot as a tool while simultaneously, a customer can envision the service robot as an employee’s co-worker.
The way the service robot engages with customers and employees can exhibit utilitarian and/or hedonic values. Service robots are seen to have utilitarian value because they are efficient in tasks, such as serving food to customers or providing operational support for employees (Odekerken-Schröder et al., 2021). Conversely, with hedonic value, a service robot can have entertainment value when interacting with customers (Odekerken-Schröder et al., 2021). This illustrates the notion of service robots as being tools (utilitarian value) adding to the efficiency and productivity of service, or as co-workers (hedonic value) whether to engage with customers on a lighter or deeper level. Prior research in the service literature examining robot-related AI contactless service has demonstrated that hedonic types of customer interactions evoke emotions, particularly those around empathy and assurance (Li et al., 2022). This ability to engage emotionally with customers suggests an empathetic interaction, so the customer and employee viewpoint of service robot purpose may vary.

**Empathy in the Worker-Robot Service Encounter**

Empathy is the ability to share and understand others’ emotionality and experiences, connecting it with one’s own emotional perspective (Jung et al., 2023; Davis, 1996). To provide a quality of service, frontline service workers must exhibit empathy to anticipate and personalize the needs of customers. Empathy consists of cognitive and affective dimensions (Jung et al. 2023), which frame empathy from two unique perspectives. The contrasts between cognitive and affective empathy in service worker teams have been evaluated in the literature but are limited in identifying the impact on employee well-being (Jung et al., 2023; Yang & Gao, 2023). Therefore, understanding affective empathy in the service environment may expand the SERVQUAL empathy scale to explore different depths of service delivery.
The SERVQUAL empathy subscale primarily focuses on cognitive empathy, meaning it focuses on the ability to “know” something, rather than to “feel” something (Chiu, 2002). Cognitive empathy, as explained in the psychology discipline, is derived from the theory of mind perspective (Wellman, 2014), where individuals aim to understand other’s emotional status through application of their personal experiences (Clark, Robertson, & Young, 2019). Prior research has identified the importance of empathy in the service encounter yet lacks an exploration of the affective dimension of empathy and the impact that service robots have on workers’ empathy. Service robots, to some extent, can exhibit varying degrees of cognitive empathy, but are insufficient in expressing affective empathy in the service encounter (Leite et al. 2013). In contrast with cognitive empathy, affective empathy is defined as a response or internalized feeling that considers or prioritizes another individual’s situation ahead of one's own situation (Leite et al., 2013; Hoffman, 2001). When engaging in the service environment, the intentional or unintentional decision to harness cognitive and/or affective empathy appears to be a response derived from the server’s perception of the service quality desired by the customer (De Vignemont & Singer, 2006; Jung et al., 2023).

However, despite the empathy as perceived by the worker in the service encounter, other disciplines view affective empathy in a different manner. In the Industrial-Organizational psychology literature, affective empathy originates from the simulation perspective, where people involuntarily react to other’s emotional response (Clark, Robertson, & Young, 2019; Gallese & Goldman, 1998). This results in a shared affective response between two people, where affective empathy becomes targeted onto the individual with increased emotional status. In hospitality, affective empathy is an expected part of service quality, where it is derived from
the empathetic concern for customers to create an emotional service experience (Umasuthan, Park, & Ryu, 2017). Further work is needed to fully explore the different types of empathy.

**Customer Experience with Service Robots**

In general, there are varying expectations of the service experience including those involving the robot’s potential for cognition, emotion, and volition (Huang et al., 2021). Cognition and emotion are highly relevant to service robot interactions and therefore, service experiences. Robot cognition involves reasoning and problem-solving processes. Cognitive capabilities of robots, such as language processing, task execution, and adaptation enables a robot to provide individualized service, but only to the extent that they have been programmed or created to do so (Huang et al., 2021). Emotion in the context of service robots refers to subjective feelings that impact users’ behaviors and perceptions. Emotion recognition and regulation are important service traits to be designed into robots. These involve emotional cues and adaptive responses that foster empathy (Huang et al., 2021). Volition refers to how robots respond and react to situations. Going beyond the pre-programmed routines, service robot volition is important particularly in service recovery, but is still subject to the capabilities of the robot’s mechanics, design, and creation (Huang et al., 2021).

Prior research has found that service robots influence a service environment in terms of presence and/or embodiment (Tung & Law, 2017). These concepts are related, yet distinct, as service robot presence refers to a subjective or psychological state of “being there”, while robot embodiment refers to the physical structure and characteristics of the robot (Tung & Law, 2017). Previous literature suggests that customer-robot interactions have responses in forms of varying customer experiences, trust, satisfaction, perception, and adoption (Huang et al., 2021). In the service encounter, typical dyadic interactions between the customer and server are expected, as
are different types of emotional communication (Becker, Efendić, & Odekerken-Schröder, 2022). However, factoring service robot presence and embodiment into this long-held dyadic service framework is nuanced both in research and in practice. With the increasing labor shortages in the hospitality industry, service robots are needed to communicate both in presence (i.e., emotionally) and in embodiment (i.e., physically being there) for further integration into the workforce (Becker, Efendić, & Odekerken-Schröder, 2022; Tung & Law, 2017). The key components to effectively communicating in service is being customer-oriented and being active within the communication exchange (Kang & Hyun, 2012), which is not only dependent on the robot's programming capabilities and physicality, but also on the robot abilities to enhance the consumer experience.

**Emotional Recognition**

The emotional component of the service exchange is different when comparing a robot’s service with a human’s service. Despite the technological advancements in programming a service robot for use in the service environment, robots are not yet able to engage in emotional communication and empathy in the same depth as humans (Reis et al., 2020). Service robot emotional communication with guests includes the recognition of another’s emotional status (Kang & Hyun, 2012; Reis & Sprecher, 2009). Since robots do not have emotions wired to engage with customers emotionally, they instead present the illusion of life (Pavia, Leite, & Ribeiro, 2014). Emotional recognition is a response to the signals being put forth by the sender or communicator. Robot response signals are shown in behavioral tendencies, physiological reactions, motor expressions, cognitive appraisals, and subjective feelings (Dzedzickis, Kaklauskas, & Bucinskas, 2020).
First, to account for the customers’ emotional recognition, service robots must read the emotions. Common ways service robots have been able to read these emotions are through facial recognition, heart-rate detection, and voice analysis (Becker, Efendić, & Odekerken-Schröder, 2022; Egger et al., 2019). From there, the robot will detect emotional stimuli from the customer and choose an appropriate response. However, as straightforward as this process may be, the extensivity and variety of human emotion might not be able to be entirely captured from an emotional scan from the service robot. People have diverse personalities, life experiences, and communication methods that are extensively varied in an emotional interaction. This in turn informs emotional reactions, which are subjectively based on a personal evaluation of the robot service experience (Huang et al. 2021; Mano & Oliver, 1993).

**Emotional Response**

The first part of the communication in a service robot encounter consists of emotional stimuli recognition, and the second part is for the robot to choose an appropriate emotional response (Chuah & Yu, 2021). Prior literature surrounding service robots has categorized their emotional responses as infusing and preventing (Becker, Efendić, & Odekerken-Schröder, 2022). In determining the appropriate emotional response, the robot is pre-programmed to respond to a human successfully through emotional scans of customers and by using machine assessment techniques (Dzedzickis, Kaklauskas, & Bucinskas, 2020). However, due to the variety of potential emotional communications, the robot is programmed to provide an emotional response that injects positivity into a situation, mitigating negativity through service recovery tactics (Becker, Efendić, & Odekerken-Schröder, 2022). Although there have been advancements, the technology is still not up to par in terms of emotional recognition, so the employees and managers decide what type of emotional response is appropriate for the robot or the human-robot
service team. The face-to-face contact in a typical service encounter is customer-dependent and
driven, which is how the human worker determines the appropriate emotional response to serve
the customer (Finne & Grönroos, 2017); however, the unreliability of the service robot’s choice
of an appropriate emotional response could jeopardize the value of service. When choosing an
emotion to express, to maintain the service expectation, the robot must do so convincingly
through both verbal and non-verbal responses (Becker, Efendić, & Odekerken-Schröder, 2022).
The navigation of providing authentic service responses to a customer from the perspective of a
cobot team must be well-organized in a service business for both positive customer interactions
and responses to negative service recovery interactions. Emotional responses to customers not
only vary in personal choice, but service workers must determine the best emotional response for
their work environment ecosystem, incorporating the business model and organizational
constructs that determine service expectations (Fuentes-Moraleda et al., 2020). Overall, the
technology for service robot emotional recognition and response will continue to improve
(Chuah & Yu, 2021), but until it is perfected, the important process of emotional recognition and
response in the service encounter is in the hands of the service providers to determine the proper
execution of their service standards.

