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EXPLORING THE ENGAGEMENT PROCESS BETWEEN HUMANS AND INTELLIGENT VIRTUAL ASSISTANTS

Patrícia Saturnino Mateiro Silva Garrotes

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

Supervisor: Prof. Doutora Sandra Maria Correia Loureiro

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

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BUSINESS SCHOOL

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Abstract

Happy and loyal customers are two of the main objectives for all brands, and it represents a constant challenge which involves and depends a lot on the brand-consumer relationship. Both customer happiness and loyalty are consequences of a good relationship between the two parties, which is formed through engagement. This study aims to better understand the engagement process between Humans and Intelligent Virtual Assistants, and the influence of intimacy and attachment in this process of interaction, identification and relationship. For this purpose, a conceptual framework was created and tested, based in part on the attachment theory, in order to better understand the engagement process between Humans and IVAs. The study conducted used primary data, obtained through a questionnaire, and was employed to better understand the model and to test the hypotheses developed. The results demonstrate all hypotheses are supported by the model, and people do, in fact, create an emotional relationship with their IVAs on a daily basis context, the attachment strength influences customer engagement levels. Furthermore, they also show that there is a clear relationship of positive influence between customer engagement and customer loyalty and happiness.

Resumo

Um dos grandes objetivos de uma marca ou empresa é que os seus clientes sejam leais, garantindo a sua satisfação, algo que representa um desafio constante e que depende em grande parte da relação entre consumidor e marca. Tanto a felicidade do consumidor como a sua lealdade são consequências de uma boa relação entre as duas partes, relação essa que surge através de todo o processo de envolvimento e compromisso, do *engagem*ent. O presente estudo tem como principal objetivo compreender o processo de *engagement* entre Humanos e Assistentes Virtuais Inteligentes, e a influência, ou relevância, do nível de intimidade e conexão emocional neste processo de interação, identificação e relação entre ambos. Para este efeito, um modelo de investigação foi criado e testado, baseado em parte na teoria do apego (*attachment theory*). O estudo foi desenvolvido com base em dados primários, obtidos através de um questionário, e foram analisados para melhor compreender o modelo criado e testar as hipóteses desenvolvidas. Os resultados obtidos demonstram que de facto os consumidores criam uma relação emocional com os seus Assistentes Virtuais Inteligentes, considerando um contexto casual e diário, e que essa intimidade e proximidade emocional influência os níveis de envolvimento e compromisso do cliente. Adicionalmente, os resultados demonstram e comprovam a existência de uma relação direta de influência positiva entre os níveis de *engagement* e a lealdade e felicidade do cliente.

Keywords: Assistentes Virtuais Inteligentes, teoria do apego, intimidade virtual, *engagement* do cliente, lealdade do consumidor, felicidade do cliente

JEL: M310: Marketing

JEL: M390: Marketing and Advertising: Other

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Chapter 1 - Introduction

1.1 The relevance of the topic

The population is increasingly digital and virtual, the relationships and the way we interact with others, friends, family and even companies and brands. With the coronavirus pandemic, in which there was an obligation to stay at home and isolate ourselves, the virtual has gained even more importance. Loneliness was overcome many times through the virtual, by replacing the real (Henkel et al., 2020). As the next sub-chapter will show, the use of Intelligent Virtual Assistants has increased a lot in the last years, and also the reasons why these assistants are used have expanded. Intelligent Virtual Assistants, such as Amazon Alexa and Siri from Apple are smart devices that perform tasks for humans, through a voice command, such as playing music, setting an alarm, online shopping, provide information about the weather, tell the news, and many others. In the world of social media, it is quite common to appear videos of humans interacting with Intelligent Virtual Assistants in the most unexpected ways. Thus, the interest in studying the topic under analysis emerged. The functions of these smart devices have gone from merely functional to emotional, representing for many a companion, a distraction, a social support (Chandler & Schwarz, 2010)

Thus, it is important to understand the relationship created between users and their IVAs, how far this emotional connection can reach and how it can influence variables such as customer engagement and customer loyalty, or even consumer happiness.

The characteristics of these devices are constantly being improved, and one of the main objectives of the manufacturers is to improve the personalisation capacity to the user and make it more and more similar to a human, through voice, language, expressions, speech adaptation (McLean & Osei-Frimpong, 2019).

The purpose of the present study is to understand the relationship and interaction between humans and Intelligent Virtual Assistants (IVA), to better comprehend how humans connect and bond with these smart devices in a daily basis context. More specifically, if the attachment strength and intimacy between the user and the smart device, influence the levels of customer engagement, and subsequently the levels of customer loyalty and the feeling of happiness and delight provided by the experience.

1.2 Contextualization

The relevance of the topic under study is also statistically evident. According to Statista (2021), the worldwide market revenue for artificial intelligence will reach a size of over half a trillion U.S. dollars by 2024. In the year 2020, there were 4.2 billion digital voice assistants being used on devices around the world. It is estimated that by 2024, the number of digital voice assistants will reach 8.4 billion units, a figure higher than the world population.

Given that the study was conducted considering only United States residents, it is important to mention that in this country there are more than 110 million virtual assistant users, and the software is especially common on smartphones and smart speakers.

Considering one of the most popular Intelligent Virtual Assistants, Amazon's Alexa, as of 2019, this IVA has been used on around 60,000 different smart home devices around the world, providing a perfect example of how popular this kind of software has become.

The chart provided below (See figure 1.1), from Statista (2021), shows the emerging number of Intelligent Virtual Assistant users in the United States between 2017 and 2022. It is predicted that by 2022, 135.6 million people will use the digital voice assistant at least once a month in the United States.

Figure 1.1 – Number of Intelligent Virtual Assistant users in the United States from 2017 to 2022
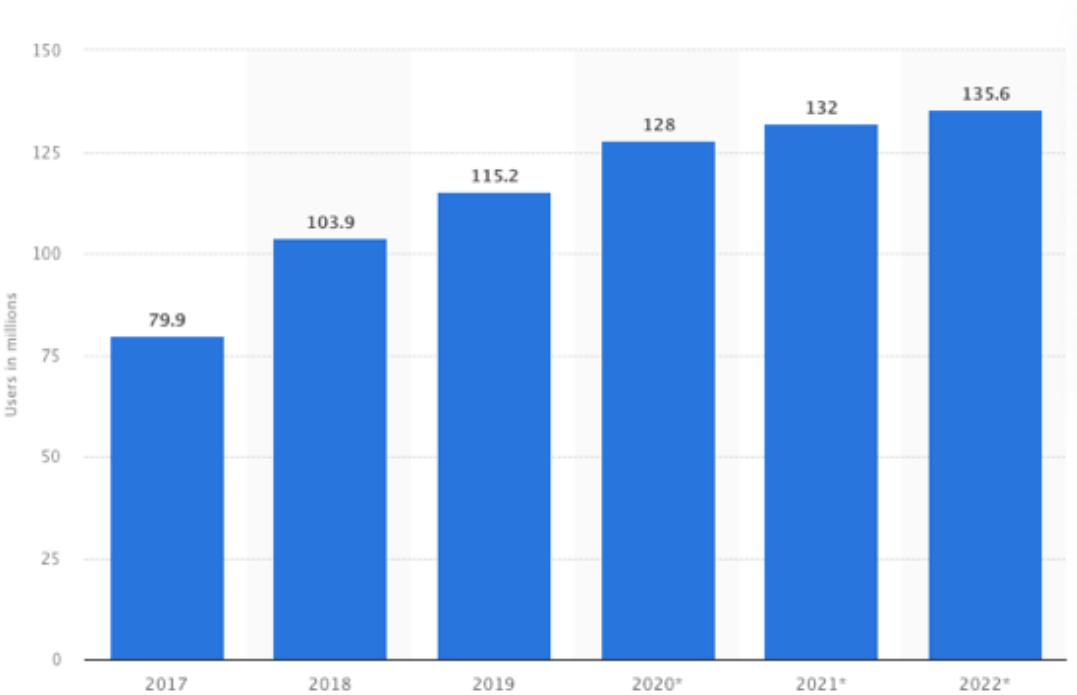
Source: Statista, 2021

1.3 Dissertation Research Questions and Objectives Definition

The main purpose of the present study is to understand the interaction between Humans and Intelligent Virtual Assistants. These smart devices through a voice command can perform tasks for its users, they can adapt throughout the time and personalize specifically to the user's preferences and interaction history.

This study focuses on day-to-day interactions, not on business issues. The main goal is to understand if, despite being just an object, due to its human-like characteristics, users develop feelings of closeness and attachment, and if those feelings make users want to engage more, to know more about the smart device, if that makes them loyal to them and their brand. Considering an individual who owns an Amazon Alexa, and interacts with "her" every day, asking questions about the weather or the traffic to work, requesting her to play a song or make a shopping list for the end of the day, over time the connection between the two will become more and more important for that person. The goal is to understand if this connection and bonding increases the levels of customer engagement, and consequently customer loyalty, and also if this emotional relationship contributes to customer happiness.

Therefore, with the present research the author will be able to connect and understand the relationship between the mentioned concepts in order to answer the following research questions:

1. Do humans get attached and intimate with their Intelligent Virtual Assistants?
2. Does the attachment strength between users and their IVAs influence the levels of engagement and, consequently, customer loyalty and customer happiness?

1.4 Structure of the Dissertation

The present dissertation is divided into five main chapters. Introduction represents the first chapter, where the topic is firstly explained, and its relevance and importance are clarified. The research questions and objectives of the study are presented in this first chapter. In the second chapter a literature review is presented, enhancing the main concepts of the research: Artificial Intelligence and Intelligent Virtual Assistants, Customer Engagement, Attachment strength and its antecedents: autonomy, competence and relatedness, Virtual Intimacy, Customer Loyalty and Happiness. The conceptual framework and hypotheses are also presented and explained in the second chapter. The methodology corresponds to the third chapter, where the conducted study is described in detail. The data gathered during the study is analysed in the fourth chapter,

together with the discussion of the results, with the theoretical contributions and managerial implications. The final chapter corresponds to the conclusions of the research, the limitations and future research recommendations.

Chapter 2 - Literature review

2.1 Artificial Intelligence

Artificial intelligence (AI) refers, in a simpler approach, to machines with software and algorithm that can think and perform tasks like humans (Kumar et al., 2019).

Rust and Huang (2018), specified and distinguished four ordinal and parallel intelligences: mechanical, analytical, intuitive and empathetic. These four intelligences are in the order of their historical development in Artificial Intelligence. Schlinger (2003), defines intelligences as the overtime learned human skills, to adapt to the environment. Therefore, Artificial Intelligence is the development of a machine that mimics human skills, such as the ability of problem-solving, knowledge, reasoning, learning, communicating and acting.

Mechanical intelligence consists on the ability to follow a routine, to perform repetitive and transactional tasks, which relies on observation to act and react, it is the minimal degree of learning. The next level of intelligence, the analytical, is the ability to process information (data) in order to solve a problem, it is logical, analytical and rule-based learning, requires rational decision-making. The third intelligence, the intuitive, requires a creative way of thinking, in order to adjust effectively to new and different situations, learning and adaptation is based on understanding, is more flexible and capable of creative problem-solving. The empathic intelligence is the fourth and final intelligence, and refers to the ability to understand, respond and influence others' emotions. It is the capacity of learning and adapting empathetically based on experience. It requires emotion recognition, affective computing and communication style learning in order to build relationships with others (Huang & Rust, 2018).

AI can dynamically change various aspects of people's lives, both in business and in a personal context. (Prentice and Nguyen, 2020). This technology functions through automation and continuous learning, and the main characteristic that makes it so life-changing and extremely popular is its level of personalization (Kumar et al., 2019). "AI seeks to simplify communication between humans and machines by means of natural language" (Pantano and Pizzi, 2020, p. 3).

