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THE IMPACT OF ARTIFICIAL INTELLIGENCE VIRTUAL PERSONAL ASSISTANTS AS SALES CHANNELS ON CUSTOMER LOYALTY

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Master in Management

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Before presenting this dissertation and its findings, I would like to show my gratitude for some people whose help proved to be vital for the accomplishment of this project.

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Abstract

Artificial Intelligence through Virtual Personal Assistants is a tendency rapidly growing in the market that offers a new purchase experience for the consumer. As such, studying the impact this channel may have becomes pivotal as it may influence customer loyalty which is one of the most important concepts for competitive advantage. Previous research on the relationship between different sales channels and loyalty is vast, however, it is mainly focused on the online (e-commerce) and offline channel. Therefore, the first objective of this dissertation is to fill in this gap and try to conclude on whether there is a relationship between customer loyalty, its antecedents, satisfaction and service quality and the new technology. Also, as Virtual Assistants are still not fully available in the Portugal, the second purpose for this dissertation is providing information on both the market's behaviour and beliefs, and their current attitude towards the technology. From the output of a questionnaire with 253 valid answers, the first purpose of the thesis was not achieved as a relationship between loyalty or the antecedents and Virtual Assistants was not found, however, it was shown that experiencing this purchase before conducting the test could drive better results. Nonetheless, it was shown that the market may not be prepared for automatic shopping and may not trust personalization features, however, they highly value purchase convenience and VPA interactivity. Lastly, a three-cluster solution was presented showing different consumer profiles that suggest that the majority of the sample is open to adopt to the technology.

Keywords: Virtual Assistants, Loyalty, Relationship, Consumer behaviour, Technology adoption;

JEL: M31

Resumo

Inteligência Artificial através de Assistentes Virtuais é hoje uma tendência que cresce exponencialmente no retalho e que oferece uma experiência de compra única. Sendo assim, torna-se imperativo estudar o impacto desta tecnologia, dado que, poderá influenciar a lealdade do consumidor que é um conceito importante para o atingimento de vantagem competitiva. A literatura oferece vários estudos que demonstram a relação entre a lealdade e diferentes canais de compra, no entanto, está maioritariamente focada nos canais digitais (comércio eletrónico) ou nos canais físicos. Deste modo, o primeiro objetivo desta dissertação pretende preencher o espaço na literatura e inferir se existe uma relação entre a lealdade, os seus antecedentes satisfação e qualidade de serviço e a tecnologia. Adicionalmente, como o Assistente ainda não se encontra disponível em Portugal, determinou-se um segundo objetivo para procurar informação sobre comportamento, crenças e a atual atitude do consumidor em relação à tecnologia. Dos resultados obtidos no questionário com 253 respostas válidas, não foi possível atingir o primeiro objetivo porque não foi encontrada nenhuma relação entre lealdade ou os seus antecedentes e o assistente virtual. Não obstante, foi demonstrado que experienciar a compra antes do teste poderá levar a melhores resultados e, ainda, que os atributos mais relevantes para os portugueses são a conveniência e a interatividade, mas que a compra automática e a personalização não serão favoráveis ainda. Por fim, foi apresentada uma solução de três clusters mostrando diferentes perfis de consumidor que sugerem que a maioria da amostra tem abertura para adotar a tecnologia.

Palavras-Chave: Assistentes Virtuais, Lealdade, Relações, Comportamento do Consumidor, Adoção de tecnologia;

JEL: M31

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1 - Introduction to the Topic

"*Retail is evolving at an accelerated rate due to changes made possible by technologies and evolving consumer behaviours*" (Grewal, D., et al., 2016, pp.4). With these changes, it becomes pivotal that we monitor and study the current technology disruptors guaranteeing a better adaptation. Given that, the ambit of this project is to understand the impact of an Artificial Intelligence retail application - the Virtual Assistant – as a sales channel on customer loyalty and provide additional information on the Portuguese customer's behaviour and attitude towards the technology.

1.1 - Market and Technology Contextualization

Artificial intelligence is a branch of computer science that can be defined as the relation between computation and cognition (Barr & Feigenbaum, 2014) as it is the combination of programming languages applied to solve patterns and symbols. However recent this notion may seem, the idea of an interactive thinking machine can be traced back to the 1950's when Alan Turing first asked if machines could think and has since then evolved and become a tool with numerous applications.

Artificial intelligence or AI is today an object of science, a cause for investment, a career option, but most of all it is a growth path strategy for a digitized world worth 23 billion US dollars and expected to be valued at 126 US dollars by 2025 (Statista, 2020). AI can be divided into subfields such as Machine Learning, Deep Learning, or Natural language processing being the first field responsible for 60% of the investment in AI (McKinsey, 2017). Machine Learning can be defined as a field that studies the computers' ability to learn without being explicitly programmed (Samuel, A., 1959) meaning that this technology enables devices to learn and offer conclusions from the data they receive. Although Machine Learning has gained the biggest role, Natural Language which is the ability of understanding intention and manipulating natural languages in order to perform tasks (Chowdhury, 2005) and Deep Learning that studies neural activities in order to gain knowledge on abstraction, pattern recognition and signal processing (Deng, 2014), all together combined are responsible for many applications we see today such as Chatbots or Virtual Assistants.

The Artificial intelligence software market has grown, from 2018 to 2019, 154% and most of the demand is focused on automation and autonomous decision making (Statista, 2020). According to a study conducted by the McKinsey Global Institute in 2017, the sectors most

likely to adopt AI technology in their value chain are High Tech and Communication, Automotive and assembly, Media and entertainment, Healthcare, Education and Retail.

Artificial Intelligence in Retail

Referring to the latter, AI adoption in retail is gaining its significance as investment in this technology is expected to grow to 225US billion dollars by 2022 (Deloitte, 2019). Additionally, in a study conducted by IBM and the National Retail Federation in 2019, it was found that 80% of retail companies confirm that by 2021 they will adopt intelligent automation within their value chain. AI integration in this sector can be divided into two main areas: Logistics and Supply Chain and Marketing and Sales (McKinsey, 2017).

In Logistics and Supply Chain, AI can offer the ability to further optimize networks and efficiency in a time where high volumes, low margins and time sensitive deadlines demand a reactive strategy (Gesing et al., 2018). With this, AI tools aid with increasing forecasting accuracy that then reduces costs with overstock and over purchasing (IBM, 2019). Moreover, this technology can lead to an increase in Operation Agility so that, as an example, by gathering climate data, package transportation can change its route into the most efficient and cost reducing solution (Woyke, E., 2018).

Regarding the Sales and Marketing area, AI will mainly increase the consumer value proposition. Firstly, because it will enable for product characteristics optimization such as dynamic pricing, targeted distribution/assortment and increase in attractiveness through personalization, this ability alone can have an impact of a 4 to 6% sales increase and a 50% assortment efficiency improvement (McKinsey, 2017). Secondly, this technology will provide a never before seen user experience by personalizing suggestions, automating in-store checkouts (e.g. Amazon Go) and offer assistance with virtual agents (Amazon Alexa) (McKinsey, 2017). Amazon is a great example of the application of this technology in retail, however, other big companies are investing in the integration of the technology in their Go-to Market products, for instance, Microsoft in 2019 announced a $19 billion investment in Artificial Intelligence (Wall Street Journal, 2019).

