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EXPLORING THE RELATIONSHIP PROCESS BETWEEN CUSTOMERS AND SOCIAL ROBOTS IN THE HOSPITALITY INDUSTRY

Ana Filipa Alves Correia Lourenço Rodrigues

Dissertation submitted as partial requirement for the conferral of Master in Marketing

Supervisor: Prof. Doutora Sandra Maria Correia Loureiro

Professora associada com agregação do Instituto Universitário de Lisboa, ISCTE Business School,
Departamento de Marketing, Operações e Gestão Geral

October, 2022

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This dissertation paper not only represents one of the most important stages of my academic life, but it is also a relevant step in my professional journey. Indeed, it is the result of several challenges as well as of a big sense of happiness for the opportunity to learn more about Relationship Marketing, a topic that I really enjoy and that I was always very curious about. This study was possible, only due to the support of several people, to whom I would like to acknowledge, and especially to manifest my gratitude.

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Abstract

It is well known that new technologies, such as Artificial Intelligence and Robotics are revolutionizing the way organizations establish relationships and provide experiences to their customers, especially in the hospitality industry. Therefore, this investigation aims to better understand the relationship process between social robots and humans, in the hospitality industry, and the influence of identification in the creation of attachment, connection, commitment and love. The possible contributions of the customer-robot emotional relationship on customers' feelings of wellness were also subject of study. Thus, a conceptual framework and several hypothesis were formulated, being mostly based on the brand relationship theory. Indeed, this research was based on primary data, obtained through four questionnaires, each containing 100 valid answers and focusing on different types of robots. The results show that a deep relationship between humans and social robots in the hospitality industry can be established, being Customer-Robot Identification a positive influence on the levels of Customer-Robot Relationship. In addition, it was concluded that Customer-Robot Relationship was crucial for the development of Customer Well-Being, fact that was reinforced in the mediation analysis, since Customer-Robot Identification, alone, is not sufficient to promote wellness to customers. Through the Multi-Group Analysis, it was understood that there aren't significant differences between the robots under study. After the exposed, this study suggests hospitality businesses to create strategies regarding human-robots relationships, that focus on social robots capable of establishing an emotional bond with customers and of providing unforgettable experiences, creating more value and ensuring long-lasting relationships.

Keywords: Social robots, hospitality industry, Customer-Robot Identification, Customer-Robot Relationship, Customer Well-Being

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Resumo

É sabido que as novas tecnologias, como a Inteligência Artificial e a Robótica, estão a revolucionar a forma como as empresas estabelecem relações e proporcionam experiências para os seus clientes, especialmente na indústria hoteleira. Esta investigação tem, assim, como principal objetivo compreender o processo de relacionamento entre humanos e *robots* sociais na indústria hoteleira, e a influência da identificação na criação de apego, conexão, compromisso e amor. Também os possíveis contributos da relação emotiva cliente-*robot* na criação de bem-estar do cliente foram estudados. Assim, o modelo de investigação e várias hipóteses foram formuladas, sendo maioritariamente baseadas na teoria do relacionamento. De facto, este estudo baseou-se em dados primários, obtidos de quatro questionários, cada um contendo 100 respostas válidas e focando-se em diferentes tipos de *robots*. Os resultados demonstram que pode ser criada uma relação profunda entre humanos e *robots* sociais, na indústria hoteleira, tendo a identificação cliente-*robot* influenciado positivamente os níveis de relacionamento cliente-*robot*. Além disso, concluiu-se que a relação cliente-*robot* é essencial para o desenvolvimento de bem-estar do cliente, facto esse que foi reforçado através da análise de mediação, pois a identificação cliente-*robot*, por si só, não é suficiente para promover o seu bem-estar. Na Análise Multi-Grupo entendeu-se que não há diferenças significativas entre os *robots*. Assim, este estudo sugere que as empresas hoteleiras criem estratégias sobre as relações humanos-*robots* sociais, devendo focar-se no desenvolvimento de *robots* capazes de estabelecer um vínculo emocional com os clientes e proporcionar experiências inesquecíveis, criando mais valor e garantindo relações de longa duração.

Palavras-Chave: *Robots* sociais, indústria hoteleira, identificação entre cliente-*robot*, relação entre cliente-*robot*, bem-estar do cliente

JEL: M31: Marketing

JEL: M39: Marketing and Advertising: Other

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Chapter 1 - Introduction

1.1 The relevance of the topic

Identifying market trends is absolutely fundamental for companies to not be left behind. Based on this, digitalization and the use of technologies, such as Artificial Intelligence (AI) or Robotics, are readjusting and impacting all business industries, the economy and society in such a way that experiences and relationships among people are being completely transformed (Loureiro et al., 2021; Makridakis, 2017; Mingotto et al., 2020). The hospitality industry, traditionally rooted on Human-Human Interactions (HHI) (Simon et al., 2020), is no exception to this technological transformation and, in fact, a growing interest has been generated around it (Mingotto et al., 2020), becoming a relevant topic in societies. Therefore, the exponentially increased importance of the use of AI and Robotics, and the reasons why these technologies have expanded will be further demonstrated.

Starting with AI, this concept has rapidly evolved, and it is usually associated with technologies that can not only learn and connect, but also adapt, depending on the design and need of the application (Huang & Rust, 2021). In fact, due to its characteristics, AI is expected to be a very good ally to strength robots to do relevant tasks, especially in the hospitality industry (Li et al., 2019), in which is being more and more common to see robot assistants for room service delivery (Lin & Mattila, 2021) (such as A.L.O. servant-robot, from the Aloft Hotel Cupertino (Vatan & Dogan, 2021)), or even for front desk help (such as Connie robot, from Hilton McLean Tysons Corner, that provides information to guests and learns by experience) (Luo et al., 2021; Vatan & Dogan, 2021).

Similar to AI, robots are developing quite fast, and despite being a recent concept, the notion of robot detains several definitions (Luo et al., 2021). Thus, according to the International Organization for Standardization (2012), a robot is defined as a certain autonomous mechanism that can perform several tasks. This type of technology can be differentiated between industrial robots and social service robots: while the industrial ones are controlled in an automatic way and focus merely on movable or immovable industrial assignments, social service robots are constructed to perform beneficial tasks, beyond its industrial functions for individuals (International Organization for Standardization, 2012), as there is the attention of interacting with the inserted environment and people in an user-friendly, organic and congruent way (Pinillos et al., 2016).

Nevertheless, it is of extreme importance to use technologies that contribute to an enhanced hospitality experience and that also don't threaten clients' sense of hospitableness, concept that is usually associated to human interactions (Qiu et al., 2020; Tasci & Semrad, 2016). That is why social robots, the ones that learn and adjust from the experiences, can appear as a possible solution, contributing to the creation of a better relationship between robot usage and customer experiences

(Huang & Rust, 2021) in the hospitality industry. Thus, it is essential to understand how robots can improve the hospitality services and increase customers' satisfaction (Qiu et al., 2020) and, especially, in a way that allows a deeper and closer relationship between them.

That said, the interest in investigating the topic under analysis emerged. Indeed, due to the service robots' rapid technological progresses, new opportunities in the hospitality industry regarding their application are arising (Luo et al., 2021), which supports the claim that the future of guests' experience in hospitality will be very much influenced by the mentioned technologies.

The truth is that much more is in need to be studied, such as the possibility of creating a relationship between customers and social robots, how far this emotional link can reach and how it can influence variables like customer well-being.

This study has a purpose of understanding the interactions between humans and robots, and consequently, of comprehending how humans can create a deep relationship, a connection, and a bond with this type of technology. In more detail, if identification levels between a customer and a social robot influences relationship levels, and subsequently, the feelings of wellness during the experience.

1.2 Contextualization

In the previous sub-chapter, it was explained why the topic under study is relevant. Nevertheless, its importance can also be demonstrated statistically.

According to the market research report, published by Global Market Estimates, AI in Hospitality Market, from 2021 to 2026, will register a growth of around 10 percent CAGR (Global Market Estimates, 2022). In addition to that, the International Federation of Robots (2021) estimates that hospitality robots will not only increase their acceptance and popularity, but they also will create a turnover of 249 millions of U.S. dollars. Due to the pandemic, the need and awareness to prevent contact with food products grew rapidly, as well as the demand for food service robots, which registered a turnover of 32 million U.S. dollars (representing an increase of 196%), being, therefore, verified a boost in the use and development of robots in the hospitality industry (International Federation of Robots, 2021).

Furthermore, it is also evidenced, by the data collected from Statista (2022), that the worldwide market revenue for service robotics will reach a size of over 32 billion U.S. dollars by 2027. In addition, whereas, in the year of 2017, there were utilized around 2.4 million service robots worldwide, in volume, in 2025, it is expected that service robots used worldwide will reach a volume of more than 4.1 million, which is almost double (Statista, 2022).

Having in mind that this study only considers United States of America residents, it is crucial to explain that, in this country, and according to Statista (2022), there are more than 442,700 service robots in volume, in 2022, which corresponds to approximately an eighth of the total of service robots worldwide (in 2022, there are around 3.6 million service robots around the world). And the tendency is to see these numbers increase, since it is expected that the USA reaches almost the volume of 540,000 service robots by 2027 (Statista, 2022). In addition, when doing a Global Comparison, the United States of America is in the number one worldwide country regarding service robot revenue, in 2022, and this will be maintained till 2027 (6 million USD, in 2022, and more than 8 million USD, in 2027) (Statista, 2022). All of the above demonstrate that AI and social robots, in the hospitality industry, have a huge potential to grow and to create new ways of interacting.

1.3 Problem Statement, Dissertation Research Questions and Objectives

Definition

Nowadays, it is possible to count with a wide body of literature regarding Artificial Intelligence/Robotics, and also in the hospitality industry (Mingotto et al., 2020). In fact, previous investigations on hospitality sector focus on seven central research domains, which are 1) the design and adoption of robots (aspect, functionality, mobility); 2) human field, regarding consumer experiences, employees' attitudes, reactions, roles and value co-creation; 3) robot manufacture, in what concerns hardware and software; 4) functions in businesses related to tourism, like marketing and operations; 5) servicescape; 6) external environment, regarding economic, legal, and social aspects; and 7) education, training and research organizations (Ivanov et al., 2019; Mingotto et al., 2020).

However, these developments have mostly been done with little interdisciplinary exchanges (Loureiro et al., 2021). Also, because of the continuous and fast evolution of these technologies, the impact on the way the service is provided and delivered to the customer remains one critical topic to be researched in the future (Loureiro et al., 2021). Very few of the existing studies highlight the customers' perspective and sentiments on service robots (Luo et al., 2021) or the robot-human interactions/ customer service experience (Choi et al., 2021). In fact, further studies in service design, in the enhancement of human well-being through transhumanistic technologies, close relationship marketing capabilities, and the evolution of the engagement process between humans and AI-enabled machines are necessary (Loureiro et al., 2021).

All of the above mentioned serves to justify the main motivation for this dissertation paper. To address the existing gaps, the main objective of this dissertation paper is to investigate the interactions between social robots and humans. In detail, if it is possible for a human to develop a deep and close relationship with a social robot and, if so, how it is created. This will be crucial to understand the

possible contributions of the customer-robot emotional relationship on customers' feelings of wellness. In addition, this research intend to understand the impact different types of social robots have on humans' perception of services and the existing relationship's differences between distinct robots and humans. Having in mind Susan Fournier (1998) study on customer-brand relationship, the current dissertation paper will find support on this researcher's investigation, by associating customer-brand relationship studies to a customer-robot relationship. This paper will also adapt the constructs that already exist in the current literature regarding this topic, starting with the yet adjusted constructs of Customer-Robot Identification and Customer-Robot Relationship, ending up with Customer Well-Being.

Based on the above, it will be attempted to answer to the following research questions:

RQ1) Can humans develop feelings of identification with a social robot in the hospitality field?

RQ2) Can the identification that clients perceive between themselves and hospitality social robots be strong enough to influence the creation of a close relationship between both parties (as if it was a human-human interaction), and consequently, the creation of customer well-being?

1.4 Structure of the Dissertation

This master thesis is divided into six main chapters. The first chapter, Introduction, identifies and explains the topic of this dissertation and clarifies its relevance, giving, in addition, a small statistics contextualization. Moreover, it is also presented, in this chapter, the research questions and the objective of this study. Then, in the second chapter, a Literature Review will be presented, in which the main concepts of this thesis will be explored: Human-Robot interactions, Brand and organization identification, Brand- Robot Relationship, Brand- Robot Relationship Quality and Customer Well-Being. Furthermore, in the third chapter, the conceptual framework and the hypothesis are developed and explained. In the following chapter, the fourth, the Research Methodology will be shown and explained in detail. Indeed, in the mentioned part, the methods of data collection and surveys' structure will be exposed. Moreover, the analysis of the data collected, together with the discussion of the results will be presented in the fifth chapter. The theoretical and managerial contributions will be evidenced in this chapter too. Lastly, the sixth chapter indicates the main conclusions of this thesis, as well as its limitations and recommendations for future investigations.

Chapter 2- Literature Review

2.1 Human-Robot Interactions

AI and robots are growing in relevance in firms and society, changing rapidly the way service industries operate, work, manage, organize processes, and think the business to deliver more value to customers (Mingotto et al., 2020; Ruel & Njoku, 2020; Makridakis, 2017). Thus, it is crucial to deeply investigate how Human-Robot Interactions (HRI) can promote valuable customer experiences, especially in the hospitality industry.

Firstly, it is necessary to specify what HRI means. HRI is the subject field that studies the robotic systems' comprehension, design and assessment for humans' usage (Goodrich & Schultz, 2007). These can be very beneficial, since by interacting with service robots, customers can get improved and customized service delivery (Pinillos et al., 2016; Wirtz et al., 2018), whereas hospitality services can benefit from the reduction of costs and maximization of operational efficiencies (Li et al., 2019) and even the improvement of the hospitality service's attractiveness (Vatan & Dogan, 2021).

In order to create these interactions, it is crucial to comprehend what guests expect from the services and how service robots can be enhanced in the hospitality industry. In essence, in comparison with industrial robots, service robots tend to be more displayed to direct human interactions, not only because of their higher levels of communication, but also because customers, nowadays, look for experiences that enrich them and bring them value, which can contribute to their satisfaction (Choi et al., 2020; Lemaignan et al., 2017). In fact, some researchers say that with the digitalization and technological advances, guests demand hotels to quickly adopt technologies that empower new experiences (Kim et al., 2021; Qiu et al., 2020). Therefore, due to the automated social presence, for instance provided by robots, customers not only expect to feel their company, but also to gain new value, as well as memorable experiences (Kim et al., 2021; van Doorn et al., 2017). There are even investigations that state that characteristics such as emotions and the efficacy of the performance, as well as motivations and facilitating conditions can influence guests' desire to use robots (Lu et al., 2019). Advances such as immersive environments and the evolution on communication technologies allow the extension of service robots and, thus, HRI, which will be essential to create customer contentment (Choi et al., 2020; Lemaignan et al., 2017).

Additionally, Technology Acceptance Model (TAM) can be utilized to understand the acceptance, utilization intentions and usefulness of new technologies (Kim et al., 2021; Venkatesh & Davis, 2000). Some researchers found that when guests have a favorable attitude towards robots usage, it usually has an impact on customers' preferences regarding service robots adoption (Kim et al., 2021; Shin & Jeong, 2020). Yet, this acceptance depends on users themselves, that is, on their perception of a robot's intelligence and security (Qiu et al., 2020; Tung & Au, 2018). This leads to the need for

enhancement of service robots to correspond to the guests' expectations (Lin & Mattila, 2021). Therefore, Huang & Rust (2021) distinguished three types of robot intelligence: 1) mechanical intelligence, referring to tasks that are considered to be simple, ordinary and standardized; 2) thinking intelligence, based on learning and adapting through data, is related to tasks that are understood to be straightforward, based on rules, complex and systematic, ideal for service personalization; and 3) feeling intelligence, based on learning and adapting from different experiences, has to do not only with social and emotional tasks, but also with interactive and communicative ones, ideal for service relationship. These can be used for different levels of customer service and, once it progresses to a higher level, it means that it retains already the lower level of intelligence skills (Huang & Rust, 2021). While in the future, robots are predicted to be able to use the first two types of intelligence, it is still hard to understand if they will ever be able to match the human level of emotional and social required when delivering services (Huang & Rust, 2021; Wirtz et al., 2018). In fact, some researchers believe that it's hard to pass to a complete automation (Simon et al., 2020), at least in these first years, as hotels like Henn-na, the first in this industry to implement 100% robotic staff (Tung & Au, 2018), had to withdraw half of its robots, due to the inability of maintaining a good performance (Luo et al., 2021; Simon et al., 2020).

Human dimension has to be present in the hospitality industry, as the absence of humanization or emotions can result in guests' negative experiences provided by service robots (Choi et al., 2020; Qiu et al., 2020). This means that feeling intelligence needs to be worked on, in order to be deliver the value customers look for, and mostly, to promote a close relationship between robots and guests. It's crucial to study how to develop close relationships, so that a higher service quality perception is seen.

