

Enhancing Brand Equity through Co-Creation: A Quantitative Study on Interaction Types and Individual Characteristics

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Abstract

Inspired by the continuously evolving changes that are happening within the field of co-creation, this thesis examines the effect different interaction types (robot vs. human) can have on customer's willingness to co-create and overall brand equity. Additionally, the study will test whether individual characteristics (anxiety and avoidance) can affect the relationship between interaction type and willingness to co-create. It is hypothesized that brand equity will be higher (vs. lower) when co-creation is enabled through interaction with a robot (vs. human), and that a high willingness to co-create has a positive effect on brand equity. Furthermore, it is expected and that individual characteristics (high vs. low level of anxiety) can moderate the relationship between interaction type and willingness to co-create. In other words, it is expected that the more anxious you are, the more open you are to use robots instead of human as interaction type, and vice versa. Finally, it is hypothesized that willingness to co-create mediates the relationship between interaction type (robot vs. human) and brand equity, but only for individuals with low anxiety and not for individuals with high anxiety.

The results from an independent samples t-test reveals that the robot condition's effect on brand equity is negligible, thus we could not confirm that the interaction type robot had a more positive effect on brand equity. On the other hand, a higher willingness to co-create had a positive effect on brand equity, and the hypothesis was be confirmed. Moreover, statistical evidence revealed that the participants individual characteristics (high vs. low levels of AAAS) moderated the relationship between interaction type (robot vs. human) and willingness to co-create, such as the more anxious you are, the more open you are to use robot instead of human as interaction type, and vice versa. Finally, it was significantly proven that willingness to co-create mediated the relationship between interaction type (robot vs. human) and brand equity only for individuals with low anxiety, but not for individuals with high anxiety.

Based on previous research, we know that co-creation and technology brings value separately, but there is some resistance to new technologies. On this basis, the present thesis research was created to provide valuable insights into the current knowledge.

Keywords: Co-creation, brand equity, willingness to co-create, attachment styles, interaction types, digital environments, technology

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Introduction

In today's highly competitive and rapidly changing business environment, companies are increasingly turning to co-creation to enhance their brand and product experience. *Co-creation* is a term used to refer to collaborative creation (Prahalad & Ramaswamy, 2000). Customers and other stakeholders are involved in the design, development, and delivery of products and services through co-creation. This approach is enabled by a range of technologies that facilitate communication, collaboration, and sharing of ideas.

Scholars in this field have investigated how the use of IT for openness can stimulate collaboration, which can lead to value co-creation (Schlagwein et al., 2010). These findings, however, are based on analyses of digital-native companies like Google, Facebook, and Salesforce. However, it is unclear to what extent these conclusions can be applied to established companies and how our current understanding of value co-creation through openness and collaboration addresses the unique challenges faced by such companies (Schlagwein et al., 2010).

The purpose of this master's thesis is to investigate the affect different interaction types (robot vs. human) can have on customer's willingness to co-create and overall brand equity. Additionally, the study will test whether individual characteristics (anxiety and avoidance) can affect the relationship between interaction type and willingness to co-create. In other words, the impact of interaction type on customer's willingness to co-create may differ depending on the customer's individual characteristics. It is unclear to what extent previous research have investigated whether individual characteristics in a co-creation context and if this will affect the willingness to co-create and brand equity. Therefore, this thesis strives to answer the following research question: *How does the type of interaction (robot vs. human) affect customers' willingness to co-create and overall brand equity, and what role has individual characteristics such as anxiety and avoidance in these relationships?*

The findings of this study will contribute to the understanding of how companies can effectively leverage co-creation technologies to enhance the brand and product experience, and whether this approach is a viable strategy for building brand equity and engaging customers in the co-creation process. Ultimately, this research aims to provide insights that can help companies make informed decisions about the use of co-creation technologies and their impact on brand value.

The structure of the thesis can be outlined as follows: Initially, a comprehensive review of existing literature related to the research question is provided. Subsequently, the associated hypothesis and the conceptual framework employed in this study are introduced. Then, the research methodology is described, outlining the procedure used to test the hypotheses, as well as the data collection and analysis methods employed. Following this, the results are presented, along with their theoretical contributions and managerial implications. Finally, the thesis concludes with a discussion of the study's limitations, suggestions for future research, and concluding remarks.

1.0 The Importance of Co-Creation in Digital Environments

1.1 Co-Creation

According to Promise Corporation (Meyassed et al., n.d.), co-creation is the dynamic and collaborative process where producers and users work together to generate value for customers. It emphasizes the notion that organizations can achieve greater success by innovating in partnership with consumers, rather than solely for them. In its essence, co-creation suggests that consumers no longer occupy a passive position at the end of the value chain, but instead play a pivotal role in the value creation process. Furthermore, co-creation is the result of a wide-ranging and irreversible shift in society and corporate culture. Co-creation projects are now being piloted by 58% of businesses to help drive innovation and companies that use co-creation can generate economic value while also lowering costs by delegating some of the company's productive tasks to consumers (Livescault, n.d.).

Rapid innovation cycles are critical for success in the industry 4.0 era. With so many potential co-creation partners available, it is critical to carefully select the right partner and partnership type (Kwan et al., 2020). Identifying internal capability gaps, establishing shared goals, and defining a mutual value proposition are all part of this process. Companies in a variety of industries have seen significant benefits from expanding their innovation efforts beyond their organizational boundaries (Kwan et al., 2020). Today's most successful innovators use an ecosystem strategy to ensure that their product portfolio keeps up with technological advancements, market trends, and changing customer demands. Organizations can position themselves for success in the digital economy by implementing a co-creation strategy and operating model that align with the overall corporate strategy and innovation objectives.

In a survey conducted by IBM, which included 1,500 CEOs from around the world, it was found that the most prosperous organizations are those that engage in co-creation with their customers (Meyassed et al., n.d.). These successful companies actively involve their customers in the development of products and services, integrating them into the core processes of the organization. IBM have previously collaborated with Cisco to globally bring business insights to the edge of the network for IoT solutions (Kwan et al., 2020). In this case, IBM and Cisco both got access to leading technologies that they leverage to develop a marketplace offering. Furthermore, IBM have also engaged in a collaborative co-creation process with Yara to develop innovative solutions in the field of agriculture and sustainability. Yara's expertise in crop nutrition and farming solutions is combined with IBM's advanced technologies and digital capabilities in this collaboration (IBM, n. d.).

1.2 Technologies in Co-Creation

Technology and business go hand in hand. Entrepreneurs utilize technological advancements to create profitable products. Additionally, technology influences how companies operate. For instance, electricity facilitated the development of larger and more efficient factories, while email has largely replaced traditional

letters. However, technology's impact on business goes beyond operational changes; it also affects the nature of work itself (The Economist, 2023).

High-speed internet and platforms such as Zoom and Microsoft Teams enable approximately one-third of working days in developed countries to be conducted remotely (The Economist, 2023). Hence, the distinction between working with colleagues, freelancers, and other businesses is blurring. Businesses are increasingly utilizing shared resources such as cloud computing and human capital. Skilled freelancers in the United States earned around \$247 billion in 2021, up from around \$135 billion in 2018 (The Economist, 2023).

Technology significantly facilitates the expansion and evolution of people's social lives, both in the real and virtual worlds. The emergence of various social media platforms has inspired companies to develop strategies for value co-creation with consumers through social media (Dey et al., 2019; Kapoor et al., 2015; Ostrom et al., 2015). As technology advances, consumers today are becoming increasingly connected, informed, and actively involved in every aspect of the industry system (Ramaswamy, 2009). Zhang et al. (2020) presented a figure depicting technological advancements that facilitate value co-creation. The figure includes technologies such as machine learning and artificial intelligence, virtual reality, online communities, social media, and internet (Zhang et al., 2020). Each of these technologies is discussed in greater detail in the following paragraph.

1.2.1 Machine Learning and Artificial Intelligence (AI)

Through the implementation of machine learning and artificial intelligence (AI), co-creation can be made more efficient and intelligent by facilitating the exchange of resources and enabling the customization and digitalization of services (Kaartemo & Helkkula, 2018). *Machine learning* is a type of AI that allows systems to learn and improve without the need for explicit programming. In co-creation, it can be used to analyze customer feedback, and forecast future preferences (Badillo et al., 2020). This assists brands in developing products or services that meet the needs of their customers. *Artificial intelligence* (AI) is the process of developing computer systems that can perform tasks that require human intelligence, such as decision-making, speech recognition, and natural language processing (Russell et al., 2021, p. 2).

Both machine learning and AI are technologies that play a significant role in co-creation processes. Large volumes of data generated during co-creation activities, such as customer preferences, feedback, and design choices, can be analyzed by machine learning algorithms. AI systems can extract valuable insights and patterns from this data, providing organizations with a better understanding of customer needs, preferences, and trends. These insights can be used to inform decision-making and co-creation strategies. Overall, machine learning and AI technologies can improve the co-creation process by introducing automation, personalization, and enhanced decision-making capabilities. Co-creation platforms can become more intelligent, responsive, and capable of delivering exceptional results for both customers and businesses by effectively leveraging these technologies.

1.2.2 *Virtual Reality (VR)*

Despite having existed as a concept for several decades, *virtual reality* (VR) has only recently been adopted by industries as a new medium for enhancing consumption experiences (Mütterlein, 2018). VR is a technology that creates immersive, computer-generated environments or simulations that users can interact with using specialized devices such as VR headsets. In the context of co-creation, VR offers unique opportunities to enhance the collaborative design process and create more engaging and realistic experiences for participants. By leveraging VR, customers can engage in highly immersive interactions that simulate real-world experiences with a heightened sense of realism (Zhang et al., 2020). According to Brodie et al. (2013), virtual communities enable consumers to engage in direct interactions and communications with the firm and other stakeholders regardless of their geographical location or time zone. The mobility of interactions and communications between customers and the firm has been further enhanced by the growing popularity of mobile technology and devices (Eastman et al., 2014)

1.2.3 *Online communities, social media and internet*

Online communities are digital environments in which individuals with shared interests, goals, or identities congregate to exchange information and engage in collaborative activities (Lejealle et al., 2022). Within the context of co-creation, value is generated through the collaborative efforts of multiple stakeholders who operate within various social configurations (Zhang et al., 2020). Customers constitute social groups, or communities that interact more actively and socially with companies to engage dialogue and contribute to the co-creation process.

In a co-creation setting, *social media* provides a platform for companies to engage with customers and stakeholders through real-time, interactive communication. Social media enables customers to offer feedback and suggestions, share experiences, and co-create value with companies in a collaborative manner (Zhang et al., 2020). According to Prahalad and Ramaswamy (2004), social media facilitates social integration between businesses and their customers, resulting in the creation of value using customers' experiences and knowledge. Additionally, Vargo et al. (2008) recognize social media as a tool for integrating and sharing resources and information, which is critical in co-creating value. The exchange of knowledge and information between firms and customers creates mutually beneficial value (Rashid et al., 2019; Singaraju et al., 2016).

Internet makes the information access easier and eliminate geographical obstacles and timeliness (Zhang et al., 2020). Moreover, internet allows for greater transparency and openness in the co-creation process, which can help to build trust and enhance customer satisfaction (Castronovo & Huang, 2012). Transparency has become more desirable in recent years as information about products, technologies, and business systems has become more important for customers, thanks to the internet's widespread availability (Prahalad and Ramaswamy, 2004).

1.3 Examples of Successful Co-Creation Strategies via Digital Tools

1.3.1 LEGO

LEGO is a Danish company founded by Ole Kirk Kristiansen in 1932, and the company is now one of the world's leading manufacturers of play materials, based on the iconic LEGO brick (LEGO, n.d..a). The bricks consist of colorful plastic blocks, gears, figures and other parts that can be assembled together in an almost infinite number of combinations.

LEGO uses machine learning in their co-creation process. Customers can submit their own designs for new Lego sets through the company's online platform, LEGO Ideas (LEGO, n.d.-b). The platform analyses submissions using machine learning algorithms to identify those with the best chance of success. The algorithm considers factors such as the number of votes a design receives, the feedback from the community, and the level of creativity and innovation in the design (LEGO, n.d.-b). This assists LEGO in identifying and bringing the most promising ideas to market, while also involving customers in the product development process (Zhang et al., 2020). LEGO, for example, invited customers to design toy robots and construction models, write applications for the robots, and share their designs with other customers via its website.

1.3.2 Ford

Ford Motor Company, commonly referred to as Ford, is an automobile and tractor manufacturer founded in 1903 by Henry Ford in Highland Park, Michigan (Ford, 2020). While the company's initial production vehicle was the Model A, it is noteworthy that Henry Ford had already created his first car in 1896 and subsequently developed his first racing car in 1901. Initially headquartered in Detroit, USA, Ford has since expanded its operations globally, establishing factories and partnerships across various regions worldwide (Ford, 2020).