Artificial Intelligence can be manifested in various forms: machines, robots, computers, and can be programmed to assist both humans and businesses (Prentice & Nguyen, 2020).

Regarding AI for personal use, there are various popular tools: personal and/or in-home voice assistants such as Amazon Echo and Alexa, Apple Siri, Google Assistant and Cortana by Microsoft which perform tasks for their users through voice commands; travel planning

assistants like Mezi and ETA, they help users to book flights, hotels, restaurants, and manage itineraries; music, like Pandora, that helps finding music the user might like; for financial planning, Andy is a personal tax accountant and Olivia helps the customer to manage their finances; for language translation, Microsoft Translator provides real time, translated conversations with captions. All of the mentioned above constitute very popular examples of Artificial Intelligence tools for personal use, however, there are many other tools with different purposes from those mentioned, with the purpose of assisting users in everyday situations in a personal context. Considering Artificial Intelligence tools for business, the most popular ones include AI based solutions that assist business needs, such as Chatbots and AI Avatars (e.g. Fluid AI); e-commerce and digital marketing solutions, big data and process automation, face recognition and credit scoring (Kumar et al., 2019).

2.2 Intelligent Virtual Assistants

Intelligent Virtual Assistants, such as Amazon Alexa and Siri from Apple are smart devices that perform tasks for humans, through a voice command. Consumers are, therefore, able to interact with them using verbal language (Giridhar Kumar & Kolla, 2019).

AI-powered voice assistants, or Intelligent Virtual Assistants (IVA), such as Amazon Alexa, Apple Siri, Google Assistant and others, represent a very relevant subject to research, due to its growth in the most recent years. These smart devices are changing people's daily routine, by completing tasks for them (e.g. set alarms, play music, send texts, make calls, make reservations etc.), searching for information (e.g. news, weather, traffic, etc.) making purchases online, through a simple voice command. In addition, their characteristics and features, which make them so human-like, such as their voice, the natural language and the fact that they personalise the content considering the user's interests and behaviours (McLean and Osei-Frimpong, 2019), can encourage users to bond with them (Schweitzer *et al*., 2019).

Intelligent Virtual Assistants can take many forms and be used with different electronic devices, such as smart speakers (e.g. Amazon Alexa; Google Nest), mobiles (e.g. Apple Siri; Google Assistant), computers (e.g.Mycroft; Home Assistant), tablets and iPads and even in Vehicles. Some require the user to download an app in order to use them (e.g. Google assistant), others are integrated into the smart device itself (e.g. Apple Siri).

Intelligent Virtual Assistants, through machine learning, can better adapt and personalize throughout time, by learning the user's interests and preferences (Bishop, 2006). Therefore,

these smart devices, due to their friend-like characteristics, encourage users to develop feelings like brand warmth and attachment. (Wu *et al.*, 2017). Consumers interact with them by having conversations and through commands and requests, leading to higher levels of engagement.

Anthropomorphic characteristics of Intelligent Virtual Assistants can cause consumers to appreciate them more (Wan et al., 2017), to regard them as something vivid rather than a static object (Noble et al., 2013) therefore making them more valuable (Hart et al., 2013). This tends to increase their consumption (Hur et al., 2015), as consumers look at the product as a social being and intend to keep it for longer, since replacing it would make them disloyal to their 'friend' (Chandler & Schwarz, 2010).

2.3 Customer Engagement

Over time, the objectives of organizations and companies have changed, passing by having an essentially transactional objective, evolving to a focus on the relationship between customers and brands, in the 1990s and 2000s, in which the main objective was to develop positive and lasting relationships with customers, ensuring customer satisfaction and loyalty through a good product and/or service. However, during this particular era, the correlation between customer satisfaction, loyalty and profitability was strongly discussed, understanding that for a customer to be loyal and profitable for a company, it is not enough to keep him satisfied, it is necessary to go further, to reach a higher level of connection. Companies needed to differentiate themselves in order to develop a sustainable competitive advantage, guaranteeing a profitable loyalty over time. Thus, the companies' main goal progressed once more, from a relationship marketing approach to engaging customer in every way possible, that's how the concept of customer engagement appeared in the marketing field. (Pansari & Kumar, 2017).

The concept of customer engagement has occurred in the marketing literature over the last decade and has multiple definitions and conceptualisations, depending on the perspective of the author(s). Nonetheless, customer engagement refers, in a general approach, to the customers' involvement and connection with a brand or organisation (Prentice & Nguyen, 2020).

Customer Engagement, according to Kumar and Pansari (2016, p. 498), refers to *"cocreation, interaction, solution development, and so on, all of which depend on the attitude that drives the behaviour of customers and employees toward a firm"*. The higher the level of connectedness and the more positive the attitude and behaviour towards the brand, the higher

the level of engagement (Kumar *et al.*, 2019). Hollebeek (2011), highlights that the cognitive and emotional investment of the customer towards a brand is an important factor when increasing the levels of engagement.

So et al. (2016), define customer engagement following a multidimensional approach, supporting the idea that an engaged customer feels a personal connection and shows cognitive, affective and behavioural attitudes towards the brand. According to this multidimensional definition, customer engagement is a high-order construct, which is explained by five dimensions: enthusiasm, attention, absorption, identification and interaction. The first dimension, enthusiasm, refers to the level of excitement and interest a person feels towards the focus of engagement, a brand, company, product. The second dimension refers to the attention someone pays to the brand. Forwardly, the third dimension, absorption, happens when the customer is fully concentrated with the brand, immersed with the experience as a consumer. Interaction is the fourth dimension that explains the level of customer engagement through the customers participation with the brand, communication and collaboration, both online and offline. Finally, identification, refers to the feeling of belongingness to the brand. All these five dimensions explain the customer engagement psychological and behavioural aspects (So et al., 2016).

Customer experiences and co-created value represent the foundation of customer engagement. Furthermore, in order to increase the level of connectedness, and thus engagement, between brands and customers the environment needs to be dynamic, motivating mutual interactions, which, consequently, will represent a source of superior competitive advantage (Brodie et al., 2011). Therefore, despite having various definitions, customer engagement has multiple antecedents and drivers that need to be identified and strategically considered, since it strongly influences important outcomes such as customer loyalty and firm performance (Prentice & Nguyen, 2020).

After identifying the main antecedents, a company needs do apply a strategy to engage customers by encouraging them to do more than purchasing a product (Kumar, 2013). A positive and satisfying experience with a brand will lead to a more engaged customer, who will not only purchase more but also provide feedback, interact in social media and online communities, communicate positive word-of-mouth, do more referrals, among other actions from which firms will benefit (Kumar & Pansari, 2016). According to Rosado-Pinto and Loureiro (2020), antecedents like experience, involvement, brand/brand page interactivity, satisfaction and trust represent important and often considered drivers of engagement.

Regarding the main outcomes, brand loyalty, firm /brand performance, positive word-of-mouth, satisfaction and trust represent the consequents or outcomes that have been studied and considered by researchers more often.

2.4 Attachment strength and its antecedents: Autonomy, Relatedness and Competence

The attachment strength refers to having a strong and powerful relationship with someone or something, which can be a person, an animal, a group of people, or even an object. This strong type of relationship is generally developed during the childhood, with parents, grandparents, siblings. However, during an individual's life multiple attachments are developed with other targets, such as celebrities, animals, objects like smart devices, a house or a car.

The attachment strength depends on how strong the relationship is, it occurs when a person perceives the relationship as irreplaceable and is emotionally immersed (Thomson, 2006). Being attached to something is an indicator of relationship quality (Fournier, 1998), and, therefore, refers to something brands should consider, when developing a strategy for their brand-consumer relationships. When the attachment strength with a brand is intense and resilient, desirable outcomes will occur, such as brand loyalty, consumers' willingness to forgive more, decrease of consumers desertions and more engaged customers. Following this statement, Thomson (2006), suggests that it is crucial for brands and marketeers to understand the antecedents of attachment, the main determinants, in order to develop long and sustainable relationships with clients and customers.

According to La Guardia et al. (2000) and Ryan and Deci (2000), when someone finds his/her needs of autonomy, relatedness and competence fulfilled by an object, the individual will likely develop a strong relationship with it, resulting in an intense attachment strength. "Autonomy, relatedness, and competence are fundamental human needs" (Thomson, 2006, p. 106).

Regarding autonomy needs, it refers to an individual feeling autonomous, knowing that the his/her decisions are self-made, the actions are managed in the first person and self-sustained, and that the right to freedom of expression is guaranteed (Ryan & Deci, 2000). Feeling free of pressure and impositions is also associated with the fulfillment of autonomy needs, an individual cannot feel coerced or restricted (Thomson, 2006).

Relatedness refers to a person's need to feel a sense of complicity and closeness with others (Deci & Ryan, 2000). The need to relate to something and/or someone corresponds to

the desire of belonging to a social sphere, the opposite of feeling lonely and secluded. When the need for relatedness is met, the individual feels "connected and cared for by another" (Thomson, 2006, p. 106).

Competence refers to a person's innate tendency to seek to feel effective, accomplished and challenged in their activities (Deci & Ryan, 2000). When an individual feels competent it is very likely to feel skilled and capable of carrying out their activities and more motivated and curious about new challenges (Thomson, 2006, p. 106).

2.5 Virtual Intimacy

"Intimacy refers to feelings of closeness, connectedness, and bondedness in loving relationships." (Sternberg, 1997, p. 315).

Intimacy implies a relationship between two parties, a relationship of closeness. It is considered one of the most rewarding social and human exchanges, because being intimate with someone gives the feeling of social belonging, of welcome, making one feel good and accepted. Intimacy allows people to develop satisfying relationships with other humans but also with virtual beings, animals etc. (Potdevin et al., 2020).

Humans are social beings and relate not only to other humans but also to all living beings and machines. This relationship between humans and machines is developed through a sense of social presence. The sense of social presence depends on the level of intimacy that the machine conveys to the human. An intelligent virtual assistant through its features such as its natural language, voice and capacity of user's personalization, has a high social presence, being able to develop a relationship of intimacy with the user. Intimacy is one of the factors that reinforces the most the social recognition of virtual assistants. (Potdevin et al., 2020).

The Social Presence phenomenon happens when an individual has the feeling or sense of being with someone else, not alone, it can occur through the interaction with another human or with a machine (Parker et al., 1978).

Virtual Intimacy refers to the interaction of two parties, where there is honesty, it is about being genuine, encouraging pleasurable feelings and positive sensations and emotions, about understanding one another (Potdevin et al., 2018). The term is used to describe close relationships between humans and machines.

2.6 Customer engagement outcomes

2.6.1 Customer Loyalty

After discussing the concept of customer engagement, we can conclude that one of the main outcomes of an engaged customer is being loyal to a specific brand. (Rosado-Pinto & Loureiro, 2020). Engaged customers tend to develop more positive attitudes towards a brand, leading into customer loyalty, by having a closer relationship through repeat purchases and many other behaviors which can indicate that a customer is loyal and feels committed to a specific brand. (Vivek et al., 2012).

Customer loyalty refers to a long-term relationship between brand and customer. A preference for a specific brand and being loyal to it means not only choosing to (re)purchase a brand among similar brands, over a long period (McMullan & Gilmore, 2003) but also favourable attitudes such as positive word-of-mouth communication and recommendations (Kandampully and Suhartanto, 2003).

According to Oliver (1999), the focus of companies, which used to be essentially on customer satisfaction, has shifted to customer loyalty. This is because companies have begun to understand the importance and how profitable a loyal customer is, more so than a customer who is merely satisfied with the product or service. Being loyal to a company or brand has numerous positive consequences that are now the focus of study for many firms. Nevertheless, there is a clear linkage between customer satisfaction and loyalty that cannot be ignored. "satisfaction is a necessary step in loyalty formation but becomes less significant as loyalty begins to set through other mechanisms." (Oliver, 1999, p. 33).