2.2 Social Robots and Customers: How to establish an enduring relationship?

Previous researchers in the hospitality area did not examine the direct influence of close relationship marketing capabilities on human-robot interactions (Loureiro et al., 2021), but similar support could be drawn by associating brand relationship current studies to social robots. Thus, in the ongoing study, the idea is to understand if customer-robot relationships can be created the same way as customer-brand relationships are. The literature below will reveal the current brand relationship studies to further evaluate its relationship with robots.

2.2.1 Brand and organization identification

Establishing a significant and long-lasting relationship between a brand and a customer is becoming very important for firms that want to gain advantages regarding their competitors and get positive outcomes (Tuškej & Podnar, 2018). Nowadays, customers don't buy brands or even services just

because they do their job (Rather et al., 2018). As a matter of fact, brands are bought not only because of their meaning (Bhattacharya & Sen, 2003), but also because of the customer's perception and identification of a brand's similitude with one's self-concept, allowing brands to act as facilitators of social identity (Elbedweihy et al., 2016; Rather, 2018; Stokburger-Sauer et al., 2012). So the question that arises is: what is social identity? According to the existing marketing literature, social identity theory is an essential part of the self-concept of an individual that is gained from social brands to which one is inert (Elbedweihy et al., 2016; Tajfel & Turner, 1986). Social identity can also impact the perceptions and the cognitions of customers, as well as their attitudes towards a service brand (Rather, 2018), so the higher the customer identification with a brand is, the higher will be the brand commitment (Su, Swanson, Chinchanchokchai, et al., 2016) with the ongoing relationship (Rather, 2018; Rather et al., 2018).

If brand identification informs customers about what the brand's values, beliefs and unique associations are (Bhattacharya & Sen, 2003), in turn, organizational identification theory is based on the individual's perceived connectivity to an organization and its activities (Ashforth & Mael, 1989). Based on the previous definitions, it is possible to say that both concepts can be considered as a form of social identification (Ashforth & Mael, 1989; Wilkins et al., 2016). Some studies evidence that as customers perceive an organization's/ brand's identity as being attractive, there is an increase in their willingness to support and to engage with that organization/ brand, promoting beneficial behaviors towards it (Dutton et al., 1994; Wilkins et al., 2016). Since the experience gained, for instance in an hotel, can depend on several efforts, including the staff, customers' criteria and quality perception, it supports that organizational identification might lead guests to reach better experiences for their own self benefit (Wilkins et al., 2016).

Thus, customer-brand identity (CBI), which is a psychological condition that comprises the customer's perceptions, sentiments and evaluation of one's belongingness to a brand (Lam et al., 2010), ends up being coherent with brand associations, as some authors state that customers who identify with a brand and retain in their memory positive, deep and unique brand associations are more willing to stay closer to it (Loureiro et al., 2014), as well as with the idea that self-defined needs can be fulfilled if customers identify with a brand of organization and share some similar values (Bhattacharya & Sen, 2003). Despite being considered as a very relevant construct, more efforts need to be done to study this construct and to understand its influence on close relationships.

In another strand, social robots can have a huge impact on customers' brand/ organization identification, as well as on AI quality. Indeed, guests tend to choose representations, which can be in the form of social robots, that allow a deeper interaction with them, and especially, that act similarly to one's ideal self (Belk, 2016), which can enhance deeper relationships and a higher quality perception. Also, and regarding AI, as AI quality gets higher, firms can support customers to make

decisions and to plan by, for instance, providing adaptable recommendations of services that match the guests' needs (Nguyen et al., 2021). An organization's innovativeness can be understood through the quality of AI, which can impact guests' perception of the organization (Nguyen et al., 2021; Shams et al., 2015), and, most importantly, it can emerge as a source for customers to identify with a brand/ organization (Nguyen et al., 2021). That said, these technologies, indeed, are able to revolutionize the hospitality industry, providing more experiences adapted to customers' self-identity, that can result in better and deeper relations.

In a wider context, brand or organization identification can have a positive influence on marketing favorable outcomes, since it can not only promote an increase in the search for a product/ service, its repurchase and willingness to pay more for it, but also the enhancement of positive attitudes/ behaviors, leading to satisfaction and loyalty (Büyükdag & Kitapci, 2021; Popp & Woratschek, 2017). To stand out from the competition, many hospitality industry players have defined brand strategies to offer different services, always focusing on the relevance of customer-brand identification in understanding customer-brand relationships (Rather et al., 2018; So et al., 2013). That said, more details about brand relationship will be provided in the following chapters.

2.2.2 Brand-Robot Relationship

Despite being crucial to provide a new set of experiences that can increase customers' willingness to visit hospitality services again, it's not less important to enhance these experiences by the existence of positive relationships. When a mutual connection is felt between a customer and a brand, customer-brand relationship emerges, being essential to deepen the relationship between both (Alvarez & Fournier, 2016). In fact, Batra et al. (2012) consider that positive/ close relationships tend to stimulate not only Word-of-Mouth and the willingness to repurchase, but also the resistance for negative information. Thus, there is a need to understand how close relationships can be created, in order to have a greater hotel advocacy.

Foremost, it is important to have in mind that hospitality services are built on "hospitableness", that is, "the positive emotional responses in guests feeling welcomed, wanted, cared and important" (Tasci & Semrad, 2016, p.31), which can empower close relationships with guests. This term is often associated when the service is provided by humans, since it relies on emotional accompaniment evidenced in human touches and values (Golubovskaya et al., 2017; Kim et al., 2021). Therefore, since one of the main influences for positive customers' experiences in hotels are human features (Kim et al., 2021), some specificities of human staff characteristics are going to be mentioned, in order to be understood the potential design of robots. Firstly, guests' experience depends on the staff's politeness, attention, willingness to communicate and emotion transmitted during the service (Kim et al., 2021),

so it is possible to assume that the higher the politeness, attention and emotion, the better the experience will be. Likewise, inappropriate attitudes among the staff members can lead to a negative experience and dissatisfaction (Kim et al., 2019; Kim et al., 2021). Thus, these characteristics need to be thought carefully for the enhancement of the robot.

To see if the service is being well delivered and if it contributes to customer satisfaction, an assessment should be always made. Until today, to assess human interactions, SERVQUAL (Parasuraman et al., 1988), SERVPERF (Cronin & Taylor, 1992) and the three-factor service quality model (Brady & Cronin, 2001) are the traditional methods to evaluate them (Kim et al., 2021). The three-factor service quality model can be also used in service robots, because of its flexibility and extensiveness (Choi et al., 2020).

However, hospitality and close relationships do not just occur when hospitableness is promoted (Qiu et al., 2020). It is also possible to think about a close and connecting relationship between social robots and humans as if it was a customer-brand relationship. In essence, the concept of customer-brand relationship, firstly introduced by Fournier (1998), emerges as a metaphor and it proposes that humans can create a relationship with brands in the same way as if it was a relationship between humans, in a social context (Fournier, 1998). Therefore, it could be expected that social robots would also be able to create a relationship with humans as if it was between people. But how can this happen? First, consumers appreciate knowing about how much the brand cherishes them, and so they reciprocate the care, leading to a deeper relationship (Alvarez & Fournier, 2016; Fournier, 1998).

For this to happen (even with robots), it becomes critical to comprehend people's attachment styles, which is the relating interpersonal style, that is, if the self is or isn't worthy of love (anxiety) and the availability/ trustworthiness in relations (avoidance) (Alvarez & Fournier, 2016; Fournier, 1998). Brands can be affected by attachment styles through three different mechanisms (Alvarez & Fournier, 2016). Compensatory role is the first mechanism identified and it suggests that people with both high levels of interpersonal anxiety and avoidance styles have difficulties in developing worthwhile relationships with others, so they create deeper relations with brands to compensate their interpersonal insecurities and needs for belongingness (Thomson et al., 2012), especially for those that are materialistic (Rindfleisch et al., 2009). In the same way, this compensation of insecurities can occur with robots. The second mechanism involves the understanding of how customers use brands not as a substitute for humans, but rather as a tool to help them develop and enhance relationships with others (Swaminathan et al., 2009). In fact, customers with high interpersonal anxiety are more prone to connect with brands that are consistent with their self-concept (or the ideal one) to feel worthy (Alvarez & Fournier, 2016). Lastly, the third mechanism regards parallelism of processes evidenced both in brands and interpersonal relations, so the higher the interpersonal attachment anxiety, the

lower will be satisfaction, and involvement levels (Alvarez & Fournier, 2016; Thomson & Johnson, 2006).

Close relationships are essential for the creation of customers' deep connections with brands/ organizations, so it is critical to understand brand relationship quality, in order to boost relations.

2.2.3 Brand-Robot Relationship quality

Knowing how customers develop emotional and deep relationships will be a key point to deliver more value to them, being, then, crucial to study how quality relations are created. As a matter of fact, responsible for the creation of the relationship theory associated with brands, Fournier (1998) was also the pioneer on extending this theory to the so-called brand relationship quality model. The author suggests that the depth and strength of customer-brand relationships occur when meaningful actions are seen from both parties (Fournier, 1998; Smit et al., 2007). With the existence of a strong customer-brand relationship quality, customers can create motivational and emotional connections with brands in an identical way as with humans (Kim et al., 2014; Lo, 2020). In fact, customer-brand relationship quality is affected by customers' experiences in hotels or restaurants (Lo, 2020), thus existing a need to study it deeper, especially in a robots' context.

Fournier (1998) proposed six facets of brand relationship quality construct that integrate the brand relationship quality model. Thus, Love and Passion, Self-Connection, Interdependence, Commitment, Intimacy and Partner Quality are the dimensions present in the model, and these have a crucial role in not only promoting socio emotive and affective attachments (through the dimensions of Love and Passion and Self-Connection), but also in incentivizing behavioral ties (Commitment and Interdependence) and supportive cognitive beliefs (Partner Quality and Intimacy) (Fournier, 1998).

That said, and starting with the first dimension of this model, **Love and Passion**, it refers to the core of all solid relationships, in which feelings of love can range from an addictive dependency to warmth (Fournier, 1998). Passion, on the other hand, is the strong desire a person has for a brand or even the feeling of harmony, togetherness and natural fit one can experience (Batra et al., 2012). Fournier (1998) mentioned that the affection with which this dimension supports the resistance and depth of brand relationship is much greater than that understood in brand preference. As a matter of fact, the love that is felt for a brand is considered relevant in the diagnosis and boosting of customer-brand relationships (Bagozzi et al., 2017), since it was experienced a sentiment of miss and anxiety upon separation, making the brand irreplaceable (Fournier, 1998). Moreover, Love and Passion can enhance not only the positive Word of Mouth and the repurchase intentions, but also the resistance to the brand's negative feedback (Batra et al., 2012), being also relevant in a robot context.

Regarding **Self-Connection** dimension, it is related to the extent to which brands deliver on relevant identity tasks, themes and concerns (Fournier, 1998), that is, the degree to which a brand is part of the self and whether (or not) a brand and an individual are very much alike (Smit et al., 2007). Also, powerful self-connections contribute to the relationship continuance through the development of sentiments of dependency and singularity (Drigotas & Rusbult, 1992; Fournier, 1998), as well as throughout the temporal horizon, that can go from the past (in which a brand is part of an individual's history and associated to a specific memory, reassembling to a nostalgic connection (Smit et al., 2007)) to the actual and future (desired) selves (Fournier, 1998; Kleine et al., 1995).

Interdependence is another dimension of this model. It refers to the frequent and intense interactions, as well as the enhanced range and diversity of activities an individual has with a brand, which can promote a strong brand relationship (Fournier, 1998). According to Smit et al. (2007), those relationships can alter, not only due to the successive interactions that occur, but also due to several differences regarding the environment where these interactions happen. Also, Interdependence is considered to be adopted and accelerated through consumption rituals, being, inclusively, seen as a central process (Fournier, 1998). However, despite these relationships can endure, Fournier (1998) alerts for additional caution when analyzing this dimension, as low levels of involvement can be seen.

In regards **Commitment**, this dimension has to do with the customers' propensity and intention to have, and especially to continue, a deep, attached and long-term relationship (Morgan & Hunt, 1994; Tong et al., 2018), thus behaving in a supportive way (Fournier, 1998). Customers that demonstrate having emotional, strong and stable commitment levels towards a brand are more prone to recognize it as being part of their lives (Fournier, 1998). Also, if customers recognize the shared values they have with an organization, it can lead to a higher willingness to continue investing in a relationship, or the so called commitment (Morgan & Hunt, 1994; Rather et al., 2018; Su, Swanson, Chinchanchokchai, et al., 2016). Within the hotel context, some investigations found that commitment is an important variable that impacts the advancements of brand loyalty (García de Leaniz & Rodríguez Del Bosque Rodríguez, 2015). In addition, commitment embraces 3 distinct dimensions: the continuance, the affective and the normative commitment (Allen & Meyer, 1990). Continuance commitment is based on the customers' willingness to continue a relation with a brand/firm, due to the switching costs associated (Allen & Meyer, 1990). On the other hand, normative commitment mentions the obligational feeling customers can sense to continue the relationship (Allen & Meyer, 1990). Finally, affective commitment is the emotional bond, attachment, and pleasure of continuing the relation with the brand/ firm (Allen & Meyer, 1990; Tong et al., 2018).

In terms of the **Intimacy** dimension, it focuses on the proximity between knowledge structures regarding a brand and relationship partners (Smit et al., 2007). According to Fournier's study (1998), all solid relations were developed in beliefs regarding a better performance. Some of those beliefs

refer to the utilitarian brands' functioning and to their higher performance, which make these brands unique and more resistant to competitors (Fournier, 1998). Brand self-disclosure can influence the feeling of intimacy, as it can lead to a better comprehension of partners, specifically of their thoughts, behaviors, and feelings (Huaman-Ramirez et al., 2022), and it can incentivize the development of a relationship, being considered rewarding by those that are disclosure's target (Collins & Miller, 1994; Huaman-Ramirez et al., 2022). Yet, intimacy and close relations development aren't just influenced by brand self-disclosure. As a matter of fact, brand meaning can also influence and enhance intimacy, through advertising cues, such as brand characters or slogans, as well as through personal nicknames, which reveal being beneficial for customers to personalize and memorize brand information (Fournier, 1998). Indeed, a relationship can be reinforced by memory, since, by doing personal associations and remembering experiences, customers gain memory accumulation of interaction activities between them and brands (Fournier, 1998).

The last dimension of the referred model is **Partner Quality** and it has to do with the overall power and reliability of a relationship, which englobes an evaluation (done by the customer) of the brand's performance during the ongoing relation, in its partnership role (Fournier, 1998). Through her study, Fournier (1998) suggests some components of brand partner quality that, in a way, can protect the relation from negative influences or biases: the first one regards the positive feeling of a brand towards a customer, by taking good care of them and showing interest and respect; then, the judgments of the general dependability and trustworthiness of a brand in doing its partnership role; third, the judgments of the respect of the brand to follow several procedures that are included in the relationship contract (Wiseman, 1986); fourth, the belief that the brand will bring what is feared versus what is wished, and finally; the responsibility the brand has for its actions (Fournier, 1998).

Fournier (1998) also mentioned that the brand relationship quality construct can be the first step to start articulating a comprehensive framework on brand relationship. Therefore, several authors adapted this model to do a more detailed study on this topic. One example is the study conducted by Chang & Chieng (2006), that studied Customer-Brand Relationship in the hospitality industry and considered other six relationship dimensions: Functional Exchange, Love, Commitment, Attachment, Self-Connection and Partner Quality. That said, Attachment and Functional Exchange facets, which are new regarding the firstly introduced model, will be now explained. In regards **Attachment**, it refers to the brand's incorporation in the routines/ daily life of the customer (Smit et al., 2007), that is, the emotional connection between brands and customers (Huaman-Ramirez & Merunka, 2019). According to Fournier (1998), one's attachment to something is an efficient indicator to evaluate relationship quality, thus being a dimension that should be considered when developing brand-consumer relationships strategies. Also, when there is an intensity in the attachment levels with a brand, positive outcomes and behaviors can be verified (Huaman-Ramirez & Merunka, 2019). Lastly, the **Functional**

Exchange facet refers to a relationship formed between functional components and customers' attitudes towards a brand, service/product (Lin & Mattila, 2021; Wirtz et al., 2018). Regarding social robots, their acceptance depends on their ability to fulfill customers' functional needs (the better social robots fulfill customers' functional needs, like efficiency, usefulness, and accuracy (Lin & Mattila, 2021), for example, the better will also be the customer's acceptance of them) (Wirtz et al., 2018).

After what was said, it is important to note that the same reasoning used in the mentioned dimensions can be transferred to a robots' context, so more studies on this are necessary. Also, even though the wide possibilities these dimensions can bring to the customer-brand relationship field, it becomes clear that more needs to be done regarding Customer Well-Being. Some studies state that high levels of satisfaction, and consequently well-being, can be experienced if one's partner is able to provide a close relationship, which can allow the fulfillment of basic needs (la Guardia et al., 2000). So, understanding how to deliver customers' well-being is a priority.