Ford employs virtual reality (VR) to create collaborative design spaces in which designers and engineers from all over the world can collaborate in real time (Ford, 2020). They can use virtual reality to review and refine 3D models of cars, exploring every angle and detail before making physical prototypes. Because team members can communicate and make decisions in real time, regardless of their physical location, this approach allows for faster and more efficient collaboration. Hence, allowing them to iterate and test different design options quickly, reducing the time and cost required to develop new cars (Ford, 2020).

1.3.3 Starbucks

In 1971, Starbucks made its debut in Seattle's Pike Place Market, offering a selection of fresh-roasted coffee beans, tea, and spices (Starbucks, n.d.). In 1982, Howard Schultz joined the company and was deeply moved by the quality of Starbucks coffee. After a transformative trip to Milan in 1983, Schultz envisioned bringing the vibrant coffeehouse culture of Italy to Starbucks. This led to the transition from a retail store to a coffeehouse experience in 1987. Starbucks continued to expand its presence across the United States and internationally, opening stores in Japan, Europe, and China (Starbucks, n.d.). Over the years, Starbucks has

become a cherished part of countless communities, fostering human connections through every cup, conversation, and interaction (Starbucks, n.d.). Their mission is rooted in nurturing the boundless possibilities of human connection.

Starbucks is one company that uses online communities in their co-creation process. They use an online community called My Starbucks Idea, for co-creation, where customers can submit ideas for new products, services, or experiences (Harvard Digital Initiative, 2015). Other customers can vote on the ideas and comment on them, providing feedback (Starbucks, 2013). This feedback is used by Starbucks to identify new trends and develop products or services that better meet the needs of their customers, such as the Frappuccino and mobile ordering app, thereby strengthening their customer relationship.

There are several examples of social media platforms used in co-creation where companies can engage with their customers and receive both feedback and gather ideas for new products or services, such as Facebook, Instagram, Twitter, and LinkedIn.

1.3.4 Patagonia

Patagonia, Inc., founded by Yvon Chouinard in 1973, is a leading American retailer of outdoor clothing (Patagonia, n.d.-a). Initially starting as a one-person operation, Chouinard's expertise as a rock climber led him to establish Chouinard Equipment in 1957, where he sold meticulously crafted mountain climbing gear. Patagonia is renowned for its strong commitment to environmental stewardship. Since 1985, the company has consistently allocated 1% of its total sales to support environmental groups through its collaboration with One Percent for the Planet, an organization co-founded by Yvon Chouinard. In 2016, the company made a notable pledge to contribute 100% of its Black Friday sales to environmental organizations, resulting in a significant donation of \$10 million. In June 2018, Patagonia gained attention by announcing its decision to donate the \$10 million received from President Trump's 2017 tax cuts to support groups dedicated to preserving the environment, natural resources, and finding solutions to the climate crisis.

Patagonia is an example of a sustainable clothing company that employs transparency in their co-creation process, by openly sharing information about their manufacturing process, including the materials used, factories involved, and employee working conditions. Customers can therefore make educated decisions and have faith in the Patagonia brand. In addition, the company promotes repairing products rather than purchasing new ones, thereby promoting sustainability (Patagonia, n. d.-b).

2.0 Literature Review

The present chapter will shed light on the theories and concepts that serve as the foundation for this study by conducting a literature review. Furthermore, the hypotheses are based on this theory, which will provide a preliminary understanding of the importance of empirical measures in exploring the topic and the significance of the analysis conducted in this study.

2.1 Self-Service Technology in Co-Creation Processes

According to Sood and Pattinson (2012), technological advancements such as social media and digital platforms for business interaction, as well as mobile devices that can connect to these platforms, have aided in the spread and acceptance of new digital media. This has resulted in increased interactions between companies and consumers, as noted by Manchanda et al. (2015). Furthermore, Bø and Lichtenthaler (2008), defined *technological co-creation* (TCC) as “when the customer is involved in the creation of value (for the firm and customer) by using technology as the tool of co-creation”, which is derived from Lusch and Vargo’s (2006) definition of co-creation combined with technology. Hence, interactions between customers and companies on digital platforms has increased with the use of technology.

Self-service technology (SST) is a widely used technology that eliminates the need for human interaction between a customer and a company. According to Meuter et al. (2000), self-service technology is a technological system that provides services to customers without the involvement of human personnel. Furthermore, SST fosters self-reliance by allowing users to perform desired transactions at their leisure, resulting in cost savings (Davis et al., 2011). Hotel check-in and check-out systems, as well as online airport check-in systems, are examples of SST (Meuter et al., 2000). SSTs should be flexible and not overly rigid to avoid user discomfort or impatience, as technology must be user-friendly, provide fast delivery, be dependable, and easy to manage (Ayodeji & Rjoub, 2021).

2.1.1 Robot vs. Human

The rapid advancement of robotics, automation, and artificial intelligence (AI) is expected to have a significant impact on various aspects of the hospitality and service industries, potentially resulting in operational and practice transformation (Choi et al., 2020). Service robots have emerged as a popular technology trend in the service industry. Frontline service robots have been promoted as a way for businesses to improve their interactions with customers and are defined as “system-based autonomous and adaptable interfaces that interact, communicate and deliver service to an organizations customer” (Wirtz et al., 2018, p. 909). These robots are being considered as a possible replacement or augmentation for human workers, with potential applications in hotels, airports, and restaurants (Choi et al., 2020). Frontline service robots are already being used by forward-thinking businesses to improve personalization, customer service, and modernize service delivery processes (Belanche et al., 2020).

As service robots become more prevalent in our daily lives, there is a growing body of research exploring the dynamics of human-robot interactions (Belanche et al., 2020; Ivanov et al., 2018; Lu et al., 2020; Mende et al., 2019; Wirtz et al., 2018). Despite the growing body of research in this field, there is little research on which interaction type (robot vs. human) that will increase customers willingness to co-create with the company. The concept of co-creation has been widely acknowledged as a valuable approach in various domains. Similarly, technology has been recognized as a valuable tool for enhancing productivity and efficiency. However, despite these recognized benefits, there exists a discernible level of resistance towards technology adoption in certain contexts (Leung et al., 2018). The use of self-service technologies has been explored in various domains, for example in hospitality management (Pozharliev et al., 2021). However, to the best of the author knowledge, no previous research has focused on how consumers perceive the interaction with self-service technologies such as robots, compared to humans, when it comes to co-creation environments. Accordingly, the present study aims to investigate what the best setup for co-creation is.

2.2 Brand Equity

Aaker (1991, p. 15) defined *brand equity* as “(...) a set of assets and liabilities linked to a brand, its name and symbol, that add to or subtract from the value provided by a product or service to a firm and/or that firm’s customers”. The use of brand equity to reinforce brand importance in marketing strategies is becoming increasingly popular (Keller, 2020, p. 58). A strong brand equity will lead to increased purchases and recommendations to other customers, giving the brand a competitive advantage. In other words, brand equity refers to the value that a brand adds to a product or service, beyond its functional features: brand awareness, perceived quality, brand loyalty, and brand associations.

Brand equity is a central concept in research (Farquhar, 1990; Yoo & Donthu, 2001), and practitioners place considerable importance on it since they invest substantial resources in its maintenance and expansion (Keller & Lehmann, 2006; Bambauer-Sachse & Mangold, 2011). It has also become an essential component in measuring market performance and is critical in assessing and comprehending the overall impact (Christodoulides et al., 2006). Moreover, according to Rust et al. (2000), brand equity is especially important in situations where it is difficult to assess the quality of a product or service prior to consumption, which is highly relevant in the context of co-creation and the use of technology. Consistent with Keller (1993), Aaker (1991) proposed that brand equity contributes to firm value by increasing the effectiveness of marketing initiatives, fostering brand loyalty, commanding price premiums, creating a favorable environment for brand extensions, and more. At the same time, it adds value to the customer by facilitating improved information processing, increasing purchase decision confidence, and promoting increased product satisfaction.

2.2.1 Keller's Brand Equity Model

Keller's model (1993; 2020) is the most all-encompassing brand equity model presented in the literature (Kuhn et al., 2008). The model consists of six building blocks: salience, imagery, performance, judgements, feelings, and resonance (Keller, 2020). Establishing *brand salience* (or brand awareness), is fundamental to the development of brand equity (Nedungadi, 1990, p. 264). The second phase involves connecting tangible and intangible brand associations to create brand meaning. As a result, functional associations (*brand performance*) or abstract associations (*image-related*) are used to describe brand meaning. Brand imagery is heavily influenced by the extrinsic properties of the ranges and includes how the brand attempts to meet the psychological or social needs of the customers (Keller, 2020, p. 83). Furthermore, customer personal opinions, referred to as *brand judgements*, are compiled from various brand performance and imagery associations. Customers make brand decisions based on quality, credibility, consideration, and superiority (Keller, 2020, p. 97). Moreover, customers emotional responses and reactions to the brand are referred to as *brand feelings* (Kuhn et al., 2008). Finally, at the peak of the brand equity model is *brand resonance*, which is at the heart of what brands strive for (Malär et al., 2011, p. 37). Brand resonance is the strength of a customer's relationship with a brand, reflecting the customer's willingness to engage with and identify with the brand (Keller, 2020). This block is determined by how much a person resonates and feels connected to a brand (Keller, 1993).

The literature describes various techniques for evaluating the financial worth to the firm, but there is limited discussion on assessing the value to the customer (Washburn & Plank, 2002). Kristal et al. (2016) discovered that co-creation has a marginally positive effect on brand equity. Another study discovered that co-creation among tourist organizations improves their performance (Tussyadiah & Zach, 2013). Understanding brand equity from the customer's perspective, is critical according to Keller (1993). Keller emphasizes that while the primary goal of marketing initiatives is to increase sales, it is critical to first establish positive brand knowledge structures that elicit positive consumer responses to marketing efforts (Keller, 1993, p.8).

The role of co-creation on brand equity has already been explored by previous studies (Kristal et al., 2016; Tussyadiah & Zach, 2013; Rust et al., 2000), but no study focused on the comparison between the use of self-service technology or human interaction in co-creation environment, and whether this derives a higher brand equity or not. Drawing on these empirical insights, the following hypothesis is made:

H1: *The use of self-service technologies in co-creation environments (robot vs. human) has a direct effect on brand equity, such that brand equity will be higher (vs. lower) when co-creation is enabled through interaction with a robot (vs. human).*

2.3 Value Co-Creation

Academics and practitioners are increasingly recognizing co-creation as an innovation of shared services by multiple consumers and service providers (Zhang et al., 2020; Ramaswamy & Ozcan, 2016; Bharti et al., 2015; Gebauer et al., 2013; Mustak et al., 2013; Prahalad & Ramaswamy, 2004). With the rise of digitally

empowered consumers, the traditional model of brand management has shifted from a one-way (with feedback) process to a (more complex) multi-sided, multi-stakeholder joint creation process (Laker, 2022; Bughin, 2014). Co-creation is formally defined by Prahalad and Ramaswamy (2004) as “a joint creation of value by the company and the customer, allowing the customer to co-construct the service experience to suit her context”. Furthermore, the subject demonstrates how organizations can collaborate with external stakeholders to create and develop new products and services (Kristiania, 2023). Firms and organizations must go beyond organizational boundaries into the value chain to foster collaborative exchange and integrate resources and skills to gain a competitive advantage (Kristal et al., 2016; Tussyadiah & Zach, 2013)

Traditional brand management orthodoxies are being challenged as brands co-evolve with co-creation experiences. By allowing customers to generate ideas and challenge the existing boundaries of the customer experience, co-creation takes the concept of customer participation to the next level. The ongoing participation of active customers in the co-creation process challenges the traditional marketing belief that the company is the sole authority on value creation (Zhang et al., 2020). The co-creation phenomenon in marketing is driven by changes in consumer behavior and preferences, such as the desire for more personalized and meaningful experiences, the increased use of social media, and the growth of the sharing economy (Cheung & To, 2016).

Furthermore, Adner and Kapoor (2010) argue that although the idea of co-creation emerged as a response to the changing role of customers in the value chain, its progress and implementation in the business world have always been closely connected to the advancement and development of technology. The continuous and long-term advancements in technology have a significant impact on the market and consumer behavior. Among various technological advancements, Information and Communication Technologies (ICTs) have a crucial role in facilitating interactions and interfaces for value co-creation (Zwass, 2010). Co-creation projects are now being piloted by 58% of businesses to help drive innovation (Livescault, n.d.). For instance, IKEA invites customers to engage and develop new products on their digital platform – “Co-Create IKEA” launched in 2018 (IKEA, n.d.).