As shown, Artificial Intelligence is every day, gaining its weight and being integrated in both company solutions and consumer products. Statistics show that it will become one more tool in recurrent life tasks and as such it is important to understand how and in what ways it can impact the market.

1.2 – Research Problem

Following a similar growth as Artificial Intelligence, since the launch of Siri by Apple in 2011, Virtual Personal Assistants have rapidly developed into a user-centric and friendly interface (Bonneau, V., et al., 2020) that can be accessed from any user device (smartphone, car or homepod) offering unprecedented convenience (Harvard Business Review, 2018). Statistics show that by 2021, over 1,8 billion consumers will daily use Virtual Assistants which will account for more than 20% of the global population. Additionally, 62% of customers who use a virtual assistant regularly state that they're likely to purchase through it within the month (Go-gulf, 2018).

Because of this exponential growth, more brands and retailers are investing in Virtual Assistant app development like Walmart, Starbucks, Domino's Pizzas or Applebee's who have already a dedicated app for Google Assistant (Google, 2019). The technology with all its attributes hasn't still become available in the Portuguese market but projections in European countries (Coppola, D., 2020) suggest this new voice-store will increasingly gain more importance and companies must adapt and prepare for that.

Customer Loyalty has been vastly studied as it is critical for achieving sustained competitive advantage (Kotler & Singh, 1981). This concept joined with satisfaction and service quality are performance indicators companies strive to achieve in order to deliver superior value (El-Adly, M., 2019). There is extensive research studying the relationship between these variables (Wong, A., & Sohal, A., 2003; Dixon J., et al., 2015; El-Adly, M., 2019) and even the impact various sales channels have on them (Geffen, D., 2002; Carpenter, J. & Fairhurst, A., 2005; Yoo, Q., et al., 2010).

However, there are still no studies on the impact Virtual Assistants as sales channel can have on Customer retention and loyalty, proving the existence of a gap in research. In addition to this and looking specifically to the Portuguese market where the purchase store is still not available, adoption to the technology is still uncertain and may differ from projections as Portugal is a country with already low online penetration rates (Teixeira, A., 2020).

1.2 – Research Question and Objectives

Given that, wanting to contribute in both a theoretical and managerial perspective, this dissertation seeks to answer the following questions:

i. Does a Virtual Personal Assistant positively impact Customer Loyalty?
    a. Does a Virtual Personal Assistant positively impact Customer Satisfaction?
    b. Does a Virtual Personal Assistant positively impact Service Quality?
ii. Who is the Portuguese consumer and how does he behave towards Virtual Assistants?

From these questions a first objective is then formed of fulfilling the literature gap previously mentioned and elucidating if a Virtual Assistant can have an impact on Satisfaction, Service Quality and, lastly and more importantly, on Customer Loyalty so as to help brands and retailers understand whether this channel should be invested on and prepare accordingly.

The second research objective intends to provide additional information on who are the consumers in Portugal, their behaviour and beliefs and, additionally, their current attitude towards the technology, aiming to shed some light on how integration and adoption in the country can go and provide clear targets helping companies and brands to better fulfil customer needs.

1.3 – Structure

This dissertation is distributed along different sections following a clear path of thought for a better organization and understanding of the topic. The present chapter presents an overview of the main topics explaining the relevance of the theme, the gap in the literature and defines the research objectives.

In the following chapter, a more extensive look into the topic will be conducted through the literature review. Here the various concepts and relationships will be examined and a framework and hypothesis to test will be proposed.

The third chapter approaches the methodology used for this study, identifying the chosen approach to test the proposed framework using quantitative methods. It also specifies the structure of the survey published to collect data and the scales for the item questions chosen to measure the concepts.

The next section concerns the data analysis of the results obtained from the questionnaire relating them with the hypothesis and objectives previously formulated. For this, a descriptive

analysis will be conducted, followed by a reliability test of the scales and tests for the proposed hypothesis.

The final chapter of this dissertation will discuss and conclude on the obtained results relating them with the previous research, assess the theoretical and managerial implications and, lastly, reflect on the experienced limitations and suggest future research to be developed in the area.

2 - Literature Review

2.1 - Where do and where will consumers buy?

A channel is a place where a customer can interact with a brand or retailer (Neslin et al., 2006). Customers seek different channels depending on where they can fulfil their need and receive the best experience and satisfaction (Sharma, A., 2007).

In order to provide the best experience, information is key. From a single purchase, retailers had access to a multitude of information such as price paid, quantity and shopping basket composition using this to draw insights and enhance customer experience boosting sales and performance (Brynjolfsson, E., et al., 2013). Today, the principle hasn't changed, however, the level of information and access to it has been greatly enlarged for both the brands and the customer. With this, it's critical to understand retailing areas where innovation is changing the scenery so that we can prepare and evolve in the future (Grewal et al., 2016).

2.1.1 - From Multi-channel Strategies to Omnichannel Management

We started off with simple brick and mortar stores that offered exactly what customers needed and where availability and the best prices were sufficient for instant gratification (Brynjolfsson, E., et al., 2013). However, with the increasing importance of the internet, many retailers initiated a shift to multi-channel strategies. Neslin et al. in 2006 defined this concept as the design and coordination of channels to enhance customer value, acquisition, retention, and development. Most studies consider three main channels, offline (physical stores), online (web stores and search engines) and traditional direct marketing channels. The driver for this strategy relies on the growth of the online channel (Verhoef, et al., 2015), yet, the main goal is maximizing each channel individually for better performance (i.e. sales per channel).

Following this strategy, with the development of interactive channels where customers could communicate with firms and with each other (social media) and the appearance of new concepts such as showrooming (search offline, purchase online) and webrooming (search

online, purchase offline) (Verhoef et al., 2007), thinking of channels individually wasn't enough and so a new concept had risen – the omnichannel strategy.

In 2015, Verhoef et al. defined omnichannel management as the synergetic management of available channels and customer touchpoints, in such a way that the customer experience and performance across channels is optimized. This strategy focuses on customer experience integrating all channels towards an increase in performance as a whole. One big challenge for this approach is the amount of offer and availability presented to the consumer, making him more likely to change between platforms. Melis et al. (2015) found that customers start picking the online option of their preferred retailer, however, as shopping experience increases, shoppers start to switch between platforms, ultimately choosing the one that provides a better experience.

In 2017, PricewaterhouseCoopers conducted a study on omni-channel retail finding that in only 2 years, digitalization, being the degree of digitalization for sales channels, in the countries studied increased 27%. In Portugal, the omnichannel strategy has been adopted by the majority of big retail chains, such as, *Continente, Pingo Doce, Worten, Fnac*, etc. Technology is making omni-channel retailing inevitable and is destroying geographic barriers that traditional retailers used to rely on to overcome competition (Brynjolfsson, E., et al., 2013). With this, adaptation and integration becomes even more important.