2.3 Customer Well-Being

Creating brands/ services that promote well-being to consumers is a good strategy for the long-term success of businesses, since customers' well-being and happiness are rather durable and resistant (Devezer et al., 2014), which can be connected to customers' brand consumption for a long period of time (Yoshida et al., 2021; Zhong & Mitchell, 2012). It was further understood that the perception of well-being has a huge influence on customers' decision-making regarding products and brands consumption (Kim et al., 2016; Sirgy et al., 2007). According to Kotler et al. (2003), marketers and managers need to transfer more value to customers, in order to provide equal or superior well-being for them, as well as for society, in general. Based on the previous chapters, it is noted that, as customers recognize shared values with a brand/ organization, they start connecting, caring, and deeply developing feelings about it (Bhattacharya & Sen, 2003), which can motivate them to interact more often with brands, boosting their quality of life (Dolnicar et al., 2012) and well-being (Su, Swanson, & Chen, 2016).

In another perspective, and in the hospitality context, organizations that promote employees' (psychological) well-being tend to have increasing results on their employee's working relationship with other colleagues, and even with clients that can experience an improved quality of service, thus promoting customers' well-being (Erkutlu & Chafra, 2016). In addition, the enhancement of employees' wellness, as well as customers' satisfaction and well-being can be also provided by service social robots, since these can not only do some of the human workers' tasks (thus reducing their workload), but also offer new and different experiences to customers (Lin & Mattila, 2021). After the exposed, it is necessary to look carefully to the concepts of well-being, and especially customer well-

being, as customers are becoming more attentive to products and brands that improve their wellness (Kim et al., 2016; Kim et al., 2012).

Therefore, and starting with well-being, there isn't a consensual definition for this concept (Falter & Hadwich, 2020). Nevertheless, the terms happiness and life satisfaction, as well as quality of life and well-being are pointed out, by some investigators, as being equivalent (Uysal et al., 2016). Well-being detains two main concepts: subjective well-being and psychological well-being (Lee et al., 2020). Starting with the subjective well-being, it refers not only to individuals' cognitive assessment of life as being satisfactory, but also to their affective assessment of mood of it (Diener, 1984; Diener et al., 1985). Focusing on the affective element of subjective well-being, the individuals' perceptions on the intensity or balance of either pleasant or unpleasant feelings can be highlighted (Su, Swanson, & Chen, 2016), being this called "hedonic balance" (Schimmack et al., 2002). People can also reflect on their subjective well-being rooted on their beliefs regarding the objectives' fulfillment (Su, Swanson, & Chen, 2016). Thereby, the main assumptions of several well-being types is that each individual has its own subjective understanding of experience and the goal is to analyze the happiness processes (Diener et al., 1999). Furthermore, high levels of subjective happiness can be seen in individuals that feel optimistic, joyful, and life satisfied (Lee et al., 2020).

In regards psychological well-being, it focuses on the development and challenge of human life (Ryff, 1989). To provide optimal individual's functioning, this concept covers six different components that include: the person's positive assessment of self and past life (Self-Acceptance); the feeling of ongoing growth and improvement as an individual (Personal Growth); the conviction that one's life is worthwhile (Purpose in Life); the ability to effectively manage one's life and circumjacent world (Environmental Mastery); the dominion of quality relationships with others (Positive Relations With Others); and the feeling of self-determination (Autonomy) (Ryff & Keyes, 1995). Both subjective and psychological well-being enable the achievement of the high-level well-being (Huta & Ryan, 2010).

After the explanation of well-being concept, customer well-being needs to be also analyzed in detail. Hence, customer well-being is considered to be the satisfaction a customer gets with diverse life subdomains and domains, which can result in one's overall perception of an improvement of his/her quality of life (el Hedhli et al., 2013; Sirgy et al., 2007). In fact, this concept can be seen as the connection between customer satisfaction and quality of life, being expected that the higher the levels of customer well-being, the higher will also be the levels of quality of life, life satisfaction and life happiness (Sirgy et al., 2007). Similar to what happens with other concepts, customer well-being not only is the owner of innumerable conceptualizations (i.e. the shopping satisfaction or the perceived value models), but it also provides measurements for well-being in several life domains, such as family, work or leisure (Falter & Hadwich, 2020; Sirgy et al., 2007).

Another thing that is essential to mention is the relevance of customer well-being in services. According to Falter & Hadwich (2020), customer service well-being refers to the affective, cognitive, and subjective assessment of a customer's experience during a service with an employee-customer interaction, which is expected to be positive, arising from the relational, interactive, and experiential features of the service. The same authors mention that when customer service well-being is high, it can be concluded that not only the quality of the service is good, but also that the interactions between the customer and the employee met the individual's needs (Falter & Hadwich, 2020).

With all of the above, it is necessary to do empirical research, in order to gain insight into service robots and customer potential relationships with them.

Chapter 3- Conceptual Framework and Hypotheses development

This chapter is dedicated to the presentation of the created conceptual framework, as well as the hypotheses developed to reach the results and obtain this investigation's conclusions. In order to create the model and the hypotheses, and thus to analyze the obtained data, the positivist approach was the method used. According to Park et al. (2020), the positivist approach counts on a hypothetico-deductive method, in order to confirm the quantitative hypotheses *a priori*. Therefore, the conceptual framework (in Figure 3.1) was established through theory-based premises, and the positivist approach empowers the author to objectively collect data and clarify the results. Having said this, the research shown earlier, presented in the Literature Review, is the foundation of the framework and hypotheses.

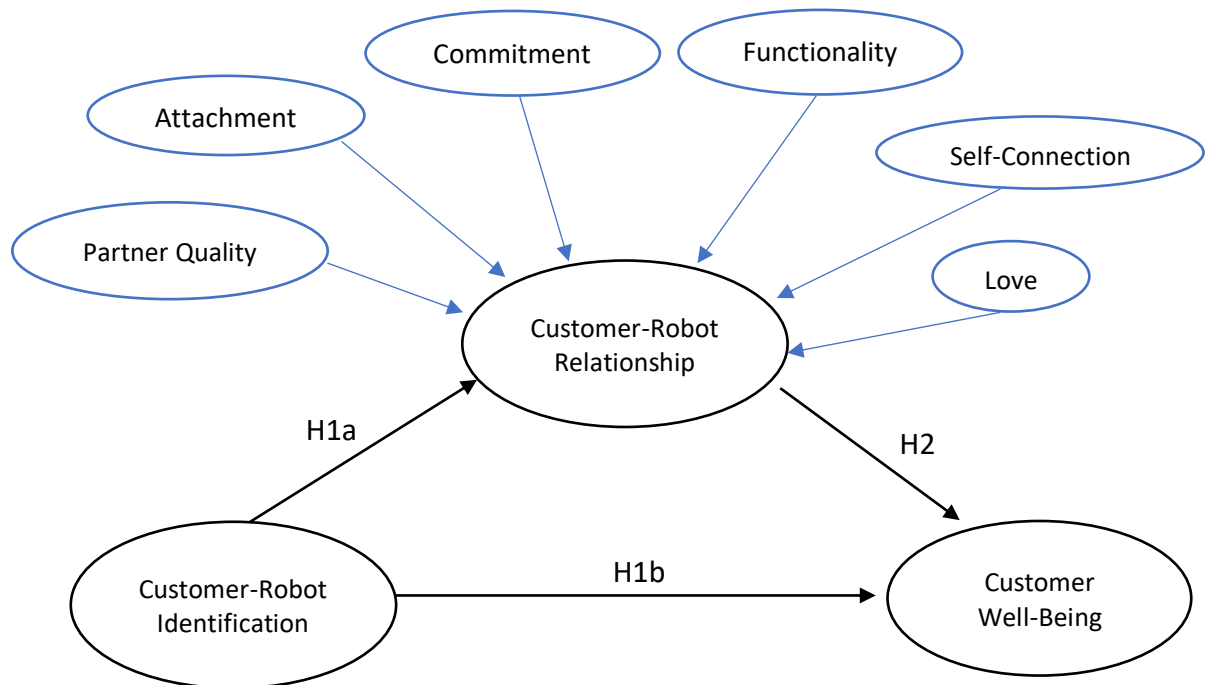
In addition, Fournier's Brand Relationship Theory (1998) was also the main foundation of the revealed conceptual framework. According to Wolter et al. (2016), the idea that customers use brands/objects to create identity is suggested by several studies, among which the Brand Relationship one (Fournier, 1998). Investigators with curiosity in brand identification relationships understood the relevance of social identity to depict how brands could represent a customer's self-identity (Wolter et al., 2016). Indeed, customers' identification with a brand/organization can be crucial to fulfill their self-definition needs, and thus, to develop strong relationships (Bhattacharya & Sen, 2003). One possibility to satisfy these needs is to choose a representation that is similar to one's ideal self, which can be transferred into another "body", extending, this way, a customer's self (Belk, 2016). Nowadays, the identification of self may be done through the format of robots (Belk, 2016).

Furthermore, self-connection, one of the dimensions that is present in Fournier's Brand Relationship Quality scale, is, among others, related to Customer-Brand Identification (Fournier, 1998). Indeed, it was also considered, for the creation of this framework, Fournier's (1998) study on consumers' deep and emotional relationship to objects and brands as these were actual partners. For the model presented below, the deep relationship under study is between people and robots. In addition, Fournier (1998) suggests that a consumer with a meaningful relationship to an object/brand is more likely to humanize it, thus developing favorable actions and beneficial feelings for brands, which can be transferred to a robot scenario (Belk, 2016). Furthermore, long-term well-being can also arise from this meaningful relationship between customer and brand/object, being actually believed that brand relationship can have a role in developing Customer Well-Being (Fournier, 1998; la Guardia, 2000). All of the mentioned was considered while developing the conceptual framework under study.

The hypotheses evidenced below will be tested, through the methodology exposed in chapter 4, in order to comprehend the relationship between social robots and humans and if the level of Customer-Robot Identification influences the levels of Customer-Robot Relationship, and consequently, Customer Well-Being. This study will, then, reveal not only the relationship level created

between humans and robots, but also what benefits hospitality managers can derive from this relationship.

Figure 3.1- Proposed Conceptual Framework



Source: Author's own creation

From the shown framework (figure 3.1), three hypotheses were developed and these will be presented forwardly.

H1: Customer-Robot Identification positively influences Customer-Robot Relationship (H1a) and positively influences Customer Well-Being (H1b)

H2: Customer-Robot Relationship positively influences Customer Well-Being

3.1 Customer-Robot Relationship as the dependent variable

As already mentioned in the literature review, in a marketing and hospitality perspective, some studies mention the importance of customer identification regarding one's willingness to stay closer to a brand/ object (Loureiro et al., 2014), and to establish and maintain a relationship with it. Furthermore, if customers identify with a brand or organization that helps them to fulfill their self-defined needs, the development of higher levels of customer relationship will be promoted (Bhattacharya & Sen, 2003).

Since Belk (2016) mentions that it is expected that humans identify with future selves in the format of robots, the same outcomes are assumed to be verified for Customer-Robot Identification.

Therefore, the following hypothesis was created to better understand the influence of Customer-Robot Identification on the levels of Customer-Robot Relationship:

H1a: Customer-Robot Identification positively influences Customer-Robot Relationship

Also, according to el Hedhli et al. (2013), Customer Well-Being refers to feelings of satisfaction, with several consumer life domains and subdomains, such as product acquisition, product ownership or use. As already mentioned in the literature review, when customers identify with an organization/ brand, an inevitable feeling of care and connection towards it emerges, as well as the desire to interact, in a positive way, with that organization/ brand (Bhattacharya & Sen, 2003), which can contribute to the creation of quality of life and well-being (Bhattacharya & Sen, 2003; Dolnicar et al., 2012; Su, Swanson, & Chen, 2016).

Considering all of the mentioned, one can hypothesize that customers that perceive a robot to match their self-image may experience a sense of well-being. The following hypothesis will then contribute to study the influence of Customer-Robot identification on Customer Well-Being:

H1b: Customer-Robot Identification positively influences Customer Well-Being

3.2 Customer- Robot Relationship outcomes

As already mentioned in the previous chapters, there are few studies on the relation between Customer-Brand Relationship and Customer Well-Being. From the literature review, it was possible to understand that whereas Brand Relationship happens when a mutual feeling of care is felt between the brand and the individual (Alvarez & Fournier, 2016), Customer Well-Being involves feelings of satisfaction (el Hedhli et al., 2013). Thus, despite being different, there is a relationship between both concepts, since according to la Guardia et al. (2000), in order for an individual to experience satisfaction of essential psychological needs, one's partner must be able to establish a sensitive and deep relationship, which will help providing occasions to fulfill several basic needs. Therefore, since customer well-being involves feelings of satisfaction (el Hedhli et al., 2013), the individual is expected to experience well-being (la Guardia et al., 2000).

That said, the feeling of well-being provided by the relationship with the robot is expected to be greater if the established relationship between the customer and the robot is a deep one. Therefore, the following hypothesis was developed:

H2: Customer-Robot Relationship positively influences Customer Well-Being

Chapter 4 – Methodology

As mentioned in the previous chapters, the present study aims to investigate not only the individuals' perceptions and attitudes towards social robots and the relationship that can be established between them both in the hospitality industry, but also if customers become emotionally attached to these robots in a way that influences customer well-being. For that matter, a conceptual framework and hypotheses were already created.

This chapter's goal is to explore the research method used to address the hypothesis shown in chapter 3. In order to deepen the knowledge on the topic, a quantitative research was carried out for this investigation. This revealed the significance of not only collecting information from a broader sample and measuring data, but also of generalizing findings and acknowledge patterns (Malhotra & Birks, 2007). Therefore, the quantitative research method that was selected to test the hypotheses and respond to the research questions was the questionnaire. In addition, hospitality customers from the United States of America were the targeted audience using the platform Amazon Mechanical Turk and four questionnaires concerning different stages of robots, which will be further explained, were implemented.

4.1 Construct Measurement

The questionnaires were applied to measure all constructs and their respective items, being these developed based on scales from previous studies. The author used original measurement scales, which were firstly selected from several articles concerning each construct, and then adjusted to the aim of this study.

Customer-Robot Identification, Customer-Robot Relationship and Customer Well-Being were the three main constructs that constitute the conceptual framework, and these were also the basis for the elaboration of the questionnaires (Table 4.1). The construct Customer-Robot Identification was adapted from the scale developed by García de Leaniz and Rodríguez Del Bosque Rodríguez (2015), which was previously adjusted from Mael and Ashforth (1992) and it comprises 4 items itself. This construct was applied to primarily understand the development of humans' identification between a social robot and their self-concept.

This leads to the next construct, which is Customer-Robot Relationship. Indeed, and as already explained, it becomes crucial to understand the different levels of relationship that can be established between humans and social robots once the first ones identify with a robot. Therefore, the construct Customer-Robot Relationship is composed by six dimensions (which were adapted from Chang and Chieng (2006) study, and more specifically, from their Customer-Brand Relationship construct), and it was adjusted from a multidimensional scale developed by several authors. These six dimensions will

explain Customer-Robot Relationship levels: Functionality (that contains 6 items, was measured by adapting Lin & Mattila's (2021) scale); Love (that comprises 6 items, was measured by adapting Bagozzi et al.'s (2017) scale); Commitment; Attachment; Self-Connection and Partner Quality (each containing 3 items, were measured by adapting Chang and Chieng's (2006) scale).

The construct Customer Well-Being, that comprises four items, was measured by adapting el Hedhli et al.'s (2013) scale and it focuses on the feeling of wellness provided by the relationship with a robot.

All of these constructs were measured in the questionnaires according to a 7-point Likert Scale, in which the respondents answered from 1 (Strongly disagree) to 7 (Strongly agree) to all the items that constitute each variable under study. All constructs and its items can be found in chapter 5.1.2.

Table 4.1- Measurement Scales

Construct	Dimensions	Type of Likert-Scale	Source
Customer-Robot Identification		7-Point Likert scale of agreement (1- Strongly disagree to 7-Strongly Agree)	(García de Leaniz & Rodríguez Del Bosque Rodríguez, 2015)
Customer-Robot Relationship	Functionality;	7-Point Likert scale of agreement (1- Strongly disagree to 7-Strongly Agree)	Lin & Mattila, 2021
	Love;		Bagozzi et al., 2017
	Commitment;		Chang & Chieng, 2006
	Attachment;		
	Self-Connection;		
	Partner Quality;		
Customer Well-Being		7-Point Likert scale of agreement (1- Strongly disagree to 7-Strongly Agree)	El Hedhli et al., 2013

Source: Own elaboration

4.2 Questionnaire

As already mentioned, four questionnaires were created having in mind the literature review, and all measurement items were adjusted from existing materials. These were carried out using an online platform named Qualtrics, which revealed innumerable advantages, such as the possibility to include teasers, to add an indefinite number of questions, as well as the collection of an unlimited number of responses. In addition, this platform not only contributed to the utilization of Likert-type scales (which were mostly used), but it also was crucial in allowing the creation of a singular and unique code (which is a random ID) for each respondent by the end of the questionnaires. This code was an essential part of the process, since it facilitated the collection of data in Amazon Mechanical Turk, which is an adequate and trustworthy online platform that will be further explained in chapter 4.3.