On the other hand, little research has been conducted to investigate the disadvantages of co-creation. According to Heidenreich et al. (2015), companies should adopt a matching strategy in which they align the extent of customer involvement in service recovery with the level of co-creation during service delivery. When co-creation is flawed, it results in internal attributions of failure, which increases perceived guilt. Our findings show that in such cases, providing co-created service recovery is the most effective way to restore customer satisfaction (Heidenreich et al., 2015).

However, the co-creation process offers customers a range of social benefits. By being recognized as a valuable source of information by other stakeholders, customers can enhance their social status. Furthermore, active participation in communities with like-minded individuals can improve communication skills, foster social connections, and provide enjoyment (Etgar, 2008). Customers sense of accomplishment derived from co-creation can also lead to feelings of pride and ownership (Franke & Schreier, 2010; Moreau & Herd, 2010).

The “I designed it myself effect” by Franke et al., (2010, p. 125), refers to the added value a customer ascribes to a self-designed object simply because they feel like its originator. This leads us to the following hypothesis:

H2: A high willingness to co-create has a positive effect on brand equity.

2.4 Individual Characteristics

Previous research has suggested that inconsistencies in customer responses to frontline service robots may be attributed to both robot-specific design attributes, such as anthropomorphism, and customer-related factors (Castelo et al., 2019; Hancock et al., 2011; Wirtz et al., 2018). Previous research has concentrated on the technical aspects of service robots, such as their physical appearance, gender, and voice (Castelo, 2019; Eyssel et al., 2012). Van Pinxteren et al. (2019), for example, investigated the impact of robot anthropomorphism on customer responses in terms of affective responses (enjoyment), attitudinal responses (trust), and behavioral responses. Furthermore, Jörling et al. (2019) discovered that customers' perceptions of robot autonomy led to decreased feelings of control.

Marketing researchers have been focusing on this topic more recently, but their findings have been mixed. On one hand, customers have positive attitudes and are more likely to interact with service robots (Belanche et al., 2020; Qiu et al., 2020; Reich & Eyssel, 2013). However, other studies have found that certain customers may feel uneasy and dissatisfied when interacting with service robots (Choi et al., 2020; Desai et al., 2013; Griffin & Bartholomew, 1994a; Mende et al., 2019). This study will further investigate two anxiety and avoidance attachment styles (hereafter AAAS), described by Pozharliev et al. (2021).

2.4.1 Anxiety and avoidance

Anxiety is defined by the National Institute of Mental Health (n. d.) by a feeling of fear, apprehension, and unease. Sweating, restlessness, tension, and a rapid heartbeat are some of the symptoms and is a common reaction to stress (NIH, n. d.). Furthermore, anxious people have a biased attention towards detecting threats in their social environment, and as a result, they fear rejection from attachment figures (Verbeke et al., 2020). Avoidance on the other hand, refers to specific actions that people take to avoid becoming involved in a situation or to exit one that they are already in (Saxena, 2022). These behaviors also include those who actively avoid confronting emotions and may indicate a mental health problem (Saxena, 2022).

Nomura et al. (2020) conducted research to explore whether people with social anxiety had less actual and “anticipatory” anxiety when interacting with a robot compared to interacting with a person. This research concluded that people with high levels of anxiety preferred to interact with robots (Nomura et al., 2020). Previous findings also show that customers with lower anxious attachment style scores are more satisfied and more likely to share positive word-of-mouth feedback after interacting with a human service agent rather than a frontline robot (Pozharliev et al., 2021). Another study by Verbeke et al. (2020), found that the higher levels of relationship avoidance, the more these customers want to keep the firm at a distance while also being more

sensitive to service firm errors. Firms could potentially create more customized offers for these customers by engaging in more proactive data-mining practices to gain a deeper understanding of their needs, while also keeping their desire for distance in mind. Ultimately, this could potentially lead to higher brand equity. The following hypothesis is developed from this:

H3: *Individual characteristics (high vs. low level of anxiety) moderate the relationship between self-service technologies (robot vs. human) and willingness to co-create, such that the more anxious you are, the more are you open to use robots instead of human as interaction type, and vice versa.*

2.5 Consumer Behavior

Co-creation has the potential to provide numerous advantages to brands, including increased customer satisfaction, loyalty, and engagement, as well as improved brand reputation and innovation. However, it also introduces new challenges and risks, such as losing control of the brand message, negative customer experiences, and intellectual property issues, all of which must be effectively managed to ensure success. Customer behaviors are constantly influenced by the emergence of new marketing technologies and the evolving customer behavior shaped and refined by their internet experiences.

2.5.1 Customer satisfaction

Previous research has discovered that *customer satisfaction* is affected by their perception of the contribution of value creation partners and is related to a higher/lower value for suppliers. (Grissmann and Stokburger-Sauer, 2012). According to Oliver's (1977) confirmation-disconfirmation paradigm, the principal theoretical basis for customer satisfaction research is the notion that satisfaction arises from the customer's assessment of how well a product or service meets or exceeds their expectations. Although co-creation has been suggested as a source of satisfaction (Vega-Vazquez et al., 2013), it has received relatively little attention in the literature on customer participation (Navarro et al., 2016).

Recognizing customer satisfaction as a key driver of competitive advantage, researchers have identified a range of positive outcomes, including post-purchase behavior, retention, word-of-mouth, loyalty, and repurchase intentions (Tam, 2004; Ranaweera & Prabhu, 2003; Bloemer & Lemmink, 1992; Anderson & Sullivan, 1993). Empirical research has shown that satisfaction directly contributes to profitability and highlights the importance of customer participation in driving this relationship (Eisingerich et al., 2014; Anderson et al., 1994). Researchers have also noted that co-creation can lead to an elevation in customers satisfaction levels, and a stronger feeling of being valued by the company as integral and significant contributors to the product development process, as well as an increased level of self-esteem (Vega-Vazquez et al., 2013; Ramaswamy & Gouillart, 2010). Furthermore, Pozharliev et al. (2021) found that customers who score lower on the anxious attachment style (AAAS) report higher levels of satisfaction and are more likely

to share positive word-of-mouth (WOM) after interacting with a human service agent instead of a frontline robot service agent (Pozharliev et al., 2021).

2.5.2 *Customer loyalty*

Customer loyalty is a long-term and positive relationship between a customer and a business that encourages repeat purchases and encourages current customers to choose the company over competitors offering comparable benefits (Oliver, 1999; Qualtrics, n. d.). Co-created values may serve as significant intermediaries between customer participation and service outcomes, such as customer satisfaction and loyalty (Chen & Wang, 2016). In the realm of customer marketing, fostering customer loyalty is a crucial objective, as it constitutes a fundamental element for a company's long-term sustainability (Chen & Chen, 2010).

Strong brand equity, according to Keller (1998), is typically associated with higher brand loyalty. This viewpoint is consistent with Aaker's (1991) assertion that brand loyalty is both a component and a result of brand equity. Taylor et al. (2004) found that brand equity and trust are the two most important factors that influence both behavioral and attitudinal loyalty. However, customer loyalty does not directly lead to customer equity (Reinartz & Kumar, 2002). Nevertheless, previous research states that there is a relation in some form (Oliver, 1999; Johnson, 1998; Fornell & Johnson, 1993).

2.5.3 *Customer engagement*

Customer engagement values can be maximized through factors such as customer satisfaction and value perceptions (Kumar et al., 2010). According to Higgins and Scholer (2009), *customer engagement* is defined as an individual's intense and sustained involvement in an activity or experience as a result of a specific attraction or repulsion force. Customer engagement in the value co-creation process is viewed by scholars as a multifaceted construct that encompasses a customer's brand-related motivation, contextual factors, and cognitive, emotional, and behavioral responses during interactions with a brand (Oyner & Korelina, 2016; Brodie et al., 2013). The concept of value co-creation is intimately connected with customer engagement during interactions with a company (Oyner & Korelina, 2016).

According to Syaglova and Salamovska (2019), superior customer understanding is a source of a competitive advantage in the digital era. The quality of the customer experience is a significant source of differentiation (Syaglova & Salamovska, 2019). In previous studies of the hotel industry, feedback and user-generated reviews are viewed as types of customer engagement behavior in co-creation (Oyner & Korelina, 2016; Wei et al., 2013). Enabling customers to engage at a deeper level through co-creation method can generate a sense of pride among customers as they perceive their contributions to the jointly created achievement, resulting in valuable outcomes (Roberts et al., 2014; Chathoth et al., 2016). On the other hand, previous studies have found that unless customers believe that firms are committed to collaborating with them to generate positive experiences and value, they are unlikely to engage with these firms (Ashley et al., 2011).

Using new technologies to interact with customers is a popular way to improve customer engagement. Nonetheless, it is unclear how such marketing initiatives influence engagement, and more specifically, the type of engagement (Pöyry et al., 2020). According to these findings (Pöyry et al., 2020), customer engagement can be directed not only towards brands or companies, but also towards the services provided or the technologies that enable the services. Moreover, customers who score low on AAAS are more satisfied and more likely to engage in positive WOM after interacting with human (rather than robot) service agents, according to Pozharliev's et al. (2021) findings. Furthermore, different types of engagement can coexist and reinforce one another, but engagement with the company is less volatile (Pöyry et al., 2020). There are also those who believe that automation, particularly in the form of artificial intelligence, has the potential to render human labor obsolete and erode society's humanity (Mokyr et al., 2015). These concerns are contentious and widely debated, as evidenced by discussions in mainstream media (The Economist, 2016). The following hypotheses have been derived from this discussion:

H4: *Willingness to co-create mediates the relationship between self-service technologies (robot vs. human) and brand equity.*

2.6 Conceptual Model and Hypothesis Overview

Figure 1 visualizes the conceptual model used to evaluate how different interaction types can have an impact on the customers willingness to co-create and brand equity.

This relationship is influenced by the moderating variable of individual characteristics and the mediating variable willingness to co-create. The mediator can help explain the relationship between the interaction type (robot vs. human) and brand equity (Hair et al., 2006). Theoretically, a mediated effect, implies that the independent variable causes the mediator, who then causes the dependent variable (MacKinnon et al., 2000; Holland, 1988; Sobel, 1987). The role of individual characteristics as a moderator is to see if individual characteristics (like anxiety and avoidance) can moderate the relationship between the interaction type (robot vs. human) and the customers willingness to co-create. In other words, companies that can use the interaction type that will increase customers willingness to co-create are more likely to see an increase in overall brand equity.

As anticipated, the present work aims to test the following hypotheses:

H1: *The use of self-service technologies in co-creation environments (robot vs. human) has a direct effect on brand equity, such that brand equity will be higher (vs. lower) when co-creation is enabled through interaction with a robot (vs. human).*

H2: *A high willingness to co-create has a positive effect on brand equity.*

H3: *Individual characteristics (high vs. low level of anxiety) moderate the relationship between self-service technologies (robot vs. human) and willingness to co-create, such that the more anxious you are, the more are you open to use robots instead of human as interaction type, and vice versa.*

H4: *Willingness to co-create mediates the relationship between self-service technologies (robot vs. human) and brand equity.*

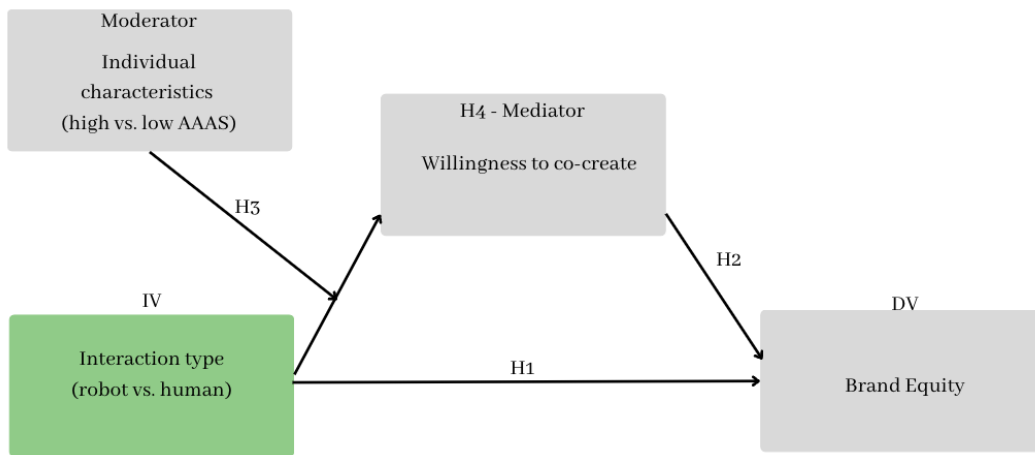


Figure 1 - Conceptual model

3.0 Research Methodology

3.1 Overview of the Study

This study is an online experiment to examine the affect interaction type (robot vs. human) can have on customer's willingness to co-create and overall brand equity. Additionally, the study will test whether individual characteristics (anxiety and avoidance) can affect the relationship between the different interaction types and customers willingness to co-create. In other words, the impact of interaction type on customers willingness to co-create may differ depending on the customers' individual characteristics.