Besides satisfaction, more components are required to determine whether a customer is loyal or not. It is necessary that the customer is satisfied, that he feels pleasure when buying a certain brand or product, but it is also necessary to add to the definition of customer loyalty a behavioral component, the act of consuming. In the words of Oliver (1997, p. 392), customer loyalty can be defined as "a deeply held commitment to rebuy or repatronize a preferred product/service consistently in the future, thereby causing repetitive same-brand or same brand-set purchasing, despite situational influences and marketing efforts having the potential to cause switching behavior.".

To define customer loyalty, two components must be taken into consideration, the behavioral and the psychological. Behavioral loyalty is related to the attitude of repeatedly buying a product or brand, rather than its substitutes and competitors. The psychological

component, which is more difficult for brands to analyze and control, is related to the cognitive, affective and conative dimensions (Berkowitz et al., 1978).

According to Oliver (1999), the first phase of loyalty is the cognitive phase, which corresponds to loyalty based on information, that is, a consumer prefers a brand over others simply because of the information he or she has about its attributes and performance. The second phase, affective, happens when the act of consuming a specific brand or product becomes something satisfying and pleasurable for the individual. The next phase is the conative phase. During this phase the consumer has the intention to rebuy, this intention and desire is influenced by previous episodes of affectivity towards the product or brand. However, this intention may often not turn into an action itself. Having said this, the fourth and last phase corresponds to action loyalty, a phase in which the intention becomes an action, the obstacles are overcome, and the user is ready to take an action, in this case rebuying a product or service.

In a more practical approach, "a loyal customer is a customer who mostly repurchases, when feasible, from the same provider and maintains a positive attitude towards the provider." (Kandampully & Suhartanto, 2003, p. 7).

2.6.2 Happiness

Happiness is a very subjective concept and so, many theories and definitions evolved. According to Christopher and Hickinbottom (2008), happiness, from a psychological perspective, can be conceptualized in two ways: emotional satisfaction and authentic happiness. Emotional satisfaction refers to "pleasurable experiences and the achievement of a subjective sense of contentment" (Loureiro *et al*., 2019, p. 4). The authentic happiness approach suggests that this feeling is an outcome of "positive emotions, a sense of purpose in life and a sense of positive connection to daily life." (Loureiro *et al*., 2019, p. 4). Authentic happiness also includes meaningful relationships and achievements in life (Loureiro *et al*., 2019).

The study on the concept of happiness is extensive and encompasses several areas and disciplines of study such as psychology, philosophy, among others. However, studies on customer happiness are still limited.

Customer happiness refers to a particular kind of happiness, which corresponds specifically to the customer's satisfaction, pleasure and sense of harmony (Niedermeier et al., 2019).

Satisfaction corresponds to a cognitive judgement created by comparing actual and existing conditions with developed expectations (Niedermeier et al., 2019). Past experiences,

current conditions, goals and desires (Shin & Johnson, 1978), norms (Haybron, 2007), and other people's lives are the basis for the creation of these expectations. In a marketing approach, satisfaction happiness refers to the cognitive judgement created by comparing expectations with the actual performance of a product/service (Niedermeier et al., 2019).

Customer delight is directly related to pleasure happiness, in which the balance between positive and negative emotions is positive (Haybron, 2008). It corresponds to the customer's positive emotional state, short-term condition. This emotional state is characterized by emotions such as joy, pleasure and surprise (Niedermeier et al., 2019).

Unlike customer delight, harmony corresponds to a long-term emotional state of mind, it is not an immediate, short-lived emotion. In terms of marketing, harmony happiness refers to customers' long-term positive inner state of mind, their emotions and cognitions are in balance. "Customer harmony involves both emotional harmony (e.g., feeling calm, relaxed) and cognitive harmony (e.g., peace of mind, being unconcerned)" (Niedermeier et al., 2019, p. 57).

For marketing purposes, customer happiness is a key benefit and is an expected outcome of customer engagement. An engaged customer will likely develop feelings of satisfaction, pleasure/delight and harmony towards a brand (Niedermeier et al., 2019).

2.7 Conceptual Framework and Hypotheses development

In this part of the study the conceptual framework developed will be presented together with the hypotheses created to achieve the results and draw the conclusions of the research. The positivistic approach was the method used to develop the model and hypotheses and interpret the results of the research. The conceptual framework presented (See Figure 2.1) was created through theory-based assumptions, and the positivistic method assigns the researcher the role of collecting data and interpreting the results objectively. The foundation of the framework and hypotheses is the previously done research, presented in the Literature Review.

The attachment theory is also the foundation of the conceptual framework presented. The attachment theory was firstly explained and presented by Bowlby (1977), who studied the infant-parent emotional attachment relationship. However, for the present study Thomson's (2005) study on consumers' emotional attachment to objects and brands was considered in the creation of the framework. People develop emotional attachment relationships not only with other people but also with pets, brands, celebrities and even with special and favorite objects. For the model presented below the emotional attachment relationship under study is between people and their Intelligent Virtual Assistants. Thomson (2005), suggests that a consumer with

a greater attachment to an object or brand is more likely to develop favorable actions and beneficial feelings for brands, such as higher levels of engagement, commitment and even loyalty. Furthermore, happiness can also arise from this attachment relationship between consumer and brand or object, "An individual who is emotionally attached to a brand is likely to be satisfied with it." (Thomson et al., 2005, p. 79). These statements were taken into consideration while developing the conceptual framework under study.

The hypotheses forwardly presented will be tested, through the chosen methodology presented in chapter 3, with the purpose of understanding the relationship between humans and IVAs and if the level of attachment strength influences the levels of engagement, and consequently customer loyalty and happiness. In this manner, this research will reveal the relationship level created between humans and smart devices, more specifically IVAs, which can be much more than a convenient tool, and what benefits brands, such as Amazon (Alexa) and Apple (Siri), can derive from this relationship.

Figure 2.1 – Proposed Conceptual Framework
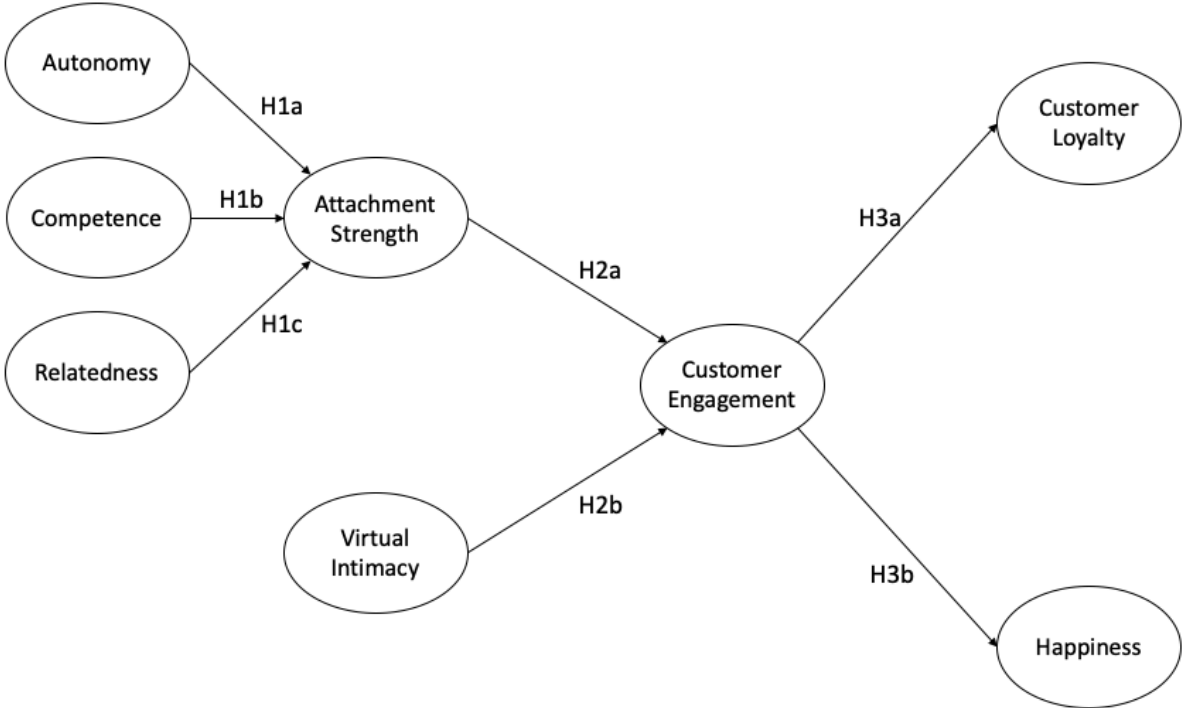
Source: Author's own creation

From the presented framework (see figure 2.1), seven hypotheses were developed that will be presented on the next pages.

H1: Autonomy (H1a), Competence (H1b), Relatedness (H1c) positively influence Attachment Strength

H2: Attachment Strength (H2a) and Virtual Intimacy (H2b) positively influence Customer Engagement

H3: Customer Engagement positively influences Customer Loyalty (H3a) and Happiness (H3b)

Attachment as the dependent variable

As described in the literature review, autonomy refers to the feeling of freedom, without pressure to behave in a certain way. Relatedness corresponds to the feeling of belonging, of not feeling alone. Competence is directly related to feeling capable, that our achievements are effective and recognised.

Ryan and Deci (2000) state that if an object, for this study the Intelligent Virtual Assistant, projects this kind of feelings and guarantees that the autonomy, relatedness and competence needs of the user are fulfilled, the probability of attachment is higher. Therefore, the following hypotheses were formulated:

H1a: Autonomy positively influences Attachment.

H1b: Competence positively influences Attachment.

H1c: Relatedness positively influences Attachment.

Customer Engagement as the dependent variable

In a marketing perspective, the attachment strength between humans and objects or brands can lead to several positive consequences, such as preventing a customer to leave a company after one bad experience and even increasing commitment and customer loyalty (Thomson, 2006). These positive consequences, particularly customer loyalty, are commonly considered an outcome of customer engagement.

Additionally, Hollebeek (2011), highlights the importance of the emotional investment placed in the relationship, for increasing the levels of customer engagement. In the context of Intelligent Virtual Assistants, if a user feels emotionally attached to it, he/she will become more engaged.

Therefore, the following hypothesis was created to better understand the influence of attachment strength on the levels of customer engagement:

H2a: Attachment positively influences Customer Engagement.

According to Sternberg (1997), intimacy refers to feelings of proximity, bondedness and connectedness. Pansari and Kumar (2017) refer to emotional connectedness as an antecedent of customer engagement. When the user feels more connected with the Intelligent Virtual Assistant, his or her levels of engagement will be higher, "when a relationship is satisfied and has emotional bonding, it then progresses to the stage of "engagement"" (Pansari & Kumar, 2017, p. 295). Considering these statements, the following hypothesis was created in order to study the influence of Virtual Intimacy on Customer Engagement:

H2b: Virtual Intimacy positively influences Customer Engagement.

Customer Engagement outcomes

The relationship between Customer Engagement and Customer Loyalty has been studied by several researchers. Customer Engagement happens when an individual connects with the brand besides purchasing, interacts and identifies with the brand or product more profoundly (So et al., 2016). In contrast, being loyal to a brand or specific product refers to an individual's commitment to rebuy and make positive referrals of a favourite brand consistently, throughout a long period of time (Oliver, 1999).

Despite being different concepts and implying different attitudes, there is a relationship of influence between the two concepts. According to Vivek et al. (2012), an engaged customer is more likely to foster positive perceptions and attitudes towards a brand or product, and those attitudes might lead to a loyal customer. "An engaged customer tends to develop more favourable attitudes towards the brand or the organisation, and leads to cognitive complacency, resulting in customer loyalty" (Prentice & Nguyen, 2020, p. 3). Hereby, the following hypothesis aims to study the influence of Customer Engagement on Customer Loyalty:

H3a: Customer Engagement positively influences Customer Loyalty.