Concerning the structure and design of the questionnaires, these surveys contained the same questions and structure, differing only in the teasers shown (Appendix A), and their structure was mainly adapted from Lin and Mattila's (2021) quantitative study (Study 2). Indeed, all four surveys contained small videos for respondents to visualize the development of hotel service robots throughout the years. The respective descriptions were presented to the respondents, starting from a less evolved robot (an autonomous food delivery robot that respond to stimulus, called, in this study, as Robot 1), to an humanoid robot like Pepper (referred, in this study, as Robot 2) and then to a physically human-like robot (i.e., receptionist human-like robot, such as the one in Henn-na Hotel, named, in this investigation, as Robot 3), ending up with what is expected to be the future (a yet non-existing, totally humanized, empathic and emotional robot, that is hardly distinguished from humans i.e., Arisa bot, mentioned, in this study, as Robot 4). These teasers were crucial, since, this way, the respondents were able to provide their point of view regarding the same robot, which facilitates the assessment of the participants' attitudes.

Initially, all respondents were introduced to a clarification of the investigation's objective and then they were asked about their technology expertise and if any previous visualization/ interaction with service robots occurred. These questions were relevant for the author, since the data collected before showing the teasers was a key point to understand the respondents' level of knowledge and familiarity with service robots. Secondly, and as exposed, in each survey, a teaser regarding one of the robots under study was shown. Indeed, short videos were the tool used to show the robots, since some studies state that videos/teasers are easily recalled, in comparison with images (Mendelson et al., 2017). Furthermore, the three under analysis constructs were measured using matrix table question types. The constructs' items were included as statements and the participants of this study indicated the extent of their agreement from 1 ("Strongly disagree") to 7 ("Strongly agree"). The surveys contained also some sociodemographic questions, like the Gender, Age Group, Education Level, Occupation and Annual Household Income, that were measured in a multiple choice scale. All the collected data was important for the author to make a description and analysis of the sample, compare data and cross the empirical with the theoretical part. Lastly, questions regarding marker blue were added, and these helped the author to assess the Common Method Variance. Surveys and their respective teasers can be seen in Appendix A.

4.3 Data collection and Procedures

As previously stated, the data was gathered from the four online questionnaires that were created in Qualtrics and then, published in Amazon Mechanical Turk, which is an Amazon's crowdsourcing platform. There are two categories of users on this marketplace: the workers, who finish tasks and are

eligible to receive payment when they submit the projects, and the requesters, that share their projects, which can be, for example, surveys, and pay to obtain the demanded data. Therefore, four surveys were distributed to the workers, in order to gather, in an easy, virtual and trustworthy way, data for this investigation. It is also important to mention that through the Amazon Mechanical Turk platform, any researcher is able to add necessary filters, with the goal of having a more selective and accurate sample. Thus, since the target audience of the survey was exclusively USA residents (due to what was already explained in the Contextualization chapter), a location filter was applied.

Before answering the questionnaires, all the participants were informed about the length of the survey (6 to 7 minutes), the amount of money to be paid by the requester, for how long the task would be still available (30 days), and the aim of the investigation. The workers that decided to answer the surveys responded anonymously and after approving their answers and verifying their proper submissions on both Amazon Mechanical Turk and Qualtrics, it was possible to proceed with the payment for the respective completed task. In addition, Qualtrics attributed to each worker a validation code by the end of each survey, and this code was intended to be transcribed to the Amazon Mechanical Turk task page, with the goal of matching the worker's answer with the validation code, and thus approving and paying the respondent/ worker (Appendix A).

Only 400 respondents (100 from each survey) from a total of 412 answers (103 from each survey) were eligible, since these answered all of the presented questions, which means that 12 answers were excluded from the sample. The collected data from the four questionnaires was uploaded to IBM SPSS 25 Statistics to calculate the sample profile and then to SmartPLS 3, to test the model.

4.4 Pre-test

The author decided to conduct a pilot test before publishing the questionnaires. This pilot test was important to assess if, before the actual implementation of the surveys, these needed any revisions or adjustments, that is, if there were any misunderstandings regarding any topic or question, if the exposed teasers with the different stages of the robots were understood and suitable for the research's objectives or if there was any redundant question. Therefore, no recommendations or doubts regarding the wording or measurements were pointed out by the 20 expert respondents that answered to the pilot test, being only made some few adjustments.

4.5 Sample Profile

As explained in chapter 4.2, the surveys included questions regarding the respondents' understanding of technology, and more specifically, service robots. Firstly, the participants were asked to state their level of technology expertise. From a total of 400 responses, only 14 (3.5%) people affirm to be "not

experienced”, signifying that almost 97% of the respondents are average, experienced, or very experienced users.

Additionally, most of the respondents stated they had already seen a service robot before (74.75%), as well as they had interacted with one (65.5%), which indicates that the majority of the participants had an understanding on how these robots operate, being, therefore, this sample size characterized as adequate and representative.

Lastly, for those that had interacted with a service robot before, it was asked the occasions/ places in which these participants had those interactions and the answers were the following: in hotels (37.04%), in restaurants (35.93%), in airports (23.33%) and in hospitals (3.70%).

By the end of each survey, sociodemographic data was gathered to better comprehend the sample’s profile. Among the 400 respondents, 190 (47.5%) are male, 207 (51.75%) are female and 3 (0.75%) respondents answered “other”. Regarding age groups, more than half of the sample (56.50%) is composed of adults in the age range from 26 to 41 years old, followed by adults within the age range of 42 to 57 years old (24.25%), which indicates that most of the sample size is composed by Millennials, followed by people belonging to Generation X. In what concerns the education level, more than half of the respondents have a bachelor’s degree (62%) and 21.75% (87 participants) have a master’s degree. Looking at the occupation of the participants, most of them stated they are employed (73.25%). Finally, by analyzing the household income, almost half of the sample (40.75%) is composed of adults with an annual household income between 50,001 – 100,000€, followed by adults with an annual household income between 25,000 - 50,000€ (37.75%). In Table 4.2, it is possible to find this information.

Table 4.2- Sociodemographic data | Sample Size

	Frequency	Percentage (%)
Gender		
Male	190	47.5
Female	207	51.75
Other	3	0.75
Age group		
18-25	50	12.5
26-41	226	56.5
42-57	97	24.25
58-67	27	6.75
Highest Education Level		
Less than High School	2	0.5
High School Graduate	31	7.75
Vocational training	23	5.75
Bachelor's degree	248	62
Master's Degree	87	21.75
Doctorate Degree	9	2.25
Occupation		
Employed	293	73.25
Self-employed	61	15.25
Unemployed	18	4.5
Student	14	3.5
Retired	8	2
Unable to work	6	1.5
Annual household income		
< 25,000€	34	8.5
25,000 - 50,000€	151	37.75
50,001 – 100,000€	163	40.75
100,001 – 200,000€	42	10.5
> 200,000€	10	2.5
Technology Expertise		
Very Experienced	45	11.25
Experienced	206	51.5
Average User	135	33.75
Not Experienced	14	3.5
Previous robot interaction		
Yes	270	65.5
No	130	32.5
Place of interaction		
Hotels	100	37.04
Hospitals	10	3.70
Restaurants	97	35.93
Airports	63	23.33
Previous visualization of robots		
Yes	299	74.75
No	101	25.25

Source: Author's creation based on SPSS output

Chapter 5 – Results and Discussion

This chapter's main goal is to combine the research findings with the theoretical knowledge, in order to draw some conclusions regarding the topic under study, which is the understanding of the relationship between service robots and humans. In more detail, the aim is to comprehend if a close and enduring relationship between robots and customers can be established and, if so, how. This will be crucial for hospitality managers to guarantee a greater value, and subsequently, customer well-being when providing the service.

That said, and in this chapter, the gathered results will be demonstrated, and the findings of the research will be shown, as well as explained. More precisely, the author will firstly do a thorough analysis of the data, that was collected from the surveys, exposing afterwards the discussion of the results. Finally, the theoretical contributions and managerial implications will be shown.

5.1 Data Analysis

To analyze the data collected from the questionnaires, it was used Partial Least Squares (SmartPLS) as an estimation method. SmartPLS is suitable when the structural model is considered complex and combines formative high-order constructs, as well as when the study's goal is to test a theoretical framework from a predictive perspective (Hair et al., 2019). Having said this, since the proposed model is complex, and implicates formative high-order measurement, the PLS software usage is justified.

5.1.1 Model Estimation

Estimating the model was the first step using SmartPLS. Indeed, this study's model is composed by two first-order constructs (Customer-Robot Identification and Customer Well-Being) and one formative second-order construct that contains six first-order dimensions (Customer-Robot Relationship: Love; Commitment; Self-Connection; Attachment; Partner Quality; Functionality). It is important to mention that Customer-Robot Relationship is a formative construct, because all of its six dimensions give a contribute explaining Customer-Robot Relationship levels, being significantly different from each other. Additionally, having in consideration the three approaches provided by PLS literature to estimate models with high-order constructs, the two-stage approach is the most accurate to be followed, since Customer-Robot Relationship is an endogenous variable (predicted by the model), neither being the repeated indicator approach nor the hybrid method the most accurate to estimate the high-order construct (Becker et al., 2012). The following subsections will reveal the results obtained.

5.1.2 Descriptive Statistics

A descriptive statistical analysis will be performed for all the variables that are mentioned in the conceptual framework, pointed out in chapter 3. Initially, the Mean and Standard Deviation of the variables' items were presented. Then, the Mean of each construct was obtained by the calculation of the mean of each mean associated with the particular variable, being computed using SPSS software. In this chapter, an analysis of each variable is demonstrated in a table that contains values reached with SPSS and PLS software.

Customer-Robot Identification

Firstly, Customer-Robot Identification (CRI) will be under analysis and it is composed by 4 items, presented in Table 5.1 (CRI 1, CRI 2, CRI 3, CRI 4). The item with the highest average value is **CRI 2: I am very interested in what others think about a robot like this** (mean= 5.165), indicating that it has the highest level of agreement in the answers provided by the respondents. In addition, the item **CRI 2** also presents the lowest standard deviation (SD= 1.589), which indicates the lowest disparity among the respondent's answers. In contrast, the item that presents the lowest average value is **CRI 1: When someone criticizes a service robot similar to this, it feels like a personal insult** (mean= 4.170), which corresponds to the lowest level of concordance in respondents' answers. The item **CRI 4: When someone compliments this robot then it feels like a personal compliment** has the highest value of Standard Deviation (SD=1.968), which means it has the lowest similarity among the respondent's answers. The construct Customer-Robot Identification has an average value of 4.694 and a Standard Deviation of 1.878, which indicates that the sample population has a considerably high level of agreement.

Table 5.1 – Descriptive Statistics – Customer-Robot Identification

	Mean	SD	Loading
CRI 1. When someone criticizes a service robot similar to this, it feels like a personal insult.	4.170	1.947	0.851
CRI 2. I am very interested in what others think about a robot like this.	5.165	1.589	0.818
CRI 3. When I talk about this robot, I usually say "he/she" rather than "it".	4.853	1.846	0.829
CRI 4. When someone compliments this robot then it feels like a personal compliment.	4.588	1.968	0.910
Construct: Customer-Robot Identification	4.694	1.878	

Source: Author's creation based on PLS and SPSS output

Customer-Robot Relationship

Customer-Robot Relationship (CRR) is explained by the following six dimensions: Functionality, Love, Attachment, Commitment, Self-Connection and Partner Quality. Whereas Functionality and Love comprise 6 items each, Attachment, Commitment, Self-Connection and Partner Quality are constituted by 3 items each. All six dimensions and its items can be seen in Appendix B, together with the corresponding data. As presented in Table 5.2, the dimension with the highest average value is Functionality (mean= 5.129), followed by Partner Quality (mean= 5.008). Therefore, these two dimensions are those with the greatest concordance rate from the respondents, both presenting mean levels that are high. Functionality also presents the lowest Standard Deviation of 1.574, which indicates the lowest disparity among the answers concerning its items. In contrast, Self-Connection demonstrates the lowest agreement rate (mean= 4.025) and the highest Standard Deviation of 2.270, meaning there was a big disparity among the participants' answers regarding its items. Despite this, the mean values of all dimensions are considerably high. Thus, the construct Customer-Robot Relationship presents an average value of 4.587 and a Standard Deviation of 1.931, which signifies that the respondents have a reasonably high level of agreement.

Table 5.2 – Descriptive Statistics – Customer-Robot Relationship

	Mean	SD
1. Functionality	5.129	1.574
2. Love	4.388	2.029
3. Attachment	4.220	2.157
4. Commitment	4.753	1.747
5. Self-Connection	4.025	2.270
6. Partner Quality	5.008	1.625
Construct: Customer-Robot Relationship	4.587	1.931

Source: Author's creation based on PLS and SPSS output

Customer Well-Being

Customer Well-Being (CWB) comprises 4 items and all of these are presented in Table 5.3. Regarding the average values, the item **CWB 4: These type of robots do play an important role in enhancing the quality of life of those that interact with them** reveals the highest accordance rate from the respondents (mean= 5.205). In contrast, **CWB 2: A robot like this would play an important role in my social well-being** has the lowest agreement rate of 4.473, and additionally, the highest Standard Deviation of 2.017, which shows a high level of disparity among respondents' answers. Looking at the lowest Standard Deviation, the item **CWB 1: This type of robot would satisfy my overall needs in the hospitality industry** stands out, with a Standard Deviation of 1.539, showing a greater similarity among answers. Therefore, the construct Customer Well-Being presents an average value of 4.837, indicating a high level of agreement, and a Standard Deviation of 1.798.

Table 5.3 – Descriptive Statistics – Customer Well-Being

	Mean	SD	Loading
CWB 1. This type of robot would satisfy my overall needs in the hospitality industry.	5.003	1.539	0.873
CWB 2. A robot like this would play an important role in my social well-being.	4.473	2.017	0.917
CWB 3. This robot would play an important role in my leisure well-being.	4.668	1.908	0.913
CWB 4. These type of robots do play an important role in enhancing the quality of life of those that interact with them.	5.205	1.597	0.890
Construct: Customer Well-Being	4.837	1.798	

Source: Author's creation based on PLS and SPSS output

5.1.3 Assessment of measurement model

This SmartPLS model was evaluated and interpreted in two different stages: the measurement model, and the structural model. In the present part, the author will reveal and analyze not only the results of the measurement model of the first-order constructs, namely Customer-Robot Identification and Customer Well-Being, but also the dimensions of Customer-Robot Relationship, which are Functionality, Love, Attachment, Commitment, Self-Connection and Partner Quality.

Firstly, regarding the reliability of the constructs' items, all items revealed, as already shown, loadings above 0.7, thus being considered as appropriate and reliable (Hair et al., 2010).

Furthermore, Cronbach's alpha and rho_A values were also calculated (Table 5.4), with the goal of measuring the construct reliability (also known as internal consistency). Since the values range, respectively, between 0.874 and 0.971 and 0.879 and 0.971, all constructs are reliable, according to the commonly accepted lower limit of 0.7 (Hair et al., 2010). In addition, the composite reliability was calculated, being inclusively considered to be a more precise measurement than Cronbach's alpha (Fornell & Larcker, 1981; Loureiro & Kaufmann, 2016). According to Table 5.4, all composite reliability values vary between 0.914 and 0.981, exceeding not only the lower limit of 0.7, but also the strictest threshold of 0.8, thus being this criterion verified (Nunnally, 1978; Loureiro & Kaufmann, 2016). Concluding, all constructs are reliable.

Regarding convergent validity, the Average Variance Extracted (AVE) presents values that range between 0.727 and 0.945 (shown in Table 5.4), which surpass the minimum limit of 0.50 (Fornell & Larcker, 1981). That said, this criterion is confirmed, indicating that more variance in the variables related with a construct was clarified than unclarified (Loureiro & Kaufmann, 2016). All of these measures fully validate the model.

In order to evaluate the first-order constructs' discriminant validity, the Fornell-Larcker criterion was used. Having in mind this testing system, the square root of Average Variance Extracted (AVE) of each construct should be higher than any of the correlations with other constructs of the model (Fornell & Larcker, 1981). Through an inspection of the discriminant validity results, and to meet the criterion, an item was eliminated, which was included in one of Brand Relationship's dimensions, Love (CRRLOV 6). This decision has to do with the fact that the value of the square root of AVE in this dimension was lower than the correlation with other constructs. Since the mentioned item was cross-loading and the difference was less than 0.10 (being, in addition, the lowest among the other items), this was the chosen item to be removed from the model and analysis (Farrell, 2010). After its elimination and the recalculation of the model, this criterion was successfully met, as demonstrated in Table 5.5.