A structured questionnaire was used to collect data as part of a quantitative research method. The survey was created using a set of scales that were carefully chosen, tested in recent literature, and tailored to the co-creation environment. A pre-test was conducted to test the survey, and some changes were made to the item wording. A seven-point Likert-scale was used to assess all variables.

3.2 Participants

167 of participants took part in the study conducted through an online survey on Qualtrics. The participants consisted of 55.09% female, 44.91% male, and none non-binary, and their age ranged from 20 to 61 years old (mean = 29.74; standard deviation = 10.954) (see Figure 2). A mixed design experiment with two factors: robot (R) vs. human (H), and low and high levels of anxiety and avoidance was used in the study. There were 86 people in the R group and 81 in the H group (see Table 2).

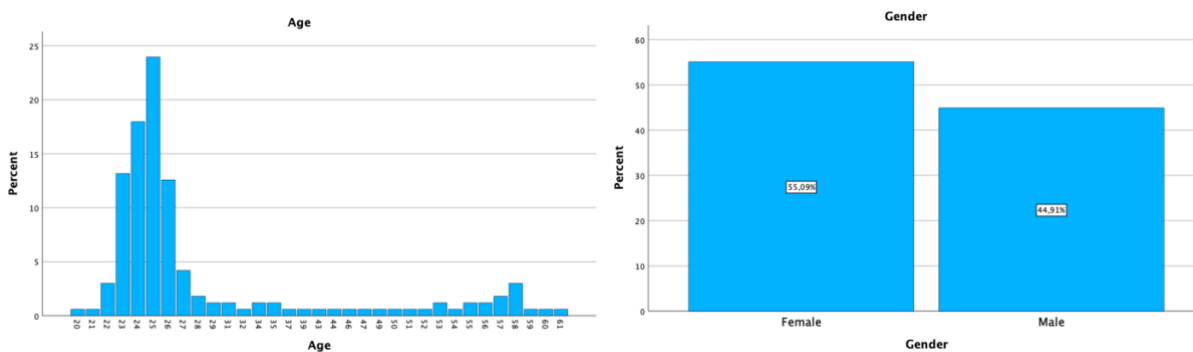


Figure 2 – Age distribution and gender percent

3.3 Questionnaire Development and Administration

The developed questionnaire (see Appendix I) is based on previous theoretical discussion and research of the various concepts, value co-creation, customer satisfaction, brand equity, and technology. It is unclear how far previous research has gone in measuring the relationship between value co-creation and brand equity, with customer satisfaction acting as a mediator. Furthermore, the use of technology may be able to moderate the relationship between value co-creation and customer satisfaction. For the different variables, I based the survey questions on scales developed by Chen and Wang (2016), González-Mansilla et al. (2019), Yi and Gong (2013), Fuentes-Blasco et al. (2017), and Washburn and Plank (2002).

3.3.1 Measures

In order to put the conceptual model to the test, I created 16 statements measured from 1 to 7 (where 1 = strongly disagree, 7 = strongly agree). In addition, the survey includes questions about respondents' age, gender, educational level, and employment status to create a demographic profile. All 16 statements were evaluated using a multi-item scale ranging from 1 to 7, with the higher number representing a stronger agreement with the statement.

Finally, the survey includes two questions in which respondents are asked to consider any brand they are familiar with, not just Living Lush Furniture. These questions are used as controls to double-check the effect of the moderator and mediator on the relationships.

3.4 Apparatus and Materials

For the purpose of the experiment a survey was created in Qualtrics with randomization applied, so that some participants will be given the scenario of using an app to design the furniture first, followed by a robot production, while others will be given the scenario of meeting a human in-store to design the sofa, followed by a human production. The survey measured individual characteristics, willingness to co-create and brand equity variables in the two conditions (robot vs. human) (Table 1). In addition, a set of demographic questions were made in order to create a demographic profile of the participants.

To measure levels of individual characteristics (AAAS), the scale from Verbeke et al. (2014) were used. Furthermore, this study used well-established measures with a solid foundation in previous research, allowing for easy comparison of our findings with existing literature. The individual characteristics scales in this survey have two items of which measure the anxiety dimension and two of which measure the avoidance dimension.

For measuring customers willingness to co-create, González-Mansilla's et al. (2019) scale was used, and the survey included four of them. Rather than the impact of co-branding, Washburn and Plank (2002) investigated the properties of the brand equity scale. To better understand the impact of co-branding, they used Yoo and Donthu's (1997) brand equity scales, on a seven-point scale rather than a five-point (Washburn & Plank, 2002). Furthermore, Washburn and Plank's (2002) scale to measure Multidimensional Brand Equity (MBA) and Overall Brand Equity (OBE), were used as scale to measure brand equity. I only included the items Washburn and Plank (2002) concluded with, and remained with one item for perceived quality, and one for brand loyalty as the MBE scale. Furthermore, for the OBE scale, I was left with one original item. Additionally, I included three of Chen and Wang's (2016) satisfaction items because satisfaction directly contributes to profitability (Eisingerich et al., 2014; Anderson et al., 1994).

<i>Dimensions</i>	<i>Measuring items/statements</i>	<i>Adapted from</i>
Individual characteristics - Anxiety	I find it relatively difficult to get close to others. I find it difficult to trust others completely.	Griffin & Bartholomew, 1994b
Individual characteristics - Avoidance	I want to get close to others, but I keep pulling back. I try to avoid getting too close to others.	Verbeke et al. (2014)
Willingness to co-create	I prefer this type of interaction with the brand if I was designing a furniture. This way of collaborating with a brand is more effective. It is easier to share information with a brand with this type of interaction. I prefer this type of interaction when I want to seek information from a company.	González-Mansilla et al. (2019)
Brand equity	The quality of this brand's service seems to be of extremely high quality. I could see myself loyal to this brand in the future. Even if another brand has the same features, I will prefer to buy from Living Lush Furniture in the future.	Washburn & Plank (2002)
Satisfaction items	I like the brand. I am satisfied with the services that Living Lush Furniture provides. This brand's service meets my expectations.	Chen & Wang (2016)

Table 1 - Items for measuring dimensions.

The survey measured four distinct constructs: four individual characteristics, four co-creation items, three brand equity items, and three satisfaction items. In addition, for investigative purposes, a block was added to compare the interaction type with any company (not just the fictitious one). The section also included an optional question for participants to answer why they chose their preferred type of interaction. Finally, demographic measurements were used to create a demographic profile of the respondents.

3.4.1 Scale type and validity

For the majority of the survey questions, a pre-validated seven-point multi-item Likert scale were used. The latter is commonly used to assess a person's perception of an organization or brand based on their set of beliefs. The scales were adapted from other measures that assess the same concepts to ensure satisfactory construct validity in this study (Malhotra & Birks, 2007). The content validity of a research method refers to how well it covers the concepts presented in the questionnaire (Malhotra & Birks, 2007). Using prior research to create the questionnaire improves its content validity. However, it is possible that respondents will interpret the concepts differently, jeopardizing the content validity. Loyalty, perception, branding, and value are all subject to individual perception, making them difficult to accurately measure. There is a possibility of introducing bias into the research process.

3.5 Pre-Test

To ensure that the questions were clear and unambiguous to casual readers, the survey was pre-tested on a small sample of 12 respondents, following the recommendation by Rust et al. (2000) for measuring customer equity. The pre-test revealed no significant issues with the questionnaire, therefore only minor adjustments were made to enhance its clarity.

3.6 Questionnaire Stimuli, Design, and Procedure

At the beginning of the research, all participants were given the same information about a fictitious home furnishing retailer chain and a subsequent co-creation appeal (see Appendix I). More specifically, participants were either exposed to a robot or human condition. In the first condition, participants engaged in a co-creation process where they designed furniture using an app interface. Subsequently, the production of the furniture was carried out by a robot. In the control condition, participants engaged in an in-person co-creation process where they designed the furniture with the assistance of a human representative. The subsequent production of the furniture was also carried out by humans (see Appendix I). To avoid potential interference from pre-existing brand awareness, a fictional company rather than a real one was chosen. Because the majority of consumers have purchased from service providers within this category, the home furnishing retailer industry was chosen. The brand name, logo, and introductory text were created to give the impression of a trustworthy brand, to create the belief that the home furnishing retailer chain exists, and to convey that the company needs assistance in enhancing its services.

The study followed a between subject single-factorial design, as only the presence of self-service technologies (robot) was the only variable which has been manipulated. After reading the introductory text, participants were randomly assigned to one of the two (robot vs. human) between-subject conditions in a co-creation setting. Participants were randomly assigned, and participants in the robot condition were presented with the opportunity to design their own furniture through an app, followed by a production process using a

robot (see Figure 3). While for the human condition, participants had to physically visit the store to design their own furniture, followed by human production (see Figure 4).



Figure 3 – Stimuli for robot

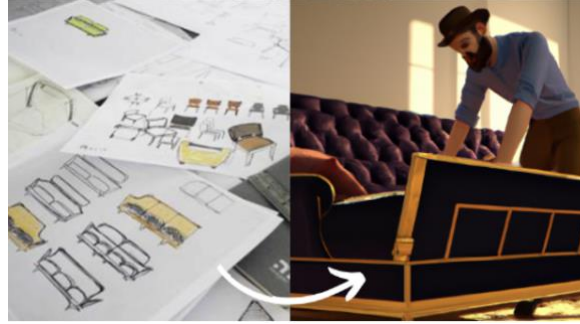


Figure 4 – Stimuli for human

Summarized, the study tests whether participants in each condition wants to co-create with the company, how they prefer to co-create, and to what extent they feel satisfied with the brand. After the participants were assigned to either the robot or human conditions, the participants had to answer questions regarding their individual characteristics, their willingness to co-create, brand equity, satisfaction, and demographics.

3.7 Analysis

The experiment investigates the impact of various interaction types on respondents' willingness to co-create and brand equity. Specifically, the study tests how consumers behavior towards co-creating with a brand through robot vs. human, and if their AAAS levels (high vs. low) can affect this relationship, (robot vs. human) x (high vs. low AAAS). Because both anxiety and avoidance are measured using seven-point Likert-scale items, a respondent with an average score of 3.51 or higher (scoring above the scale midpoint) on the anxiety and avoidance dimensions is considered "high," whereas a respondent with an average score of 3.5 or less on those two dimensions is considered "low" (Verbeke et al., 2020).

The analysis begins by examining if the use of self-service technologies in co-creation environments (robot vs. human) has a direct effect on brand equity (H1), using an independent samples t-test with means compared across two levels, supported by a univariate analysis of variance. Furthermore, a linear regression analysis was conducted to test if a high willingness to co-create from the respondents will have a significant effect on brand equity (H2). Hayes' (2018) regression analysis PROCESS (Model 7) was used to capture the moderation and mediation effects for H3 and H4. The goal of the regression was to see if willingness to co-create mediates the relationship between the independent variable (interaction type) and our dependent variable (brand equity). Moreover, PROCESS (Model 7) also allows to detect whether the attachment style (either anxious or avoidant) was affecting the relationship between self-service technology (robot vs. control-human) and consumers' willingness to co-create. The PROCESS model includes one independent variable (X), one moderator (W), one mediator (M), and one dependent variable (Y). The model accounts for the mediating effect of willingness to co-create as well as the moderating effect of individual characteristics to show the total, direct, and indirect effect of interaction types on brand equity.

4.0 Results

Condition (Robot = 1, Human = 0) served as the independent variable, brand equity served as the dependent variable, willingness to co-create served as the mediator, and individual characteristics (AAAS scores) served as the moderator.

4.1 The Effect of Interaction Type on Willingness to Co-Create

To assess the effect of the self-service technologies in co-creation has on brand equity (H1), an independent samples t-test, supported by a univariate analysis of variance. As the mean value are higher for robot (4.3411) (Table 2), it indicates that brands that meets their customers with a robot, will gain a higher brand equity, compared to customers being met by a human (3.9547) (Figure 5).