2.1.2 - New Channels brought by new technologies

"*The introduction of smartphones have revolutionized shopping*" (Grewal, et al., 2016 pp.2). Introducing mobile technology allows customers to purchase anywhere at any time and aids retailers to offer relevant information based on location, time of day and customer profile from gathered data (Grewal et al., 2016).

Similarly, other growing technologies in retail are Augmented Reality (AR) and Virtual Reality (VR). Studies show that, in 2020 the AR/VR is already worth 18.8 billion US dollars (Statista, 2020). The biggest reason behind this increase is experience. There are already various examples of this technology in use, such as in fashion stores to help customer engagement (Poncin & Mimoun, 2014) or Pokémon Go in the gaming realm.

Another trend that is making a clear impact is the Internet of things (IoT). By its definition IoT allows for interconnectedness among devices providing the internet's advantages in all aspects of daily life (Want et al., 2015). The retail industry will be one of the most affected as

it will improve the quality of the customer's experience (Pantano & Timmermans, 2014). IoT can act upon behavioural patterns and provide tailored information available in different devices and networks.

One clear example of this are smart homes and, specifically, smart refrigerators that can reorder products as stock gets low. Statistics show that, from 2019 to 2023, smart appliances will grow yoy (year over year) 18,4%. Additionally, in 2019, household penetration of these products is 10,5% and is expected to reach 19% in four years for the US Market (Statista, 2019).

Connecting devices and bringing digital solutions to offline tasks is becoming a need, and, as statistics evidence, the demand for IoT solutions will grow almost 600% from 2020 to 2025 (Statista, 2020).

2.1.3 - Introducing AI Virtual Assistants

As the ideal bridge between human beings and the networks of interconnected devices, the Virtual Assistant was created (Statista, 2020). AI materialized through Virtual Assistants comes as the ground-breaking channel that is conquering its territory and becoming a private helper in each household. *"Providing customers with individually tailored brand experiences is the holy grail of marketing. With AI, such personalization can now be achieved with previously unimaginable precision and at a vast scale"* (Wilson & Daugherty, 2018, pp.11)

Virtual Personal Assistants (VPA) is a software program meant to interact with the end user in a natural way, to answer questions, follow a conversation and complete tasks (Bonneau et al., 2017). In other words, they are voice helpers that can be accessed in a car, a smartphone, a computer or at a home speaker. As shown, they are the combination of the predictive behaviour analysis in Machine Learning, pattern and intention recognition of Deep Learning and the interactive communication of Natural Language Processing. Through a Virtual Assistant, a consumer can purchase, play music, seek information, connect all Wi-Fi wearables or house devices and more, with over 1 million actions (Google, 2019).

Thus far Amazon has sold more than 100 million Echo smart speakers just for people to interact with the AI Voice Assistant – Alexa (CNBC, 2019). Google's solution - Google Assistant - is already available in more than 400 million devices and Apple, Samsung and Microsoft, are already investing in Home Pods to keep up with this trend (Harvard Business Review, 2018). In Portugal, on the 12th of November of 2019, Google announced the expansion

of Google Assistant for the country in its language – Portuguese. Nonetheless, the software update still didn't come with all of the functionalities available, only being able to control via smartphone and without the ability of purchasing (Pplware, 2019). Still, the following tasks are nowadays possible (Google, 2019):

- Text and make calls;
- Ask for information (traffic, weather, restaurants);
- Alarm definition;
- Google search;
- Ask for anecdotes;
- Control other applications compatible with the assistant, through smartphone;
- Make translations.

The tendency for these numbers is to continuously increase sales as expansion keeps growing, however, adoption in each country must be monitored. Regarding the age variable, not all age groups of the population are reacting the same way. Only the young population (18-29) account for 34% of the Voice Assistant Consumers in the US while consumers above 60 account for 20% of the market (Kinsella, B., 2019). However, a study conducted by PwC, shows that even though the younger portion of the population will adhere faster, it is the early 30's age group that will eventually give more use to the applications (PwC, 2018).

Also, in a study conducted by Statista in 2019 in the United States where the respondents were asked "Which of the following do you think a digital assistant can do to assist you?". In a 5-year span, 94% of the respondents chose the option "Help me reach and engage with my favourite brands", 93% chose "Provide accurate and personalized recommendations" and 92% of the respondents chose the option "Help me make retail purchases". With this, even when this technology is still not available worldwide, consumers do acknowledge that in a near future, these devices will integrate their daily lives and routines.

"AI assistants will not only minimize costs and risks for consumers but also offer them unprecedented convenience. They'll ensure that routines purchase flow uninterrupted to households (…) and manage complexity (…) of shopping decisions by learning consumers' criteria and optimizing." (Dawar, N., 2018, pp.3).

According to a study conducted by Harvard Business Review in 2019 there are various value propositions a Virtual Assistant may offer for both companies and consumers. In comparison with a traditional channel, what characterizes the VPA is:

a. Automation – by offering the ability of automatic reordering, routine purchasing and product selection will be made easier and faster than through traditional shopping;
b. Personalization – through the algorithms brought by Artificial Intelligence that feed these appliances, consumer patterns and habits will make for personalized shopping features and offers;
c. Convenience – the VPA is always accessible through various devices, at any time, providing useful information and anticipating needs;
d. Interactivity – engaging with the personal helper is already one of the main reason customers buy a home pod and, because of that, predictions state that Virtual Assistants will become the primary channel for information, goods and services seeking.

However promising this data may seem, some challenges will be faced by the platform holders companies. Given that, there are two main difficulties for this technology according to the same study from Harvard Business Review. Firstly, the algorithms need to keep up to date with consumer habits in order to evolve with the purchase habits and recommend the right products. Additionally, the software must manage needs and preferences carefully reaching fulfilment in every case (which is the brand promise for this device) so that the client doesn't feel like he's being tricked. Secondly, companies must consider privacy. Even though AI Assistants will provide far more convenience, for this to be possible, gathering information will be more intrusive and may cause discomfort and reluctance to use.

In Portugal, where the technology is still under developed, barriers to adopt will be similar as the one e-commerce faces already in the country. In May 2020, an article was released on the status of online shopping in Portugal and concluded that, the biggest issues the population still have are Privacy and Security with payments and their personal data, Logistical constraints for availability and delivery of products and poor online experience from the lack of investment in the area. These concerns still make Portugal reluctant to wifi-based purchases (Teixeira, 2020).

2.2 – How can AI VPA's drive Customer Loyalty?

Loyalty can be defined as a favourable attitude towards a brand in addition to purchasing it repeatedly (Day, 1969). This concept is mostly applied to Brand loyalty, however, Customer loyalty as a broader concept encompasses both retailer loyalty and brand loyalty (Wallace et al., 2004). Loyal Customers are known to buy more, are willing to pay higher prices, and generate positive word of mouth, thus influencing profitability (Reichheld, 1993). Studies show that a slight increase in loyal customers can lead to an increase profitability by as much as 30 to 85% (Reichheld & Sasser, 1990) which proves that retaining customer is critical and presents as an important competitive advantage for any business (Wu & Li, 2019).