**Trust**

A service encounter requires emotional communication between the server and the
customer. With human-customer interactions, this is a shared recognition and response in the
emotional standard they deem fitting of the situation. However, when service robots are
introduced, previous literature has stated that servers and consumers possess varying levels of
trust with the robot (Huang et al., 2021). In any service interaction, human-human trust is gained
and lost during a service encounter. If a server makes a mistake, this results in diminishing trust
on behalf of the customer, who becomes wary if the same mistake should occur again. Service robots will also present this same issue, where a decrease in customer trust results from robot error (Giorgo et al., 2022). Humans can empathetically communicate in the service recovery, while most service robots cannot communicate at this level. This is one obstacle of service that robots will continue to face until the technology has advanced, but because human-human interactions are well-known and already established in the population, the use of service robots will be a challenge for organizations and their workers in generating trust to the level of humans (Leo & Huh, 2020). Regardless, the novelty of the service robot and the excitement customers have when encountering one does aid to generate trust in the service encounter, therefore mitigating problems with trust caused by unintended errors (Van Pinxteren et al., 2019; Wu & Chang, 2005).

**Anthropomorphism**

Lack of trust between the consumer and the service robot may be due to the issues service robots have conveying human emotion, and even lacking “human touch” (Huang et al. 2021; Fusté-Forné, 2021). Service robot design varies from anthropomorphic (human based design) to zoomorphic (animal-based design), and this has generated different issues with trust and emotional socialization with robots (McCartney & MacCartney, 2020). With anthropomorphic service robot design, the illusion of ‘humanness’ through emotional response creates feelings of ‘eeriness’ or ‘creepiness’. This is the Uncanny Valley Hypothesis, where the creepy/eerie feelings result in the lack of trust with the robot due to a perception that the robot plans to gain more autonomy and exercise self-control over humans (Appel et al., 2016).

However, anthropomorphism can be observed in two ways, either with appearance or social functioning, and previous literature has found that when the appearance of the service
robot is more human-like, yields more trust in the robot-consumer interaction (Van Pinxteren et al., 2019). This stems from the generation of trust that humans use to assess the trustworthiness of one another. Humans assess trustworthiness through their own morality and whether others can access social emotions, such as empathy (Everett, Pizarro, & Crockett, 2017). Conversely, interactions with robots may trigger discomfort because humans unknowingly search for social and emotional cues in hopes of predicting robot behavior (Mourey, Olson, & Yoon, 2017). Therefore, the more human likeness a service robot carries, the more willing a customer is to trust it (Van Pinxteren et al., 2019).

In the case of a cobot team, previous literature has found a certain dynamic between service workers and the robot when encountering a guest. A service robot can have utilitarian value (task-filling) and/or hedonic value (entertainment), which are key components within a service encounter. In most cases, a service robot-worker team provides either or both hedonic and utilitarian value (Ozturk et al., 2023; Yang et al., 2024). If the service robot is perceived as hedonic in value, the service worker will become more of the utilitarian force and vice versa (Odekerken-Schröder et al., 2021). This can result in difficulty for the service worker, where the mandatory use of the service robot may inhibit the emotional connection between the service worker and the guest to execute the tenets of service quality (Odekerken-Schröder et al., 2021; Yang et al., 2024). In the case where the workers' emotional engagement is utilitarian or hedonic, if the robot's value is already determined by the customer, this will force the worker into a role they may not feel comfortable with or one they do not prefer (Lu et al., 2020; Ozturk et al., 2023). Ultimately, this change of work function can create role conflict and employee dissatisfaction which can in turn negatively influence employee well-being and subsequently the overall customer experience.
CHAPTER THREE: METHODOLOGY

Context and background of the study

This study was embedded with the data collection of a larger project. The purpose of the larger project was to explore service workers’ perspectives of working with robots from a technology acceptance point of view (Mejia et al., In Press). The focus of this thesis was to analyze the employee response using the context of empathy questions derived from the quantitative portion of the former SERVQUAL model. As a backdrop, further probing was done in order to elicit potential different responses then classifying those responses into cognitive and affective empathy. The primary data collection process involved semi-structured interviews with service workers and their experience with service robots. Interview questions for this project were conducted using the SERVQUAL empathy subscale (Parasuraman et al., 1988), following the protocol of the larger project in various interview settings, as discussed in greater detail below.

Protocol Development

The interview questions for this study were adapted from the SERVQUAL dimension of empathy (Parasuraman et al., 1988). These questions were used to measure empathy in a service setting and shifted the focus from the consumer lens of SERVQUAL to the employee perspective. The SERVQUAL empathy dimensions were chosen due to their significance and reliability in the service literature (Stevens et al., 1995; Lee, 2017; Santos, 2003), and this study intended to show the observed responses of empathy based on past interactions and experience working with robots. The SERVQUAL empathy questions in the interview protocol were assessed by participating faculty who are experts in the fields of I/O psychology and hospitality.
management. Secondary (probing) questions were added to the existing protocol to elicit fuller responses (see Table 1).

Table 1. Adapted SERVQUAL interview questions.

<table>
<thead>
<tr>
<th>SERVQUAL Empathy Questions</th>
<th>Probing Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>When working with a service robot, are you able to provide more/less personal attention to your customers?</td>
<td>How are you able to recognize the type of personalized service a guest may need?</td>
</tr>
<tr>
<td>How/when do you know you need to provide caring and personalized service to your customers when you're working with the service robot?</td>
<td>What cues are you getting from the table that signify you need to do a better job with the caring component of your service?</td>
</tr>
<tr>
<td>Are the times where the service robot makes it more difficult or easy to understand the specific needs of the guests?</td>
<td></td>
</tr>
<tr>
<td>Have there ever been any times where the service robot has made it unrealistic or difficult for you to have the customer's best interest at heart?</td>
<td>Do you feel it is unrealistic to have the customer's best interest at heart when working with a service robot?</td>
</tr>
</tbody>
</table>

**Sampling Frame**

Within the restaurant and foodservice industry, there are many styles of dining experiences curating unique service expectations (Davis et al., 2018). Each restaurant or foodservice experience encompasses a certain service style typically classified into fine dining service, quick service, casual dining, and family dining. In this study, the two types of service styles used for data collection were fine dining and casual dining service. Fine dining is characterized by full table staff service, paying at the table after the meal, and elevated restaurant ambiance (Dixon, Miscuraca, & Koutroumanis, 2018). Casual dining is characterized by table
service and medium service quality usually without tablecloth service (Dixon, Miscuraca, & Koutroumanis, 2018).

The target population for this study were restaurant or foodservice workers over the age of 18 who consistently worked with a service robot at their organization. The access to the sample and locations was provided through a recommendation from Bear Robotics, who administered the placement of the service robots in these organizations and connected the research team to these locations for data access. The service robot used among participants in the study was the Servi model, consisting of two to three trays placed on wheels, where the primary function was to bring the food to the customer’s table (See Figure 2). Servi can dispatch to and from the kitchen with the press of a button, where it is pre-programmed with the map of the restaurant to avoid obstructions and alert servers when the food is ready for delivery which involved picking up the plates off the trays. Two foodservice organizations agreed to participate in the research and allowed data collection.