GROUP STATISTICS

BRAND EQUITY - AVERAGE	Condition	N	Mean	Std. Deviation	Std. Error Mean
	Robot	86	4.3411	1.36432	.14712
	Human	81	3.9547	1.51360	.16818

Table 2 – Group Statistics

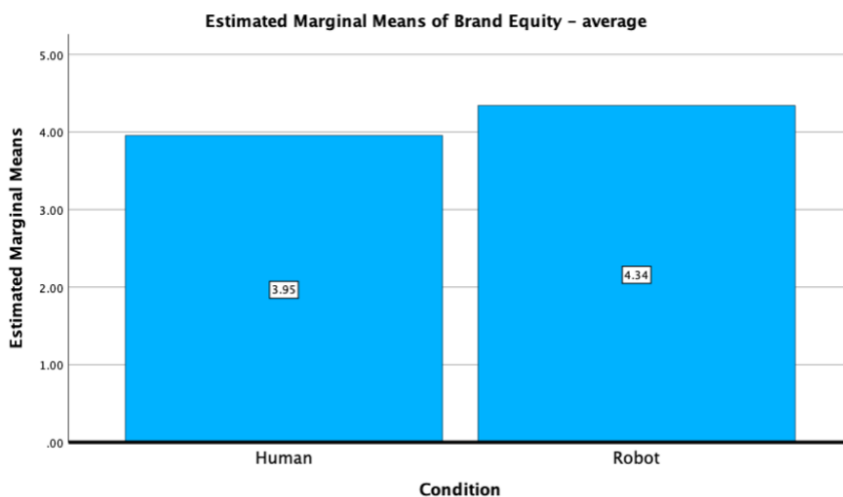


Figure 5 – Univariate Analysis of Variance. Estimated Marginal Means of Brand Equity – average

The Levene's test for variance equality (Table 3) shows that there is no statistically significant difference in variance between the robot and human conditions. We can confidently interpret the regular t-value and associated significance level ($t = 1.734$, $df = 165$, $p = .085$) because of the non-significant p-value ($F = .368$, $p = .545$). However, the mean differences (.38635) are within the 95% confidence interval ($CI = -.05345/.82616$), indicating that there is a difference in means. As a result, no significant evidence exists to support a difference in brand equity between the two conditions. Nonetheless, when interacting with a robot, respondents report slightly higher brand equity, though this difference is not statistically significant.

INDEPENDENT SAMPLES TEST

BE - AVERAGE	Levene's Test for Equality of Variances		t-test for Equality of Means							
	F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence interval of the Difference	
					One- sided p	Two- sided p			Lower	Upper
Equal variances assumed	.368	.545	1.734	165	.042	.085	.38635	.22275	-.05345	.82616
			1.729	160.711	.043	.086	.38635	.22344	-.05491	.82762

Table 3 – Independent Samples T-test for Brand Equity

Cohen's d of .269 (Table 4) indicates a small effect size (0.2=small, 0.5=medium, and 0.8=large) (Cohen, 1988). Essentially, the difference between the robot and human conditions' effect on brand equity is negligible, and H1 cannot be confirmed.

INDEPENDENT SAMPLES EFFECT SIZES

BE - AVERAGE	Standardizer	Point Estimate	95% Confidence Interval	
			Lower	Upper
Cohen's d	1.43863	.269	-.037	.573

Table 4 – Independent Samples Effect Sizes for Brand Equity

4.2 Regression Analysis and ANOVA

To test H2, a linear regression analysis was conducted. An unstandardized value of .170 (Table 5) is a predictor of the relationship between WCC and BE. When WCC increase with one unit, BE is predicted to increase by .170 ($p < .001$). Furthermore, the beta coefficient is of .811, and is considered a large relationship between WCC and BE.

COEFFICIENTS

	Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95% CI for B Lower Bound	95% CI for B Upper Bound
(CONSTANT)	1.141	.181		6.288	<.001	.783	1.499
WCC_FACTOR	.170	.010	.811	17.815	<.001	.151	.189

A. DEPENDENT VARIABLE: BRAND EQUITY - AVERAGE

Table 5 - Coefficients

The multiple correlation ($R = .811$) (Table 6) measures the strength and direction of the linear relationship between two variables, and it indicates that there is a strong positive relationship between the variables, and

that the relationship is positive. Moreover, R-squared (.658) is the coefficient of determination that measures the proportion of variation in the dependent variable that is explained by the independent variables. The value is indicating that the independent variable (WCC) explains above half of the variation in the dependent variable (BE). Finally, the F-test ($F = 317.385$, $p < .001$) (Table 7) tells us that the R-squared is significantly greater than zero.

MODEL SUMMARY

MODEL	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.811	.658	.656	.84902

Table 6 – Model Summary

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
REGRESSION	228.783	1	228.783	317.385	<.001
RESIDUAL	118.938	165	.721		
TOTAL	347.722	166			

A. DEPENDENT VARIABLE: BRAND EQUITY – AVERAGE
 B. PREDICTORS: (CONSTANT), WCC_FACTOR

Table 7 – ANOVA

The relationship between respondents’ willingness to co-create and brand equity is visualized in figure 6. We can see the line of best fit, and there is a positive relationship as seen in table 8 as well. Therefore, we can conclude that a high willingness to co-create from the respondents will have a significant effect on brand equity. In other words, a higher willingness to co-create has a positive effect on brand equity, and H2 is supported.

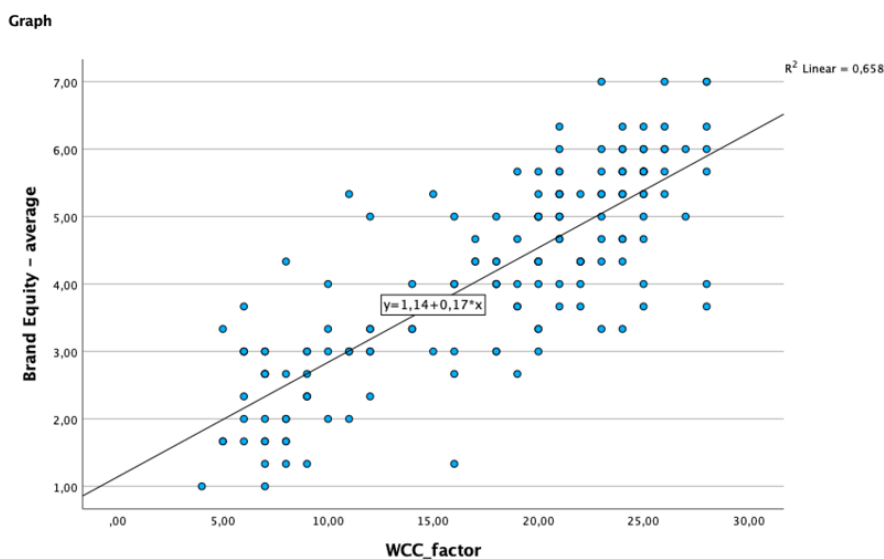


Figure 6 – Scatterplot of the relationship between WCC and BE

4.3 Moderated Mediation Analysis

The results of the regression analysis (see Appendix II) showed that the independent variable (self-service technology vs. human-control) robot has a negative impact on the respondents' willingness to co-create ($b = -2.9253$, $p = .0000$). This means that people surveyed usually prefer human interaction compared to robotic interaction for home furniture design. However, in line with our conceptualization there was a significant impact of the moderator, individual characteristics, on individual's willingness to co-create ($b = 1.6353$, $p = .0000$), which reversed the effect for people self-reporting high levels on the Attachment Styles scale (Figure 7). In other words, people scoring high on the AAAS scale (either more anxious or more avoidant) prefer to interact with a company via technology, and vice versa, if they reported low levels of AAAS, you will be more willing to co-create if meeting a human representative from the company.

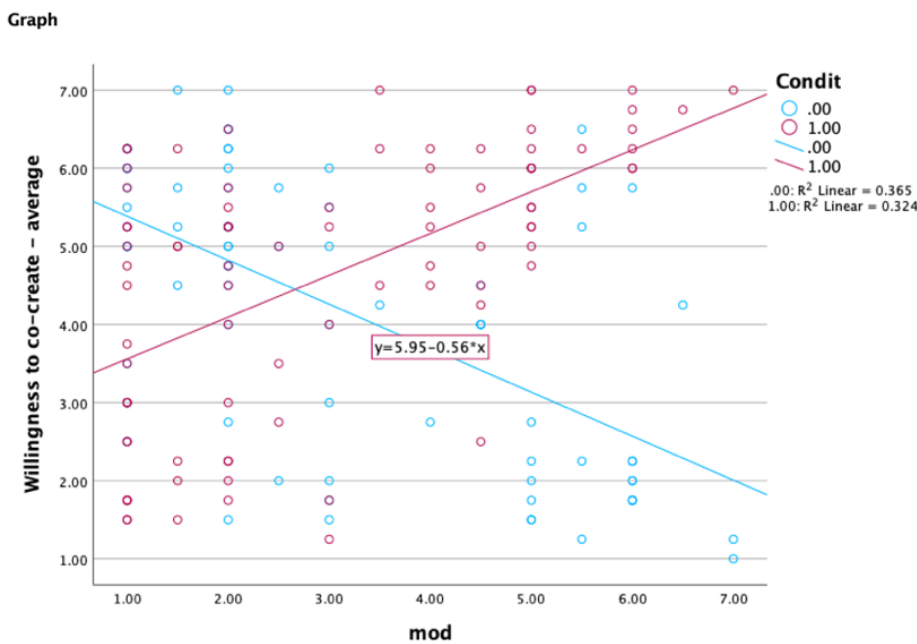


Figure 7 – The interactive effect of robot vs. human and individual characteristics on willingness to co-create.

For the robot condition (1) we can see that the higher anxiety and avoidance you have, the more you are willing to co-create. For the human condition (0) we can see that the higher anxiety and avoidance you have, the less are you willing to co-create. However, in case of medium level of anxiety and avoidance level, the effect on respondents WCC is not significant ($p = .4310$). In other words, except for very high or very low scores of AAAS, the best way to interact with a company is by a robot. On the other hand, if you score low on AAAS, you will be more willing to co-create if meeting a human representative from the company. This result is in line with previous literature on the topic (Pozharliev et al., 2021), and confirms our conceptualization. In result, the indirect effect from condition to brand equity through WCC is being moderated by individual characteristics.

Hayes' (2018) PROCESS (Model 7) is also used to analyze H4, the mediator, namely WCC, effect between the interaction type and brand equity (BE). Thus, focusing on brand equity as outcome variable, the

results of the regression analysis (see Appendix II) showed that the effect of WCC on brand equity has a significant positive impact ($b = .6761$, $p = .0000$), but the condition is not ($b = .0818$, $p = .5387$). In other words, the effect of the self-service technology on brand equity is fully mediated. Moreover, the analysis of indirect effect (cond x WCC x BE) is how the relationship between the conditions (robot vs. human) has on willingness to co-create, and brand equity. This effect is negative for low ($b = -1.2353$) and medium ($b = -.1213$) levels of anxiety and avoidance, and positive ($b = 1.7354$) for high levels of AAAS. In other words, people with higher levels of AAAS are less willing to co-create with a robot, and vice a versa. These results are significant at high and low levels of individual characteristics (CI low = $-.17037/-7731$, CI high = $1.3455/2.1048$).

Finally, the index of moderated mediation is significant equal to $.7427$ (CI = $.5793/.9005$). As a result, it is possible to conclude that the indirect effect of the use of self-service technology on brand equity is mediated by the willingness to co-create and, in turn, is moderated by individual characteristics, supporting the moderated mediation hypotheses.

5.0 Discussion

Based on previous research, we know that co-creation and technology brings value separately (Etgar, 2008; Kristal et al., 2016; Tussyadiah & Zach, 2013; Manchanda et al., 2015; Meuter et al., 2000), but there is some resistance to new technologies (Leung et al., 2018), and only limited knowledge about how consumers evaluate such services is available (Pozharliev et al., 2021). On this basis, the present thesis research was created to provide valuable insights into the current knowledge. The purpose of this thesis was to examine whether a robot or a human is best for consumers' willingness to co-create and the subsequent evaluation of brand equity. Moreover, the author considered if individual personality trait, such as anxious and avoidant attachment styles could affect the relationship. Therefore, the impact of interaction type (robot vs. human) on customers' willingness to co-create and brand equity was tested, as a function of their AAAS scores in this relationship. The results show a significant direct effect of interaction type robot (vs. human) on willingness to co-create, but not on perceived brand equity. Customers were more willing to co-create with a robot than with a human, and companies gained more brand equity when consumers interacted with a robot rather than a human, according to the mean differences.

In general, respondents reported higher willingness to co-create in the human-control scenario, which in turn had a positive effect on brand equity, and this result aligns with previous research (Leung et al., 2018). However, we also show that this effect is reversed for people with high AAAS scores, since they preferred interacting with a robot with respect to a human employee for home furniture design. This may be because anxious and avoidant people often do not thrive in social settings and therefore prefer to interact with robots (Nomura et al., 2020). Customers with low AAAS scores, on the other hand, evaluated brand equity positively after interacting with a human (rather than a robot). These results are in line with the research of Pozharliev et al. (2021), in the domain of hospitality services. In both cases, the effect was mediated by their willingness to co-create.