Table 5.4 – Construct Reliability and Convergent Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Attachment	0.951	0.952	0.969	0.911
Customer-Robot Identification	0.874	0.879	0.914	0.727
Commitment	0.915	0.917	0.947	0.855
Self-Connection	0.971	0.971	0.981	0.945
Customer Well-Being	0.920	0.923	0.944	0.807
Functional	0.931	0.935	0.945	0.743
Love	0.945	0.946	0.958	0.822
Partner Quality	0.913	0.915	0.945	0.852

Source: Author's creation based on PLS output

Table 5.5 – Discriminant Validity: Fornell-Larcker Criterion

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Attachment (1)	0.955							
Customer-Robot Identification (2)	0.787	0.853						
Commitment (3)	0.833	0.826	0.925					
Self-Connection (4)	0.907	0.768	0.818	0.972				
Customer Well-Being (5)	0.831	0.797	0.880	0.803	0.898			
Functional (6)	0.703	0.747	0.836	0.674	0.873	0.862		
Love (7)	0.903	0.835	0.896	0.898	0.877	0.794	0.906	
Partner Quality (8)	0.744	0.737	0.823	0.725	0.843	0.803	0.782	0.923

Source: Author's creation based on PLS output. | Note: The values in bold on the diagonal represent the square root of AVE. The values in the lower diagonal indicate factor correlations.

In what concerns the formative second-order construct, it was necessary to do an assessment to understand if all six dimensions, which are Functionality, Love, Attachment, Commitment, Self-Connection and Partner Quality, contribute to the explanation of Customer-Robot Relationship. PLS software was used to calculate the non-parametric bootstrapping and the results can be found in Table 5.6. It was understood that not only all the beta weights for the six dimensions of this investigation were greater than 0.2 (which is the recommended value) (Chin, 1998), but also their p-values revealed being lower than 0.05, and even lower than 0.001, which is considered as a positive significance level ($p\text{-values} < 0.001$), and indicates that all indicators (Functionality, Love, Attachment, Commitment, Self-Connection, Partner Quality) are relevant to explain the Customer-Robot Relationship construction (Chin, 1998). Therefore, the dimension that influences Customer-Robot Relationship the most is Self-Connection ($\beta = 0.254$), followed by Attachment ($\beta = 0.252$) and Functionality ($\beta = 0.251$). In addition, the Variance Inflation Factors (VIF) was also assessed to understand the degree of multicollinearity in the indicators. The acceptable values of VIF can depend on the study or author, but according to Hair et al. (2010), it is acceptable a VIF with an upper limit of 10 (Hair et al., 2010). In the table below (Table 5.6), the values of VIF are below the mentioned value, so these don't indicate problems with multicollinearity.

Table 5.6 – Customer-Robot Relationship (2nd order construct) measurement model assessment

First-order constructs	Weight (Beta)	T Statistics	P Values	VIF
1. Functionality	0.251	42.896	0.000	4.156
2. Love	0.242	67.367	0.000	9.956
3. Attachment	0.252	43.240	0.000	8.107
4. Commitment	0.249	62.363	0.000	7.228
5. Self-Connection	0.254	45.103	0.000	7.559
6. Partner Quality	0.241	52.703	0.000	3.880

Source: Author's creation based on PLS output

5.1.4 Assessment of structural model

In this part, it will be presented and assessed the structural model. The structural model, also acknowledged as the inner model, intends to understand the paths/relationships between the latent variables, and thus revealing the outputs of the hypotheses tests (Hair et al., 2011). Therefore, the mentioned model is conducted to assess the path coefficients, retrieved from the PLS algorithm calculation, and to understand the significance of the paths between the latent constructs (Hair et al., 2011). For this, it was crucial to conduct a non-parametric bootstrapping procedure.

This model, visible in Figure 5.1, is comprised by two types of variables: the endogenous variables, which are those that are anticipated by the model and clarified by other constructs through structural model relationships (Customer-Robot Relationship and Customer Well-Being); and the exogenous

latent construct, the one that has no structural path relationship (Customer-Robot Identification) (Hair et al., 2011). Having in mind that all paths should be greater than 0.2 (Chin, 1998) and present p-values lower than 0.05, it is possible to state that most of the path coefficients were found to be significant, except for the path of the main effect from Customer-Robot Identification to Customer Well-Being, as verified in the Table 5.8 (**CRI→CWB**: $\beta = -0.014$, $p = 0.761$).

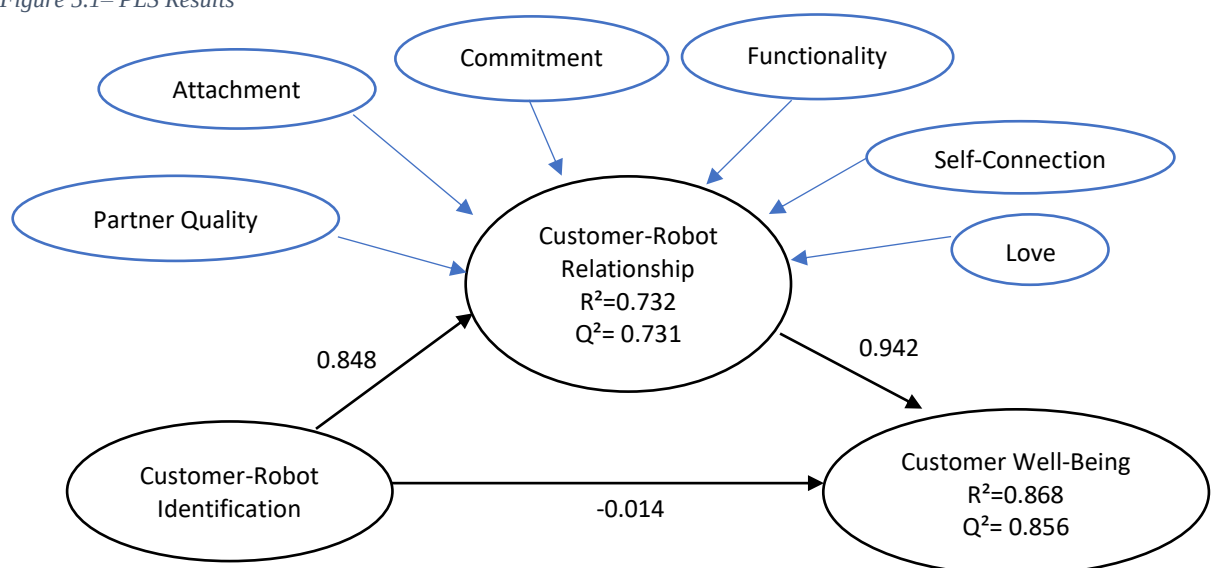
In regards H1(a), it posits that Customer-Robot Identification positively influences Customer-Robot Relationship. Having in consideration the results obtained ($\beta = 0.848$; p-value= 0.000, which is <0.001), it is possible to state that when a customer interacts with a robot and identifies with it, a very strong relationship is established between them both.

H2 hypothesizes that Customer-Robot Relationship positively influences Customer Well-Being. Indeed, the results obtained ($\beta = 0.942$; p-value=0.000, which is < 0.001) evidence that when a relationship between customers and robots is established, that is, when a connection, love and attachment occur, the feeling of well-being provided by robots to customers is greater.

Finally, H1(b) evaluates if Customer-Robot Identification positively influences Customer Well-Being. Unlike the other hypotheses tested and what was predicted, this one is not supported by the results, since Customer-Robot Identification does not significantly influence Customer Well-Being directly ($\beta = -0.014$; p-value= 0.761, which is superior than 0.05). Nevertheless, this finding strengthens the motivation and importance of this investigation in what regards the need to discover, analyze and evaluate pertinent mediators or moderators for this relationship. Therefore, a mediation analysis was then conducted in the following chapter, with the purpose of understanding if any of the variables fully or partially mediate this relationship, and if so, which ones.

Also, in Table 5.8, it can be seen not only all these direct effects, but also the confidence intervals, in which it is possible to observe that beta value is contained inside the interval for all the constructs.

Figure 5.1– PLS Results



Source: Author's own creation based on PLS outputs

Table 5.8- Direct effects

	Beta	Standard Deviation	T Statistics	P Values	CI [2.5%; 97.5%]	Hypothesis
CRR → CWB	0.942	0.038	24.517	0.000	[0.871; 1.017]	H2: Supported
CRI → CRR	0.848	0.020	42.076	0.000	[0.806; 0.882]	H1a: Supported
CRI → CWB	-0.014	0.047	0.305	0.761	[-0.110; 0.074]	H1b: Not Supported

Source: Author's creation based on PLS output

Furthermore, in the following table (Table 5.9), R square, Chi-square and Model Fit measures are shown. Firstly, R square (R^2) is a statistical measure that has to do with the variance's proportion of an endogenous variable that is clarified by the exogenous variable(s) (Fornell & Larcker, 1981). Its values can range between 0 and 1, signifying those that are closer to 1 a greater predictive accuracy. Chin (1998) considers that a R^2 value of 0.67 for endogenous latent variables is substantial. Regarding Chi-square (Q^2), it can be measured in PLS through the blindfolding calculation and provides the predictive relevance of the structural model (Hair et al., 2011; Loureiro et al., 2019).

Therefore, it is possible to state that Customer-Robot Identification explains 73.2% of the variance in Customer-Robot Relationship ($R^2 = 0.732$), thus being considered relevant for this variable ($Q^2 = 0.731$). In its turn, Customer-Robot Relationship and Customer-Robot Identification explain 86.8% of the variance in Customer Well-Being ($R^2 = 0.868$) and it is relevant for this variable ($Q^2 = 0.856$). To finalized, to measure the model fit, and in order to avoid model misspecification, the Standardized Root Mean Residual (SRMR) was calculated. The model in study has a SRMR of 0.076, which, according to Hu & Bentler (1999), indicates a well-fitting model, since a commonly considered good fit corresponds to a value lower than 0.08.

Table 5.9 - R-square, Chi-square and Model Fit

	R Square	Chi-square
CRR	0.732	0.731
CWB	0.868	0.856
Model Fit		
SRMR	0.076	

Source: Author's creation based on PLS output

The Common Method Variance (CMV) was also considered for this investigation. CMV is a systematic variance that is a result of the method used, that is, the method with which the data was collected (Simmering et al., 2015; Spector & Brannick, 2010). In order to effectively identify CMV, it is suggested that investigators use techniques based on marker (Malhotra et al., 2006; Simmering et al., 2015). In fact, in order to have an optimal marker, various criteria should be met, such as selecting a priori, theoretically unconnected to substantive variables, but with some degree of similitude in regards cognitive response tendency (Richardson et al., 2009; Simmering et al., 2015). Thus, and

according to Simmering et al. (2015), there are four types of marker that are considered to be ideal: 1) benefits administration perceptions, which analyzes perceptions of the explained benefits and one's needs (Simmering et al., 2015); 2) creative efficacy, or the expectation that an individual can conceive a creative output (Tierney & Farmer, 2002); 3) Web utilization, which measures the number of times an individual utilizes the web with the goal of searching for services and financial information (Hansen, 2012; Simmering et al., 2015); and 4) attitudes towards blue color, or the so called blue attitude, whose items may draw out reply processes identical to those enforced in responding to other attitudinal measure (Chan, 2009). For this study, and given the above justifications, the marker attitudes towards the color blue was the one the author considered to be the ideal.

Thus, a blue attitude marker was added at the end of the questionnaires and its items were measured according to a 7-point Likert Scale, in which the respondents answered from 1 (Strongly disagree) to 7 (Strongly agree). In addition, it was measured with four items: "I love the blue color", "I think blue is a nice color", "I like the color blue" and "I prefer blue to other colors", items adapted from Simmering et al. (2015) article, which were previously adjusted from Miller & Chiodo (2008). In the table below (Table 5.10), it is possible to state that there are no significant differences between the values of path coefficients with marker or those without it. Indeed, all path coefficients present similar values, which indicate that there isn't common method bias (1st path, which is CRR → CWB: **without marker**: $\beta = 0.942$; p-value = 0.000 | **with marker**: $\beta = 0.939$; p-value = 0.000; 2nd path, which is CRI → CRR: **without marker**: $\beta = 0.848$; p-value = 0.000 | **with marker**: $\beta = 0.800$; p-value = 0.000; and 3rd path, which is CRI → CWB: **without marker**: $\beta = -0.014$; p-value = 0.761 | **with marker**: $\beta = -0.013$; p-value = 0.797).

Additionally, in Table 5.10, the confidence intervals of all paths can be found. Therefore, it is possible to observe that the beta value is contained inside the interval for all the constructs, with or without marker.

Table 5.10 - Compare direct effects: without and with Marker

Path	Without Marker						With Marker					
	Beta	Standard Deviation	T Statistics	P Values	2.5%	97.5 %	Beta	Standard Deviation	T Statistics	P Values	2.5%	97.5%
CRR → CWB	0.942	0.038	24.517	0.000	0.871	1.017	0.939	0.039	24.447	0.000	0.869	1.022
CRI → CRR	0.848	0.020	42.076	0.000	0.806	0.882	0.800	0.029	40.194	0.000	0.736	0.854
CRI → CWB	-0.014	0.047	0.305	0.761	-0.110	0.074	-0.013	0.052	0.257	0.797	-0.114	0.085

Source: Author's creation based on PLS output

5.1.5 Mediation analysis

As mentioned in the previous chapter, a mediation analysis is in need, since, in this case, the direct effect of the path Customer-Robot Identification → Customer Well-Being is not significant ($\beta = -0.014$, $p\text{-value} = 0.761$). That said, in order to conduct this analysis, Cepeda-Carrion et al. (2018) research was followed, and the bootstrapping procedure was adopted to compute 97.5% confidence intervals for the indirect effect.

Before proceeding to the analysis, it is important to explain what mediation is. Mediation effect or indirect effect includes a third variable with the goal of adding an intermediate role between the relationship of the dependent and independent variables (Cepeda-Carrion et al., 2018). In turn, full mediation occurs when the direct effect is not significant, but the indirect effect is, which means that it is only seen when the indirect effect through the mediator is verified (Cepeda-Carrion et al., 2018).

The following table (Table 5.11) reveals the only indirect effect of this relationship, which, in addition, proves to be significant. Indeed, by analyzing the indirect effect result, it can be settled that Customer-Robot Relationship is a strong mediator of the Customer-Robot identification → Customer Well-Being relationship ($\beta = 0.798$, $t = 21.737$, $p = 0.000$), which was expected, since hypotheses H1a (Customer-Robot Identification → Customer-Robot Relationship) and H2 (Customer-Robot Relationship → Customer Well-Being) were supported. This corroborates with the idea that Customer-Robot Relationship is the central piece to initiate Customer Well-Being, especially when customers establish such a deep relationship with a brand/ object (in this case, a robot), and desire to continue with the relation, which contribute to the improvement of their quality of life and well-being. Therefore, it is perceived that Customer-Robot Identification is an important variable to Customer-Robot Relationship, but alone, it isn't enough to promote and explain Customer Well-Being.

In addition, it is possible to see that the confidence interval of the indirect effect does not contain zero, and therefore, one can state that mediation is established (Cepeda-Carrion et al., 2018).

Table 5.11 - Mediation Analysis Results

	Beta	Standard Deviation	T Statistics	P Values	CI [2.5%; 97.5%]	Result
CRI → CRR → CWB	0.798	0.037	21.737	0.000	[0.722; 0.835]	Full mediation

Source: Author's creation based on PLS output

Overall, as the direct effect between Customer-Robot Identification and Customer Well-Being is not significant, but the indirect effect is, full mediation can be confirmed (Cepeda-Carrion et al., 2018).

5.1.6 Multi-Group Analysis (MGA)

This investigation utilizes a permutation test for a Multi-Group Analysis (MGA) to find eventual differences between the four types of robots under study. Indeed, and as already mentioned, there are four types of robots, which were converted into four different groups (Robot 1, Robot 2, Robot 3 and Robot 4, corresponding to Group 1, Group 2, Group 3 and Group 4, respectively), each being constituted by 100 participants. Therefore, the results obtained in SmartPLS were carefully analyzed and explained.

Firstly, an assessment of Measurement Invariance of Composite Models (MICOM) was carried out. The three steps in the MICOM test were followed, with the goal of measuring the invariance of composites (Henseler et al., 2016). Therefore, it was concluded that the results of MICOM test support all steps, which are configured invariance (step 1), compositional invariance (step 2) and composites' equality of mean values and variances across the groups (step 3), revealing the establishment of full measurement invariance (Henseler et al., 2016).

The next table (Table 5.12) synthetizes the results for all groups under study, and consequently, for all the robots. The obtained results indicate that the estimated paths Customer-Robot Identification → Customer-Robot Relationship (H1a) and Customer-Robot Relationship → Customer Well-Being (H2) are significant with $p < 0.001$ for all groups (all p-values from these paths are 0.000). Thus, for all types of Robots (1, 2, 3 and 4), hypotheses H1a and H2 are supported (see Table 5.12). Also, it was verified that all of the above mentioned paths have a positive beta weight, not only in Group 1 (those that responded to the Robot 1's survey) and in Group 2 (those that answered to Robot 2's questionnaire), but also in Group 3 (those that did the survey regarding Robot 3) and Group 4 (those that answered the Robot 4's survey). This is due to the fact that the beta weights in both estimated paths are larger than 0.2 (**Group 1:** CRR → CWB: 0.946 | CRI → CRR: 0.818 / **Group 2:** CRR → CWB: 0.818 | CRI → CRR: 0.844 / **Group 3:** CRR → CWB: 1.018 | CRI → CRR: 0.847 / **Group 4:** CRR → CWB: 0.895 | CRI → CRR: 0.834) (Chin, 1998).