As mentioned in the literature review, Happiness is an expected outcome of Customer Engagement. Customer happiness involves feelings of satisfaction and delight and the sense of harmony, and it is estimated that an engaged customer will more likely develop these feelings towards a brand of product, in this study towards his/her Intelligent Virtual Assistant. A positive influence of customer engagement on customer happiness is expected. "Happiness can be created through engagement" (Niedermeier et al., 2019, p. 59). The happiness provided by the

experience with the IVA will be greater if the customer engages with the device. Therefore, the following hypothesis was developed:

H3b: Customer Engagement positively influences Happiness.

Chapter 3 - Methodology

The purpose of the present study, as mentioned in the previous chapters, is to better understand the relationship between Humans and Intelligent Virtual Assistants, if users become emotionally attached to them, and, if so, how this emotional relationship influences customer engagement and, subsequently, customer loyalty and happiness. For that purpose, a conceptual framework and research hypotheses were developed.

The present chapter explores the research methods employed to address the hypotheses presented in the chapter 2.7.

To understand the relationship between Humans and their IVAs, consumers residing in the United States of America were targeted using the platform Amazon Mechanical Turk. A questionnaire was the chosen quantitative research method to test the hypotheses and address the research questions of the present study.

3.1 Construct Measurement

In the present study, all constructs and respective items were measured in the questionnaire by employing scales from prior research. The author resorted to original measurement scales, selected from various articles related to each construct, which were adjusted and adapted to the purpose of the present investigation.

The questionnaire was developed focusing on the eight constructs that constitute the conceptual framework: Attachment, Competence, Relatedness, Autonomy Virtual Intimacy, Customer Engagement, Customer Loyalty and Happiness.

The constructs Attachment, Competence, Relatedness and Autonomy, were all adapted from the scales developed by Thomson (2006). Attachment, which comprises 4 items itself, is predicted by Competence, which comprises 3 items, Relatedness that is constituted by two items and, lastly, Autonomy, composed of 3 items. These constructs were applied in order to understand the development of attachment feelings from humans towards Intelligent Virtual Assistants, and moreover, if that attachment strength is influenced by the user's fulfillment of relatedness, of autonomy needs and competence needs (Thomson, 2006).

The construct Virtual Intimacy was measured by adapting a pre-developed scale of Sternberg (1997), the Triangular Love Scale, in which Intimacy comprises 8 items. This variable was measured in order to understand the levels of intimacy, more specifically closeness and connectedness, between Intelligent Virtual Assistants and its users and also its role to predict Customer Engagement.

In order to understand the levels of engagement regarding Intelligent Virtual Assistants, such as Amazon Alexa and Apple Siri, who act as personal assistants for the user in a daily basis context, the construct Customer Engagement was applied. To measure Customer Engagement, a multidimensional scale developed by So et al. (2016) was adapted. This construct is composed of five dimensions: Identification; Enthusiasm; Attention; Absorption and Interaction, which explain the levels of Customer Engagement.

Customer Loyalty, constituted by twelve items, was measured in order to study the user's intention to reuse and/or repurchase, to provide positive word-of-mouth communication and to recommend the Intelligent Virtual Assistant to others. This construct was measured by adapting Prentice's (2020) scale which was previously adjusted from Kandampully & Suhartanto's (2003).

The construct Happiness, which comprises three items, was measured by adapting Loureiro et al.'s (2019) scale to focus on the feeling of delight and fulfilment provided by the experience with the Intelligent Virtual Assistant.

All constructs were measured in the questionnaire using a 7-point Likert Scale, where participants answered from 1 (Strongly disagree) to 7 (Strongly agree) to all the items that constitute each variable under analysis. All constructs and respective items can be found in chapter 4.1.2.

Table 3.1 Measurement Scales

Construct	Dimensions	Type of Likert-Scale	Source
Attachment		7-Point Likert scale of agreement (1-Strongly disagree to 7-Strongly Agree)	Thomson 2006
Competence		7-Point Likert scale of agreement (1-Strongly disagree to 7-Strongly Agree)	Thomson 2006
Relatedness		7-Point Likert scale of agreement (1-Strongly disagree to 7-Strongly Agree)	Thomson 2006
Autonomy		7-Point Likert scale of agreement (1-Strongly disagree to 7-Strongly Agree)	Thomson 2006
Virtual Intimacy		7-Point Likert scale of agreement (1-Strongly disagree to 7-Strongly Agree)	Sternberg 1997
Customer Engagement	Identification; Enthusiasm; Attention; Absorption; Interaction	7-Point Likert scale of agreement (1-Strongly disagree to 7-Strongly Agree)	So et al. 2016
Customer Loyalty		7-Point Likert scale of agreement (1-Strongly disagree to 7-Strongly Agree)	Prentice 2020
Happiness		7-Point Likert scale of agreement (1-Strongly disagree to 7-Strongly Agree)	Loureiro et al. 2019

Source: Own Elaboration

3.2 Questionnaire

The questionnaire was developed based on the literature review and all measurement items were adapted from existing instruments as mentioned above. Entitled "Understanding the relationship between Humans and Intelligent Virtual Assistants", the questionnaire was developed in Qualtrics (Qualtrics.com), an online platform which presents several benefits for the researcher such as: unlimited number of questions and responses, possibility of performing logic questions, admitting open questions, allowing the usage of various Likert-type scales, which were the most utilized. One particular feature that was extremely valuable was the possibility to create a unique code (four-digit random ID) for each participant by the end of the survey. This unique code provided the possibility to share the survey and collect data in an

extremely efficient and reliable platform, Amazon Mechanical Turk, subject that will be further explored in chapter 3.3.

Regarding the design and structure of the questionnaire, all respondents were initially introduced to a brief explanation of the study and asked to state which Intelligent Virtual Assistants (IVA) they use the most on their quotidian. In a second section, having the Intelligent Virtual Assistant mentioned before in mind, the respondents were asked for how long they own their IVA, how often they use them, and if the usage increased from 2019 to 2020 due to the Covid-19 pandemic. These questions provide the researcher important prior information to describe the usage of these devices. Forwardly, all eight constructs under analysis were measured using multiple choice and matrix table question types. All items that constitute each construct were exposed as statements and respondents indicated the extent of their agreement from 1 ("Strongly disagree") to 7 ("Strongly agree"). Using the open-ended question format, participants were asked to state the main purpose why they use their Intelligent Virtual Assistants (e.g. play music, make calls, set alarms, shopping). Lastly, sociodemographic questions, such as gender, age, education level, technology expertise, and household size were made. Therefore, the researcher is able to make a description of the sample, and also cross this information with other important data collected from the survey. The questionnaire can be found in Annex A.

3.3 Data collection and Procedures

The data was collected through an online survey developed in Qualtrics, as mentioned and described above, and published in Amazon Mechanical Turk, a crowdsourcing platform, that works as a marketplace owned by Amazon. In this platform, there are two types of users: the requesters, who share the projects (e.g. survey) and pay to get the data and the workers, who get tasks completed in order to get paid.

For the purpose of the present study, a survey was shared with workers to collect answers virtually using an effective and reliable method to get data. With Amazon Mechanical Turk, the researcher is able to apply desirable filters in order to have a more selective sample, and the eligible workers can participate in the project and get paid by the researcher when they finish the task, in this particular case, when submitting the questionnaire. For the present study, a location filter was applied, since the target of the survey was USA residents only. The participants answered anonymously and voluntarily having prior information about how much time the survey takes to be answered (7 to 9 minutes), how much the researcher pays each

worker, for how long the task is available (30 days), and the purpose and subject of the study. This information was provided in the preview version of the task. Once the worker decided to answer the survey, only after submitting it properly on both platforms (Amazon Mechanical Turk and Qualtrics) the researcher is able to approve the answer and pay for the respective task. As mentioned in the previous chapter, Qualtrics provided each respondent a unique code by the end of the survey, this code was meant to be copied to the Amazon MTurk task page, so the researcher was able to match the participant's answer with the unique code and forwardly approve and pay the worker.

From a total of 259 answers, only 222 respondents were eligible by answering all of the 17 presented questions, meaning that 37 answers were excluded from the sample.

3.4 Sample Profile

As explained in chapter 3.2, questions to better describe the participants' usage of Intelligent Virtual Assistants were included. Primarily, the participants were requested to state the Intelligent Virtual Assistant they use the most. From a total of 222 responses, 48% of the participants answered Amazon Alexa, being the most referred one, followed by Apple Siri (28%) and Google Assistant (17%). These three devices together constitute 93% of the answers. Almost half of the respondents (46,8%) own their personal voice assistants for more than two years. Regarding how often they use them, the most common answer was "Everyday", a percentage of 37,4%, which corresponds to 83 people, followed by "2 to 3 times a week" (24,8%). The least selected answer was "Less than a month" (6,3%), which indicates that most of the participants are common users of these devices and so characterize a good and significantly representative sample. Additionally, the majority (52%) of the respondents answered they agree (6) and agree somewhat (5), from 1 ("strongly disagree") to 7 ("strongly agree"), that the usage of these devices increased due to the Covid-19 Pandemic.

Lastly, the participants were asked about the main reasons why they use their IVA on a daily basis, the answer was open and the most frequent ones were: to set an alarm, to make a shopping list, to purchase things online, to play music, to ask about the weather and other information.

Sociodemographic data was collected by the end of the questionnaire to better describe the sample's profile. Among the 222 respondents, 114 (51.4%) are women, 107 (48.2%) are men and 1 (0.5%) respondent answered "other". Regarding age, almost half of the sample (43.7%) is composed of adults in the age range from 25 to 34 years old, followed by adults

within the age range of 35 to 44 years old (22.5%). Looking at the education level, almost half of the respondents are college graduated (41.9%), 19.4% (43) have a master's degree, and 23% (51) affirm to have some college. Considering the respondents' technology expertise, only 4 (1.8%) people affirm to be "not experienced", meaning that almost 98% of the respondents are average, experienced, or very experienced users. Finally, by analysing the household size, more than half of the respondents (59.9%) state to live in a house with 3 or more persons. This information can be found in Table 3.2.

Table 3.2 Sociodemographic Data | Sample profile.

	Frequency	Percentage (%)
Gender		
Female	114	51.4
Male	107	48.2
Other	1	0.5
Age		
18 - 24	20	9.0
25 - 34	97	43.7
35 - 44	50	22.5
45– 54	28	12.6
55 – 64	20	9.0
> 65	07	3.2
Education Level		
Less than High School	1	0.5
High School Graduate	15	6.8
Some College	51	23.0
Professional Degree	17	7.7
College Graduate	93	41.9
Master's Degree	43	19.4
Doctorate	2	0.9
Technology Expertise		
Very Experienced	54	24.3
Experienced	95	42.8
Average User	69	31.1
Not Experienced	4	1.8
Household Size		
1 – 2 persons	89	40.1
3 persons	60	27.0
Above 3 persons	73	32.9

Source: Autor's creation based on SPSS output.

Chapter 4 – Results and Discussion

This chapter will present the obtained results and findings of the research. More specifically, an analysis of the data, collected from the questionnaire, will be presented and fully explained. Afterwards, the author will expose the discussion of the results, and the theoretical contributions and managerial implications will be presented.

The main objective of the present chapter is to combine the theoretical knowledge with the results of the study, formulating conclusions about the topic of study, which is to understand the relationship between humans and Intelligent Virtual Assistants. To comprehend if, in fact, humans create a relationship of closeness and intimacy with the smart device and if these feelings influence the levels of customer engagement and subsequently customer loyalty and happiness provided by the experience with the smart device.