5.1 Theoretical Contribution

The aim of the literature review was to highlight the growing body of research on service robots. Frontline service robots have been promoted as a way for businesses to improve their interactions with customers (Wirtz et al., 2018, p. 909) and are considered a possible replacement for human workers (Choi et al., 2020). The current study adds to the existing body of knowledge on co-creation and technology by investigating the impact of interaction type (robot vs. human) on customers' willingness to co-create and brand equity, as well as the moderating effect of individual characteristics such as anxiety and avoidance. Similar to Pozharliev et al. (2021), this study found that participants are more willing to design a product with a brand interacting with an app and a fictitious robot compared to a human being. However, when they were split by condition, we saw that participants in the human condition would prefer collaborating with a human, while for the robot condition participants would prefer interacting using an app.

Recent research on service robots and customer attitudes has yielded conflicting results. Some studies report positive attitudes and increased interaction with service robots (Belanche et al., 2020; Qiu et al., 2020; Reich & Eyssel, 2013), while others report that certain customers may feel uneasy and dissatisfied when interacting with them (Choi et al., 2020; Desai et al., 2013; Griffin & Bartholomew, 1994a; Mende et al., 2019). Despite the fact that there was no significant direct effect of human (vs. robot) interaction on willingness to co-create or brand equity, customers were more willing to co-create with a robot than with a human, and companies gained more brand equity from robot interactions. Furthermore, respondents who were more willing to co-create had a greater positive impact on brand equity, which is in line with previous research by Leung et al. (2018).

Verbeke et al. (2020) discovered that customers with higher levels of relationship avoidance tend to keep firms at a distance while also being more sensitive to service errors. Furthermore, Pozharliev et al. (2021) found that customers with lower AAAS are more satisfied and more likely to share positive word-of-mouth feedback after interacting with a human service agent rather than a frontline robot within the hospitality sector. Our findings align with this stream of research, since customers with high AAAS scores rated willingness to co-create and brand equity lower after interacting with a human (vs. a robot), indicating a preference for the interaction with the robot. This may be due to the fact that anxious individuals often do not fare well in social situations (Nomura et al., 2020). Differently from previous studies which focused on “sensitivity to errors” (Verbeke et al., 2020; Pozharliev et al., 2021) and individual’s satisfaction and positive word-of-mouth (Pozharliev et al., 2021) the present study focused on two additional variables: namely, willingness to co-create and evaluations of brand equity, providing additional evidence of the role of attachment style as a powerful explanatory variable to understand consumers’ responses to technological applications.

5.2 Managerial Implications

Interactions between customers and companies on digital platforms has increased with the use of technology. According to an analysis from Washington Post (Birch, 2018), 20% are categorized as anxious and 25% as avoidant people. Indicating that almost half of the population would score high on this study’s AAAS scale. Knowing this, it would be crucial for managers to know what half of the population would want from the companies. This thesis' findings have several managerial implications for companies looking to improve customer co-creation and brand equity through digital interactions. To begin, businesses should consider using robots to interact with customers in co-creation activities. Customers may be more willing to co-create with robots than with humans, according to the findings, and companies may gain more brand equity through robot interactions.

To begin, businesses should consider using robots or technological applications to interact with customers in co-creation activities. However, they should be aware of potential drawbacks since this work provide additional evidence of overall resistance to technology adoption. Indeed, customers were more willing

to co-create with robots than with humans. Hence, it is extremely important to take individual characteristics into account, especially in terms of individual attachment styles. Customers with high AAAS scores may prefer interacting with robots over humans, and businesses should consider the potential benefits of providing these customers with robot-mediated interactions, in order to also ensure higher participation in co-creation initiatives, which are an extremely valuable source of insights and ideas for companies operating in a digital environment.

Finally, the findings emphasize the significance of customer co-creation as a method of increasing brand equity. Respondents who expressed a strong willingness to co-create had a greater positive impact on brand equity, which is consistent with previous research. Companies should therefore actively seek to engage customers in co-creation activities, potentially using digital platforms and robots. Companies can potentially improve customer satisfaction and brand equity while also customizing this option for customers' individual needs and preferences.

In summary, the study's findings emphasize the importance of taking individual characteristics into account when designing co-creation experiences. Businesses can enhance their brand equity and provide a more positive customer experience by providing consumers the chance to decide whether to interact with a human or a service robot into co-creation initiatives. For example, a physical store of a furniture firm should include self-service technologies and human employees, so that consumers could select the option that best fits with their needs. Simultaneously, it would be preferable to provide the same choice in the digital environment: for example, businesses should consider proposing co-creation platforms that also allow for face-to-face interaction with experts (e.g., videocall, etc.).

6.0 Limitations and Further Research

Despite the valuable insights provided by this study, there are some limitations to be considered. Firstly, this study only tested within a simple online experimental scenario and may not fully reflect real-world interactions between customers and service providers. Nevertheless, the author believes that this implication can be sustained for more general situations. Moreover, future research should consider adapting qualitative techniques such as face-to-face in-depth interviews, or mixed methods combining fields and experimental studies. Secondly, the sampling method is one of convenience, due to circulating the online questionnaire on my social media channels of the author, and thus limited to own acquaintances, which may limit the findings' generalizability.

An additional limitation concern to the variable under investigation. Indeed, the study only looked at how interaction type (robot vs. human) and AAAS scores affected willingness to co-create and brand equity. Future research could investigate other factors such as other individual characteristics (e.g., big 5 personality traits), emotional factors, perceived trust, loyalty, and satisfaction which usually affect the outputs of a social interaction. Another potential limitation of this study could be related to the phrasing of the survey statements, as well as how the constructs were combined and whether the statements were positively or negatively loaded. This could have resulted in a halo effect, where respondents' answers are influenced by their overall impression of the survey rather than their genuine opinions. Even though the statements were taken from previous research using the same factors, their interpretation may vary in a new setting. Other options include using groups of simulations rather than sending out a digital survey.

Additionally, further research could investigate how the effects of interaction type and individual characteristics on willingness to co-create and brand equity might vary across different service industries. Moreover, as technology continues to evolve and become more sophisticated, future research could explore how customers' perceptions of service robots may change over time. Finally, future research could also investigate how the use of service robots may impact employee perceptions of job security and satisfaction, as well as the potential ethical and societal implications of increasing reliance on technology in service contexts.

Overall, while this study provides valuable insights into the role of technology in co-creation and brand equity, there are still many avenues for further research and exploration that could provide interesting insights for both academics and practitioners.

7.0 References

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8.0 Appendix

Appendix I – Questionnaire

Start of Block 1: Introduction

Dear Participant,

I appreciate your participation in this survey, which is part of my Master's thesis in the BI-LUISS Joint Degree in Marketing at BI Norwegian Business School and Libera Università Internazionale degli Studi Sociali - Guido Carli (LUISS Guido Carli).

The survey should take about 4 minutes to complete. Please read the questions carefully and provide your honest opinions. Your input is valuable to the study.

Your participation in the survey is anonymous, and all responses will be treated with confidentiality. The survey data will only be accessible to the survey administrators, and all data will be permanently deleted by the end of 2023.

I greatly appreciate your participation and that you take the time to help me with this study.

If you have any questions about the survey, please contact me at:

marie.isaksen@studenti.luiss.it.

I agree that the collected data from the survey can be used in this master's thesis.

- Yes
- No

Skip to: End of Survey If answer = No

End of Block 1: Introduction

Start of Block 2: Human Condition

Q1) On a scale from 1 (strongly disagree) to 7 (strongly agree), to what extent do you agree with the following statements?

	1 (strongly disagree)	2	3	4	5	6	7 (strongly agree)
I find it relatively difficult to get close to others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find it difficult to trust others completely.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to get close to others, but I keep pulling back.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I try to avoid getting too close to others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

-----Page Break-----

You will now be presented with a home furnishing retailer called Living Lush Furniture. Imagine that you are going to **design a sofa** for your house/apartment.

Please read the text on the next page carefully before responding to the questions afterwards.

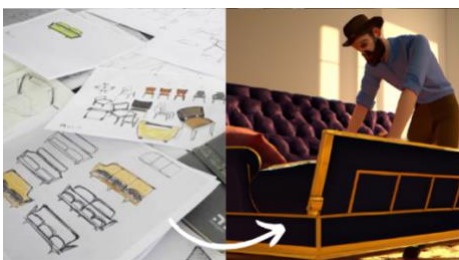


-----Page Break-----

Imagine that you are going to design a sofa for your house/apartment. You are placed in Living Lush Furniture's **store**, and you will collaborate with Living Lush Furniture's **designers and craftsmen** to design a personalized sofa that perfectly match your taste and preference.

After your design is done, the **furniture maker** will produce the sofa.

The result is a beautifully crafted, one-of-a-kind piece of furniture that perfectly reflects your individual style and personality.



End of Block 2: Human Condition

Start of Block 3: Robot Condition

Q1) On a scale from 1 (strongly disagree) to 7 (strongly agree), to what extent do you agree with the following statements?

	1 (strongly disagree)	2	3	4	5	6	7 (strongly agree)
I find it relatively difficult to get close to others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find it difficult to trust others completely.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to get close to others, but I keep pulling back.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I try to avoid getting too close to others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

-----Page Break-----

You will now be presented with a home furnishing retailer called Living Lush Furniture. Imagine that you are going to **design a sofa** for your house/apartment.

Please read the text on the next page carefully before responding to the questions afterwards.

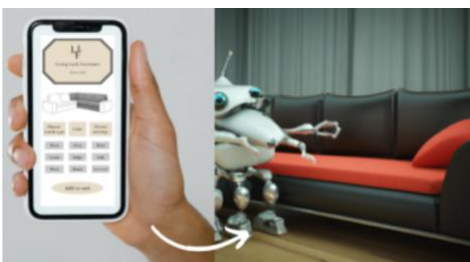


-----Page Break-----

Imagine that you are going to design a sofa for your house/apartment. You are placed **at home**, and you will use an **app**, created by Living Lush Furniture, to design a personalized sofa that perfectly match your taste and preference.

After your design is done, the **robot** will produce the sofa.

The result is a beautifully crafted, one-of-a-kind piece of furniture that perfectly reflects your individual style and personality.



End of Block 3: Robot Condition

Block 2 and 3 was randomized and evenly distributed to respondents.

Start of Block 4: After Manipulation

Q2) Consider Living Lush Furniture and answer on a scale from 1 (strongly disagree) to 7 (strongly agree), to what extent you agree with the following statements.

	1 (strongly disagree)	2	3	4	5	6	7 (strongly agree)
I prefer this type of interaction with the brand if I was designing a furniture.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This way of collaborating with a brand is more effective.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easier to share information with a brand with this type of interaction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer this type of interaction when I want to seek information from a company.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

-----Page Break-----

Q3) Consider Living Lush Furniture and answer on a scale from 1 (strongly disagree) to 7 (strongly agree), to what extent you agree with the following statements?

	1 (strongly disagree)	2	3	4	5	6	7 (strongly agree)
I like the brand.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am satisfied with the services that Living Lush Furniture provides.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This brand's service meets my expectations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The quality of this brand's service seems to be of extremely high.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I could see myself loyal to this brand in the future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Even if another brand has the same features, I will prefer to buy from Living Lush Furniture in the future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

-----Page Break-----

Q4) Now, consider **not** only Living Lush Furniture, but any brand you are familiar with.

Assume you are going to design a product with a brand (e.g., chocolate, shampoo, bathroom etc.), would you prefer to sit **at home using an app** or **in-person with a company representative**?

- Using an app
- Collaborate in person with a company representative
- Other

Textbox

Q5) Why would you prefer this interaction with the company?

Textbox

End of Block 4: After Manipulation

Start of Block 5: Demographics

Q6) What is your age?

Textbox

Q7) What is your gender?

- Female
- Male
- Non binary / third gender
- Other

Textbox

Q8) What is your highest completed education?

- High school
- Trade certificate (yrkesfag utdannelse/fagbrev)
- Bachelor's degree
- Master's degree
- PhD
- Other

Textbox

Q9) What is your current employment status?