One foodservice organization was a senior living community with two dining rooms, one being a fine dining room, in Central Florida. The other organization that agreed to data collection were two casual dining restaurants located in South Florida. The senior living community’s fine dining room was a newer and private dining room with elegant décor offering upscale cuisine. The location in South Florida had décor representing the restaurant’s history with family style tables to serve many people.
Figure 2. Utilitarian-designed "Servi" robot used by participants in the study.

The rationale for including two different service style types was to gain a better understanding of the context and role service robots have in vastly different service settings to improve the useability and expand the generalizability of the study (Liu, Wang, & Wang, 2022). Participants interviewed either worked directly with the robot or observed the robot during their shifts.

**Data Collection**

Forty-three (43) service workers in total (i.e., servers, supervisors, and managers) were interviewed across the foodservice locations specified above. After obtaining IRB approval, data collection occurred during June 2023 and all interviews were conducted in person. At the location in Central Florida, 17 participants were interviewed in one day. The interviews ranged from 15 to 45 minutes, and were conducted in the locations of the venue as prescribed by management. Twenty-six participants were interviewed over the course of two days in South Florida. The interviews ranged from 15 to 30 minutes, and were conducted by one or two interviewers on the research team in the main dining room. At the location in South Florida, it is
important to note that most of the participants were Spanish speakers. The English version of the protocol was professionally translated into Spanish and the research team conducted the interviews in Spanish. The participant interviews were conducted during workers’ breaks and shift changes, following the direction of the manager on duty. All participants were asked the same questions in the same order from the interview protocol, and probing questions were used to gain further insight when participants answered “yes” or “no” to the questions. All qualitative interviews were audio recorded and transcribed by Otter.ai, an online transcription software. In the case of the interviews conducted in Spanish, these were translated professionally by a third-party company according to the IRB mandate.

**Data Analyses**

The data were analyzed using a qualitative deductive and inductive methodology, where each transcript was analyzed and read, and coded for identifying empathy narratives in the data (Creswell & Poth, 2016). The coding analysis for the present study ran concurrently with the data coding for the larger study. The rationale for coding the two studies simultaneously was to identify and separate the data for two independent analyses. The coding strategy entailed a deductive approach associating the level of service quality, distinction in service styles (i.e. fast service or slower, timely service), and empathy dimensions (Elo & Kyngäs, 2008).

The data were analyzed using MAXQDA v.22 qualitative software, where an initial read-through of the interviews was followed by an iterative process conducting an in-depth analysis of the areas that evoked emergent themes. The themes and subthemes that emerged from the data analysis were coded using knowledge of the definitions of cognitive and affective empathy scheme. Overall, 432 coded segments were generated, followed by a data triangulation process and inductive methodology aimed to confirm the final emergent themes. Further triangulation
was achieved with participating faculty on this project, where the relationships and coding similarities were discussed and mapped.
CHAPTER FOUR: RESULTS AND DISCUSSIONS

The data from the respondents were evaluated using deductive and inductive reasoning, revealing themes and subthemes that emerged when coding for employee answer to the questions then classified into a cognitive and affective empathy classification scheme. The resulting themes and subthemes from the data analysis are described in detail below, where sample narrations from the participants are highlighted to add transparency and credibility of the findings (Cresswell & Miller, 2000).

Demographics

All transcripts from the 42 participants were used in the data analysis. The participants’ roles included servers, bussers, bartenders, chefs, delivery workers, and managers. The gender of the participants included 25 (59.5%) females and 17 (40.5%) males. Participants ranged in years working in the hospitality industry from 3 months to 47 years, with the most common time spent being about 1-5 years working in the industry. The time that the service workers had been at their place of employment spanned from one month to 14 years, with an average of 2-3 years. The identities of the participants will remain anonymous, as numbers are used instead to protect their identity as specified in the IRB (see Table 2).
Table 2. Demographics of participants \((n = 42)\).

<table>
<thead>
<tr>
<th>Participant</th>
<th>Current Role:</th>
<th>Years in Industry:</th>
<th>Years at Current Org.</th>
<th>Male/Female:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Server</td>
<td>9 years</td>
<td>10 months</td>
<td>Female</td>
</tr>
<tr>
<td>2</td>
<td>Server</td>
<td>10 months</td>
<td>10 months</td>
<td>Female</td>
</tr>
<tr>
<td>3</td>
<td>Server</td>
<td>22 years</td>
<td>16 years</td>
<td>Female</td>
</tr>
<tr>
<td>4</td>
<td>Manager</td>
<td>14.5 years</td>
<td>14 years</td>
<td>Female</td>
</tr>
<tr>
<td>5</td>
<td>Server</td>
<td>1 year</td>
<td>1 year</td>
<td>Female</td>
</tr>
<tr>
<td>6</td>
<td>Bartender</td>
<td>22 years</td>
<td>108 days</td>
<td>Male</td>
</tr>
<tr>
<td>7</td>
<td>Server</td>
<td>1 year</td>
<td>10 months</td>
<td>Female</td>
</tr>
<tr>
<td>8</td>
<td>Server</td>
<td>15 years</td>
<td>1 year</td>
<td>Female</td>
</tr>
<tr>
<td>9</td>
<td>Busser/Server</td>
<td>5 months</td>
<td>5 months</td>
<td>Male</td>
</tr>
<tr>
<td>10</td>
<td>Server</td>
<td>9 years</td>
<td>10 months</td>
<td>Male</td>
</tr>
<tr>
<td>11</td>
<td>Cook</td>
<td>10 years</td>
<td>1 month</td>
<td>Male</td>
</tr>
<tr>
<td>12</td>
<td>Server</td>
<td>47 years</td>
<td>8.5 years</td>
<td>Female</td>
</tr>
<tr>
<td>13</td>
<td>Kitchen Manager</td>
<td>17 years</td>
<td>9 years</td>
<td>Male</td>
</tr>
<tr>
<td>14</td>
<td>Server</td>
<td>5 years</td>
<td>1 year</td>
<td>Female</td>
</tr>
<tr>
<td>15</td>
<td>Server</td>
<td>10 years</td>
<td>1 year</td>
<td>Female</td>
</tr>
<tr>
<td>16</td>
<td>Server</td>
<td>15 years</td>
<td>1 month</td>
<td>Female</td>
</tr>
<tr>
<td>17</td>
<td>General Manager</td>
<td>25 years</td>
<td>9 years</td>
<td>Female</td>
</tr>
<tr>
<td>18</td>
<td>Server</td>
<td>4 years</td>
<td>3 years</td>
<td>Male</td>
</tr>
<tr>
<td>19</td>
<td>Bartender/Server</td>
<td>3 years</td>
<td>2 months</td>
<td>Male</td>
</tr>
<tr>
<td>20</td>
<td>Server</td>
<td>1 year</td>
<td>1 year</td>
<td>Male</td>
</tr>
<tr>
<td>21</td>
<td>Cook</td>
<td>4 years</td>
<td>1 year</td>
<td>Male</td>
</tr>
<tr>
<td>22</td>
<td>Busser</td>
<td>31 years</td>
<td>7 years</td>
<td>Male</td>
</tr>
<tr>
<td>23</td>
<td>Server</td>
<td>9 years</td>
<td>8 years</td>
<td>Male</td>
</tr>
<tr>
<td>24</td>
<td>Dispatcher</td>
<td>15 years</td>
<td>10 years</td>
<td>Male</td>
</tr>
<tr>
<td>25</td>
<td>Bartender</td>
<td>10 years</td>
<td>1.5 years</td>
<td>Female</td>
</tr>
<tr>
<td>26</td>
<td>Server</td>
<td>25 years</td>
<td>9 years</td>
<td>Male</td>
</tr>
<tr>
<td>27</td>
<td>Dispatcher/Window</td>
<td>5 years</td>
<td>7 months</td>
<td>Female</td>
</tr>
<tr>
<td>28</td>
<td>Window/Delivery</td>
<td>n/a</td>
<td>8 years</td>
<td>Female</td>
</tr>
<tr>
<td>29</td>
<td>Server</td>
<td>4 years</td>
<td>4 years</td>
<td>Female</td>
</tr>
<tr>
<td>30</td>
<td>Server</td>
<td>2 years</td>
<td>2 years</td>
<td>Female</td>
</tr>
<tr>
<td>31</td>
<td>Bartender/Server</td>
<td>4 years</td>
<td>4 years</td>
<td>Female</td>
</tr>
<tr>
<td>32</td>
<td>Server</td>
<td>6 years</td>
<td>1 year</td>
<td>Female</td>
</tr>
<tr>
<td>33</td>
<td>Driver</td>
<td>3 years</td>
<td>1.5 years</td>
<td>Male</td>
</tr>
<tr>
<td>34</td>
<td>Employee</td>
<td>10 years</td>
<td>10 years</td>
<td>Female</td>
</tr>
<tr>
<td>35</td>
<td>Dispatcher</td>
<td>2 years</td>
<td>1 year</td>
<td>Female</td>
</tr>
<tr>
<td>36</td>
<td>Server</td>
<td>10 years</td>
<td>8 years</td>
<td>Female</td>
</tr>
<tr>
<td>37</td>
<td>Server</td>
<td>30 years</td>
<td>13 years</td>
<td>Female</td>
</tr>
<tr>
<td>38</td>
<td>Delivery</td>
<td>7 months</td>
<td>7 months</td>
<td>Female</td>
</tr>
<tr>
<td>39</td>
<td>Delivery Supervisor</td>
<td>5 years</td>
<td>3 years</td>
<td>Female</td>
</tr>
<tr>
<td>40</td>
<td>Dispatcher</td>
<td>12 years</td>
<td>11 years</td>
<td>Male</td>
</tr>
<tr>
<td>41</td>
<td>Server</td>
<td>3 months</td>
<td>3 months</td>
<td>Male</td>
</tr>
<tr>
<td>42</td>
<td>Delivery</td>
<td>9 months</td>
<td>9 months</td>
<td>Male</td>
</tr>
</tbody>
</table>
Emergent Themes