4.1 Data Analysis

To conduct an analysis of the collected data, partial least squares (PLS) was used as an estimation method. The appropriateness of PLS can be explained by the fact that the present study aims to test a theoretical framework based on a predictive perspective and also by the existence of a formative high-order construct. Both of these statements justify the choice of PLS software (Hair et al., 2019).

4.1.1 Model Estimation

The first step using PLS consisted of the estimation of the model. The model is constituted by seven first-order constructs (Attachment, Autonomy, Competence, Relatedness, Virtual Intimacy, Loyalty and Happiness) and one formative second-order construct with five first-order dimensions (Customer Engagement: Identification; Enthusiasm; Attention; Absorption; Interaction). Customer Engagement is alleged as a formative construct since all of its five dimensions are significantly distinctive from each other, and, additionally, all of them explain and contribute to the levels of Customer Engagement. Therefore, to estimate the high-order construct, the two-stage approach was followed. As Customer Engagement is an endogenous variable - predicted by the model - the two-stage approach stands as the most accurate, in contrast to the additional two PLS provides – the repeated indicator approach and the hybrid method (Becker et al., 2012). The results are presented in the following sub-sections.

4.1.2 Descriptive Statistics

The primary stage when analysing the data is to perform a descriptive statistical analysis for all the variables that constitute the conceptual framework, presented in chapter 2.7. In this first stage, the mean and standard deviation will be applied.

Primarily, it was required to generate a new variable for all the questions of the survey. Therefore, the researcher performed the calculation of the mean of each mean associated with the particular variable in order to create the constructs. These means were computed using SPSS software.

In the present chapter, an analysis of each variable is presented with a table constituted by the values acquired with PLS and SPSS software.

Attachment

The first variable under analysis is Attachment. This construct comprises 4 items presented in Table 4.1. The item with the highest average value is **ATTACH 03: If IVA was permanently gone from my life, I would be upset** (mean= 4.194), which means the highest level of agreement in the respondent's answers. As an opposite, **ATTACH 01: I feel better if I am not away from or without IVA for long periods of time** presents the lowest average value (mean= 3.811) and the lowest standard deviation of 1.773, which corresponds to the lowest concordance level and the lowest disparity among the respondent's answers. **ATTACH 02: I miss IVA when I don't have with me**, having the lowest Standard Deviation, presents the highest similarity among the respondent's answers.

The new construct Attachment has an average value of 3.962 and a Standard Deviation of 1.642.

Table 4.1 – Descriptive Statistics – Attachment.

	Mean	SD	Loading
ATTACH 01. I feel better if I am not away from or without IVA for long periods of time	3.811	1.773	0.863
ATTACH 02. I miss IVA when I don't' have it with me	3.869	1.885	0.908
ATTACH 03. If IVA was permanently gone from my life, I would be upset	4.194	1.787	0.912
ATTACH 04. Losing IVA forever would be distressing to me	3.973	1.860	0.906
Construct: Attachment	3.962	1.642	

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

Autonomy

The variable Autonomy comprises 3 items, as presented below in Table 4.2. The item with the highest average value is **AUT 03**: **IVA makes me feel free to be who I am** (mean= 4.568), which means that this specific statement presents the highest agreement rate in the respondents' answers. In contrast**,** the item **AUT 02: IVA makes me feel pressured to be certain ways** presents the lowest agreement rate of 3.293, which can be somewhat explained by the fact that the statement is in the reversed form and so the participants tend to disagree.

Regarding Standard Deviation, **AUT 01: IVA makes me feel controlled** and **AUT 02: IVA makes me feel pressured to be certain ways** present similar values, 1.866 and 1.865 respectively, which correspond to a high level of disparity between responses. **AUT 03: IVA makes me feel free to be who I am** presents the lowest Standard Deviation of 1.642, which means that respondents answered more equally to this item.

The new construct Autonomy has an average value of 3.889 and a Standard Deviation of 1.471.

Table 4.2 – Descriptive Statistics – Autonomy.

	Mean	SD	Loading
AUT 01. IVA makes me feel controlled (reversed)	3.806	1.866	0.819
AUT 02. IVA makes me feel pressured to be certain ways (reversed)	3.293	1.865	0.831
AUT 03. IVA makes me feel free to be who I am	4.568	1.642	0.788
Construct: Autonomy	**3.889**	**1.471**	

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

Competence

The following variable, Competence, initially comprised 3 items. However, COMP 03 was eliminated from the measure, since this particular item presented a loading lower than 0.7. Therefore, this construct is constituted by the two remaining items (COMP 01 and COMP 02) presented in Table 4.3. The item with the highest Mean and highest Standard Deviation is **COMP 02: Generally, IVA makes me feel effective** (mean= 4.955; SD= 1.479), being, therefore, the item with the highest agreement rate and but also with the biggest disparity between responses.

The new construct, Competence, has an average value of 4.887 and a Standard Deviation of 1.407.

Table 4.3 – Descriptive Statistics – Competence.

	Mean	SD	Loading
COMP 01. Generally, IVA makes me feel very capable	4.820	1.456	0.959
COMP 02. Generally, IVA makes me feel effective	4.955	1.479	0.955
COMP 03. IVA makes me feel inadequate or incompetent (reversed)	3.203	1.901	0.612
Construct: Competence	4.887	1.407	

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

Relatedness

The construct Relatedness is constituted by two items, as presented in table 4.4. By looking at the Table, one can state that the item **RELAT 01**: **IVA makes me feel cared about** presents the highest agreement rate of 4.243 and the lowest disparity among respondents' answers (SD= 1.895).

The new construct, Relatedness, has an average value of 4.160 and a Standard Deviation of 1.844.

Table 4.4 – Descriptive Statistics – Relatedness.

	Mean	SD	Loading
RELAT 01. IVA makes me feel cared about	4.243	1.895	0.961
RELAT 02. I feel a lot of closeness with IVA	4.077	1.926	0.966
Construct: Relatedness	4.160	1.844	

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

Customer Engagement

The variable Customer Engagement is explained by five dimensions: Identification, Enthusiasm, Attention, Absorption and Interaction. Identification comprises 4 items, Enthusiasm, Attention and Interaction are constituted by 5 items each, and, Absorption comprises 6 items. All five dimensions and respective items can be found in Annex B, together with the corresponding analyses.

As presented in Table 4.5, the dimension with the highest average value is Attention (mean= 4.432), followed by Enthusiasm (mean= 4.141). These two dimensions are the ones with the highest agreement rate from the participants. In contrast, Identification presents the lowest agreement rate of 3.497 and the highest Standard Deviation of 1.916, meaning there was a big disparity among the respondents' answers regarding its items.

The construct Customer Engagement presents an average value of 3.914 and a Standard Deviation of 1.656.

Table 4.5 – Descriptive Statistics – Customer Engagement.

	Mean	SD
1. Identification	3.497	1.916
2. Enthusiasm	4.141	1.734
3. Attention	4.432	1.619
4. Absorption	3.704	1.769
5. Interaction	3.797	1.912
Construct: Customer Engagement	3.914	1.656

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

Customer Loyalty

The variable Customer Loyalty comprises 10 items. Originally there were twelve items, however, two of them, LOY 08 and LOY 12, presented a loading lower than 0.7 and, consequently, were eliminated from the model and analysis. All ten items are presented in Table 4.6.

The item with the highest Average Value is LOY 05: I am most likely to reuse this IVA (mean= 5.369), indicating a good rate of agreement from the participants. As an opposite, LOY 07: I will repurchase this IVA even if the price increases presents the lowest agreement rate of 4.788.

Looking at the Standard Deviation, LOY 07: I will repurchase this IVA even if the price increases presents the highest value of 1.567, showing, therefore, a big disparity among answers. LOY 05: I am most likely to reuse this IVA, in contrast, presents the lowest value of 1.280, indicating a greater similarity among responses.

The new construct Customer Loyalty presents an average value of 5.153 and a Standard Deviation of 1.114.

Table 4.6 – Descriptive Statistics – Loyalty.

	Mean	SD	Loading
LOY 01. I would say positive things about this IVA to other people	5.104	1.360	0.771
LOY 02. I would recommend this IVA to someone who seeks my advice	5.122	1.398	0.843
LOY 03. I would refer this specific IVA to my friends and relatives	5.185	1.445	0.835
LOY 04. I would provide positive reviews for this IVA	5.212	1.289	0.824
LOY 05. I am most likely to reuse this IVA	5.369	1.280	0.748
LOY 06. High likelihood of repurchasing this IVA	5.203	1.349	0.815
LOY 07. I will repurchase this IVA even if the price increases	4.788	1.567	0.788
LOY 08. I pay a higher price than for other services for the benefits of this specific IVA	4.392	1.699	0.622
LOY 09. It is the best IVA I have ever used	5.041	1.383	0.819
LOY 10. I'm pleased to have used this IVA	5.239	1.316	0.846
LOY 11. It was a good idea to start using this IVA	5.266	1.286	0.832
LOY 12. I do not regret choosing this IVA	5.342	1.238	0.643
Construct: Customer Loyalty	5.153	1.114	

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

Virtual Intimacy

The variable Virtual Intimacy is constituted by 8 items, presented in Table 4.7. The item with the highest agreement rate is VINT 04: I value IVA greatly in my life (mean= 4.333). In contrast, the item VINT 01: I received considerable emotional support from IVA presents the lowest average value of 3.635, indicating a low level of concordance.

Regarding Standard Deviation, VINT 08: I give considerable emotional support to IVA corresponds to the item with the highest value of 2.196, indicating a significant disparity between respondents' answers, and, as an opposite, the item VINT 04: I value IVA greatly in my life presents the lowest value, and so, more similarity among all answers.

The new construct, Virtual Intimacy, presents an average value of 3.964 and a Standard Deviation of 1.820.

Table 4.7 – Descriptive Statistics – Virtual Intimacy.

	Mean	SD	Loading
VINT 01. I received considerable emotional support from IVA	3.635	1.990	0.912
VINT 02. I am able to count on IVA in times of need	4.230	1.897	0.867
VINT 03. IVA is able to count on me in times of need	3.793	2.018	0.903
VINT 04. I value IVA greatly in my life	4.333	1.837	0.869
VINT 05. I am willing to share myself with IVA	3.973	2.038	0.928
VINT 06. I experience great happiness when interacting with IVA	4.243	1.939	0.909
VINT 07. I feel emotionally close to IVA	3.806	2.093	0.936
VINT 08. I give considerable emotional support to IVA	3.698	2.196	0.926
Construct: Virtual Intimacy	3.964	1.820	

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

Happiness

The following variable, Happiness, is constituted by three items, presented in Table 4.8.

Regarding the Average Values, the item HAPP 03: The experience with IVA is very personally fulfilling presents the highest agreement rate of 4.568. The item HAPP 01: The experience with IVA contributed very much to my happiness in life, in contrast, presents the lowest agreement rate of 4.392 and, additionally, the lowest Standard Deviation of 1.626, meaning a bigger similarity among responses. As an opposite, HAPP 02: The experience with IVA is very meaningful by presenting the highest Standard Deviation (SD= 1.783) shows a big level of disparity among participants' answers.

The construct Happiness has an average value of 4.435 and a Standard Deviation of 1.624.

Table 4.8 – Descriptive Statistics – Happiness.

	Mean	SD	Loading
HAPP 01. The experience with IVA contributed very much to my happiness in life	4.392	1.626	0.921
HAPP 02. The experience with IVA is very meaningful	4.486	1.783	0.946
HAPP 03. The experience with IVA is very personally fulfilling	4.568	1.779	0.943
Construct: Happiness	4.435	1.624	

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

4.1.3 Assessment of measurement model

In the present section, the results of the measurement model of the first-order constructs, attachment, autonomy, competence, relatedness, customer loyalty, virtual intimacy, and happiness and the components of customer engagement, namely, identification, enthusiasm, attention, absorption and interaction, will be presented and analysed.