- Employed
- Student
- Unemployed
- Retired
- Unable to work
- Other

Textbox

End of Block 5: Demographics

Appendix II – Moderator effect of interaction type on willingness to co-create

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 4.2 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model : 7
Y : BE
X : Condit
M : WCC
W : mod

Sample
Size: 167

OUTCOME VARIABLE:
WCC

Model Summary	R	R-sq	MSE	F	df1	df2	p
	.5965	.3558	1.9597	30.0107	3.0000	163.0000	.0000

Model	coeff	se	t	p	LLCI	ULCI
constant	5.9489	.3011	19.7598	.0000	5.3545	6.5434
Condit	-2.9253	.4244	-6.8933	.0000	-3.7633	-2.0874
mod	-.5632	.0832	-6.7705	.0000	-.7275	-.3989
Int_1	1.0984	.1188	9.2492	.0000	.8639	1.3329

Product terms key:
Int_1 : Condit x mod

Test(s) of highest order unconditional interaction(s):	R2-chng	F	df1	df2	p
X*W	.3381	85.5477	1.0000	163.0000	.0000

Focal predict: Condit (X)
Mod var: mod (W)

Conditional effects of the focal predictor at values of the moderator(s):

mod	Effect	se	t	p	LLCI	ULCI
1.0000	-1.8269	.3279	-5.5709	.0000	-2.4745	-1.1794
2.5000	-.1794	.2272	-.7895	.4310	-.6279	.2692
5.0000	2.5666	.3153	8.1406	.0000	1.9441	3.1892

OUTCOME VARIABLE:
BE

Model Summary	R	R-sq	MSE	F	df1	df2	p
	.8116	.6587	.7236	158.2854	2.0000	164.0000	.0000

Model	coeff	se	t	p	LLCI	ULCI
constant	1.1124	.1875	5.9321	.0000	.7421	1.4827
Condit	.0818	.1328	.6161	.5387	-.1805	.3441
WCC	.6761	.0385	17.5489	.0000	.6001	.7522

***** DIRECT AND INDIRECT EFFECTS OF X ON Y *****

Direct effect of X on Y	Effect	se	t	p	LLCI	ULCI
	.0818	.1328	.6161	.5387	-.1805	.3441

Conditional indirect effects of X on Y:

INDIRECT EFFECT:
Condit -> WCC -> BE

mod	Effect	BootSE	BootLLCI	BootULCI
1.0000	-1.2353	.2399	-1.7037	-.7731
2.5000	-.1213	.1591	-.4335	.1939

5.0000 1.7354 .1949 1.3455 2.1048

Index of moderated mediation:

	Index	BootSE	BootLLCI	BootULCI
mod	.7427	.0815	.5793	.9005

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
5000

W values in conditional tables are the 16th, 50th, and 84th percentiles.

----- END MATRIX -----

Thesis Summary

1.0 Introduction

Co-creation is gaining popularity among companies in order to enhance their brand and product experience in today's highly competitive business environment. It involves involving customers and stakeholders in the design, development, and delivery of products and services through collaborative creation. This approach is facilitated by various technologies that enable communication, collaboration, and idea-sharing (Prahalad & Ramaswamy, 2000).

While previous research has explored how information technology can stimulate collaboration and value co-creation in digital-native companies, such as Google and Facebook, its applicability to established companies remains unclear. The unique challenges faced by established companies in utilizing openness and collaboration for value co-creation have not been extensively studied (Schlagwein et al., 2010).

This master's thesis aims to investigate the impact of different interaction types (robot vs. human) on customers' willingness to co-create and overall brand equity. The study will also explore whether individual characteristics, such as anxious and avoidant attachment styles (AAAS), moderate the relationship between interaction type and willingness to co-create. The role of individual characteristics in a co-creation context and their influence on willingness to co-create and brand equity have not been thoroughly examined. The research question driving this thesis is: *How does the type of interaction (robot vs. human) affect customers' willingness to co-create and overall brand equity, and what role has individual characteristics such as anxiety and avoidance in these relationships?*

The findings of this study will contribute to the understanding of how companies can effectively leverage co-creation technologies to enhance the brand and product experience. It will shed light on whether co-creation is a viable strategy for building brand equity and engaging customers in the co-creation process. The research aims to provide insights that can inform companies' decision-making regarding the use of co-creation technologies and their impact on brand value.

1.1 The Importance of Co-Creation in Digital Environments

1.1.1 Co-Creation

Co-creation has emerged as a dynamic and collaborative process where producers and users work together to generate value for customers. It represents a significant shift in societal and corporate culture, recognizing the importance of involving consumers in the value creation process (Meyassed et al., n.d.). Businesses are increasingly adopting co-creation projects, with 58% of companies piloting such initiatives to drive innovation (Livescault, n.d.). By engaging consumers in the value creation process, companies can not only generate economic value but also lower costs by delegating certain tasks to consumers.

In the era of Industry 4.0, rapid innovation cycles are crucial for success (Kwan et al., 2020). With numerous potential co-creation partners available, careful selection of the right partner and partnership type is

essential. This involves identifying internal capability gaps, establishing shared goals, and defining a mutual value proposition. Many organizations across various industries have reaped significant benefits by expanding their innovation efforts beyond their organizational boundaries (Kwan et al., 2020). To thrive in the digital economy, businesses can adopt a co-creation strategy and operating model that align with their overall corporate strategy and innovation objectives.

Research conducted by IBM reveals that the most successful organizations actively engage in co-creation with their customers (Meyassed et al., n.d.). These companies involve customers in the product and service development processes, integrating them into the core of their operations. IBM itself has collaborated with companies like Cisco to bring business insights to the edge of the network for IoT solutions, leveraging leading technologies for a marketplace offering. Additionally, IBM has engaged in a collaborative co-creation process with Yara in the field of agriculture and sustainability. By combining Yara's expertise in crop nutrition and farming solutions with IBM's advanced technologies and digital capabilities, innovative solutions are developed (IBM, n. d.).

Overall, co-creation is a transformative approach that recognizes the value of collaboration between businesses and consumers. By embracing this approach, companies can foster innovation, achieve greater success, and effectively respond to evolving market trends and customer demands.

1.1.2 Technologies in Co-Creation

Technology has revolutionized the way businesses operate and has had a profound impact on various aspects of the work environment. Advancements in communication technology, such as high-speed internet and video conferencing platforms like Zoom and Microsoft Teams, have enabled remote work to become increasingly common. This has blurred the lines between working with colleagues, freelancers, and other businesses, as shared resources and collaborations become more prevalent. In fact, freelancers in the United States saw a significant increase in earnings, reaching \$247 billion in 2021, highlighting the growing importance of technology in facilitating flexible work arrangements (The Economist, 2023).

In addition to its effects on the workplace, technology has also transformed people's social lives. The rise of social media platforms has prompted companies to develop strategies for value co-creation with consumers through these digital channels. Consumers today are more connected, informed, and actively engaged in the industry system. Various technological advancements have facilitated this trend, including machine learning and artificial intelligence, virtual reality, online communities, social media, and the internet itself. These technologies empower consumers to participate in the creation and shaping of value, as highlighted by researchers such as Dey et al. (2019), Kapoor et al. (2015), and Ostrom et al. (2015).

As technology continues to advance, businesses need to adapt and harness its potential for value co-creation. The integration of these technologies into business strategies enables companies to engage with consumers in new and innovative ways, leveraging the power of connectivity and collaboration. By embracing

these technological advancements, businesses can unlock opportunities for enhanced customer engagement, improved brand equity, and sustainable growth in an increasingly digital and interconnected world (The Economist, 2023).

Technologies such as artificial intelligence (AI), virtual reality (VR), online communities, social media, and internet are among the technologies that were discussed. Machine learning and artificial intelligence (AI) improve co-creation by enabling resource exchange and service customization. They analyze customer feedback and predict preferences, aiding brands in meeting customer needs. Virtual reality (VR) enhances consumption experiences by providing immersive interactions. Virtual communities allow direct interactions regardless of location, aided by mobile technology. Online communities facilitate collaboration and information exchange among stakeholders. Social media platforms enable real-time communication, feedback, and value co-creation. The internet enhances information access, transparency, trust, and customer satisfaction in co-creation processes.

2.0 Literature Review

2.1 Self-Service Technology in Co-Creation Processes

Technological advancements, including social media, digital platforms, and mobile devices, have increased interactions between companies and consumers. Technological co-creation (TCC) involves customers using technology as a tool to create value for both the firm and the customer. Self-service technology (SST) eliminates the need for human interaction and promotes self-reliance, leading to cost savings. Service robots are emerging as a popular trend in the service industry, with applications in hotels, airports, and restaurants. Research on human-robot interactions and customers' willingness to co-create with robots is limited. The study aims to explore the best setup for co-creation between consumers and self-service technologies, such as robots.

2.2 Brand Equity

Brand equity is defined as the set of assets and liabilities linked to a brand that adds or subtracts value to a product or service for both the firm and its customers (Aaker, 1991, p. 15). It includes brand awareness, perceived quality, brand loyalty, and brand associations (Keller, 1993, 2020). Brand equity is important for marketing strategies, market performance measurement, and assessing overall impact. Keller's brand equity model (1993; 2020) consists of salience, imagery, performance, judgments, feelings, and resonance.

Brand equity is a crucial concept in both research and practice, as it requires significant investments to maintain and expand (Farquhar, 1990; Yoo & Donthu, 2001; Keller & Lehmann, 2006; Bambauer-Sachse & Mangold, 2011). It plays a vital role in measuring market performance and understanding overall impact (Christodoulides et al., 2006). In situations where evaluating product or service quality is challenging, such as in co-creation and technology use, brand equity becomes even more important (Rust et al., 2000). Aaker (1991) and Keller (1993) both emphasize that brand equity contributes to firm value by enhancing marketing

effectiveness, fostering loyalty, commanding price premiums, enabling brand extensions, and providing value to customers through improved information processing, purchase decision confidence, and increased satisfaction.

There is limited discussion in the literature regarding assessing the value to the customer, with most focus on evaluating financial worth to the firm (Washburn & Plank, 2002). Co-creation has been found to have a slightly positive impact on brand equity (Kristal et al., 2016), and it has also been shown to improve the performance of tourist organizations (Tussyadiah & Zach, 2013). Keller (1993) emphasizes the importance of understanding brand equity from the customer's perspective, stating that establishing positive brand knowledge structures that elicit positive consumer responses to marketing efforts is crucial before aiming to increase sales (Keller, 1993, p.8).

2.3 Value Co-Creation

Co-creation is recognized as an innovation in shared services by multiple consumers and service providers (Zhang et al., 2020; Ramaswamy & Ozcan, 2016; Bharti et al., 2015; Gebauer et al., 2013; Mustak et al., 2013; Prahalad & Ramaswamy, 2004). It involves joint creation of value between the company and the customer, allowing customers to co-construct the service experience. Co-creation challenges traditional brand management and involves ongoing participation of active customers in the value creation process. It is driven by changes in consumer behavior, preferences for personalized experiences, social media usage, and the sharing economy. Technology plays a crucial role in facilitating co-creation through information and communication technologies (ICTs) (Zwass, 2010).

While co-creation offers social benefits and a sense of accomplishment for customers, research on the disadvantages of co-creation is limited. Heidenreich et al. (2015) suggest that companies should adopt a matching strategy that aligns customer involvement in service recovery with the level of co-creation during service delivery. When co-creation fails, it leads to internal attributions of failure and an increase in perceived guilt. The study findings indicate that in such situations, providing co-created service recovery is the most effective way to restore customer satisfaction.

On the other hand, the co-creation process offers customers various social benefits. Customers who are recognized as valuable sources of information by other stakeholders can enhance their social status. Active participation in communities with like-minded individuals can improve communication skills, foster social connections, and provide enjoyment. Additionally, engaging in co-creation can give customers a sense of accomplishment, leading to feelings of pride and ownership (Franke & Schreier, 2010; Moreau & Herd, 2010). Hence, matching the level of customer involvement in service recovery with the level of co-creation during service delivery is important to maintain customer satisfaction.

2.4 Individual Characteristics

Previous research has explored the inconsistencies in customer responses to frontline service robots, considering both robot-specific design attributes and customer-related factors. Some studies have focused on the technical aspects of service robots, such as their appearance and autonomy, while marketing researchers have provided mixed findings regarding customer attitudes and satisfaction with service robots. This study aims to investigate anxiety and avoidance attachment styles in relation to customer interactions with service robots. Anxiety is characterized by fear, apprehension, and unease, while avoidance refers to actions taken to avoid or exit situations. Previous research suggests that people with social anxiety may prefer interacting with robots, and customers with lower anxious attachment style scores are more satisfied with human service agents compared to robots. Customers with higher levels of relationship avoidance may prefer to keep a distance from service firms. Understanding these attachment styles can help firms tailor their approaches to better meet customer needs and preferences.

2.5 Consumer Behavior

Co-creation offers numerous advantages to brands, including increased customer satisfaction, loyalty, and engagement, as well as improved brand reputation and innovation. However, it also presents challenges and risks that need to be effectively managed, such as maintaining control over the brand message, addressing negative customer experiences, and managing intellectual property issues. Customer behaviors are continuously influenced by new marketing technologies and evolving internet experiences.

Customer satisfaction is influenced by their perception of value creation partners and their expectations of product or service performance. Co-creation has received limited attention in relation to customer satisfaction, but research suggests that it can enhance satisfaction levels and customers' sense of being valued contributors to the product development process. Customers with lower anxious attachment styles tend to report higher levels of satisfaction and are more likely to engage in positive word-of-mouth.

Customer loyalty is fostered through long-term positive relationships with businesses, and co-created values can serve as intermediaries between customer participation, satisfaction, and loyalty. Brand equity and trust are key factors influencing both behavioral and attitudinal loyalty. While customer loyalty does not directly lead to customer equity, there is a relationship between them.