There were 432 codes that emerged from the data, which clustered around two overarching themes: (1) Cognitive Empathy (342); and (2) Affective Empathy (90). The cluster map (see Figure 1) was formulated based on the frequency and proximity of codes to one another within the Maxqda v.22 software (Kuckartz & Radiker, 2019). The interpretation of each of the themes and codes are discussed in the following results section below, including supportive narrative examples from the participants where appropriate.

Figure 3. Results map of emergent themes with code clusters.
Table 3. Emergent themes from the data including frequencies and code percentages.

<table>
<thead>
<tr>
<th>Themes</th>
<th>Codes</th>
<th>Freq.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cognitive Empathy</td>
<td>Impacts on worker productivity</td>
<td>121</td>
<td>35.4</td>
</tr>
<tr>
<td></td>
<td>Customer Reactions</td>
<td>64</td>
<td>18.7</td>
</tr>
<tr>
<td></td>
<td>Impacts on well-being</td>
<td>52</td>
<td>15.2</td>
</tr>
<tr>
<td></td>
<td>Feelings of enjoyment</td>
<td>45</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>Analytic Empathy</td>
<td>38</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td>Personal Service Attention</td>
<td>22</td>
<td>6.4</td>
</tr>
<tr>
<td>2. Affective Empathy</td>
<td>Feelings of dread, anger, frustration</td>
<td>62</td>
<td>68.9</td>
</tr>
<tr>
<td></td>
<td>Emotional Empathy</td>
<td>28</td>
<td>31.1</td>
</tr>
</tbody>
</table>

Cognitive Empathy

A total of 342 of codes within the Cognitive Empathy theme clustered six codes: (1) Impacts on worker productivity (121); (2) Customer Reactions (64); (3) Impacts on well-being (52); (4) Feelings of enjoyment (45); (5) Analytic empathy (38); and (6) Personal service attention (22). Overall, the data revealed a tendency to pair cognitive empathy with feelings of enjoyment and positive impacts on worker productivity and well-being.

Impacts on Worker Productivity

The most prevalent code within the cognitive empathy theme was impacts on worker productivity (121). Participants focused on the impact the service robot had on their work, and whether it assisted or inhibited service. Participants had varied responses, as some experienced that it increased their productivity, but some felt it impeded their productivity. Narrators
indicated that the service robot enhanced their productivity during periods of high volume
[3][4][16][39], aiding in multitasking demands [14][19] or when they handled large, heavy
dishware [16] [20]. Generally, data revealed the relationship between impacts on worker
productivity and cognitive empathy surrounding the robot assistance of speeding up service.

“Sometimes when we are taking orders, that robot gets sent with a food so we can
do two things at the same time: we finish the order and we'll go get the food.”
[19]

The participants were focused on the nature of how the service robot sped up service,
which was interpreted that they leveraged cognitive empathy to serve the guests [2][6]. However,
not all participants experienced the service robot positively impacting their productivity. Some
participants conveyed their animosity towards the slowness of the robot, claiming it inhibited
their service. For example, in one narration, “No, I kind of just walk past it. Like, it's not even
there. You know, I ignore it, pretty much. I ignore it. Unless, you know, again, I have to use it”
[10]. Despite opposing viewpoints, most participants found that the service robot increased both
their and fellow employee productivity. As it related to the emergent theme of cognitive
empathy, worker productivity increased with the service robot assisting with quick service means
logically the service also increases. With a service robot ready to aid in any manner to the service
worker, the logical empathetic response was that the service robot improved productivity.

Customer Reactions

The customer reactions involving the robot was the second highest code (64 codes) under
the cognitive empathy theme. It was coded when servers recalled any kind of positive or negative
reaction customers had with the service robot during the service encounter. Participants primarily
recalled positive interactions between customers and the service robot. Narrators discussed how
the robot served as a buffer for customer interaction [1], that customers felt it was an interesting
and entertaining addition to the service environment and generalized positive reactions from customers. Narrators also indicated that customers felt the adoption of the robot was a waste of time and money and that some customers had mixed feelings about the presence of the robot.

Despite some apprehensive feelings from customers, narrators made a point to note how the robot generated business. Participants explained that customers will often request service from the robot, or even stop into their business location just to see the service robot. Furthermore, customers were interested and excited to be served by the robot, since it was perceived as an out-of-the-ordinary dining experience. To illustrate this point further:

“I think the robot is part of a show. [When people come to a restaurant] they are not hungry; they're going to [want] a show or they want to [decompress] from their job or whatever [else they are doing] to have time off. So they come [just like] I do, that some time [I go] with my wife for a coffee, whatever [the restaurant] gives because we need some time off, [or] out of the house, or whatever. Then, for that kind of people, they go out [and] they don't eat that much food, [just] whatever is funny for them.”

The service robot was described as a performer, being a part of the “show” that was the service experience, which contributed to customers’ positive reactions. Participants noticed the positive customer reactions and associated those feelings with the service robot, which explained its grouping in the cognitive empathy theme. Cognitive empathy is based primarily on logic, where narrators deemed the human-robot interpersonal engagement responsible for the consumers’ positive reactions.

**Impacts on Well-Being**

Another prevalent code within the cognitive empathy theme was *impacts on well-being* (52 codes), meaning how the service robot directly impacted the well-being of employees at work. Service robots shaped participants’ well-being in many ways, and narrators had varied
responses when asked about their well-being and the service robot’s involvement. One participant conveyed an increased well-being status upon arrival of the service robot:

“Yeah, I would say there's definitely been a lot less stress and a lot less burnout. Working in food service, for as long as I have, it gets really draining. And some of the older ladies that are here, they've worked here for longer—for some of them longer than almost I've been alive. So it's, yeah, it's been this industry that has been kind of like their bread and butter. So having like the robot here, I feel like it's, they've kind of shouldered that they have to do everything for everything to be done, right. Whereas with me and some of the younger generation, we kind of, we really do kind of employ the things smarter, not harder. If it's not something that we have to do, then it's something that we can try and delegate amongst each other. So having the robot be able to do something that we can delegate to it, it's been a lot easier for us mentally, physically, and emotionally as well, to kind of have that done” [1].