Primarily, the construct reliability and convergent validity was tested. Through a reliability inspection of the constructs' items, the author eliminated one item from the construct competence, and two items from customer loyalty, as these show loadings lower than 0.7. All remaining items present loadings above 0.7 and, therefore, are considered adequate and reliable (Hair et al., 2010).

In order to measure the construct reliability, also acknowledged as internal consistency, Cronbach's alpha, and rho_A values were calculated. The values range between 0.749 and 0.972, and 0.755 and 0.972 respectively. Therefore, according to the commonly accepted lower limit of 0.7, all constructs are reliable. Composite reliability is also a measure of internal consistency (Netemeyer et al., 2003), it poses as an "indicator of the shared variance among the observed variables used as an indicator of a latent construct" (Fornell & Larcker, 1981). All values should be above or equal to 0.70, since they vary between 0.854 and 0.978, this criterion is met. Finally, regarding convergent validity, the average variance extracted (AVE) should be at least 0.50 (Fornell & Larcker, 1981), this criterion can be confirmed since the values vary between 0.661 and 0.928 (See Table 4.9). The average variance extracted represents the latent variable's proportion of variance in relation to measurement error (Fornell & Larcker, 1981). To assess the discriminant validity of the first-order constructs, the author employed the Fornell-Larcker criterion. According to this testing system, the square root of average variance extracted (AVE) of each construct must be greater than any of its correlation with other constructs (Fornell & Larcker, 1981). As demonstrated in Table 4.10, this criterion has been successfully met.

Table 4.9 – Construct Reliability and Convergent Validity.

	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted (AVE)
Attachment	0.919	0.920	0.943	0.805
Autonomy	0.749	0.755	0.854	0.661
Competence	0.908	0.909	0.956	0.915
Relatedness	0.922	0.925	0.962	0.928
Identification	0.956	0.957	0.968	0.884
Enthusiasm	0.949	0.950	0.961	0.829
Attention	0.940	0.945	0.954	0.805
Absorption	0.956	0.957	0.965	0.821
Interaction	0.972	0.972	0.978	0.901
Customer Loyalty	0.943	0.951	0.951	0.661
Virtual Intimacy	0.969	0.969	0.974	0.822
Happiness	0.930	0.931	0.955	0.877

Source: Author's creation based on PLS output.

Table 4.10 – Discriminant Validity: Fornell-Larcker Criterion.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Attachment (1)	**0,897**											
Autonomy (2)	0,726	**0,813**										
Competence (3)	0,606	0,696	**0,957**									
Relatedness (4)	0,830	0,717	0,627	**0,963**								
Identification (5)	0,782	0,758	0,474	0,778	**0,940**							
Enthusiasm (6)	0,830	0,696	0,654	0,802	0,797	**0,911**						
Attention (7)	0,809	0,665	0,665	0,794	0,751	0,895	**0,897**					
Absorption (8)	0,769	0,774	0,585	0,815	0,854	0,815	0,810	**0,906**				
Interaction (9)	0,768	0,725	0,557	0,814	0,822	0,784	0,810	0,866	**0,949**			
Customer Loyalty (10)	0,543	0,294	0,608	0,466	0,395	0,611	0,629	0,459	0,428	**0,813**		
Virtual Intimacy (11)	0,795	0,733	0,616	0,845	0,852	0,841	0,819	0,896	0,887	0,520	**0,907**	
Happiness (12)	0,763	0,696	0,638	0,780	0,760	0,808	0,807	0,823	0,798	0,593	0,868	**0,936**

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

Regarding the formative second-order construct, it was required to evaluate if all five dimensions, namely, identification, enthusiasm, attention, absorption and interaction, explain and contribute to Customer Engagement. The non-parametric bootstrapping calculation was performed using PLS software and the results can be found in Table 4.11. All paths are positive, significant (p<.001), and greater than 0.1 (Chin, 1998). Therefore, one can conclude that all five dimensions are good indicators of Customer Engagement and explain somehow the global construct.

Table 4.11 – Customer Engagement (2nd order construct) measurement model assessment

First-order construct	Weight (Beta)	T Statistics	P Values
Identification	0.167	36.417	0.000
Enthusiasm	0.220	38.505	0.000
Attention	0.216	35.115	0.000
Absorption	0.252	43.318	0.000
Interaction	0.223	45.870	0.000

Source: Author's creation based on PLS output.

4.1.4 Assessment of structural model

The assessment of the structural model aims to study the relationships, or paths, between the latent variables, and therefore, present the results of the hypotheses tests. The structural model, also called the inner model, is the result of the PLS algorithm calculation, conducted to analyse the path coefficients, which indicate the strength of the relationships between the latent variables. In order to evaluate the significance of those paths, the non-parametric bootstrapping procedure was conducted (Niedermeier et al., 2019).

The conceptual model, displayed in Figure 4.1, is constituted by two types of variables, the exogenous latent constructs: autonomy; competence; relatedness and virtual intimacy, which have no structural path relationships, and the endogenous variables: attachment; customer engagement; customer loyalty and happiness, the ones that are predicted by the model and analysed through structural model relationships with other constructs (Hair et al., 2011).

Considering that all paths should be positive, greater than .1 (Chin, 1998) and p-values lower than .05, all hypotheses are supported by the results (see Table 4.12).

H1(a) hypothesizes that autonomy positively influences attachment strength. Looking at the results ($\beta = 0.250$; p-value < .001), one can state that when the Intelligent Virtual Assistant fulfills the autonomy needs of the user, the more strongly attached the user becomes to it.

Regarding **H1(b)**, it posits that competence positively influences attachment strength. The results (β = 0.102; p-value < .05), show that the customer feels more attached to the Intelligent Virtual Assistant when it does not overwhelm his/her feelings of competence. **H1(c)**, which evaluates if relatedness positively influences attachment, is also supported by the results (β = 0.587; p-value < .001), showing that the more the user feel related to the Intelligent Virtual Assistant, the greater is the feeling of attachment. **H2(a)** proposes that attachment strength positively influences customer engagement. The results support this hypothesis (β = 0.313; p-value < .001). In fact, customers become more engaged with the Intelligent Virtual Assistant when they feel more attached to it. **H2(b)** evaluates if virtual intimacy positively influences customer engagement. This hypothesis is also supported by the results (β = 0.680; p-value < .001). When the user develops feelings of closeness and connectedness towards the Intelligent Virtual Assistant (IVA), the levels of customer engagement increase. **H3(a)** proposes that customer engagement positively influences customer loyalty, and **H3(b)** checks if customer engagement positively influences happiness. Both hypotheses are supported by the results (β = 0.549; p-value < .001 and β = 0.865; p-value < .001, respectively). Therefore, one can state that customer engagement is a good predictor of customer loyalty, and also that the more the user is engaged with the device, the greater the happiness provided by the experience with it. All these direct effects can be found in Table 4.12.

Figure 4.1 – PLS Results.
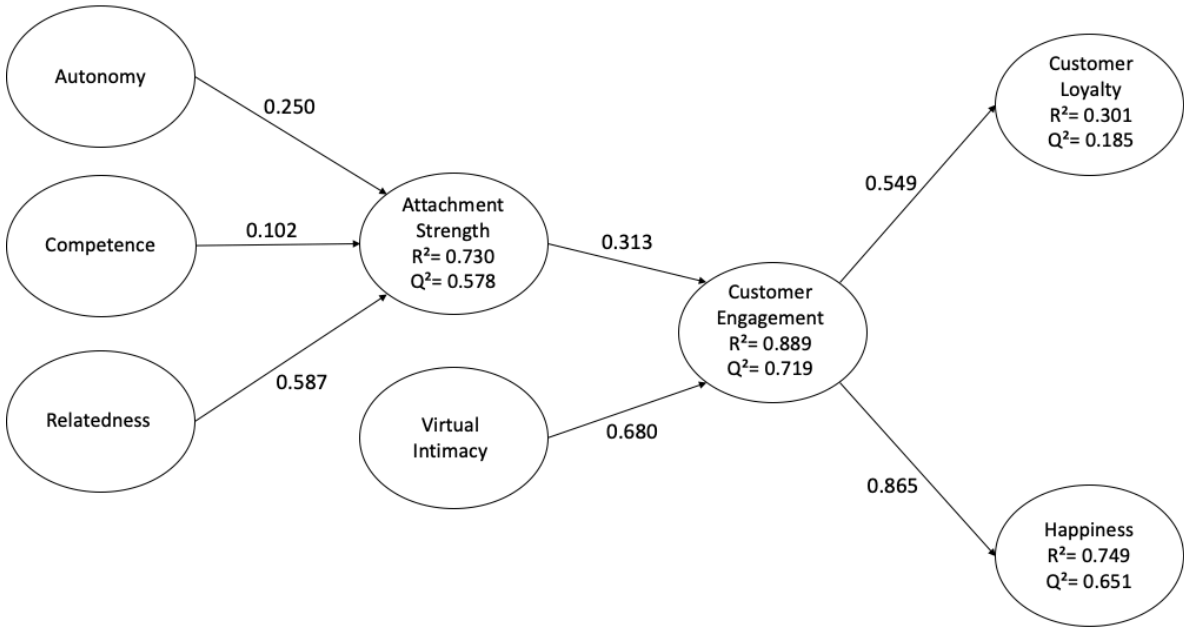
Source: Author's creation based on PLS output.

Table 4.12 – Direct Effects.

	Beta	Std Deviation	T Statistics	P Values	Hypothesis
Autonomy → Attachment	0.250	0.061	4.126	0.000	H1a: Supported
Competence → Attachment	0.102	0.050	2.045	0.041	H1b: Supported
Relatedness → Attachment	0.587	0.063	9.311	0.000	H1c: Supported
Attachment → C. Engagement	0.313	0.043	7.238	0.000	H2a: Supported
Virtual Intimacy → C. Engagement	0.680	0.040	16.791	0.000	H2b: Supported
C. Engagement → C. Loyalty	0.549	0.046	11.926	0.000	H3a: Supported
C. Engagement → Happiness	0.865	0.017	51.534	0.000	H3b: Supported

Source: Author's creation based on PLS output.

The Table 4.13, presented below, exhibits the measures R square, Q square and Model fit. R square or R^2 is a statistical measure that represents the proportion of the variance of an endogenous variable that is explained by one or more independent variable(s) in the model. Therefore, it indicates the predictive accuracy of the model. The values might range between 0 and 1, and higher values signify a higher predictive accuracy. Q square or Q^2 provides the predictive relevance of the structural model. There is proof of relevance when the values are above 0. The Q^2 of the endogenous variables can be measured in PLS through the blindfolding calculation (Hair et al., 2011).

Looking at the following Table 4.13, one can state that Competence, Autonomy and Relatedness explain 73% (R^2= 0.730) of the variance in Attachment and are relevant for this variable (Q^2=0.578). Attachment and Virtual Intimacy explain 89,8% (R^2= 0.898) of the variance in Customer Engagement and are relevant for this variable (Q^2=0.719). In its turn, Customer Engagement explains 74,9% of the variance in Happiness (R^2= 0.749) and 30% of the variance in Loyalty, and it is relevant for these variables (Q^2=0.651; Q^2=0.185 respectively).

Lastly, the model fit is measured through the standardized root mean residual (SRMR). This measure should be applied to avoid model misspecification. A commonly considered good fit corresponds to a value lower than 0.08, which can be verified since SRMR equals 0.074 (Hu & Bentler, 1999).

Table 4.13 – R-square, Chi-square and Model Fit.

	R Square	Chi-square
Attachment	0.730	0.578
Customer Engagement	0.898	0.719
Happiness	0.749	0.651
Loyalty	0.301	0.185
Model Fit		
SRMR	0.074	

Source: Author's creation based on PLS output.