Customer engagement is maximized through factors like satisfaction and value perceptions. Engagement is characterized by intense and sustained involvement in an activity or experience. It encompasses various aspects of customer interactions, including brand-related motivation, cognitive, emotional, and behavioral responses. Enabling customers to engage through co-creation can generate a sense of pride and valuable outcomes. However, customers' willingness to engage depends on their perception of the firm's commitment to collaboration.

Using new technologies to interact with customers can improve engagement, but its impact on the type of engagement is unclear. Engagement can be directed towards brands, companies, services, or the technologies enabling the services. Different types of engagement can coexist and reinforce each other, with engagement with the company being less volatile. Customers with lower anxious attachment styles tend to be more satisfied and more likely to engage in positive word-of-mouth after interacting with human service agents.

The impact of automation, particularly artificial intelligence, on human labor and societal humanity is a contentious and widely debated topic, with concerns raised about potential job obsolescence and erosion of human values.

2.6 Conceptual Model and Hypothesis Overview

Figure 1 illustrates the conceptual model used to assess the impact of different interaction types on customers' willingness to co-create and brand equity. This relationship is influenced by the moderating variable of individual characteristics and the mediating variable of willingness to co-create. The mediator helps explain how the interaction type (robot vs. human) affects brand equity. The role of individual characteristics as a moderator is to determine if factors like anxiety and avoidance influence the relationship between the interaction type and customers' willingness to co-create. Ultimately, companies that utilize interaction types that enhance customers' willingness to co-create are more likely to experience an increase in overall brand equity. The study aims to test these hypotheses:

H1: The use of self-service technologies in co-creation environments (robot vs. human) has a direct effect on brand equity, such that brand equity will be higher (vs. lower) when co-creation is enabled through interaction with a robot (vs. human).

H2: A high willingness to co-create has a positive effect on brand equity.

H3: Individual characteristics (high vs. low level of anxiety) moderate the relationship between self-service technologies (robot vs. human) and willingness to co-create, such that the more anxious you are, the more are you open to use robots instead of human as interaction type, and vice versa.

H4: Willingness to co-create mediates the relationship between self-service technologies (robot vs. human) and brand equity.

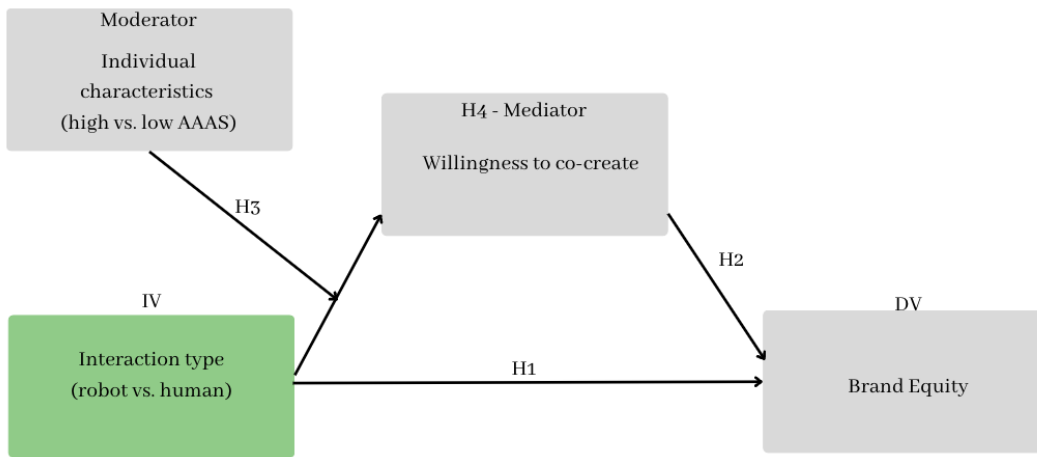


Figure 1 - Conceptual model

3.0 Research Methodology and Results

This study aims to investigate the impact of different interaction types (robot vs. human) on customers' willingness to co-create and overall brand equity. It also explores whether individual characteristics, such as anxiety and avoidance, can influence the relationship between interaction types and customers' willingness to co-create. The data was collected through an online survey using a structured questionnaire and a seven-point Likert-scale. The study included 167 participants who were randomly assigned to either the robot or human condition. In the robot condition, participants used an app interface to design furniture and a robot carried out the production. In the control condition, participants interacted with a human representative to design furniture, and humans were responsible for the production.

The questionnaire included scales based on previous scales developed by Chen and Wang (2016), González-Mansilla et al. (2019), Yi and Gong (2013), Fuentes-Blasco et al. (2017), and Washburn and Plank (2002). These scales were developed to measure co-creation, brand equity, satisfaction, and individual characteristics. For the latter, if respondents had an average score of 3.51 or higher on the anxiety and avoidance dimensions, as measured on a seven-point Likert scale, they are classified as having a "high" level of anxiety and avoidance. On the other hand, if respondent had an average score of 3.5 or less on these dimensions, they are categorized as having a "low" level of anxiety and avoidance (Verbeke et al., 2020).

The survey underwent a pre-test with a sample of 12 respondents to ensure clarity and eliminate any ambiguities, following the recommendation by Rust et al. (2000) for measuring customer equity. The pre-test results indicated no significant issues with the questionnaire, and only minor adjustments were made to enhance its clarity.

The study utilized a between subject single-factorial design and analyzed the data using statistical techniques such as independent samples t-tests, univariate analysis of variance, and Hayes' (2018) regression analysis PROCESS (Model 7). The findings aimed to examine the direct effect of interaction types on brand equity, the mediating effect of willingness to co-create on the relationship between interaction types and brand

equity, and the moderating effect of individual characteristics. The study contributes to understanding the role of interaction types and individual characteristics in enhancing brand equity through co-creation.

The study aimed to examine the impact of self-service technologies on brand equity and the role of co-creation in this relationship. To test the first hypothesis, an independent samples t-test and univariate analysis of variance were conducted. The results showed that brands that interacted with customers through a robot had higher brand equity compared to those interacting with a human. However, the statistical analysis indicated no significant difference in variance between the two conditions. Therefore, while respondents reported slightly higher brand equity when interacting with a robot, this difference was not statistically significant. Cohen's d analysis revealed a small effect size, suggesting that the impact of self-service technologies on brand equity was negligible, failing to confirm H1.

To test the second hypothesis, a linear regression analysis was performed. The analysis indicated that there was a significant positive relationship between willingness to co-create (WCC) and brand equity (BE) (unstandardized B = 0.170, $p < 0.001$). A one-unit increase in WCC predicted a corresponding increase in brand equity. The beta coefficient (.811) suggested a large relationship between WCC and BE. Additionally, the multiple correlation coefficient ($R = .811$) indicated a strong positive relationship between the variables, while the coefficient of determination (R-squared = .658) revealed that WCC explained over half of the variation in brand equity. The F-test further confirmed that the R-squared value was significantly greater than zero. The relationship between respondents' willingness to co-create and brand equity was visualized, demonstrating a positive relationship. Consequently, a higher willingness to co-create had a significant positive effect on brand equity, confirming H2.

To analyze the differences in willingness to co-create based on the service interaction, a moderation analysis using PROCESS (Model 7) was employed. The results revealed that the use of self-service technology, specifically robots, had a negative impact on respondents' willingness to co-create ($b = -2.9253$, $p = .0000$). People generally preferred human interaction over robotic interaction for home furniture design. However, the moderator analysis showed that individual characteristics had a significant impact on willingness to co-create ($b = 1.6353$, $p = .0000$). Those with high levels of AAAS preferred to interact with a company via technology, while those with low levels of attachment preferred human representatives. This finding supported the conceptualization and previous literature on the topic. Thus, the effect of condition on willingness to co-create was moderated by individual characteristics.

Further analysis using PROCESS (Model 7) examined the mediating effect of willingness to co-create (WCC) between interaction type and brand equity (BE) for H4. The results indicated that WCC had a significant positive impact on brand equity ($b = .6761$, $p = .0000$), while the condition had no significant direct effect ($b = .0818$, $p = .5387$). This implied that the effect of self-service technology on brand equity was fully mediated by WCC. The analysis of the indirect effect (cond x WCC x BE) revealed that the relationship between the conditions (robot vs. human), willingness to co-create, and brand equity was negative for low and

medium ($b_{\text{low}} = -1.2353$, $b_{\text{medium}} = -.1213$) levels of attachment anxiety and avoidance and positive for high levels ($b_{\text{high}} = 1.7354$). In other words, individuals with higher levels of attachment anxiety and avoidance were less willing to co-create with a robot, while those with high levels of attachment were more willing to co-create. These results were significant across high and low levels of individual characteristics (CI low = $-1.7037/-1.7731$, CI high = $1.3455/2.1048$).

The index of moderated mediation was significant equal to $.7427$ (CI = $.5793/.9005$), indicating that the indirect effect of self-service technology on brand equity was mediated by willingness to co-create and moderated by individual characteristics. This finding supported the moderated mediation hypotheses.

4.0 Discussion

This study aimed to provide valuable insights into the impact of interaction type (robot vs. human) on customers' willingness to co-create and brand equity, while considering individual characteristics such as anxiety and avoidance. The results indicated that although there was no significant direct effect of interaction type on willingness to co-create or brand equity, customers showed a higher willingness to co-create with robots compared to humans. Moreover, companies gained more brand equity from interactions with robots. Customers with a high willingness to co-create had a positive impact on brand equity, aligning with previous research. Additionally, customers with high levels of anxiety and avoidance preferred robot interaction, while those with lower levels rated brand equity higher after interacting with a human service agent.

The literature review aimed to examine the research on service robots and their impact on customer interactions. This study expands our understanding of co-creation and technology by examining how the type of interaction (robot vs. human) affects customers' willingness to co-create and brand equity, taking individual characteristics like anxiety and avoidance into account. Similar to a previous study (Pozharliev et al., 2021), it was found that participants are more inclined to design a product when interacting with an app and a fictitious robot, compared to interacting with a human. However, when participants were divided into different conditions, those in the human condition preferred collaborating with a human, while those in the robot condition preferred using an app for interaction.

Verbeke et al. (2020) discovered that customers who avoid relationships tend to distance themselves from firms and are more sensitive to service errors. Similarly, Pozharliev et al. (2021) found that customers with lower AAAS are more satisfied and likely to share positive word-of-mouth feedback when interacting with a human service agent in the hospitality sector. Our study aligns with these findings, as customers with high AAAS scores rated willingness to co-create and brand equity lower after interacting with a human, indicating a preference for the robot. This preference may be due to anxious individuals not performing well in social situations (Nomura et al., 2020). In contrast to previous studies focusing on sensitivity to errors and satisfaction (Verbeke et al., 2020; Pozharliev et al., 2021), our study adds willingness to co-create and brand

equity as variables, providing further evidence of attachment style's role in understanding consumer responses to technology.

Managerial implications suggest that businesses should consider using robots for co-creation activities, as customers may be more willing to engage with them. Understanding the influence of individual characteristics on brand equity is also crucial, as customers with high AAAS scores preferred robot-mediated interactions. Businesses have the opportunity to enhance their brand equity and create a better customer experience by giving consumers the autonomy to choose between interacting with a human or a service robot in co-creation initiatives. Overall, the study highlights the significance of individual characteristics and incorporating service robots in co-creation experiences to enhance brand equity and customer satisfaction.

5.0 Limitations and Further Research

This study, despite its valuable insights, has several limitations that need to be acknowledged. Firstly, the study's findings may not fully reflect real-world interactions between customers and service providers since it was conducted in a simple online experimental scenario. However, the author believes that the implications can still be relevant in more general situations. To address this, future research should consider incorporating qualitative techniques such as face-to-face interviews or mixed methods approaches.

Secondly, the sampling method used in the study was convenient and limited to the author's acquaintances through social media channels, which may restrict the generalizability of the findings. Furthermore, the study focused only on the impact of interaction type (robot vs. human) and AAAS scores on willingness to co-create and brand equity. Future research should explore additional factors such as individual characteristics, emotional factors, trust, loyalty, and satisfaction, which are known to influence social interactions. Additionally, the study's survey statements and how the constructs were combined could have introduced a halo effect, where respondents' answers are influenced by their overall impression rather than their true opinions. Different approaches, such as using groups of simulations, could be explored to mitigate this limitation.

Further research could investigate how the effects of interaction type and individual characteristics on willingness to co-create and brand equity vary across different service industries. As technology advances, it would also be valuable to examine how customers' perceptions of service robots evolve over time. Additionally, future research could explore the impact of service robots on employee perceptions of job security and satisfaction, as well as the ethical and societal implications of increasing reliance on technology in service contexts.

In conclusion, while the study provides valuable insights into the role of technology in co-creation and brand equity, there are numerous opportunities for further research and exploration that could offer interesting insights to both academics and practitioners.