In order to understand when we achieve loyalty, various theories on measurements were published and can be summarized in three main perspectives:

Loyalty Measurement perspective	Authors that support this view
Behavioural; To be considered loyal, one must consistently purchase a single brand/product. Example: The two-thirds criterion. Out of a set of three brands/products offered, four or more purchases of the same brand, must occur in a product life cycle for brand loyalty to exist.	• Copeland, 1923; • Churchill, 1942; • Brown, 1952; • Day, 1969 • Charlton & Ehrenberg, 1976; • Tucker 1964; • McConnell, 1968 • Jacoby & Chestnut, 1978 • Wu and Li, 2018
Psychological Commitment or Attitudinal; To be considered loyal, one must name a brand in response to the question "which brand/product do you prefer?" and the answer must be given regardless of the external variables such as price.	• Jacoby & Chestnut, 1978. • McConnell, 1968; • Farley, 1964; • El-Adly, 2019
Composite indices; To be considered loyal, one must forfeit a purchase in an out-of-stock situation even if there's an alternative brand.	• Copeland, 1923; • Jacoby & Chestnut, 1978;

TABLE 1 - LOYALTY MEASUREMENT PERSPECTIVES (AUTHORS ELABORATION)

The most agreed upon perspective, as presented, is the behavioural loyalty measure as it is solely viewed as the repeat purchase of a product or service. Repurchase can be defined as a consumer's current behaviour resulting in the purchase of the same product or service repeatedly (Curtis et.al, 2011). Research shows that there is direct link between loyalty and repurchasing (Taylor & Hunter, 2002) and as such loyalty can be viewed as a repurchase intention despite competitive efforts (Dixon et al., 2005).

Nonetheless, Jacoby and Chestnut (1978) argue that behaviour (repeat buying) is not enough to explain loyalty and that internal variables (e.g. attitude) prove as essential to rule out external patterns. A study by Hoyer (1984) concluded that some factors such as routine buyers (e.g. one that always buys the cheapest brand) and the amount of shelf space in store can influence repeat purchasing. As such, in addition to simple repurchase, the attitude towards the product or service like the willingness of recommending and encouraging others to purchase must also be considered (El-Adly, 2019) for attaining true Loyalty.

Research shows numerous factors that impact and drive Customer Loyalty. In similar studies regarding loyalty in sales channels, investigators found that an increase in satisfaction and the better the service output can lead to Customer Loyalty (Gefen, 2002, Wallace et al., 2004; El-Adly, 2019).

2.2.1 - Customer Loyalty and Satisfaction

Satisfaction is the seed out of which loyalty develops (Oliver, 1999) and a powerful player when it comes to influencing customer retention, price elasticities and consumer acquisition and transaction costs (Anderson et al., 1994;). It can be defined as the customer's affective response to the experience (Giese & Cote, 2000) and results from the comparison of an initial standard and perceived variance from that standard (Oliver, 1980). In other words, satisfaction is the consequence of an event and is influenced by previous experiences.

This notion can be materialized through the traditional expectancy disconfirmation satisfaction model (Oliver, 1980). This model proposes that positive disconfirmation occurs when the customer evaluates the discrepancy between what actually happened and their standards concluding that their expectations were met or exceeded. Thus, as customer satisfaction has comparison as its basis, when there is positive disconfirmation, there is an increase in satisfaction (Spreng et al., 1996).

A customer's satisfaction with the shopping experience should reflect well on the merchant (Wallace et al., 2004) as research has already proven that satisfaction can influence intentions and behaviours and is one of the most important pre-requisites for Customer Loyalty (El-Adly, 2019).

As demonstrated, research shows the link between Customer Satisfaction and Customer Loyalty hence with this Loyalty driver, the first hypothesis presents as follows:

H1: Customer Satisfaction will have a positive impact on Customer Loyalty;

2.2.2 - Customer Loyalty and Service Quality

Quality Service is the customers' subjective assessment that the service they are receiving is the service that they expect (Parasuraman et al., 1985). This concept can be divided into two sections, expected service and perceived service (Gronroos, 1984) meaning that any previous experience and the own interpretation of the service provided will influence the notion of quality.

With the objective of finding a way to measure and quantify this variable, Parasuraman et al. in 1985 operationalized a framework for understanding this concept – SERVQUAL. Through extensive research and focus groups, the author found five dimensions for measuring and achieving Service quality:

- Reliability: ability to perform the promised service dependably and accurately;
- Responsiveness: willingness to help customers and provide prompt service;
- Assurance: employees' or platforms' knowledge, courtesy and ability to inspire trust and confidence;
- Empathy: caring, individualised attention given to customers;
- Tangibles: appearance of physical facilities, equipment, personnel and written materials.

By its definition, the "Tangible" dimension could not be applied to an online platform, however, in 2002, Geffen when studying service quality in an online website measured the website's tangibility through the platforms neat an appealing appearance. In other words, when there can be judgement through sight, this dimension is applicable. When considering the service output of a Virtual Assistant, tangibility is not applicable as there is no visual stimuli or presentation.

Using this framework, various studies, have proven the link between Service Quality and Loyalty in both offline and online contexts such as in Wong et al. (2003), in Geffen (2002). Nonetheless previous research also shows that perceived service quality has an impact on satisfaction (Jiang & Zhang, 2016) and, also, that this same notion positively influences loyalty (Jiang & Zhang, 2016; Budianto, A., 2019).

Therefore, with a second driver of Customer Loyalty, the following hypothesis is proposed:

H2: Service quality will have a positive impact on Customer Loyalty;

2.2.3 - Customer Loyalty, Satisfaction, Service Quality and AIVA

Returning to the original question of this chapter which asks how AIVPA appliances can drive Customer Loyalty, two different variables were proposed and, throughout this literature review, proven as positive links for achieving Loyalty.

Up until now, there is no literature with a proven link between Virtual Personal Assistants and Customer Loyalty. However, various research have focused on testing different sales channels and their impact on latter loyalty. In 2002, Geffen studied how an e-commerce platform – Amazon.com – achieved loyalty through the quality of service it provided. Moreover, in 2004, Wallace et al., proved that a multiple channel strategy with various service touchpoints provided a better experience which led to an increase in satisfaction and lastly an increase in both behaviour and attitudinal Loyalty.

Therefore considering the increasing importance of this technology as the ultimate channel presented throughout this study and the impact Customer Loyalty brings to a company's performance, the last hypothesis present as such:

H3: AIVPA will have a positive impact on Customer Satisfaction;

H4: AIVPA will have a positive impact on Service Quality;

H5: AIVPA will have a positive impact on Customer Loyalty.

Being that the purchase attribute of Virtual Assistants is still not available in Portugal, data from purchase experience can't be collected and act as the foundation for the hypothesis presented. Yet, in other literature, another methodology can be followed where when it's not possible to measure the general construct, sub-hypothesis can be formed based on the concept's attributes. As an example of this, in 2003, Yen and Gwinner, studied if the internet self-service

technology (ISST) through its various attributes could lead to Customer Loyalty. In their proposed methodology, as they could not measure the new concept ISST, they showed survey participants various web items that portrayed ISST attributes and with only that information, the inquired were asked to evaluate the various constructs.

In other words, to measure the impact of ISST on the dependent variables chosen, the different characteristics of ISST were evaluated and measured individually and then joined in the discussion to form a final conclusion.