Having the service robot undertakes extraneous labor that is part of a service standard provided an increase in well-being for employees in this study. Participants mentioned that the service robot improved their interactions with guests and tended to blame the robot for messing up rather than themselves [41]. Alternatively, other participants discussed their apprehension towards the robot and the perceived impact it might have on their job security. With language such as “This is the future right here. I might lose my job. I’m just kidding. I’m kidding.” [5]. The lack of trust between the service robot and worker may have led to an impact on participants’ empathy during the service encounter. Where the employee may not have been able to engage in the empathy dimension they primarily use for service, in instances they were distracted or inhibited by the robot’s presence due to a lack of trust.

Feelings of Enjoyment

Feelings of enjoyment was a code (45 codes) that emerged under the cognitive empathy theme, where participants recalled customers or co-workers expressing positive feedback toward the service robot. Most participants found that the robot encouraged positive feelings of enjoyment from both customers and co-workers in which they discussed how customers showed
excitement when the robot was around [2][40], and even how the robot would bring in business
due to the excitement novelty of seeing the robot in action [34]. An example of feeling of
enjoyment from a participant:

“Oh, joy, lunchtime. I usually find joy in it, you know, and, you know, it races to
the table, and it says, you know, have a good day. And I always get a kick out of
that. When it tells the residents, "Have a good day". And it says like, please wait to
take your food. The residents always get a kick out of it. And so, I always feel a
little joy when they're having a good time. I'm having a good time” [9].

Overall, customer reactions were primarily positive feelings due to the service robot
presence. Participants also revealed their excitement upon the robot's arrival at their workplace,
discussing how unique and interesting it is to work with the service robot [3][17]. These feelings
of enjoyment were interpreted as guided by cognitive empathy, where the data divulged that
cognitive empathy was mostly associated with feelings of enjoyment. Cognitive empathy, being a
more logistical form of empathy (Chiu, 2002), illustrates the connection between feelings of
enjoyment because of the perceived helpfulness of the service robot.

**Analytic Empathy**

In terms of the code *analytic empathy* (36), which is another way to categorize cognitive
empathy, overall responses were positive towards the robot, and were related to cognitive
empathy. The nuance of the robot in tandem with its basic service resulted in feelings of
enjoyment from customers, which supported participants' analytic empathy. In other words, the
novelty of the service robot overshadowed the actual service it was providing. However, the
robot provided the bare minimum service, based on the responses from participants:

“No, the robot does not have contact with the customer. The waiter is the one who
takes the order. The robot just delivers the food. In fact, the robot arrives at the table
and either the customer takes the food or the waiter arrives and places the order on
the table. But the robot just carries the food [35].
The most basic service standards the robot performed implied a type of analytic (cognitive) empathy, which is strictly a logical way of thinking, resulting in positive reviews from the participants. Evident in the discussions surrounding the physical service the robot delivered, this highlighted participants analytic empathy through their perception of how the service robot impacted their service delivery. Though some participants said that working with a service robot inhibited the personalization of their service [14][16], participants mostly agreed that their service was faster, and that the robot helped them and their customers. This finding was associated with participants’ positive feelings towards the robot:

“Well, the interaction of the customers with the robots is tremendously good. I think that that interaction also translates in part to the waiters because they are part of the service. So, now there is a third part that is serving them, that is not just the client, and the waiter and the busser like it was before, but there is a robotic part that helps the clients. And I see that that has gotten the attention of the customers. As I said before, at the beginning when we got it, and even now on some occasions, people take selfies with the robot.” [39].

The robot had many roles in the sites they were introduced to, and generated attention that led to beneficial interactions with customers. Seeing the robot as a “tool,” through analytic empathy, allowed for the threat of the robot to be reduced and only seen as an aid to the participant [35].

**Personal Service Attention**

*Personal service attention* (22) was a code under the cognitive empathy theme, where respondents found that the robot aided in their ability to personalize service to customers. Either participants felt that the robot did not impact the personalization of service at all [15][41], or the personalized service was easier to conduct with the robot [37][38]. The connection between personal service attention and cognitive empathy was a notable finding, as personal service attention could be construed as an affective empathy practice. The customization of the
experience on the subliminal needs of guests is an affective empathy practice, as opposed to
cognitive empathy (Jung et al., 2023). Therefore, the connection between personal service
attention and cognitive empathy may be attributed to the quick-serve context that the robot
showcases during the service encounter:

“I think that I have already mentioned that when I said that in the case of the
waitresses and the waiters, they can give more personalized attention to the
customer because the robot is fulfilling functions they had to do before, that now
are done by the robot. That is very positive.” [40].

Due to its use as a tool, the service robot allowed for more time to attend to guests’
personalized needs, resulting in the connection between cognitive empathy and personalized
service attention. Cognitive empathy and service robots influenced personalized service
attention, through the impressive technological advancement of the service robot, this novelty is
now associated with personalized service. There may have been a discrepancy in age, where
younger hospitality workers were more comfortable with technology, and were well equipped to
utilize the service robot in an effective manner. Older workers may have been apprehensive
about technology, therefore having a challenging time connecting their personalized service to
service robot use.

Affective Empathy

A total of 90 codes within affective empathy clustered: (1) Feelings of dread, anger, and
frustration (62); and (2) emotional empathy (28). The clustering of these codes found that
participants often discussed moments of affective empathy in tandem with feelings of dread,
anger, and frustration. The codes of feelings of dread, anger, and frustration and emotional
empathy will be discussed further.
Feelings of dread, anger, and frustration

The foremost code under the affective empathy theme was feelings of dread, anger, and frustration (62) and were deemed related to affective empathy when the emotional level of empathy was hindered by the presence of the service robot. Narrators discussed that customers, especially elderly customers, were unimpressed and irritated with the robot implementation. For example, a narrator recalled, “At first, everyone got really excited except for the older generation. They're like, “that's not—that's dumb. Why do we need a robot?” [1]. Participants also discussed their frustration surrounding complications between the service robot and the older generation of customers, often having to worry about collisions or negative comments from the customers [15]. Affective empathy is the emotional aspect of empathy, contrasted to cognitive empathy, where the added level of concern for customers was heightened due to the service robot presence. Since the robot inhibited the way that a participant practiced affective empathy when serving customers, it was revealed as frustration and anger:

“I don’t really have to express it. I think a lot of them can read [my face]. They can read my face and they know. Like, I'll roll my eyes and I just don't care for it, you know, is what it comes down to. I don't know if it was like [the other restaurant’s] setup and it was more beneficial. I'm not opposed to using it. But over there, it's just a nuisance and it just gets in the way you know it do” [10].