In contrast, the estimated path Customer-Robot Identification → Customer Well-Being is not significant for any of the groups ($p\text{-values} > 0.05$), thus hypothesis H1b is not supported (See Table 5.12). It is, in addition, confirmed a low beta weight of the estimated path Customer-Robot Identification → Customer Well-Being for the surveys of Robots 1, 2, 3 and 4 (Groups 1, 2, 3 and 4, respectively), since the beta weights for this estimated path are lower than 0.2 (**Group 1:** CRI → CWB: 0.021 / **Group 2:** CRI → CWB: 0.099 / **Group 3:** CRI → CWB: -0.119 / **Group 4:** CRI → CWB: -0.007) (Chin, 1998).

Table 5.12- Multi-Group Analysis on Robots 1, 2, 3 and 4

	Path coefficients				P-Values				Hypothesis
	N= 100	N= 100	N= 100	N= 100	N= 100	N= 100	N= 100	N= 100	
Path	Group 1 (Robot 1)	Group 2 (Robot 2)	Group 3 (Robot 3)	Group 4 (Robot 4)	Group 1 (Robot 1)	Group 2 (Robot 2)	Group 3 (Robot 3)	Group 4 (Robot 4)	
CRR → CWB	0.946	0.818	1.018	0.895	0.000	0.000	0.000	0.000	H2
CRI → CRR	0.818	0.844	0.847	0.834	0.000	0.000	0.000	0.000	H1a
CRI → CWB	0.021	0.099	-0.119	-0.007	0.810	0.335	0.229	0.930	H1b

Source: Author's creation based on PLS output

Also, it was analyzed the significance of the differences between Robots 1 and 2, Robots 1 and 3, Robots 1 and 4, Robots 2 and 3, Robots 2 and 4 and Robots 3 and 4 (Table 5.13).

Starting with **Robots 1 and 2**, one can state that whereas the impact from Customer-Robot Relationship → Customer Well-Being was greater in Robot 1 in comparison to Robot 2 (difference is 0.127), in the paths Customer-Robot Identification → Customer-Robot Relationship and Customer-Robot Identification → Customer Well-Being the opposite is verified (a greater effect is verified in Robot 2, when comparing to Robot 1 and the differences are 0.026 and 0.079, respectively).

Regarding **Robots 1 and 4**, the impact of Customer-Robot Relationship → Customer Well-Being and Customer-Robot Identification → Customer Well-Being was greater in Robot 1 in comparison to Robot 4, with a difference of 0.051 and 0.028 respectively, whereas in Customer-Robot Identification → Customer-Robot Relationship, a greater effect is verified in Robot 4, when compared to Robot 1 (with a difference of 0.016).

In **Robots 1 and 3**, and in both paths Customer-Robot Relationship → Customer Well-Being and Customer-Robot Identification → Customer-Robot Relationship, the impact was greater in Robot 3 in comparison to Robot 1 (difference is CRR→CWB: 0.072 and CRI→ CRR: 0.029), being the opposite verified for Customer-Robot Identification → Customer Well-Being (the impact was greater in Robot 1 in comparison to Robot 3, registering a difference of 0.140).

The same impact can be also verified when comparing **Robots 2 and 3**. Whereas in Customer-Robot Identification → Customer Well-Being, the verified impact was greater in Robot 2 when comparing to Robot 3 (difference CRI→CWB= 0.219), in Customer-Robot Relationship → Customer Well-Being, the impact was greater in Robot 3 in comparison to Robot 2, with a difference of 0.199, and the same happens with the estimated path Customer-Robot Identification → Customer-Robot Relationship, in which the impact is greater in Robot 3 than in Robot 2, despite the minimal difference of 0.003.

Concerning **Robots 3 and 4**, a greater impact is verified in Robot 3 when comparing with Robot 4 both in Customer-Robot Relationship → Customer Well-Being, with a difference of 0.123, and Customer-Robot Identification → Customer-Robot Relationship, with a difference of 0.013. In turn, in Customer-Robot Identification → Customer Well-Being, it is verified a greater impact in Robot 4, in comparison with Robot 3 (difference of 0.112).

Finally, in regards to **Robots 2 and 4**, the impact of Customer-Robot Relationship → Customer Well-Being was greater in Robot 4 than in Robot 2 (difference of 0.076) and the impact of Customer-Robot Identification → Customer-Robot Relationship, and Customer-Robot Identification → Customer Well-Being was greater in Robot 2 than in Robot 4 (differences of 0.010 and 0.107, respectively).

Despite the various differences, in terms of path estimates significance between the groups, as indicated in the Table 5.13, the Multi-Group permutation tests (from the 8th to the 13th column on Table 5.13) revealed no significant differences between the various groups on any of the paths (p-value > 0.05, in all cases). These results mean that the way Customer-Robot Relationship impacts Customer Well-Being in Robot 1 is not significantly different to how Customer-Robot Relationship affects Customer Well-Being in Robots 2, 3 and 4, so there aren't substantial differences in the impact or relationship of these variables. The same findings can be verified in the other estimated paths (Customer-Robot Identification → Customer-Robot Relationship and Customer-Robot Identification → Customer Well-Being), since their p-values are also superior than 0.05.

Table 5.13- Multi-Group Analysis on the differences between the Robots under study

Path	Pooled												Hypothesis
	N= 200	N= 200	N= 200	N= 200	N= 200	N= 200	N= 200	N= 200	N= 200	N= 200	N= 200	N= 200	
Path	Path coefficient differences (Group 1 vs Group 2)	Path coefficient differences (Group 1 vs Group 3)	Path coefficient differences (Group 1 vs Group 4)	Path coefficient differences (Group 2 vs Group 3)	Path coefficient differences (Group 2 vs Group 4)	Path coefficient differences (Group 3 vs Group 4)	P-value (Group 1 vs Group 2)	P-value (Group 1 vs Group 3)	P-value (Group 1 vs Group 4)	P-value (Group 2 vs Group 3)	P-value (Group 2 vs Group 4)	P-value (Group 3 vs Group 4)	
CRR→CWB	0.127	-0.072	0.051	-0.199	-0.076	0.123	0.254	0.497	0.633	0.088	0.505	0.262	H2
CRI→CRR	-0.026	-0.029	-0.016	-0.003	0.010	0.013	0.695	0.613	0.819	0.952	0.874	0.810	H1a
CRI→CWB	-0.079	0.140	0.028	0.219	0.107	-0.112	0.565	0.289	0.817	0.129	0.420	0.383	H1b

Source: Author's creation based on PLS output

5.1.7 Control variables checks

It is important to find if the control variables have an effect on respondents' answers, and therefore, on the results and outcomes that were reached. Despite not being relevant to this investigation's aim, these will be crucial to establish a causal relationship between the variables of interest. Having said this, to understand their potential effect, several control variables (regarding questions on the

customer's age group, education, gender, income, occupation, previous interaction with robots, previous visualization of robot and technology expertise) were added to the estimated SmartPLS model.

A bootstrapping analysis was conducted, and it can be concluded that some differences were seen when analyzing the effects of the control variables on Customer-Robot Relationship. Indeed, and regarding Customer Well-Being, none of the studied control variables had an effect on it, since all presented p-values were not significant at either 0.001, 0.01 or 0.05 levels (Chin, 1998). Concerning Customer-Robot Relationship, the Table below (Table 5.14) shows that the control variable Occupation (p-value=0.000) is the only one that is significant, thus being responsible for causing an effect on this construct. The control variable Occupation actually has a negative effect on Customer-Robot Relationship (since $\beta = -0.124$). In this specific case, because this control variable was measured through a multiple choice question, in which the respondents could answered 1 of the 6 given options (Employed, coded as 1, Self-Employed, coded as 2, Unemployed, coded as 3, Student, coded as 4, Retired, coded as 5 and Unable to Work, coded as 6), one can conclude that the lower the Occupational level, the lower will be the Customer-Robot Relationship established with the respondents. This can be related with the fact that these respondents (the ones that are not in the active population) tend to be less familiar with this type of technology, which can influence their willingness to relate with robots.

Table 5.14- Control Variables

	Weight (beta)	Standard Deviation	T Statistics	P Values
Age Group → CWB	-0.010	0.018	0.581	0.561
Age Group → CRR	-0.012	0.027	0.425	0.671
Education → CWB	0.028	0.025	1.131	0.258
Education → CRR	-0.016	0.032	0.491	0.623
Gender → CWB	0.015	0.021	0.736	0.462
Gender → CRR	-0.035	0.024	1.471	0.142
Income → CWB	-0.023	0.023	1.005	0.315
Income → CRR	-0.001	0.030	0.029	0.977
Occupation → CWB	0.017	0.022	0.793	0.428
Occupation → CRR	-0.124	0.029	4.258	0.000
Previous interaction with robots → CWB	0.031	0.029	1.065	0.287
Previous interaction with robots → CRR	-0.091	0.037	2.452	0.140
Previous robot see → CWB	-0.013	0.026	0.507	0.612
Previous robot see → CRR	-0.074	0.040	1.837	0.067
Technology Expertise → CWB	0.013	0.023	0.561	0.575
Technology Expertise → CRR	0.026	0.032	0.809	0.419

Source: Author's creation based on PLS output

5.2 Discussion

This study was developed with the aim of investigating the influence that human-robot relationships can have on the individuals' perception and attitudes towards social robots and, in turn, if the relation is established, how this emotional relationship influences customer well-being. Through a varied sample of 400 participants in total (that is, 100 participants in each of the four surveys related to four different types of robots), not only the results in above were obtained, but also the main questions of the research were addressed and the proposed goals in the conceptual framework and hypotheses were achieved (presented in the chapter 3). In the next paragraphs, the results of the investigation will be discussed.

In what the Descriptive Statistics is concerned, the most relevant insights that can be retrieved are associated to the constructs with the highest and lowest level of agreement (Mean) and disparity and similitude (Standard Deviation) among respondents' answers on the 7-point Likert Scale. That said, the construct with the highest mean is Customer Well-Being, that detains a value of 4.837. In addition, its Standard Deviation value is 1.798, being, therefore, the lowest of all the constructs under study. These two values not only mean that customers that establish a deep relationship towards a service robot in the Hospitality field develop, indeed, a high sense of well-being, but also that the responses regarding the construct's items were the most similar among the respondents.

In contrast, Customer-Robot Relationship has the lowest agreement rate of 4.587 and the highest Standard Deviation of 1.931, which expresses that this construct has the greatest disparity of responses regarding the items included. Despite these values, it is possible to understand that the Mean and Standard Deviation differences between all constructs is not considerable and that all of these present good values (i.e. mean > 4). Also, the measurement model revealed reliable and valid results for all variables.

As Customer-Robot Relationship is a second-order construct, it becomes mandatory to comprehend which of the six dimensions presented the highest rate of agreement among participants. As reported by the results (further information can be seen in Appendix B), the dimension with the highest average value is Functionality (mean= 5.129), followed by Partner Quality (mean= 5.008), indicating being the ones with which respondents mostly agree with. These are also the dimensions with the lowest Standard Deviation, thus covering the lowest disparity of responses regarding the included items (SD Functionality = 1.574 and SD Partner Quality = 1.625). The presented results evidence that customers easily establish relationships with social robots by the functional benefits these offer, that is, by their usefulness, such as, for example the time saving and trendiness of using them, followed by the partner quality sense these robots transmit, that is, by the depth sentiment of

a person-robot relationship, in which can be included the sentiment of importance, care and worry about a customer, as well as the individual's dependability on them.

The relationship among this investigation's variables will be clarified in the following paragraphs.

Regarding the relationship between Customer-Robot Identification and Customer-Robot Relationship, it is revealed by the results that there is a positive relationship between these two variables ($\beta = 0.848$), thus being hypothesis H1a supported. Indeed, these results confirm that when a person identifies with an hospitality social robot, which allows the fulfillment of one self-defined needs (Bhattacharya & Sen, 2003), the levels of relationship increase and a partnership relation between a customer and a robot can be easily developed. The results presented are also consistent with Belk's (2016) study, who underlines the possibility of identification of an individual's self in the form of a robot, and with Loureiro et al.'s (2014) study, who mention the importance of a strong identification between the customer and the brand/object for increasing the levels of connection, closeness, and especially relationship.

Another outcome of Customer-Robot Identification that was considered and studied was Customer Well-Being, but despite what was expected, the research showed a negative and non-significant relationship between these two variables ($\beta = -0.014$; $p\text{-value} = 0.761$), thus not supporting hypothesis H1b. That said, one can state that, in this study, the results show that a customer who identifies with an hospitality social robot does not directly experience a sense of well-being. This contrasts with Bhattacharya & Sen (2003), Dolnicar et al. (2012), and Su, Swanson, & Chen (2016) findings, which reveal that when individuals identify with a brand, a sense of care and connection towards it arises, which contributes to the creation of immediate quality of life and well-being. Thereby, and through a mediation analysis, it was understood that Customer-Robot Relationship is a mediator of the Customer-Robot identification $\rightarrow$ Customer Well-Being relationship ($\beta = 0.798$), which corroborates with the revealed idea that Customer-Robot Relationship is vital for the creation of Customer Well-Being, being even more relevant when a deep relationship between customers and social robots is established, as well as when the desire of continuing the relation is evidenced. Thus, from this study, the variable Customer-Robot Identification, alone, is not sufficient to promote Customer Well-Being.

To finalize, the results also disclosed a positive relationship between Customer-Robot Relationship and Customer Well-Being, revealing, this correlation, the highest beta effect ($\beta = 0.942$), thus supporting hypothesis H2. This result is in concordance with la Guardia et al. (2000) study, which states that as an individual's partner develops a deep relationship, the fulfillment of basic psychological needs should be done, which promotes satisfaction, and thus, feelings of quality of life and well-being. That said, the present study confirmed that a similar connection and relationship with a social robot can occur too, thus being Customer Well-Being considered as an outcome of Customer-Robot Relationship.

Furthermore, in this investigation, since Customer-Robot Relationship was measured as a second-order construct, containing six different dimensions (Partner Quality, Functionality, Attachment, Self-Connection, Commitment and Love), it is possible to state that consumers who establish a relationship with social robots, as if these are actual human partners, due to the development of a deep connection, commitment, love and attachment with them and the recognition of their functional benefits, are more prone to build up sentiments of well-being and quality of life through the relationship created.

Additionally, the common method variance was identified and then analyzed by the use of the marker blue approach. The results show that the values of path coefficients with marker or those without it remain similar, which indicate that there isn't common method bias. Also, and regarding Multi-Group Analysis, the Multi-Group tests evidence that there weren't significant differences between the distinct groups under analysis, that is, between Robots 1, 2, 3 and 4, which means that the level of humanization of these robots was indifferent for the sample size under study.

The hospitality industry will definitely benefit from the utilization of social robots, especially due to their capability of adapting and customizing the answers given to people, through the utilization of customers' own name, which can contribute to the improvement of the service, as well as to the creation of a pleasant and involving experience. If used adequately, all of these characteristics can improve the emotional proximity, the reputation and the perceived value of the hospitality infrastructures. In the conducted study, it is evidenced that these robots are not seen only as utilitarian objects, but rather like a social being, even as a partner, that provides sentiments of comfort and even well-being. The results demonstrate that customers actually create a relationship of love, commitment and attachment with hospitality social robots. If hospitality businesses understand how to benefit from this, customers will establish long-term relationships that can contribute to their happiness with the service provided.

5.3 Theoretical Contributions

This investigation can give several and relevant theoretical contributions to the research fields of Robotics and Artificial Intelligence within the Marketing area. Since there are few studies on customers' perspective and sentiments on service robots (Luo et al., 2021) or on the Human-Robot interactions (i.e. Choi et al., 2021), this study brings several theoretical contributions to have in mind, mostly regarding the relationship strength established between robots and humans, and its possibility to promote well-being to customers.

Firstly, the whole process of idealization of the framework had in consideration the need of bringing a new point of view to the Existing Marketing Literature. Indeed, by associating social robots to the customer-brand relationships theory, from Fournier's (1998) study, as well as incorporating

Customer-Robot Identification, Customer-Robot Relationship and Customer Well-Being into an unique framework, it was concluded that customer-robot relationships can be developed similarly as customer-brand relationships are in the hospitality industry, which provides a great theoretical contribute to better understand how a robot is now perceived and the possible future steps to develop a more accurate, efficient and emotional robot.