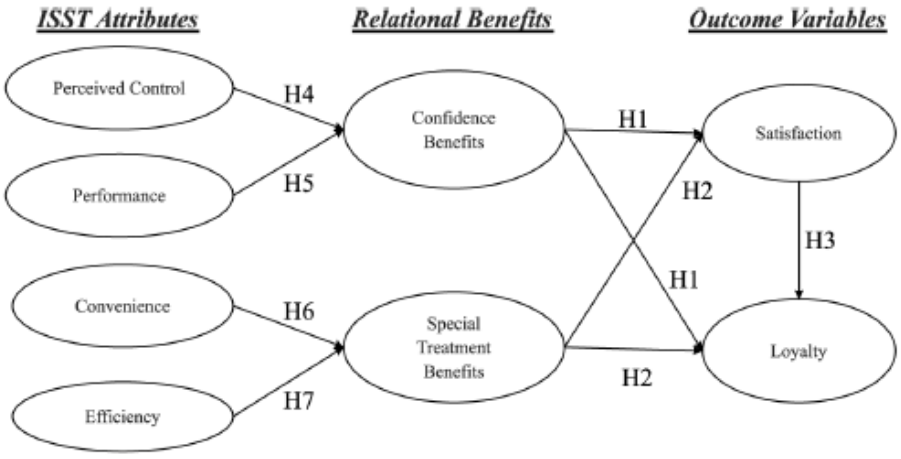

FIGURE 1 - INTERNET SELF-SERVICE TECHNOLOGY THEORETICAL MODEL. SOURCE: YEN & GWINNER, 2003

Given this, as mentioned in chapter 3.3.3, Virtual Assistants provide unique benefits to which they can be characterized – Automation, Personalization, Convenience and Interactivity (Harvard Business Review, 2018). Consequently, not being able to fully study AIVPA's impact, its attributes can be evaluated individually in order to conclude on the major hypothesis.

Moreover, the four Virtual Assistant attributes have been explored individually in prior research for various variables being some of them loyalty, satisfaction and service quality. In 2009, it was found that offering personalization in a service positively influences future purchase intentions (Lee, E., & Park, J., 2009) which can be linked with behavioural loyalty. In addition to this, Roy et al. (2018) proved a positive relationship between Convenience in banking and mobile services and word of mouth (attitudinal loyalty) and customer satisfaction. Interactivity, whose importance in e-commerce have been greatly discussed, has a validated positive influence in customer satisfaction (Yoo, W. et al., 2010). Lastly, referring to automation, no previous research was found regarding this construct, however, smart shopping

which applies the same base ideas as automation like saving time and effort increased utilitarian and hedonic benefits in a purchase (Atkins, K., & Kim, Y., 2012).

With this, despite not having precedent on a relationship VPA and Loyalty, through its unique benefits who have been studied individually and with previous examples in literature of the methodology, the hypothesis formed earlier can sub-divide into the following:

H3: AIVA benefits will have a positive impact on Customer Satisfaction;
H3.1: AIVA Automation will have a positive impact on Customer Satisfaction;
H3.2: AIVA Personalization will have a positive impact on Customer Satisfaction;
H3.3: AIVA Convenience will have a positive impact on Customer Satisfaction;
H3.4: AIVA Interactivity will have a positive impact on Customer Satisfaction.

H4: AIVA benefits will have a positive impact on Service Quality;
H4.1: AIVA Automation will have a positive impact on Service Quality;
H4.2: AIVA Personalization will have a positive impact on Service Quality;
H4.3: AIVA Convenience will have a positive impact on Service Quality;
H4.4: AIVA Interactivity will have a positive impact on Service Quality.

H5: AIVA benefits will have a positive impact on Customer Loyalty;
H5.1: AIVA Automation will have a positive impact on Customer Loyalty;
H5.2: AIVA Personalization will have a positive impact on Customer Loyalty;
H5.3: AIVA Convenience will have a positive impact on Customer Loyalty;
H5.4: AIVA Interactivity will have a positive impact on Customer Loyalty.

With this, the proposed framework can be summarized into figure 2. This model will now be applied in order to conclude on the hypothesis proposed:

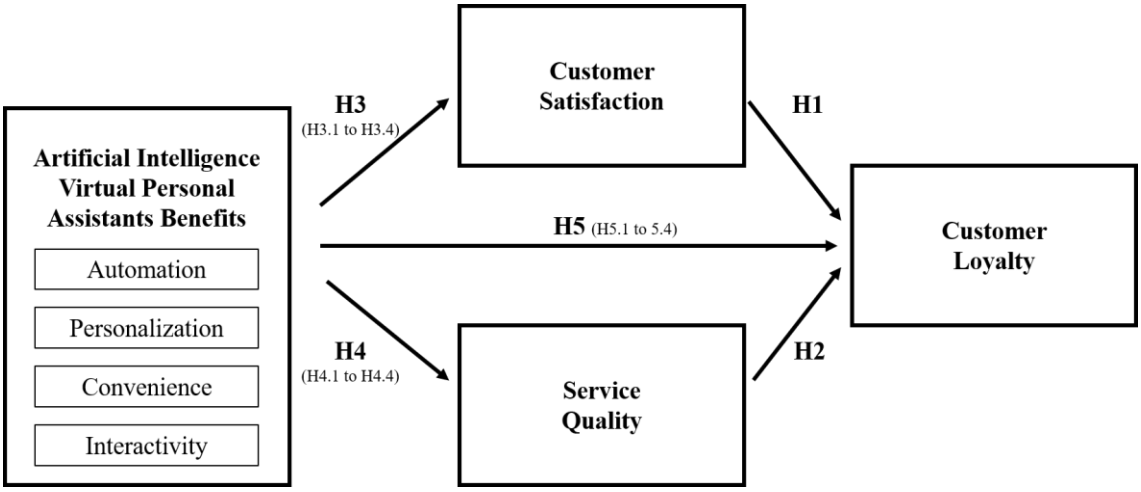

FIGURE 2 - PROPOSED FRAMEWORK WITH BENEFITS (AUTHOR'S ELABORATION)

3 - Methodology

This chapter will showcase the methodology this study will follow with the objective of finding the answers for the early research questions proposed and further validate the hypothesis presented.

A research design is a framework that guides the research project (Malhotra et al., 2017). The first main goal of this research is to conclude if Virtual Assistants, a new channel still not available in the Portuguese market, may influence loyalty, hence, this dissertation will follow a conclusive descriptive approach where research questions and hypothesis were formed to further measure and examine the relationships in question. The second general purpose is to understand and shed light on who is the Portuguese consumer, as such, a descriptive approach will also be utilized for this purpose.

Finally, this dissertation will use quantitative research techniques so as to quantify the data collected and perform statistical analysis. The technique chosen was the survey where respondents from a target population are asked questions regarding their behaviour, intentions, attitudes and demographic and lifestyle characteristics (Malhotra et al., 2017). The survey was published online and was available over a period of 46 days.

3.1 – Data Collection

This study used Primary Data as the source for information to better tackle the problem at hand which accounts for a new technology with less prior research. The survey was distributed online through the authors social media accounts so the inquired could access it wherever and whenever they could, enhancing the probability of achieving more responses.