Thus, the physical space not being conducive for a service robot only added to the frustration and anger among some participants. How the service robot interacted with the type of service desired by customers, driven by affective empathy, incurred rising levels of tension and dread from participants when inhibited by the service robot [26][42]. Workable solutions for service robot implementation will be discussed further in theoretical and practical implications.
Emotional Empathy

Emotional empathy (28 codes), was the second code that emerged under affective empathy and primarily focused on emotional service interactions. Narrators portrayed their impacted affective empathy in negative ways, meaning the robot inhibited their affective empathy. It takes an emotional intelligence the robot is not equipped with, so participants are finding difficulty balancing the emotional engagement with customers and the service robot presence. For example, one participant discussed how they engaged in emotional empathy during their service encounters:

“Yeah. There are moments and “moments”, there are customers and “customers”. It's the same word, but with different meanings. Our customers [like us] because we are not perfect. We are no robots. We are not perfect. The robot is [also] not perfect. So if you want to be better, you have to look for perfection. Maybe I can say I’m a perfectionist. I like that. I like this when something wrong happens to me, I don't want it to happen again. I want to take the steps that I need to make the next time. So there are easier customers and harder customers to treat. There is a customer who can forgive you for a second to bring the water. The older [customers] one was already getting done and can’t forgive me so that said you got to be very careful with other people.” [26]

This level of understanding of customers is closely regarded as emotional empathy, whereas service robots are yet to engage with customers in this manner. Other participants, who tended to use affective empathy during a service encounter, conveyed feelings of dread, anger, and frustration when asked about the robot. Personalization engages with affective empathy, and the robot interrupts this deep engagement with customers, resulting in negative feelings. Within the service execution, the participants were able to tailor the experiences to their guests, but from the data, the robot inhibited this process, resulting in feelings of dread, anger, and frustration [2][12] [26]. Affective empathy evoked the emotional involvement of others, which led to dreadful emotions from workers since their ability to personalize service was perceived to be inhibited by the service robot. Participants felt they experienced a sense of constraint by the
service robot when providing service. Their ability to express genuine concern for others was limited as the emotional engagement from workers was now divided between customer and service robot [34] [38].
CHAPTER FIVE: CONCLUSION

The findings of this research indicated that the service robot's presence influenced cognitive and affective empathy expression in the service encounter. Cognitive empathy was associated closely with positive reactions from customers and employees, as the logical nature of cognitive empathy determined those service interactions. Affective empathy was related to negative reactions from customers and employees, as the emotionality of affective empathy was deterred by the impersonal attributes and inability to access emotion by the service robot.

This study’s findings support and extend prior research on service quality and service robots regarding service robots' lack of emotional empathy, which negatively impacted hospitality employees’ well-being (Khoa et al., 2023). Furthermore, this study reinforces previous research indicating that the difference in service context and settings influence the type of empathetic engagement found within the employee-customer dynamic (Tan, Muskat, & Johns, 2019). This study extended SERVQUAL research, through the application of the differences cognitive and affective empathy have in a service setting.

Differentiating cognitive and affective empathy uncovered divergent empathetic responses in the service encounter, as opposed the generalized SERVQUAL empathy subscale. These findings suggest that there is a difference in empathetic response in the service encounter, and service employees evoke empathy differently with the service robot. This extends the SERVQUAL research by showing the value of breaking down the empathy subscale into finer dimensions (Jung et al., 2023). A valuable contribution to the literature, this will allow management to view their service environment differently and employees to understand how to navigate the service encounter with more efficiency. Management and employees being able to
clearly identify the level of emotional engagement a situation may require could facilitate robot use.

**Service Robot as a Tool or Co-Worker**

Through the lens of the participants in this study, the proposed conceptual model was informative of the findings. Depending on whether the participants envisioned the role of the service robot as a tool or as a co-worker, the findings in this study most often related utilitarian value to the robot as a tool, and hedonic value to the robot as a co-worker, even when its implementation was not clearly defined (Odekerken-Schröder et al., 2021; Ozturk et al., 2023). The Servi robot used among participants in this study was an inherently utilitarian type of service robot without anthropomorphic features or programming to respond in an empathetic way. The robot’s design and its impact on the results of this study also illustrates a gap between organizational intention, managerial execution, and employee technology adoption. For example, the participants’ organizations and management in this study most likely had a vision for the service robot adoption, and without an understanding of Servi’s inherently utilitarian value, the findings revealed gaps in worker trust and empathy consistent with prior research (Huang et al., 2021). Perhaps, had Servi been more anthropomorphic, the participants in this study may have felt more emotionally invested, as both workers and customers trust human-like robots more readily than utilitarian service robots, which positively affects a service encounter (Leo & Huh, 2020; McCartney & McCartney, 2020). The results from this study show that workers engaged in affective empathy during the service encounter and since the role (tool or co-worker) or value (utilitarian or hedonic) of the robot was not clearly defined (Belanche et al., 2020; Paluch et al., 2022), this resulted in issues of wellbeing and stress about job security and robot use. In contrast, when participants in this study tapped more into their cognitive empathy, their thinking aligned
more closely with utilizing the service robot as a tool, reliant on the utilitarian values of the service robot. This finding also revealed increased overall worker productivity and by self-report, enhanced the service encounter.

**Theoretical Implications**

Theoretical implications of this study include the delineation of the SERVQUAL empathy dimension into cognitive and affective empathy (Parasurman et al., 1988). As the SERVQUAL empathy dimension provides a generalized understanding, there are benefits to the finer identification of empathy in each service context. This study identified empathetic nuance and the variations the service encounter can have through cognitive and affective empathy from workers engaged with service robots in restaurants and foodservice. When applied, cognitive empathy was related to positive feelings, when the robot was seen as a helpful tool. Whereas negative feelings towards the service robot emanated from affective empathy in this study, service that required more emotional engagement was disrupted by the presence of the robot, as service robots are unable to emote affective empathy. This finding expands the service literature in terms of workers viewing the service robot as a tool with utilitarian value, or as a co-worker with hedonic value. Delineating empathy further into cognitive and affective dimensions also helps to advance the service robot's value theoretically, which in turn will help clarify its role in the service quality framework. These findings may also lead to the linkage of surface and deep acting in the workplace from the Industrial-Organizational Psychology literature (Martínez-Iñigo et al., 2007).

Surface and deep acting, as well as different empathetic responses, represent reactions contingent to the service context desired by customers. Within the fast-casual dining setting, it was found the robot expedited service delivery, which was deemed helpful by participants. In
contrast, the casual dining setting elicited higher expectations of quality service, emphasizing affective empathy in the service standards. As the research in this area is nascent, the increased use of service robots will continue to have implications on frontline service workers’ empathy, and by extension, their well-being. Therefore, measurements of service quality will need to be further developed, including the role that cognitive and affective empathy have on a service worker’s well-being (Chiu et al., 2002). Further implications should involve the varying empathy responses in different service and organizational contexts.

**Practical Implications**

Given that in most robot adoption scenarios the introduction and use of service robots is mandated by management, practical implications from this research include the importance of employee empowerment and managerial support in workplace implementation standards. Especially in the industry of hospitality and tourism, the ability to engage in service in the way that employees see fit allows for the personalization and empathetic concern that is expected in a service encounter. Management needs to be able to foster the relationship between consumer, employee, and service robot. Regular training is recommended to foster those relationships through standard operating procedures for robot use. Employee empowerment is also encouraged to be implemented, where management should support employee decisions and input regarding how to effectively use the service robot. Encouraging the use of the robot by clearly identifying its role and standard operating procedures, and considering opinions from employees, communication and transparency will inspire employees to transition into a cobot team. Managerial support can also be emphasized through pre- and post-shift meetings, specifically asking questions regarding the service robot, identifying problems, and being open to recommendations on robot use. Through opening transparent communication between
managerial support and employees, this can further discussions of empathy in the service encounter and employees’ personalization of service.

Co-creation of service robots presents another practical implication that may facilitate the adoption of service robots in the hospitality industry. Previous research has identified value in co-creation, based on consumer preferences and standards (Zhang, Balaji, & Jiang, 2022). Expanding co-creation to incorporate employee input allows employees to participate in change management when service robots are designed to assist their work. Employee-inclusive co-creation may also be useful with input from employees, creating a robot that fits the needs of both consumers and employees. The practical implications of co-creation provide a pathway to harmonize service robot capabilities from consumer and employee standards.

**Limitations and Future Research**

This study has certain constraints, primarily its dependence on the larger study and its limited access to industry. Another limitation was the interdisciplinary definitions of empathy being viewed differently across various industries. Within this study, the clarity of the definitions of empathy and how to apply them to the data was a limitation to the results. An attempt was made to code for positive and negative valence of reactions from employees and customers that did not generate additional clarity. Since the definitions of cognitive and affective empathy were different across the hospitality, retail and marketing, and psychology literature, it was challenging to have a well-defined understanding of cognitive and empathy in service. Since this is an exploratory study, future research should test a variety of definitions of empathy across disciplines. Future research recommendations are to conduct concentrated questions as a singular study. While that was not tested in this study, further research could focus on how deep and surface acting compare with cognitive and affective empathy in a service encounter, as well as
the comparison between cognitive and affective empathy and how this influences extrinsic and intrinsic motivation involving workers’ robot use. It is important to examine the reason why workers prefer to use the robot and why some do not and determine how this influences employee well-being.