4.2 Discussion

The present study was developed to determine the influence of the attachment strength and intimacy, between users and their Intelligent Virtual Assistants, on the levels of customer engagement and, in turn, how this influences customer loyalty towards the smart device and the happiness of the consumer. Through a diverse sample of 222 participants, it was possible to obtain the results presented above, to address the main questions of the research, and to achieve the proposed objectives in the conceptual model and hypotheses (See chapter 2.7). The results of the study will be discussed in the following paragraphs.

Regarding the Descriptive Statistics, the most important insights to be extracted are related to the constructs with the highest and lowest rate of agreement (mean) of respondents on the 7-point Likert Scale. Therefore, the construct with the highest mean, with a value of 5.21, is Customer Loyalty. This construct has a standard deviation value of 1.28, the lowest of all the constructs. These two values indicate that users are indeed quite loyal to their Intelligent Virtual Assistants and that the responses regarding their items were the most similar among the participants. In contrast, Autonomy has the lowest agreement rate of only 3.889. However, the highest Standard Deviation, which means the greatest disparity of responses regarding the items included, corresponds to the construct Relatedness. Both of these constructs were analysed as predictors of attachment. Despite these values, the measurement model results show that both constructs are reliable and valid.

Since customer engagement is a second-order construct, it is important to understand which of the five dimensions retains the highest rate of agreement among respondents. According to the results (see Annex B), the dimension with the highest average is Attention, 4.32, so it is the dimension with which participants agree the most. It is also the dimension with the lowest Standard Deviation, meaning that it comprises the lowest disparity of responses regarding the items included. These results show us that users are interested in the Intelligent

Virtual Assistant and enjoy interacting with it by paying attention to the device, learning more about its features and details, researching and trying new things.

As clarified in the measurement model, all the hypotheses created are supported by the model. In the next paragraphs the relationship among the variables under study will be explained in detail.

The study conducted by Thomson (2006), concludes that the attachment strength between a consumer and a brand or product depends on several factors. The determinants presented by the author and studied during this research are Autonomy, Competence and Relatedness. More specifically, the aim was to understand if when the Intelligent Virtual Assistant makes the person feel autonomous and independent, competence and effective, and welcomed and related, the strength of the attachment becomes greater. Whether the user develops a more powerful and meaningful relationship with the device when these needs are fulfilled by the device. According to the results we can conclude that yes, there is a positive relationship between the three determinants: Autonomy (Beta = 0.250), Competence (Beta = 0.102), and Relatedness (Beta = 0.587), and Attachment strength. Therefore the hypothesis H1a, H1b and H1c are supported and consistent with the Thomson (2006) study results.

Regarding the relationship between attachment strength and customer engagement, the results show that there is a positive relationship between the two variables (Beta = 0.313). Therefore, hypothesis H2a is supported. These results confirm that, indeed, when a person perceives the relationship with his/her IVA as irreplaceable and is emotionally and cognitively immersed (Thomson, 2006), the levels of interaction and engagement increase. A user with a deeper relationship with his IVA is more likely to co-create value, to interact and even to identify more with the Intelligent Virtual Assistant. The results presented are consistent with Kumar et al. (2019) and Hollebeek (2011), who underline the importance of the level of connectedness between the customer and the brand/product, and the emotional investment placed in the relationship, for increasing the levels of customer engagement.

In resemblance with the previous conclusion, the positive relationship between intimacy and customer engagement was also confirmed through the results (Beta = 0.680), thus supporting hypothesis H2b. As explained in the literature review, intimacy refers to feelings of emotional closeness, bonding, and connection (Sternberg, 1997). Thus, the results show that when the user feels closer and connected and has an emotional bonding with his/her Intelligent Virtual Assistant, the customer engagement levels increase. The results are supported by the study of Pansari and Kumar (2017), in which emotional connection is considered an antecedent

of customer engagement, "when a relationship is satisfied and has an emotional connection, it then progresses to the "engagement" stage." (Pansari & Kumar, 2017, p. 295).

Focusing on the customer engagement outcomes, customer loyalty in commonly assumed to be one of the most important consequences of an engaged customer. The study shows a positive relationship between the two variables (Beta = 0.549), supporting hypothesis H3a. This correlation is present in many marketing studies, and is confirmed by several authors, such as Rosado-Pinto and Loureiro (2020), Vivek et. Al (2012), Prentice and Nguyen (2020). All these authors mention the importance of increasing customer engagement levels, not only to have more interactive and interested consumers, but also because a more engaged customer is more likely to stay loyal with a company, to repurchase over a long period of time, to make positive recommendations, among other attitudes that only a loyal customer will do. The importance of retaining customers and increasing their loyalty is at the basis of many industries' marketing strategies.

The results show that a user who interacts and engages more with the Intelligent Virtual Assistant is more likely to become loyal to it, and is means not only to rebuy it, but also say positive things about it and recommend it to family and friends.

Finally, the results show a positive relationship between Customer Engagement and Happiness, supporting hypothesis H3b. This correlation presents the highest beta effect (Beta = 0.865). This result is in concordance with Niedermeier's (2019) study, which states that Happiness is an expected outcome of Customer Engagement. A consumer who is engaged with his/her Intelligent Virtual Assistant will feel happier and perceive the experience as more meaningful and personally fulfilling. Given that, in this study, customer engagement was measured as a second-order construct, comprising five different dimensions (interaction, identification, attention, absorption and enthusiasm), one can state that consumers who interact more, identify themselves and pay attention to the device and feel absorbed and enthusiastic about their IVA will be happier and more delighted with the experience provided.

The different selling brands of Intelligent Virtual Assistants can benefit a lot from the fact that these devices have human characteristics, the fact that they have a human-like voice, that they speak by means of natural language, that they respond to the user using their own name and that they adapt and customize their recommendations and responses to the user. All of these characteristics, if used correctly, can enhance the emotional proximity and intimacy relationships between the user and the smart device. These devices are not seen as just utilitarian objects, they are seen as a social being, as a companionship. The results demonstrate that users

actually create a relationship of attachment and intimacy with their IVAs. If companies acknowledge how to benefit from this fact, the customers will be more engaged and become more loyal and happier with the experience.

4.3 Theoretical Contributions

The major theoretical contributions of the present study are to the research area of Intelligent Virtual Assistants within the Marketing field. The study on the interaction between humans and voice assistants is already quite vast in many fields, however, the present research brings some theoretical contributions to consider. The concepts of intimacy and attachment were for the first time studied together as antecedents of customer engagement, taking into account not consumers and brands in general, but Humans and AI-powered Voice Assistants, a smart device that has human-like features and that is able to become intimate with its users through those features.

Through the integration of the concepts of intimacy and attachment, it was possible to conclude that these smart devices are not considered by their users as a mere utilitarian tool, but rather as a companion, a social being that they need, with whom they establish an emotional relationship, important to preserve.

On the other hand, the relationship studied between customer engagement and customer loyalty cannot be considered a theoretical contribution, but rather an additional confirmation of how an engaged customer becomes, most likely, a loyal customer, but, once more, not to a brand but a specific product.

Finally, the incorporation of the concept Happiness in the model can also be considered a contribution to the study of Intelligent Virtual Assistants from a Marketing perspective. This variable was measured through the questionnaire just like all the others, and analysed as an outcome of customer engagement. The scale used, which was adapted from a previous research (Loureiro et al., 2019), asked directly the participants weather the experience with their IVA contributes to their happiness in life, if it is personally fulfilling and meaningful. The descriptive statistics presented in chapter 4.1.2 (See table 4.8) show that this construct presented one of the highest agreement rates, meaning that users feel happier when using and interacting with their IVA. Happiness was not measured as immediate satisfaction but as authentic happiness.

4.4 Managerial Implications

Notwithstanding the theoretical contributions of the present study are more evident, there are also some practical implications to consider.

People during the coronavirus pandemic saw their lives change dramatically, loneliness was widely felt, and people tried to find companionship in various alternatives. According to the results of the questionnaire developed for this study, most participants agreed that the use of Intelligent Virtual assistants increased with the pandemic. Consumers are increasingly looking to buy and use products with which they feel a connection, which are innovative, and provide a different and pleasant experience. In this sense, it is important that brands, manufacturers and sellers of these smart devices, understand that the ability to personalise according to the user is one of the most important features to consider, as well as the language used. The IVA has to be not only efficient but also "empathic", as if it has feelings and a close relationship with the user. These important features will differentiate one brand from another, that will make the client loyal and committed to the brand and the smart device.

In this sense, the biggest practical implication of this study is actually the biggest conclusion at the same time: users, in fact, create an attachment relationship with their IVAs, much due to their natural language and personalization capabilities, the attachment strength is an important antecedent of customer engagement and, subsequently, customer loyalty. Users are more interested and interact more with their IVAs if they feel close to them, they are more likely to buy again, spend money with that brand, recommend and say positive things to other people if they feel emotionally attached to them.

Chapter 5 – Conclusions and Recommendations

The results from the questionnaire show that consumers create a relationship of connectedness and attachment with the smart device which works as a personal assistant and companionship for them. The more the user feels attached to the Intelligent Virtual Assistant, and the greater the level of intimacy, the higher the levels of engagement. Additionally, Customer Engagement is positively correlated with Customer Loyalty and Happiness, meaning that, when a customer is more engaged, he/she becomes more loyal to it and the happiness provided by the experience with the device is greater, the feeling of delight and fulfilment increases.

The human-like characteristics make users look at Intelligent Virtual Assistants as social beings, hence, strong feelings occur, and an emotional relationship is developed. These feelings of proximity and attachment make users more engaged, happier, more satisfied with the experience and also more loyal, consequences from which brands only benefit.

5.1 Limitations and Further Research suggestions

Despite the conclusions reached through the presented study, and the theoretical contributions and practical implications, the following limitations and future research recommendations should be taken into consideration:

First, considering the data collection, the study sample has a low representativeness. 222 participants are not enough to effectively demonstrate the influence of attachment strength and intimacy levels on customer engagement levels and, consequently, on customer loyalty and happiness.

Next, the duration of the study also needs to be considered. The questionnaire developed for the present study was distributed through the Amazon Mechanical Turk platform, with the intent of collecting responses only from residents of the United States of America. This is a platform where responses are obtained very quickly, in this particular study for one week all responses were collected. Therefore, one of the main recommendations for future research is to extend the time for collecting responses and also give more time for data analysis.

Thirdly, as mentioned above, the present study was focused only on residents of the United States of America. The choice of this country, as explained in the contextualisation of the study, was made based on statistics that present the United States as one of the largest consumers of Intelligent Virtual Assistants in a personal, everyday context. However, the consumption of these devices is growing worldwide, namely in Europe. Thus, it is

recommended that future research considers extending the study to other countries, with different cultures and economic realities.

Lastly, if the present study was continued, the variable "Happiness" would be analysed not only as a consequence of customer engagement but also as a moderating variable. This is because, according to the literature review and the results obtained, happiness seems to be not only an outcome of customer engagement but also something that may lead to customer loyalty. It would be interesting to understand if, in fact, the relationship between customer engagement and customer loyalty depends or is influenced by the happiness provided by the customers' experience with the Intelligent Virtual Assistant.

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Appendixes

Appendix A – Questionnaire

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The present questionnaire is part of a non-profit academic research.
All answers are anonymous and will be treated as a whole for academic purposes only.

The main purpose of this study is to better understand the relationship between Humans and Intelligent Virtual Assistants (IVA) , such as Amazon Alexa, Apple's Siri, Google Assistant, Microsoft's Cortana, Bixby from Samsung, and others, in a daily basis context.

Thank you so much for your cooperation in this project.

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For this study, we consider Intelligent Virtual Assistant (IVA) the software agents, such as Amazon Alexa, Apple Siri, Google Assistant, Cortana my Microsoft and others, that understand human vocal commands / questions and perform tasks for the user, such as giving information about the weather, check flight reservations, find an hotel or a restaurant, play music, create text messages, set alarms, and many others.