A pilot-test was conducted with a sample of 10 respondents to reduce errors further along the line. With the respondents' feedback, some rectifications were made. Following this, on the 29th of June, the survey was released using Google Forms and was available until the 15th of August. Although this study is conducted in Portugal, the survey had the intention of collecting answers from non-Portuguese respondents which justified the release of a Portuguese language version and an English one too. On the 16th of August, the data was inserted into IBM SPSS Statistics where it was analysed.

3.2 – Target Population

Jacoby and Chestnut, 1978, state that one can only be considered loyal if the one who has the need is the one who completes the purchase. With this in mind, the target population for

this research are individuals starting from the age of 18 years old, which is Portugal's age for financial independence. Also, as stated earlier, this survey was also intended for foreign individuals living or not in Portugal wanting to link cultural aspects to behaviour and attitude towards the technology.

3.3 – Questionnaire

As previously affirmed, the technique chosen to sought answers for the research questions and hypothesis proposed is the questionnaire. The survey is composed by 6 sections with both closed and open questions. The closed questions account for the majority of the inquiries, they vary in format from multiple choice to scale and are easily coded and will facilitate subsequent analysis. The open questions were few and used for exploratory purposes and opinion collection. Apart from questions aimed at the hypothesis, demographic, social and technology adoption questions were also integrated in order to enrich the analysis. Rather than only conclude on the aim of the study, this thesis wants to contribute with some initial information on what could be the adoption of this new technology in the Portuguese market.

All questions were based on the literature review or other researches that proved essential to measure the different dimensions. As demonstrated, VPAs as sales channels are unavailable in Portugal, so throughout the survey definitions and visual examples of the various concepts were presented before the question in order to aid and provide a clearer experience. Finally, the questions were all grouped into sections that follow a specific line of thought also aiming to provide an effortless journey through the questionnaire. The questionnaire published is presented in appendix A.

In the first section, as this is a new invasive technology, in order to rule out individuals who are less accepting of new technologies, respondents were asked: *"Do you purchase through the Internet?"*. Citrin et al., 2000, demonstrated that the higher the innovativeness, the higher the adoption of new technologies, hence, this question filters non-adoptive users based on their internet shopping behaviour. If answered "yes", then they would be asked: *"On average, how many times would you say you purchase through the internet?"*, so as to collect current online purchase behaviour. If they answered "no" then the survey would skip to the end for the demographic questions and finish.

The second section aimed to figure out current knowledge and usage on the technology in study. It started off with a brief introduction of a VPA followed by questioning if the inquired have ever accessed a VPA and if they had ever purchased a good or a service through a VPA.

If the inquired answered "no" to the first question then they would be led to a second filter question: *"If you have never been in contact with a Virtual Assistant, do you have an interest in using one?".* Once more, if there is no intention for adopting this technology then, after inquiring the reasons in an open question, the survey would end for the participant. Nonetheless, if the inquired answered "yes" to having already been in contact with the technology or having interest in using one they would lastly be asked: *"Which activities would you most likely use it for?"* where various VPA activities were listed.

From the third to fifth section, questions for measuring the dimensions were inquired. The scales used were interval scales where numbers are used to rank objects such that numerically equal distances on the scale represent equal distances in the characteristics being measured (Malhotra et al., 2017). In specific, a non-comparative scaling technique was used – 7-point Likert Scale – that requires the participant to indicate a degree of agreement or disagreement with each of the statements presented. This scale is easy to implement and rapidly understandable for the participants (Malhotra et al., 2017). Additionally, all questions are validated by literature and can be summarized in the following tables:

1. Dimension: AIVPA

Dimension	Item	Question	Scale	Adapted From	Citations
AIVPA	Automation	You would spend extra effort on a purchase	7 point likert scale	Atkins, K. and Kim, Y., 2012	84
		You would waste time making a purchase	7 point likert scale	Atkins, K. and Kim, Y., 2012	84
		This type of purchase would perfectly fit your needs	7 point likert scale	Atkins, K. and Kim, Y., 2012	84
		The purchase was exactly what I was looking for	7 point likert scale	Atkins, K. and Kim, Y., 2012	84
AIVPA	Personalization	A Virtual Assistant has options for personalizing wish lists	7 point likert scale	Lee, E., and Park, J., 2009	65
		A Virtual Assistant has recognition of one's name	7 point likert scale	Lee, E., and Park, J., 2009	65
		A Virtual Assistant has personalized shopping features	7 point likert scale	Lee, E., and Park, J., 2009	65
		A Virtual Assistant has personalized product selection aids	7 point likert scale	Lee, E., and Park, J., 2009	65
AIVPA	Convenience	A Virtual Assistant is available when I need it	7 point likert scale	Roy,S. et al., 2018	37
		A Virtual Assistant is available through various ways	7 point likert scale	Roy,S. et al., 2018	37
		The information received from a Virtual Assistant makes it easy to chose what to buy	7 point likert scale	Roy,S. et al., 2018	37
		I would be able to complete my purchase quickly	7 point likert scale	Roy,S. et al., 2018	37
AIVPA	Interactivity	This Virtual Assistant would allow me to communicate easily with the company if I ever had a specific question or wanted to purchase a product	7 point likert scale	Ballantine, P., 2005	212
		The Virtual Assistant would have the ability to respond to my specific requests for information so I could access it quickly and efficiently	7 point likert scale	Ballantine, P., 2005	212
		The Virtual Assistant would give me some control over the content I wanted to see	7 point likert scale	Ballantine, P., 2005	212
		The Virtual Assistant would make me feel like it wants to listen to its visitors	7 point likert scale	Yoo,W., et al, 2009	231

TABLE 2 - AIVPA ITEM QUESTIONS (AUTHOR'S ELABORATION)

2. Dimension: Service Quality, Satisfaction and Customer Loyalty

As both Service Quality and Satisfaction, as stated in the literature review, are concepts based on comparison with a previous experience, the respondents evaluated both the Virtual Assistant and their previous offline experience to present as base. This approach was also conducted by Wallace et al., in 2004. The offline experience was chosen as comparison because of the interactivity one receives in store whereas an online purchase could not provide.

Dimension	Item	Question	Scale	Adapted From	Citations
SQ - Service Quality	Reliability	Provides accurate information	7 point likert scale	Clottey, T. et al, 2008	188
		Keep its promises	7 point likert scale	Clottey, T. et al, 2008	188
SQ	Responsiveness	Is always willing to help customers	7 point likert scale	Geffen,D., 2002	1335
		Is never too busy to respond to user requests	7 point likert scale	Geffen,D., 2002	1335
SQ	Assurance	Instills confidence in customers	7 point likert scale	Geffen,D., 2002	1335
		Has the knowledge to do its job	7 point likert scale	Geffen,D., 2002	1335
SQ	Empathy	Gives users individual attention	7 point likert scale	Geffen,D., 2002	1335
		Understands the specific needs of users	7 point likert scale	Geffen,D., 2002	1335
CS - Customer Satisfaction	Positive Disconfirmation	Overall, the benefits you would receive by purchasing through a Virtual Assistant would be:	7 point likert scale	Wallace, D. et al, 2004	717
CS	Satisfaction	Considering everything, how satisfied would you be with the overall purchase experience?	7 point likert scale	Wallace, D. et al, 2004	717
		Compared to these other sources, how do you rate (focal retailer)?	7 point likert scale	Wallace, D. et al, 2004	717
CL - Customer Loyalty	Attitudinal Loyalty	I would recommend purchasing through a Virtual Assistant to others	7 point likert scale	Geffen,D., 2002	1335
		I would encourage purchasing through a Virtual Assistant to others	7 point likert scale	Geffen,D., 2002	1335
CL	Behavioral Loyalty	I am inclined to purchase/repurchase through a Virtual Assistant	7 point likert scale	Geffen,D., 2002	1335

TABLE 3 - DIMENSIONS ITEM QUESTIONS (AUTHOR'S ELABORATION)

The last section of this survey includes the demographic variables of the respondents such as age, gender, nationality, last educational level achieved, employment area and hierarchy placement in current employment.