Future research can also expand into different areas of the hospitality industry, widening the range to involve hotels and other service locations that utilize service robots. Examining the functionality of cobot teams through the lens of cognitive and affective empathy may expose different branches of the hospitality industry, such as tourism, hotels, and events. Also, further research can delve deeper into the examination of customer reactions, particularly focusing on when customers become acclimated to the service robot and when it will no longer be seen as a novelty. Future research should also be conducted with interdisciplinary teams to broaden perspectives and the nature of the phenomenon being studied. Disciplines such as psychology, sociology, and human factors would provide the much-needed perspectives to gain a more fulsome interpretation and analysis of the phenomenon. A quantitative or mixed methods study is also recommended to test behavioral models such as the technology acceptance model (Davis, 1985), social cognitive theory of personality (Bandura, 1999), and theory of planned behavior (Ajzen, 1991). Future research should also examine the phenomenon longitudinally, as service robots are still in an emergent adoption phase.
APPENDIX A: IRB APPROVAL LETTER
EXEMPTION DETERMINATION

May 30, 2023

Dear Cynthia Mejia:

On 5/30/2023, the IRB determined the following submission to be human subjects research that is exempt from regulation:

<table>
<thead>
<tr>
<th>Type of Review</th>
<th>Modification / Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title:</td>
<td>Hospitality Service Robots and Worker Well-Being</td>
</tr>
<tr>
<td>Investigator:</td>
<td>Cynthia Mejia</td>
</tr>
<tr>
<td>IRB ID:</td>
<td>MOD000004176</td>
</tr>
<tr>
<td>Funding:</td>
<td>Name: National Institute for Occupational Safety and Health</td>
</tr>
<tr>
<td>Grant ID:</td>
<td>None</td>
</tr>
<tr>
<td>Documents Reviewed:</td>
<td>• Hospitality Service Robots Questionnaire.docx,</td>
</tr>
<tr>
<td></td>
<td>Category: Interview / Focus Questions;</td>
</tr>
</tbody>
</table>

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made, and there are questions about whether these changes affect the exempt status of the human research, please submit a modification request to the IRB. Guidance on submitting Modifications and Administrative Check-in are detailed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system. When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Kamille Birkbeck
Designated Reviewer
APPENDIX B: IRB FACULTY ADVISOR LETTER
Cynthia Mejia, Ph.D.
Interim Dean | Associate Professor
Rosen College of Hospitality Management
9907 Universal Blvd
Orlando, FL 32819

March 6, 2024

Re: Emily Broker’s Masters data collection and IRB ID #MOD00004176 Hospitality Service Robots and Worker Well-Being

To Whom it May Concern:

Please be advised Emily Broker’s masters data collection was part of a larger study (IRB ID #MOD00004176), which remains open because the larger study is not yet completed. I am the PI and when we complete the larger project, I will close the IRB.

With Warm Regards,

Cynthia Mejia
Cynthia Mejia, Ph.D.
Interim Dean

Deputy Director for Industry Collaboration
UCF Targeted Research Training Program (TRT)
https://hospitality.ucf.edu/trt-sunshine-erc-targeted-research-training-program/
Part of the NIOSH-Sponsored Sunshine Education & Research Center
EXPLANATION OF RESEARCH

Title of Study: Hospitality Service Robots & Restaurant Well-Being

Principal Investigator: Cynthia Mejia, Ph.D.

Other Investigator(s): Mindy Shoss, Ph.D., Steve Jer, Ph.D., Mary Jean Amon, Ph.D., & Joe Kider, Ph.D.

You are being invited to take part in a research study. Whether you take part is up to you.

The purpose of this research is to understand the practices, policies, and procedures that enable restaurant and foodservice workers and workplaces to realize the benefits of service robots while lessening negative impacts to worker well-being.

You will be asked to participate in an interview, either in-person at your work location or over Zoom for up to one hour. The audio of the interview will be recorded. You will be audio recorded during this study. If you do not want to be recorded, you will be able to be in the study. Discuss this with the researcher or a research team member.

If you are recorded as part of this study, the recording will be kept in a secure digital file. The recording will be erased or destroyed 5 years after study closure per Florida law.

You have the potential to receive a $15 Amazon gift card for participating for the entire duration of this study, up to 60 minutes. If participating in person, you will receive the gift card immediately. If participating virtually, we will email you an electronic gift card. If you do not complete the entire interview, you will not receive the $15 gift card and your data will be used in the final analysis up until the point of withdrawal.

Only your title, position, and location will be stored with the identifiable data. Identifiable information that will be collected will be de-identified in the transcription process. Your identifiable data such as your name and contact information will be stored separately from the de-identified data on a UCF Teams account that is password protected. Only those researchers involved in the study will have access to the data. Your audio recording will be transcribed by Otter.ai if in-person or through Zoom if your interview is virtual. Please note that the recording will be used by Otter.ai or Zoom based on their privacy policy. Once transcriptions are completed, your information will be deidentified and stored in UCF Teams and password protected. Per UCF Policy, all study information must be stored for a minimum of 5 years after study closure.

Your information collected as part of this research will not be used or distributed for future research studies, even if all of your identifiers are removed.

You must be 18 years of age or older to take part in this research study and have worked with a service robot in a restaurant setting.

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints please contact: Cynthia Mejia, Ph.D., Associate Professor, UCF Rosen College of Hospitality Management, (407) 903-8191, or email at Cynthia.Mejia@ucf.edu.

IRB contact about your rights in this study or to report a complaint: If you have questions about your rights as a research participant, or have concerns about the conduct of this study, please contact Institutional Review Board (IRB), University of Central Florida, Office of Research, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901, or email irb@ucf.edu.
APPENDIX D: INTERVIEW PROTOCOL
MATERIALS:

1. Voice recorder/Zoom ready to record on cloud. Additional AAA batteries, we supply. [Practice using the digital recorder.]

2. Printed or digital versions of EXPLANATION OF RESEARCH

3. Hard copy NOTEBOOK (not digital) to jot down any thoughts you have while conducting the interview. These are your field notes which will be important later during triangulation.

4. Physical Amazon $20 gift cards or collect email address in your notes.

5. Hard copy of GIFT CARD LOG.

INTERVIEW INSTRUCTIONS:

1. Try to sit in a quiet place with no/few distractions. This includes Zoom, avoid public places. Do not look at your phone for any reason.

2. Sit an appropriate distance from the participant, not too close/not too far.

3. Smile, create a trustful, professional environment. Thank the participant for their interest.

4. Make a note on the digital recorder file # and include the date, location, and time of the interview in your field notes.

5. Ask if they are ready to begin, then start the interview script (see below).

6. Do not ask the participant their name. Do not call them by their name, this is anonymous.

7. If the participant stops at any time prior to the final question, that is OK, but they do not receive a gift card. We retain the data up until the stopping point (see Explanation of Research).

8. If they do not agree to be recorded, that is OK. You will need to take detailed notes of the interview.

9. If conducting the interview on Zoom, voice-only is allowed. Do not make the participant use their camera.

BEST PRACTICES:

1. Try to stay on script. Often, participants will inadvertently answer questions further in your script. This is OK. Keep track of the flow and do not ask new questions they have already addressed/answered.

2. Try not to lead the participant. Allow spaces of silence, sometimes people need time to collect their thoughts. Resist the temptation to fill in quiet space.

3. Try to keep a pace, you only have 45-60 minutes to complete the interview. 30 minutes is optimum, or fatigue and repetition starts to set in.

4. Sometimes, participants veer into other areas when answering. Use attentive listening and be prepared with probing questions.
5. Try to achieve fulsome answers. If a participant says ""yes"" or ""no"" to a question, you may have to follow up with ""why do you feel that way"" or ""can you provide an example""?