The relationship studied between Customer-Robot Identification and Customer-Robot Relationship is not considered a theoretical contribution, but more like an additional corroboration. In fact, and taking into account humans and social robots, the integration of these two concepts confirms the idea of how a customer that identifies with a social robot establishes, most likely, a relationship with it. The development of these relationships evidences the role these social robots can have in providing comfort and fulfilling customers' needs, as if these were social beings, actual partners, with whom it is possible to create an emotional long-term relationship.

Lastly, the incorporation of the concept of Well-Being in the model was also essential to provide a contribution to the study of Robots and Artificial Intelligence from a Marketing overview. This variable, just as all the others, was measured through the surveys, and analyzed as an outcome of Customer-Robot Relationship and Customer-Robot Identification. The used scale, adapted from a previous research (el Hedhli et al., 2013), asked the respondents whether the interaction, and more specifically, the relationship with the social robot, contributed to the satisfaction of their overall needs, to the feeling of wellness in life and if it enhanced their quality of life. The descriptive statistics, presented in chapter 5.1.2, revealed that this construct had one of the highest agreement rates, which means that customers feel well when interacting and relating with social robots.

5.4 Managerial Implications

After presenting the theoretical contributions of the present study, some managerial implications will be now revealed. Firstly, the results obtained from the questionnaires developed for this study evidenced that most respondents agreed that the relationship established with social robots in the hospitality industry would make them feel trendier and that they would rapidly depend on these technologies, always having in mind the good quality of the interaction. This is seen as an expectable outcome, since customers nowadays are increasingly looking to interact with products/technologies that provide pleasant and new experiences to them (Kim et a., 2021; Qiu et al.,2020), and with which they can establish a connection and a close relationship. Therefore, technologies like Artificial Intelligence and Robotics, when used properly, can deliver additional value to guests and especially help establishing long-term relationships. As such, it is crucial that brands, sellers and manufacturers of social robots acknowledge the importance of personalizing the experience. According to this study,

social robots are no longer just expected to be efficient; customers, in the hospitality industry, await these robots to be emotional, reliable and empathic, as if they were actual human partners with feelings. By having these details in attention, firms can differentiate themselves from their competitors, which can contribute to the creation of happy and long-lasting clients.

This brings another worry, which is the need for hospitality industry's managers and all of those that deal with service management to carefully develop strategies related to customer-robot relationships. Firstly, it is important not to forget that with the eminent end of the pandemic, customers reveal the desire to have deeper interactions and an human touch involved, so the way these social robots communicate and relate with people is crucial, in order to provide to customers the best experiences and interactions. Therefore, there should be an effort to develop social robots with feeling intelligence (Huang & Rust, 2021), in order for them to be emotional and have social feelings, which will be beneficial for customers. In turn, customers' reactions will be essential to create marketing initiatives with more impact. Also, this study reinforces that human staff should not be replaced, at least in a primary phase, but rather work together with these emotional robots, since this collaboration can bring several advantages, not only to human workers' wellness (only if hospitality managers don't threaten human workers' positions) (Erkutlu & Chafra, 2016), but also to clients, that can have new and improved experiences (Qiu et al., 2020), which can positively influence hospitality services' results.

To sum up, the biggest practical implication and conclusion of this investigation is that customers firstly identify with social robots, especially if these present themselves not only with a natural language/voice, but also with several personalized skills; after this identification, customers are more prone to create a deep and long-term relationship with them, which will, consequently, influence the guests' feelings of wellness. Indeed, customers are more willing to interact with social robots if they feel proxime to them, which makes them more likely to repeat the experience in the hospitality service and spend money with that experience, as well as recommend it to others.

Chapter 6 – Conclusions and Recommendations

Nowadays, new technologies, such as robots, are considered to be the future. In a world that deals with the aging of the global population (World Health Organization, 2021), these new technologies, and more specifically robots and AI, can have a substantial role in helping combat loneliness, as well as in adding renewed power to an elderly workforce, by enabling humans to focus on tasks of greater value. Having this said, it is important to note that robots cannot just exist; they need to be improved and provide people with unforgettable and differentiating experiences.

The results from the surveys revealed that customers create a relationship of love, connection and attachment with social robots which are operating, in this case, in an hospitality service, and that are seen as a partner for them. In fact, the more identified with social robots customers feel, the higher the levels of relationship will be. Additionally, Customer-Robot Relationship is positively correlated with Customer Well-Being, which means that, when a customer establishes a deep relationship, wellness provided by the interaction with the robot is greater and the feeling of fulfilment increases.

The social robots' features, such as the behavior and natural language, make people look at them as social beings, thus, occurring strong and positive feelings and an emotional relationship. These feelings, firstly of identification, and then of proximity and connection, make customers more willing to establish a deep relation with robots, to feel well and happy with the experience, and also more inclined to repeat it, which is a huge advantage for brands.

6.1 Limitations and Further Research suggestions

Although this study makes clear contributions, not only to the theoretical, but also to the practical part, it is subject to some limitations too. Therefore, those limitations, and also the future research recommendations will be mentioned and should be taken into account.

First, and in regards data collection, the research sample could have a higher representativeness. Despite the Multi-Group Analysis not having shown significant differences between the groups, that is, between the different robots under study, the fact is that 100 participants per each of the four questionnaires are not enough to effectively identify the differences between the four groups under study, that is, the four distinct types of robots.

Next, this investigation was just focused on residents of the United States of America. As already clarified throughout this dissertation, especially in the Contextualization chapter, the selection of this country had to do with some statistics that showed the United States of America as one of the biggest consumers of automation worldwide and where a very high level of acceptance regarding robots existed. However, the utilization of robots in Asian countries, such as South Korea, China, Japan, India and Singapore, as well as in European countries like Sweden and Germany is registering an exponential

growth, so a deeper study of these regions would be essential. With this being said, it is advised that further research considers expanding the focus of the study to different cultural and economic realities, namely to the countries mentioned.

In addition, if this study was carried on, the author would create another conceptual framework, in which the variable "Customer-Robot Identification" would be replaced by another variable, which would be "Customer-Robot Intimacy". This is because, according to the results obtained and the literature review collected, intimacy seems to be a variable that may lead to Customer-Robot Relationship. Besides that, this variable was studied as a moderating effects and it was verified that it didn't create any substantial or significant improvement on the model's results. Therefore, it would be interesting to understand if, in fact, intimacy could influence the creation of a relationship with social robots. Lastly, the variable "entertainment" would also be analyzed as a moderating variable, since according to some studies, entertainment could be a good variable to help understanding customer-robot relationships better.

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Appendixes

Appendix A- Questionnaires

Robot 1

ISCTE  Instituto Universitário de Lisboa

This questionnaire is part of an investigation within the scope of the Master's dissertation in Marketing.

The purpose of this survey is to analyze the impact AI and more specifically robots have on the way hospitality services are provided, delivered and perceived by the customer and to comprehend the possible relationship that can be formed between robots and clients.

Confidentiality and anonymity of all data collected are guaranteed and will only be used in this academic research work. You are requested to respond spontaneously and honestly to all questions.

The estimated time to complete this survey is 6 minutes.

Thank you in advance for your collaboration!

ISCTE  Instituto Universitário de Lisboa

At what level are you a technological expert?

1- Not experienced

☐

2- Average user

☐

3- Experienced

☐

4- Very experienced

☐

Have you seen a service robot before?

☐ Yes

☐ No

Have you ever interacted with a service robot before?

☐ Yes

☐ No

If so, please indicate your previous experience with service robots:

☐ At a restaurant

☐ At an hotel

☐ At an airport

☐ Other

You will be shown a small video about a service robot. Please watch it carefully



Bella Bot *

*Teaser of Bella robot (Edited from SYNETECH (2021), retrieved from <https://www.youtube.com/watch?v=IPpy75LiVs&t=4s>)

Please indicate the extent of your agreement with the statements below having in consideration the video you have seen

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7- Strongly agree
When someone criticizes this service robot, it feels like a personal insult	☐	☐	☐	☐	☐	☐	☐
I am very interested in what others think about this robot	☐	☐	☐	☐	☐	☐	☐
When I talk about this robot, I usually say "he/she" rather than "it"	☐	☐	☐	☐	☐	☐	☐
When someone compliments this robot then it feels like a personal compliment	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
It is important that robots like this help me save time	☐	☐	☐	☐	☐	☐	☐
The linkage of smart technology and service robots like this used in the hospitality industry is important to me	☐	☐	☐	☐	☐	☐	☐
I can depend on this robot in the hospitality industry	☐	☐	☐	☐	☐	☐	☐
Staying at a hotel/ restaurant that utilizes this service robot makes me feel trendy	☐	☐	☐	☐	☐	☐	☐
This service robot is here to stay	☐	☐	☐	☐	☐	☐	☐
Staying at a hotel/restaurant that uses this robot is worth my money	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I feel that interacting with this robot would say something "true" and "deep" about who I am as a person	☐	☐	☐	☐	☐	☐	☐
I feel myself desiring to interact to this robot	☐	☐	☐	☐	☐	☐	☐
I feel emotionally involved to this robot	☐	☐	☐	☐	☐	☐	☐
I believe that I would be willing to interact to this robot for a long time	☐	☐	☐	☐	☐	☐	☐
Supposing this robot would never exist, I believe I would feel anxiety	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statement below having in consideration the video that was shown to you before

	1- Very negative	2- Negative	3- Somewhat negative	4- Neither negative nor positive	5- Somewhat positive	6- Positive	7- Very positive
What is your overall feelings and evaluations towards this robot	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I would interact with this robot through good or bad times	☐	☐	☐	☐	☐	☐	☐
I would have a lot of faith in my future interactions with this robot	☐	☐	☐	☐	☐	☐	☐
I could feel very loyal to this robot	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
No other service robot could take the place of this robot	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my life	☐	☐	☐	☐	☐	☐	☐
I would feel missing if I haven't interacted with this robot for a while	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
This robot reminds me of who I am	☐	☐	☐	☐	☐	☐	☐
The robot's image and my self image are similar	☐	☐	☐	☐	☐	☐	☐
This robot and I have a lot in common	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I feel this robot would take good care of me	☐	☐	☐	☐	☐	☐	☐
I feel this robot is reliable and dependable	☐	☐	☐	☐	☐	☐	☐
I feel this robot would treat me as an important customer	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
This robot would satisfy my overall needs in the hospitality industry	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my social well-being	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my leisure well-being	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in enhancing the quality of life of hotel/restaurant clients	☐	☐	☐	☐	☐	☐	☐

Gender

- ☐ Male
- ☐ Female
- ☐ Other

Age group

- ☐ 18 to 25 years old
- ☐ 26 to 41 years old
- ☐ 42 to 57 years old
- ☐ 58 to 67 years old
- ☐ More than 67 years old

Highest education level

- ☐ Less than high school
- ☐ High school graduate
- ☐ Vocational training
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Doctorate degree

Occupation

- ☐ Employed
☐ Self-employed
☐ Unemployed
☐ Student
☐ Retired
☐ Unable to work

Annual household income

- ☐ Less than 25.000€
☐ 25.000€ to 50.000€
☐ 50.001€ to 100.000€
☐ 100.001€ to 200.000€
☐ More than 200.000€

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Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I love the blue colour	☐	☐	☐	☐	☐	☐	☐
I think blue is a nice colour	☐	☐	☐	☐	☐	☐	☐
I like the colour blue	☐	☐	☐	☐	☐	☐	☐
I prefer blue to other colours	☐	☐	☐	☐	☐	☐	☐

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Thank you for you participation. Your validation code is: 99robot1

Robot 2

This questionnaire is part of an investigation within the scope of the Master's dissertation in Marketing.

The purpose of this survey is to analyze the impact AI and more specifically robots have on the way hospitality services are provided, delivered and perceived by the customer and to comprehend the possible relationship that can be formed between robots and clients.

Confidentiality and anonymity of all data collected are guaranteed and will only be used in this academic research work. You are requested to respond spontaneously and honestly to all questions.

The estimated time to complete this survey is 6 minutes.

Thank you in advance for your collaboration!

At what level are you a technological expert?

1- Not experienced

☐

2- Average user

☐

3- Experienced

☐

4- Very experienced

☐

Have you seen a service robot before?

☐ Yes

☐ No

Have you ever interacted with a service robot before?

☐ Yes

☐ No

If so, please indicate your previous experience with service robots:

☐ At a restaurant

☐ At an hotel

☐ At an airport

☐ Other

You will be shown a small video about a service robot. Please watch it carefully



Pepper robot *

*Teaser of Pepper robot (Edited from Humber River Hospital Foundation (2019), retrieved from https://www.youtube.com/watch?v=MrRISDDZy_0&t=8s)

Please indicate the extent of your agreement with the statements below having in consideration the video you have seen

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7- Strongly agree
When someone criticizes this service robot, it feels like a personal insult	☐	☐	☐	☐	☐	☐	☐
I am very interested in what others think about this robot	☐	☐	☐	☐	☐	☐	☐
When I talk about this robot, I usually say "he/she" rather than "it"	☐	☐	☐	☐	☐	☐	☐
When someone compliments this robot then it feels like a personal compliment	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
It is important that robots like this help me save time	☐	☐	☐	☐	☐	☐	☐
The linkage of smart technology and service robots like this used in the hospitality industry is important to me	☐	☐	☐	☐	☐	☐	☐
I can depend on this robot in the hospitality industry	☐	☐	☐	☐	☐	☐	☐
Staying at a hotel/ restaurant that utilizes this service robot makes me feel trendy	☐	☐	☐	☐	☐	☐	☐
This service robot is here to stay	☐	☐	☐	☐	☐	☐	☐
Staying at a hotel/restaurant that uses this robot is worth my money	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I feel that interacting with this robot would say something "true" and "deep" about who I am as a person	☐	☐	☐	☐	☐	☐	☐
I feel myself desiring to interact to this robot	☐	☐	☐	☐	☐	☐	☐
I feel emotionally involved to this robot	☐	☐	☐	☐	☐	☐	☐
I believe that I would be willing to interact to this robot for a long time	☐	☐	☐	☐	☐	☐	☐
Supposing this robot would never exist, I believe I would feel anxiety	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statement below having in consideration the video that was shown to you before

	1- Very negative	2- Negative	3- Somewhat negative	4- Neither negative nor positive	5- Somewhat positive	6- Positive	7- Very positive
What is your overall feelings and evaluations towards this robot	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I would interact with this robot through good or bad times	☐	☐	☐	☐	☐	☐	☐
I would have a lot of faith in my future interactions with this robot	☐	☐	☐	☐	☐	☐	☐
I could feel very loyal to this robot	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
No other service robot could take the place of this robot	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my life	☐	☐	☐	☐	☐	☐	☐
I would feel missing if I haven't interacted with this robot for a while	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
This robot reminds me of who I am	☐	☐	☐	☐	☐	☐	☐
The robot's image and my self image are similar	☐	☐	☐	☐	☐	☐	☐
This robot and I have a lot in common	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I feel this robot would take good care of me	☐	☐	☐	☐	☐	☐	☐
I feel this robot is reliable and dependable	☐	☐	☐	☐	☐	☐	☐
I feel this robot would treat me as an important customer	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
This robot would satisfy my overall needs in the hospitality industry	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my social well-being	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my leisure well-being	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in enhancing the quality of life of hotel/restaurant clients	☐	☐	☐	☐	☐	☐	☐

Gender

- ☐ Male
- ☐ Female
- ☐ Other

Age group

- ☐ 18 to 25 years old
- ☐ 26 to 41 years old
- ☐ 42 to 57 years old
- ☐ 58 to 67 years old
- ☐ More than 67 years old

Highest education level

- ☐ Less than high school
- ☐ High school graduate
- ☐ Vocational training
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Doctorate degree

Occupation

- ☐ Employed
☐ Self-employed
☐ Unemployed
☐ Student
☐ Retired
☐ Unable to work

Annual household income

- ☐ Less than 25.000€
☐ 25.000€ to 50.000€
☐ 50.001€ to 100.000€
☐ 100.001€ to 200.000€
☐ More than 200.000€

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Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I love the blue colour	☐	☐	☐	☐	☐	☐	☐
I think blue is a nice colour	☐	☐	☐	☐	☐	☐	☐
I like the colour blue	☐	☐	☐	☐	☐	☐	☐
I prefer blue to other colours	☐	☐	☐	☐	☐	☐	☐

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Thank you for you participation. Your validation code is: 99robot2

Robot 3

This questionnaire is part of an investigation within the scope of the Master's dissertation in Marketing.

The purpose of this survey is to analyze the impact AI and more specifically robots have on the way hospitality services are provided, delivered and perceived by the customer and to comprehend the possible relationship that can be formed between robots and clients.

Confidentiality and anonymity of all data collected are guaranteed and will only be used in this academic research work. You are requested to respond spontaneously and honestly to all questions.

The estimated time to complete this survey is 6 minutes.

Thank you in advance for your collaboration!

At what level are you a technological expert?

1- Not experienced

☐

2- Average user

☐

3- Experienced

☐

4- Very experienced

☐

Have you seen a service robot before?

☐ Yes

☐ No

Have you ever interacted with a service robot before?