Please name the Intelligent Virtual Assistant you use the most in your daily basis. (E.g. Alexa)

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While answering this survey, please recall your experience with the Intelligent Virtual Assistant (IVA) you referred in the previous question.

From now on, please consider the word "IVA" as a reference to the Intelligent Virtual Assistant you have in mind (E.g. IVA = Siri).

Please tell us for how long do you own your IVA.

◯ Less than 1 year

◯ 1 to 2 years

◯ More than 2 years

Please tell us how often do you use your IVA.

◯ Less than once a month

◯ 1 to 3 times a month

◯ Once a week

◯ 2 to 3 times a week

◯ Everyday

During 2020, with the Covid-19 pandemic situation, in average, I used more IVA than in 2019.

Strongly disagree	Disagree	Disagree somewhat	Neither agree nor disagree	Agree somewhat	Agree	Strongly agree
◯	◯	◯	◯	◯	◯	◯

Please indicate the extent of your agreement with the statements below.

	Strongly disagree	Disagree	Disagree somewhat	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1. I feel better if I am not away from or without IVA for long periods of time	◯	◯	◯	◯	◯	◯	◯
2. I miss IVA when I dont have it with me	◯	◯	◯	◯	◯	◯	◯
3. If IVA was permanently gone from my life, I would be upset	◯	◯	◯	◯	◯	◯	◯
4. Losing IVA forever would be distressing to me.	◯	◯	◯	◯	◯	◯	◯
5. IVA makes me feel controlled	◯	◯	◯	◯	◯	◯	◯
6. IVA makes me feel pressured to be certain ways	◯	◯	◯	◯	◯	◯	◯
7. IVA makes me feel free to be who I am	◯	◯	◯	◯	◯	◯	◯
8. Generally, IVA makes me feel very capable	◯	◯	◯	◯	◯	◯	◯
9. Generally, IVA makes me feel effective	◯	◯	◯	◯	◯	◯	◯
10. IVA makes me feel inadequate or incompetent	◯	◯	◯	◯	◯	◯	◯
11. IVA makes me feel cared about	◯	◯	◯	◯	◯	◯	◯
12. I feel a lot of closeness with IVA.	◯	◯	◯	◯	◯	◯	◯

Please indicate the extent of your agreement with the statements below.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1. When someone criticizes this IVA, it feels like a personal insult	○	○	○	○	○	○	○
2. When I talk about this IVA, I usually say "we" rather than "they"	○	○	○	○	○	○	○
3. This IVA's successes are my successes	○	○	○	○	○	○	○
4. When someone praises this IVA, it feels like a personal compliment	○	○	○	○	○	○	○
5. I am heavily into this IVA	○	○	○	○	○	○	○
6. I am passionate about this IVA	○	○	○	○	○	○	○
7. I am enthusiastic about this IVA	○	○	○	○	○	○	○

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
8. I feel excited about this IVA	○	○	○	○	○	○	○
9. I love this IVA	○	○	○	○	○	○	○
10. I like to learn more about this IVA	○	○	○	○	○	○	○
11. I pay a lot of attention to anything about this IVA	○	○	○	○	○	○	○
12. Anything related to this IVA grabs my attention	○	○	○	○	○	○	○
13. I concentrate a lot on this IVA	○	○	○	○	○	○	○
14. I like learning more about this IVA	○	○	○	○	○	○	○

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
15. When I am interacting with this IVA, I forget everything else around me	○	○	○	○	○	○	○
16. Time flies when I am interacting with this IVA	○	○	○	○	○	○	○
17. When I am interacting with this IVA, I get carried away	○	○	○	○	○	○	○
18. When interacting with this IVA, it is difficult to detach myself	○	○	○	○	○	○	○
19. In my interaction with this IVA, I am immersed	○	○	○	○	○	○	○
20. When interacting with this IVA intensely, I feel happy	○	○	○	○	○	○	○
21. In general, I like to get involved in the IVA's community discussions	○	○	○	○	○	○	○

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
22. I am someone who enjoys interacting with like-minded others in the IVA's community	○	○	○	○	○	○	○
23. I am someone who likes actively participating in the IVA's community discussions	○	○	○	○	○	○	○
24. In general, I thoroughly enjoy exchanging ideas with other people in the IVA's community	○	○	○	○	○	○	○
25. I often participate in activities of the IVA's community	○	○	○	○	○	○	○

← →

Please indicate the extent of your agreement with the statements below.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1. I would say positive things about this IVA to other people	○	○	○	○	○	○	○
2. I would recommend this IVA to someone who seeks my advice	○	○	○	○	○	○	○
3. I would refer this specific IVA to my friends and relatives	○	○	○	○	○	○	○
4. I would provide positive reviews for this IVA	○	○	○	○	○	○	○
5. I am most likely to reuse this IVA	○	○	○	○	○	○	○
6. High likelihood of repurchasing this IVA	○	○	○	○	○	○	○
7. I will repurchase this IVA even if the price increases	○	○	○	○	○	○	○
8. I pay a higher price than for other services for the benefits of this specific IVA	○	○	○	○	○	○	○
9. It is the best IVA I have ever used	○	○	○	○	○	○	○
10. I'm pleased to have used this IVA	○	○	○	○	○	○	○
11. It was a good idea to start using this IVA	○	○	○	○	○	○	○
12. I do not regret choosing this IVA	○	○	○	○	○	○	○

Please answer considering your relationship with IVA.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1. I received considerable emotional support from IVA	○	○	○	○	○	○	○
2. I am able to count on IVA in times of need	○	○	○	○	○	○	○
3. IVA is able to count on me in times of need	○	○	○	○	○	○	○
4. I value IVA greatly in my life	○	○	○	○	○	○	○
5. I am willing to share myself with IVA	○	○	○	○	○	○	○
6. I experience great hapiness when interacting with IVA	○	○	○	○	○	○	○
7. I feel emotionally close to IVA	○	○	○	○	○	○	○
8. I give considerable emotional support to IVA	○	○	○	○	○	○	○

The experience with IVA contributed very much to my happiness in life.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
◯	◯	◯	◯	◯	◯	◯

The experience with IVA is very meaningful.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
◯	◯	◯	◯	◯	◯	◯

The experience with IVA is very personally fulfilling.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
◯	◯	◯	◯	◯	◯	◯

Please state the main purpose why you use your IVA (E.g. shopping, music, set alarms, etc.)

[   ]

Gender

◯ Female

◯ Male

◯ Other

Age

[⬍]

Education level

[⬍]

Technology Expertise

Very Experienced	Experienced	Average User	Not Experienced
◯	◯	◯	◯

Household Size

1 - 2 persons	3 persons	Above 3 persons
◯	◯	◯

Appendix B – Descriptive Statistics: Customer Engagement subscales

Customer Engagement: Identification

Descriptive Statistics – Customer Engagement: Identification.

	Mean	SD	Loading
1. When someone criticizes this IVA, it feels like a personal insult	3.428	1.980	0.912
2. When I talk about this IVA, I usually say "we" rather than "they"	3.284	2.033	0.949
3. This IVA's successes are my successes	3.667	2.072	0.936
4. When someone praises this IVA, it feels like a personal compliment	3.608	2.050	0.963
Construct: Identification	3.497	1.916	

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

Customer Engagement: Enthusiasm

Descriptive Statistics – Customer Engagement: Enthusiasm.

	Mean	SD	Loading
1. I am heavily into this IVA	3.824	1.964	0.906
2. I am passionate about this IVA	3.941	2.054	0.927
3. I am enthusiastic about this IVA	4.284	1.869	0.914
4. I feel excited about this IVA	4.326	1.785	0.909
5. I love this IVA	4.347	1.801	0.897
Construct: Enthusiasm	4.141	1.734	

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

Customer Engagement: Attention

Descriptive Statistics – Customer Engagement: Attention.

	Mean	SD	Loading
1. I like to learn more about this IVA	4.694	1.662	0.875
2. I pay a lot of attention to anything about this IVA	4.432	1.861	0.926
3. Anything related to this IVA grabs my attention	4.315	1.788	0.922
4. I concentrate a lot on this IVA	4.077	1.961	0.893
5. I like learning more about this IVA	4.644	1.725	0.869
Construct: Attention	4.432	1.619	

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

Customer Engagement: Absorption

Descriptive Statistics – Customer Engagement: Absorption.

	Mean	SD	Loading
1. When I am interacting with this IVA, I forget everything else around me	3.495	1.974	0.910
2. Time flies when I am interacting with this IVA	3.694	1.940	0.937
3. When I am interacting with this IVA, I get carried away	3.644	2.010	0.924
4. When interacting with this IVA, it is difficult to detach myself	3.392	1.955	0.878
5. In my interaction with this IVA, I am immersed	3.712	1.926	0.931
6. When interacting with this IVA intensely, I feel happy	4.288	1.886	0.855
Construct: Absorption	3.704	1.769	

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

Customer Engagement: Interaction

Descriptive Statistics – Customer Engagement: Interaction.

	Mean	SD	Loading
1. In general, I like to get involved in the IVA's community discussions	3.815	2.048	0.928
2. I am someone who enjoys interacting with like-minded others in the IVA's community	3.865	1.927	0.959
3. I am someone who likes actively participating in the IVA's community discussions	3.712	1.972	0.951
4. In general, I thoroughly enjoy exchanging ideas with other people in the IVA's community	3.860	2.025	0.964
5. I often participate in activities of the IVA's community	3.734	2.083	0.943
Construct: Interaction	3.797	1.912	

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

Appendix C – Total effects

	Beta	Std. Deviation	T-statistics	P values
Attach – CEng	0,313	0,044	7,126	0,000
Attach – Happ	0,271	0,038	7,038	0,000
Attach – Loy	0,172	0,030	5,670	0,000
Aut – Attach	0,250	0,065	3,864	0,000
Aut – CEng	0,078	0,024	3,212	0,001
Aut – Happ	0,068	0,021	3,232	0,001
Aut - Loy	0,043	0,014	3,092	0,002
CEng – Happ	0,865	0,016	52,735	0,000
CEng – Loy	0,549	0,045	12,227	0,000
Comp – Attach	0,102	0,050	2,039	0,042
Comp – CEng	0,032	0,016	1,962	0,050
Comp – Happ	0,028	0,014	1,952	0,051
Comp – Loy	0,017	0,009	1,902	0,058
Relat – Attach	0,587	0,060	9,737	0,000
Relat - CEng	0,183	0,032	5,729	0,000
Relat – Happ	0,159	0,028	5,622	0,000
Relat – Loy	0,101	0,021	4,746	0,000
Int - CEng	0,680	0,041	16,708	0,000
Int – Happ	0,588	0,037	15,826	0,000
Int - Loy	0,373	0,034	10,911	0,000

Source: Author's creation based on PLS outputs.

Appendix D – Specific Indirect effect

	Beta	Std Deviation	T-statistics	P values
Int – CEng – Happ	0,588	0,037	15,826	0,000
Attach – CEng – Loy	0,172	0,030	5,670	0,000
Aut – Attach – CEng – Happ	0,068	0,021	3,232	0,001
Relat – Attach – CEng – Happ	0,159	0,028	5,622	0,000
Comp – Attach – CEng - Loy	0,017	0,009	1,902	0,058
Comp – Attach – CEng	0,032	0,016	1,962	0,050
Attach – CEng - Happ	0,271	0,038	7,038	0,000
Int – CEng – Loy	0,373	0,034	10,911	0,000
Relat – Attach – CEng	0,183	0,032	5,729	0,000
Relat – Attach – CEng – Loy	0,101	0,021	4,746	0,000
Comp – Attach – CEng – Happ	0,028	0,014	1,952	0,051
Aut – Attach – CEng - Loy	0,043	0,014	3,092	0,002
Aut – Attach - CEng	0,078	0,024	3,212	0,001

Source: Author's creation based on PLS outputs.