6. The questions are grouped. Before asking a new group of questions, tell the participant, ""this next group of questions is about xyz"".

7. Understand this questionnaire, the basis for the questions, and the appropriate theories behind the questions.

**INTERVIEW SCRIPT:**

1. Hello, my name is:_______________. Our study is about the use of service robots in restaurants/foodservice.

2. Discuss EXPLANATION OF RESEARCH

3. Ask: "May I have your permission to record our conversation?"

4. Turn on recorder/Zoom cloud record and say "I am now recording this conversation".

**BEGIN INTERVIEW QUESTIONS:**

5. How long have you worked in this organization?

6. What is your current role and how long have you worked in your current role?

7. How long have you worked in the hospitality/restaurant industry?

8. How long have you been working with the service robot?

9. Have you ever used or worked with a service robot, or any other robotic technology, either personally or professionally (beside in this job)?

<table>
<thead>
<tr>
<th>Category</th>
<th>Primary Question(s)</th>
<th>Follow-Up Question(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>General technology use</td>
<td>What type of technology do you use most regularly in your personal life? For example, internet, computers or tablets, cellphones, or smartwatches or other wearable devices? May need to redirect here.</td>
</tr>
<tr>
<td>Technology</td>
<td>Technology at work</td>
<td>Technology at work questions</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Technology</td>
<td>Type of technology at work</td>
<td>Is there any type of technology or device, that you don’t currently use at work, but that you think would be helpful in your job?</td>
</tr>
<tr>
<td>Technology</td>
<td>Technology-related challenges</td>
<td>Have you experienced any challenges associated with using the service robot at work? If so, what were these challenges?</td>
</tr>
<tr>
<td>Technology</td>
<td>Past technology introductions</td>
<td>What has your past experience been like when new technology has been introduced at work?</td>
</tr>
<tr>
<td>Technology</td>
<td>Past technology experience</td>
<td>What functions do you find most helpful when using the service robot?</td>
</tr>
<tr>
<td>Robot</td>
<td>Rationale for adoption</td>
<td>Do you know why the robot was brought into the restaurant?</td>
</tr>
<tr>
<td>Robot</td>
<td>Safety outcomes (related to robot use)</td>
<td>Have you noticed any improvements in safety while using the service robot? For example, reduced accidents, lower injury rates, or improved identification of health risks. If so, how?</td>
</tr>
</tbody>
</table>

55
<table>
<thead>
<tr>
<th>Robot</th>
<th>Organizational outcomes (related to robot use)</th>
<th>What has the service robot done to increase or decrease your productivity, and in what ways?</th>
<th>Increased job satisfaction or engagement? Reduction in sick leave or absenteeism?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot</td>
<td>Health outcomes (related to robot use)</td>
<td>Have there been any improvements to your well-being since using the service robot? For example, reduced stress or burnout?</td>
<td></td>
</tr>
<tr>
<td>Robot</td>
<td>Reliability: SERVQUAL</td>
<td>How reliable or dependable is the service robot in your work?</td>
<td></td>
</tr>
<tr>
<td>Robot</td>
<td>Facilitating Conditions: Co-workers UTAUT</td>
<td>Have you noticed any changes in your co-workers or their behavior since using the service robot?</td>
<td>Have you been able to try new service standards while observing your co-workers using the service robot?</td>
</tr>
<tr>
<td>Robot</td>
<td>Facilitating Conditions: Management UTAUT</td>
<td>How often do you and the management talk about ways to improve working with the robot? Does your team have any goals in using the robot?</td>
<td>Have you noticed any unintended consequences of using the robot?</td>
</tr>
<tr>
<td>Robot</td>
<td>Facilitating Conditions: Management UTAUT</td>
<td>What type of training have you received prior to using the service robot?</td>
<td>To what extent do you feel supported in your organization given the training you have received to work with the robot?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What type of supervisory or managerial support have you received since using the service robot?</td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>Process Improvement</td>
<td>What types of changes might you recommend to the service process/standards in your restaurant?</td>
<td>Are you caring trays to the table when using the robot? Are you bussing dirty dishes and taking those back to the dish station when using the robot?</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Operations</td>
<td>Process Improvement</td>
<td>Have you ever had an idea about how to improve the service with the robot? Did you tell someone? What did or did not happen?</td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>Affective Factors</td>
<td>Do you have any feelings of enjoyment when working with the robot? How about dread, or disappointment? When and why do these feelings occur?</td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>Affective Factors</td>
<td>Do you ever get angry or frustrated with the robot? How do you feel when you don't want to use the robot and you are expected to?</td>
<td>Have you ever seen any of your co-workers get angry with the robot?</td>
</tr>
<tr>
<td>Operations</td>
<td>Process Improvement Customer</td>
<td>Does the robot slow down your service to the customer? Does the robot inhibit your ability to deliver good service to your customers?</td>
<td>In what ways could the robot or service standards change in order for you to give better service?</td>
</tr>
<tr>
<td>Operations</td>
<td>Process Improvement Customer</td>
<td>How do your customers feel about the robot?</td>
<td>How do you think having a service robot impacts the server-customer interaction? Do your customers treat you differently when you are using the robot during service?</td>
</tr>
<tr>
<td>Robot</td>
<td>Empathy: SERVQUAL</td>
<td>When working with a service robot, are you able to provide more/less personal attention to your customers?</td>
<td>How are you able to recognize the type of personalized service a guest may need?</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Robot</td>
<td>Empathy: SERVQUAL</td>
<td>How/when do you know you need to provide caring and personalized service to your customers when you're working with the service robot?</td>
<td>What cues are you getting from the table that signify you need to do a better job with the caring component of your service?</td>
</tr>
<tr>
<td>Robot</td>
<td>Empathy: SERVQUAL</td>
<td>Are the times where the service robot makes it more difficult or easy to understand the specific needs of the guests?</td>
<td></td>
</tr>
<tr>
<td>Robot</td>
<td>Empathy: SERVQUAL</td>
<td>Have there ever been any times where the service robot has made it unrealistic or difficult for you to have the customer's best interest at heart?</td>
<td>Do you feel it is unrealistic to have the customer's best interest at heart when working with a service robot?</td>
</tr>
<tr>
<td>Facility</td>
<td>Physical Plant Tangibles: SERVQUAL</td>
<td>Are there any changes you might recommend for mapping the robot's movements/paths in the restaurant?</td>
<td>Are walls in the way? Are tables in the way? What happens when you have to move tables?</td>
</tr>
<tr>
<td>Facility</td>
<td>Physical Plant Tangibles: SERVQUAL</td>
<td>Do customers ever run into the robot due to not enough room in the path?</td>
<td>What typically happens and how does management handle any incidents?</td>
</tr>
<tr>
<td>Facility</td>
<td>Physical Plant Tangibles: SERVQUAL</td>
<td>How efficient is the robot in the given space you have to work? What would make the robot more efficient? What would make your workflow more efficient?</td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>Technology skills</td>
<td>What level of experience do you have with technology and how comfortable are you with learning new technologies?</td>
<td>Do you consider your technological skills to be beginner level, expert level, or somewhere in-between?</td>
</tr>
<tr>
<td>------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Additional Comments</td>
<td>Is there anything else you would like to share about your thoughts or feelings on using or working with the service robot?</td>
<td>Anything you think we should know that we have not asked?</td>
<td></td>
</tr>
</tbody>
</table>

**WHEN IT'S OVER/NEXT ACTIONS (turn off the recorder):**

1. Thank the person for their participation.

2. Offer a hard or digital copy of the EXPLANATION OF RESEARCH. Do not force them to take it.

3. For physical gift card, have them sign and date they have received the card on the rectification sheet.

3a. For the digital gift card, collect their email and log on rectification sheet.
LIST OF REFERENCES


https://doi.org/10.1177/0022243718822827


12. https://doi.org/10.1080/0144929X.2023.2295032