☐ Yes

☐ No

If so, please indicate your previous experience with service robots:

☐ At a restaurant

☐ At an hotel

☐ At an airport

☐ Other

You will be shown a small video about a service robot. Please watch it carefully



Henn-na staff robot *

*Teaser of Henn-na staff robot (Edited from The Japan Times (2018), retrieved from https://www.youtube.com/watch?v=5Gvv_lPw390)

Please indicate the extent of your agreement with the statements below having in consideration the video you have seen

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7- Strongly agree
When someone criticizes this service robot, it feels like a personal insult	☐	☐	☐	☐	☐	☐	☐
I am very interested in what others think about this robot	☐	☐	☐	☐	☐	☐	☐
When I talk about this robot, I usually say "he/she" rather than "it"	☐	☐	☐	☐	☐	☐	☐
When someone compliments this robot then it feels like a personal compliment	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
It is important that robots like this help me save time	☐	☐	☐	☐	☐	☐	☐
The linkage of smart technology and service robots like this used in the hospitality industry is important to me	☐	☐	☐	☐	☐	☐	☐
I can depend on this robot in the hospitality industry	☐	☐	☐	☐	☐	☐	☐
Staying at a hotel/ restaurant that utilizes this service robot makes me feel trendy	☐	☐	☐	☐	☐	☐	☐
This service robot is here to stay	☐	☐	☐	☐	☐	☐	☐
Staying at a hotel/restaurant that uses this robot is worth my money	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I feel that interacting with this robot would say something "true" and "deep" about who I am as a person	☐	☐	☐	☐	☐	☐	☐
I feel myself desiring to interact to this robot	☐	☐	☐	☐	☐	☐	☐
I feel emotionally involved to this robot	☐	☐	☐	☐	☐	☐	☐
I believe that I would be willing to interact to this robot for a long time	☐	☐	☐	☐	☐	☐	☐
Supposing this robot would never exist, I believe I would feel anxiety	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statement below having in consideration the video that was shown to you before

	1- Very negative	2- Negative	3- Somewhat negative	4- Neither negative nor positive	5- Somewhat positive	6- Positive	7- Very positive
What is your overall feelings and evaluations towards this robot	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I would interact with this robot through good or bad times	☐	☐	☐	☐	☐	☐	☐
I would have a lot of faith in my future interactions with this robot	☐	☐	☐	☐	☐	☐	☐
I could feel very loyal to this robot	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
No other service robot could take the place of this robot	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my life	☐	☐	☐	☐	☐	☐	☐
I would feel missing if I haven't interacted with this robot for a while	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
This robot reminds me of who I am	☐	☐	☐	☐	☐	☐	☐
The robot's image and my self image are similar	☐	☐	☐	☐	☐	☐	☐
This robot and I have a lot in common	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I feel this robot would take good care of me	☐	☐	☐	☐	☐	☐	☐
I feel this robot is reliable and dependable	☐	☐	☐	☐	☐	☐	☐
I feel this robot would treat me as an important customer	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
This robot would satisfy my overall needs in the hospitality industry	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my social well-being	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my leisure well-being	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in enhancing the quality of life of hotel/restaurant clients	☐	☐	☐	☐	☐	☐	☐

Gender

- ☐ Male
- ☐ Female
- ☐ Other

Age group

- ☐ 18 to 25 years old
- ☐ 26 to 41 years old
- ☐ 42 to 57 years old
- ☐ 58 to 67 years old
- ☐ More than 67 years old

Highest education level

- ☐ Less than high school
- ☐ High school graduate
- ☐ Vocational training
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Doctorate degree

Occupation

- ☐ Employed
- ☐ Self-employed
- ☐ Unemployed
- ☐ Student
- ☐ Retired
- ☐ Unable to work

Annual household income

- ☐ Less than 25.000€
- ☐ 25.000€ to 50.000€
- ☐ 50.001€ to 100.000€
- ☐ 100.001€ to 200.000€
- ☐ More than 200.000€

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Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I love the blue colour	☐	☐	☐	☐	☐	☐	☐
I think blue is a nice colour	☐	☐	☐	☐	☐	☐	☐
I like the colour blue	☐	☐	☐	☐	☐	☐	☐
I prefer blue to other colours	☐	☐	☐	☐	☐	☐	☐

ISCTE  **Instituto Universitário de Lisboa**

Thank you for you participation. Your validation code is: 99robot3

Robot 4

This questionnaire is part of an investigation within the scope of the Master's dissertation in Marketing.

The purpose of this survey is to analyze the impact AI and more specifically robots have on the way hospitality services are provided, delivered and perceived by the customer and to comprehend the possible relationship that can be formed between robots and clients.

Confidentiality and anonymity of all data collected are guaranteed and will only be used in this academic research work. You are requested to respond spontaneously and honestly to all questions.

The estimated time to complete this survey is 6 minutes.

Thank you in advance for your collaboration!

At what level are you a technological expert?

1- Not experienced

☐

2- Average user

☐

3- Experienced

☐

4- Very experienced

☐

Have you seen a service robot before?

☐ Yes

☐ No

Have you ever interacted with a service robot before?

☐ Yes

☐ No

If so, please indicate your previous experience with service robots:

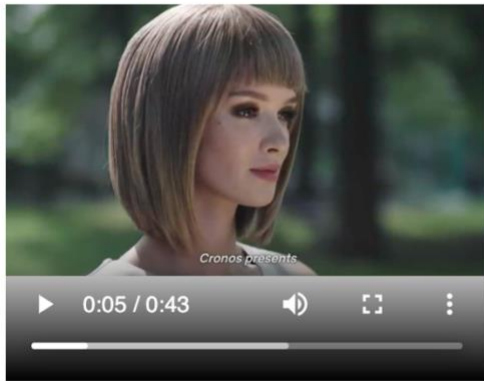
☐ At a restaurant

☐ At an hotel

☐ At an airport

☐ Other

You will be shown a small video about a service robot. Please watch it carefully



Arisa bot from Better than us *

*Teaser of Arisa Bot, from "Better than us", (Edited from Santos (2019), retrieved from https://www.youtube.com/watch?v=E7_mn1ZiJoo)

Please indicate the extent of your agreement with the statements below having in consideration the video you have seen

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7- Strongly agree
When someone criticizes this service robot, it feels like a personal insult	☐	☐	☐	☐	☐	☐	☐
I am very interested in what others think about this robot	☐	☐	☐	☐	☐	☐	☐
When I talk about this robot, I usually say "he/she" rather than "it"	☐	☐	☐	☐	☐	☐	☐
When someone compliments this robot then it feels like a personal compliment	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
It is important that robots like this help me save time	☐	☐	☐	☐	☐	☐	☐
The linkage of smart technology and service robots like this used in the hospitality industry is important to me	☐	☐	☐	☐	☐	☐	☐
I can depend on this robot in the hospitality industry	☐	☐	☐	☐	☐	☐	☐
Staying at a hotel/ restaurant that utilizes this service robot makes me feel trendy	☐	☐	☐	☐	☐	☐	☐
This service robot is here to stay	☐	☐	☐	☐	☐	☐	☐
Staying at a hotel/restaurant that uses this robot is worth my money	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I feel that interacting with this robot would say something "true" and "deep" about who I am as a person	☐	☐	☐	☐	☐	☐	☐
I feel myself desiring to interact to this robot	☐	☐	☐	☐	☐	☐	☐
I feel emotionally involved to this robot	☐	☐	☐	☐	☐	☐	☐
I believe that I would be willing to interact to this robot for a long time	☐	☐	☐	☐	☐	☐	☐
Supposing this robot would never exist, I believe I would feel anxiety	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statement below having in consideration the video that was shown to you before

	1- Very negative	2- Negative	3- Somewhat negative	4- Neither negative nor positive	5- Somewhat positive	6- Positive	7- Very positive
What is your overall feelings and evaluations towards this robot	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I would interact with this robot through good or bad times	☐	☐	☐	☐	☐	☐	☐
I would have a lot of faith in my future interactions with this robot	☐	☐	☐	☐	☐	☐	☐
I could feel very loyal to this robot	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
No other service robot could take the place of this robot	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my life	☐	☐	☐	☐	☐	☐	☐
I would feel missing if I haven't interacted with this robot for a while	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
This robot reminds me of who I am	☐	☐	☐	☐	☐	☐	☐
The robot's image and my self image are similar	☐	☐	☐	☐	☐	☐	☐
This robot and I have a lot in common	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I feel this robot would take good care of me	☐	☐	☐	☐	☐	☐	☐
I feel this robot is reliable and dependable	☐	☐	☐	☐	☐	☐	☐
I feel this robot would treat me as an important customer	☐	☐	☐	☐	☐	☐	☐

Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
This robot would satisfy my overall needs in the hospitality industry	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my social well-being	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in my leisure well-being	☐	☐	☐	☐	☐	☐	☐
This robot would play an important role in enhancing the quality of life of hotel/restaurant clients	☐	☐	☐	☐	☐	☐	☐

Gender

- ☐ Male
- ☐ Female
- ☐ Other

Age group

- ☐ 18 to 25 years old
- ☐ 26 to 41 years old
- ☐ 42 to 57 years old
- ☐ 58 to 67 years old
- ☐ More than 67 years old

Highest education level

- ☐ Less than high school
- ☐ High school graduate
- ☐ Vocational training
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Doctorate degree

Occupation

- ☐ Employed
☐ Self-employed
☐ Unemployed
☐ Student
☐ Retired
☐ Unable to work

Annual household income

- ☐ Less than 25.000€
☐ 25.000€ to 50.000€
☐ 50.001€ to 100.000€
☐ 100.001€ to 200.000€
☐ More than 200.000€

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Please indicate the extent of your agreement with the statements below having in consideration the video that was shown to you before

	1 - Strongly disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7 - Strongly agree
I love the blue colour	☐	☐	☐	☐	☐	☐	☐
I think blue is a nice colour	☐	☐	☐	☐	☐	☐	☐
I like the colour blue	☐	☐	☐	☐	☐	☐	☐
I prefer blue to other colours	☐	☐	☐	☐	☐	☐	☐

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Thank you for your participation. Your validation code is: 99robot4

Appendix B- Descriptive Statistics: Customer-Robot Relationship subscales

Customer-Robot Relationship: Functionality

	Mean	SD	Loading
CRRFUN 1. It is important that robots like this help me save time.	5.305	1.445	0.817
CRRFUN 2. The linkage of smart technology and service robots used in a hospitality industry is important to me.	4.935	1.596	0.886
CRRFUN 3. I can depend on this kind of robots in the hospitality industry.	5.093	1.483	0.890
CRRFUN 4. Staying at a hotel/ restaurant that utilizes service robots make me feel trendy.	5.230	1.618	0.853
CRRFUN 5. Service robots are here to stay.	5.335	1.406	0.831
CRRFUN 6. Staying at an hotel/restaurant with this kind of robots is worth my money	4.878	1.808	0.892
Construct: Functionality	5.129	1.574	

Source: Author's creation based on PLS and SPSS outputs

Customer-Robot Relationship: Love

	Mean	SD	Loading
CRRLOV 1. I feel that interacting with this robot says something "true" and "deep" about who I am as a person	4.268	2.058	0.918
CRRLOV 2. I feel myself desiring to interact to this robot	4.730	1.856	0.852
CRRLOV 3. I feel emotionally involved to this robot	4.188	2.091	0.938
CRRLOV 4. I believe that I would be willing to interact to this robot for a long time	4.728	1.805	0.916
CRRLOV 5. Supposing this robot would never exist, I believe I would you feel anxiety	4.028	2.213	0.907
CRRLOV 6. On the following scales, please express your overall feelings and evaluations towards this robot	5.230	1.441	0.830
Construct: Love	4.528	1.968	

Source: Author's creation based on PLS and SPSS outputs

Customer-Robot Relationship: Commitment

	Mean	SD	Loading
CRRCOM 1. I'll interact with this robot through good times or bad.	4.880	1.546	0.911
CRRCOM 2. I have a lot of faith in my future interactions with this type of robot.	4.823	1.707	0.937
CRRCOM 3. I could feel very loyal to this robot.	4.558	1.952	0.926
Construct: Commitment	4.753	1.747	

Source: Author's creation based on PLS and SPSS outputs

Customer-Robot Relationship: Attachment

	Mean	SD	Loading
CRRAT 1. No other service robot can take the place of this robot.	4.178	2.119	0.949
CRRAT 2. A robot like this plays an important role in my life.	4.335	2.152	0.953
CRRAT 3. I would feel missing if I haven't interacted with this robot for a while.	4.148	2.201	0.961
Construct: Attachment	4.220	2.157	

Source: Author's creation based on PLS and SPSS outputs

Customer-Robot Relationship: Self-Connection

	Mean	SD	Loading
CRRCON 1. This robot reminds me of who I am.	4.015	2.256	0.971
CRRCON 2. The robot's image and myself image are similar.	4.053	2.291	0.972
CRRCON 3. This robot and I have a lot in common.	4.008	2.268	0.974
Construct: Self-Connection	4.025	2.270	

Source: Author's creation based on PLS and SPSS outputs

Customer-Robot Relationship: Partner Quality

	Mean	SD	Loading
CRRPQ 1. This robot can take good care of me.	4.840	1.653	0.939
CRRPQ 2. This robot is reliable and dependable.	5.040	1.592	0.919
CRRPQ 3. This robot treats me as an important customer.	5.143	1.618	0.911
Construct: Partner Quality	5.008	1.625	

Source: Author's creation based on PLS and SPSS outputs

Appendix C- Total Effects

	Beta	Standard Deviation	T Statistics	P Values	2.5%	97.5%
CRR → CWB	0.942	0.039	23.865	0.000	0.873	1.020
CRI → CRR	0.848	0.020	42.629	0.000	0.808	0.886
CRI → CWB	-0.014	0.047	0.305	0.761	-0.110	0.074

Appendix D- Cross loadings

	Attachment	Customer- Robot Identification	Commitment	Self- Connection	Customer Well- Being	Functionality	Love	Partner Quality
CRRAT1	0.949	0.720	0.772	0.854	0.758	0.623	0.830	0.692
CRRAT2	0.953	0.775	0.810	0.863	0.823	0.711	0.870	0.737
CRRAT3	0.961	0.758	0.803	0.880	0.796	0.677	0.884	0.702
CRRCOM1	0.692	0.720	0.911	0.681	0.774	0.775	0.772	0.748
CRRCOM2	0.762	0.761	0.937	0.744	0.807	0.762	0.824	0.767
CRRCOM3	0.849	0.806	0.926	0.836	0.857	0.781	0.886	0.769
CRRCON1	0.880	0.753	0.807	0.971	0.786	0.660	0.890	0.702
CRRCON2	0.881	0.738	0.790	0.972	0.780	0.649	0.863	0.704
CRRCON3	0.884	0.749	0.787	0.974	0.777	0.656	0.865	0.708
CRRFUN1	0.488	0.569	0.630	0.425	0.690	0.817	0.547	0.656
CRRFUN2	0.658	0.696	0.758	0.647	0.799	0.886	0.727	0.697
CRRFUN3	0.605	0.648	0.721	0.603	0.780	0.890	0.694	0.735
CRRFUN4	0.607	0.632	0.708	0.547	0.708	0.853	0.682	0.662
CRRFUN5	0.520	0.567	0.679	0.530	0.693	0.831	0.636	0.676
CRRFUN6	0.727	0.731	0.807	0.697	0.826	0.892	0.789	0.725
CRRLOV1	0.822	0.764	0.838	0.851	0.794	0.744	0.918	0.680
CRRLOV2	0.697	0.737	0.793	0.687	0.777	0.762	0.852	0.715
CRRLOV3	0.877	0.771	0.818	0.879	0.799	0.685	0.938	0.714
CRRLOV4	0.791	0.756	0.826	0.760	0.832	0.758	0.916	0.762
CRRLOV5	0.898	0.758	0.787	0.885	0.774	0.651	0.907	0.676
BRLOV6	0,676	0,714	0,819	0,654	0,819	0,840	0,830	0,751
CRRPQ1	0.729	0.711	0.791	0.724	0.810	0.753	0.759	0.939
CRRPQ2	0.689	0.651	0.764	0.649	0.759	0.717	0.716	0.919
CRRPQ3	0.642	0.679	0.724	0.632	0.766	0.755	0.689	0.911
CWB1	0.663	0.715	0.774	0.621	0.873	0.817	0.717	0.758
CWB2	0.868	0.771	0.844	0.852	0.917	0.767	0.871	0.754
CWB3	0.787	0.702	0.774	0.765	0.913	0.765	0.823	0.730
CWB4	0.652	0.670	0.767	0.632	0.890	0.792	0.730	0.793
CRI1	0.687	0.851	0.702	0.660	0.649	0.573	0.714	0.576
CRI2	0.593	0.818	0.666	0.571	0.681	0.701	0.649	0.639
CRI3	0.634	0.829	0.657	0.630	0.646	0.598	0.684	0.616
CRI4	0.765	0.910	0.786	0.750	0.737	0.674	0.796	0.680