4 – Data Analysis

This section will focus on analysing the data obtained from the survey which gave us the final dimension of 253 answers. This research will then start from conducting a descriptive analysis of all of the responses. Afterwards perform the tests necessary to validate the hypothesis and lastly conduct a Clustering analysis in order to complete the second main purpose of the thesis and give more information about the future client.

4.1 – Filter Questions

The questionnaire had 329 responses, however, from the filter questions showcased above, 76 participants did not answer the survey to completion. For the first question *"Do you purchase through the internet?"*, 50 participants answered negatively. In these responses, the ratio female/male is equal, and every age group was represented with 48% above 51 years old and 52% from 18 to 50 years old. For the second filter question, "*If you do not have an interest in using a Virtual Assistant briefly explain why*" the remaining 26 participants were removed from the sample. Here, 30% of the answers were concerned with Security and Privacy issues and the remaining included lack of information and reluctance to use preferring current channels. Still regarding this topic, 60% of the sample is above 41 years old and 40% is below from 18 to 40 years old and 54% are from the female gender. The final dimension of the survey is 253 participants.

4.2 – Descriptive Analysis

This next section will approach the descriptive analysis of the demographic variables, other descriptive questions asked to characterize the sample and the item questions asked.

4.2.1 - Demographic variables

From the analysis conducted, the following conclusions can be made:

- The majority of the respondents are from the male gender representing 58,5% of the total dimension and the female gender accounts, consequently, for 41,5%;
- There is no age group with the majority of responses. 60% of the sample concerns age-groups from 51 to 60 years old and 18 to 25 years old with a distribution of 31,62% and, with 28,48%, each respectfully. The remaining 40% of the sample account for the other four age groups with the distribution of:
    - 7,91% aged from 26 to 30;
    - 9,09% aged from 31 to 40;

    - 16,06% aged from 41 to 50;
    - 6,32% with ages above 61 years old.
- Regarding nationality the majority of respondents are from Portugal (96,8%). The remaining 3,2% are foreign from countries such as France, Angola, Germany or Mozambique;
- As for the education level of the inquired, 45% are have a bachelor's degree, 34,8% have achieved a master's degree, 13,4% have a high school diploma, 6% have a doctorate degree and less than 1% have the primary school diploma;
- From the 253 responses, 214 (84,6%) live less than 30 minutes away from a retail area. Consequently, only 39 individuals live more than 30 minutes away from a retail area;
- Regarding the area of their employment, 20,6% of the inquired decided not to answer, however, for the latter, 22,9% have a management related employment, 18,6% come from a Military and Security background, 12,3% work in Education, 7,5% work in an IT function, 5,1% work in a Health area, 5,1% work in a Public Function, 4,3% work in the Culture Sector, 2% in Law and finally 1,6% is retired;
- Finally, from their employment, 37,5% are employees, 16,2% are team leaders or supervisors, 15% are department heads and 13% are members of the board. The remaining 18,2% decided not to respond.

4.2.2 - Technology knowledge and adoption

Referred to in the questionnaire section, in addition to socio-demographic inquiries, questions were asked to find out what the current level of knowledge of the technology, adoption, and current usage habits are for the functionalities available. After analysing the responses, we can conclude that:

- The majority of the participants (71,1%) purchases through the internet at least one time per month. 17,4% affirm they purchase two to three times a month and 8,3% affirm they purchase at least four times a month. The remaining 3,2% that purchase through the internet do not buy at least once a month;
- Regarding the knowledge of the technology, 76,3% of the inquired had already been in contact with a Virtual Assistant through one of its devices. Consequently, 23,7% have never had any contact;
- From the ones who did, 45% had used only one of the available functionalities, 29% had used at least two, 22% had used three, 6% had used four and only 1% had used

the five listed. In specific, when analysing which functionalities are currently being used, figure 3 shows the different features' usage rate (the respondents could list more than one feature).

From the figure 3, it is clear that the feature most used is the "*Browser Search*" with 123 responses, followed by "*texting and/or making a phone call*" with 78 answers and "*Connecting to a Music App*" with 75. The bottom two features are "*Consulting and managing your e-mail*" and "*Controlling smart home apps*" with 27 responses each;

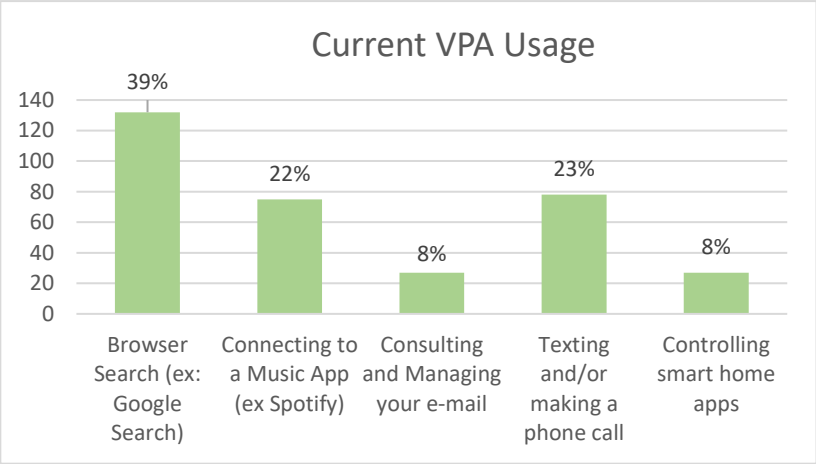

FIGURE 3 - CURRENT USAGE OF VPA FEATURES (FROM SPSS OUTPUT)

- Regarding having ever purchased using a Virtual Assistant, only 20,2% have ever experienced that feature, thus the majority of responses (79,8%) answered negatively, in line with nationality ration which shows the majority of respondents are Portuguese where this feature is still not available;
- Lastly, for the 23.7% of respondents who have never been in contact with a Virtual Assistant in any form, were then asked which of the activities listed would they most likely take advantage of. The distribution of responses are as follows:

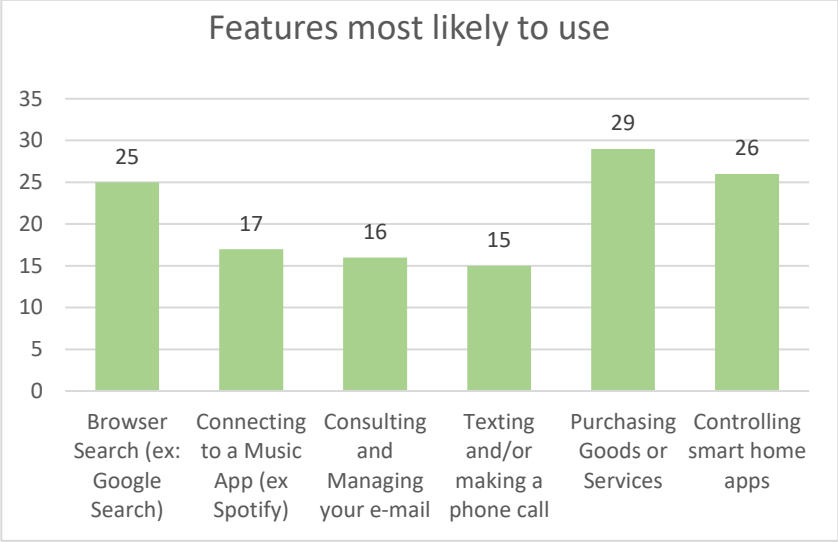

FIGURE 4 - VPA FEATURES MOST LIKELY TO ADOPT (FROM SPSS OUTPUT)

From figure 4, the feature most picked was "*Purchasing Goods or Services*" with 29 responses, followed by "*Controlling smart home apps*" with 26 and "*Browser Search*" with 25 responses. The remaining 3 features have almost equal weight with 17 responses for "*Connecting to a Music app*", 16 for "*Consulting and Managing your e-mail*" and 15 for "*Texting and/or making a phone call*"

4.2.3 - Item Questions Variables

In this section, a thorough look into the answers of the variable questions will be conducted, through a descriptive statistical analysis, starting with the AIVPA inquiries. After all variables are analysed, this investigation will move on to the hypothesis tests where a reliability analysis will be performed in order to confirm if the measurement instruments used are adequate for this study.

AIVPA Questions - Automation

The variable in question is divided into four subsections, representing the four unique benefits a Virtual Assistant offers. Starting with *"Automation"*, after being showed this benefit in action through images, participants were asked to rate their level of agreement with four statements using a 7-point Likert scale. In all questions, more than 50% of the responses are on the lower half of the scale. However, in the first two questions, the majority of responses indicate that the participants acknowledge the benefits brought by automation, nonetheless they do not deem it compatible with their shopping preferences in the last two questions. This is

also supported by the mean of responses that varies between 3,06 and 3,78 thus if automation were more compatible, the mean would assume higher values in the last two questions.

	Strongly Disagree	Somewhat Disagree	Disagree	Neither Agree or Disagree	Agree	Somewhat Agree	Strongly Agree
[You would spend extra effort on a purchase]	18,6%	**24,9%**	20,6%	16,2%	8,7%	8,3%	2,8%
[You would waste time making a purchase]	18,2%	**26,5%**	19,8%	15,4%	9,9%	7,5%	2,8%
[This type of purchase would be exactly what you were looking for]	10,7%	17,5%	**21,3%**	19,0%	16,6%	7,5%	7,5%
[This type of purchase would perfectly fit your needs]	9,5%	16,2%	18,2%	**22,5%**	16,2%	11,1%	6,3%

TABLE 4 - DISTRIBUTION OF RESPONSES (%) TO THE AUTOMATION SCALE (FROM SPSS OUTPUT)

AIVPA Questions – Personalization

Considering the second variable in the AIVPA measurements, also four statements were presented, after a series of images showing personalization benefits, where respondents could rate using a 7-point Likert scale. In general, the majority of respondents can recognize the personalization features a Virtual Assistant provides as the mean varies between 4,78 and 5,03.

	Strongly Disagree	Somewhat Disagree	Disagree	Neither Agree or Disagree	Agree	Somewhat Agree	Strongly Agree
[A Virtual Assistant has options for personalizing wish lists]	0,8%	7,5%	13,4%	17,8%	16,6%	**26,5%**	17,4%
[A Virtual Assistant has recognition of one's name]	5,1%	9,5%	9,9%	16,2%	15,4%	**24,9%**	19,0%
[A Virtual Assistant has personalized shopping features]	3,2%	4,3%	9,9%	16,2%	18,6%	**31,2%**	16,6%
[A Virtual Assistant has personalized product selection aids]	3,2%	4,7%	13,0%	13,8%	18,6%	**30,4%**	16,2%

TABLE 5 - DISTRIBUTION OF RESPONSES (%) TO PERSONALIZATION SCALE (FROM SPSS OUTPUT)

AIVPA Questions – Convenience

The convenience benefit followed the same process as the last two variables in terms of questioning, also applying a 7-point likert scale. This variable, from the four, has the highest mean values (4,88 to 5,29) which can indicate that the benefit brought by always and rapidly being available is compatible and appreciated by the participants. When having a deeper look

	Strongly Disagree	Somewhat Disagree	Disagree	Neither Agree or Disagree	Agree	Somewhat Agree	Strongly Agree
[A Virtual Assistant is available when I need it]	2,4%	5,5%	11,5%	12,6%	11,1%	22,9%	**34,0%**
[A Virtual Assistant is available through various ways]	2,0%	4,3%	11,1%	12,3%	15,8%	**28,9%**	25,7%
[The information received from a Virtual Assistant makes it easy to chose what to buy]	2,0%	7,9%	10,3%	16,2%	21,3%	**28,1%**	14,2%

TABLE 6 - DISTRIBUTION OF RESPONSES (%) TO CONVENIENCE SCALE (FROM SPSS OUTPUT)

through the distribution of responses this becomes evident as 64% of participants agree that the information received by this channel would facilitate their purchase process

AIVPA Questions – Interactivity

The last of the four variables followed, once more, the same process as the previous benefits here presented. The distribution of responses indicate that the participants agree that interacting with the VPA would be easy, quick and efficient from the output of information they would receive as more than 50% of the responses are located in the upper half of the Likert scale. This is also supported by the mode of the answers which was in 3 out of the 4 questions "6".

	Strongly Disagree	Somewhat Disagree	Disagree	Neither Agree or Disagree	Agree	Somewhat Agree	Strongly Agree
[This Virtual Assistant would allow me to communicate easily with the company if I ever had a specific question or wanted to	4,3%	9,1%	11,9%	14,2%	**23,7%**	22,1%	14,6%
[The Virtual Assistant would have the ability to respond to my specific requests for information so I could access it quickly and efficiently]	4,0%	6,3%	10,3%	14,2%	22,1%	**25,7%**	17,4%
[The Virtual Assistant would give me some control over the content I wanted to	5,9%	7,5%	11,1%	15,0%	23,3%	**25,3%**	11,9%
[The Virtual Assistant would make me feel like it wants to listen to its visitors]	5,1%	9,1%	14,2%	16,6%	17,8%	**24,9%**	12,3%

TABLE 7 - DISTRIBUTION OF RESPONSES (%) TO INTERACTIVITY SCALE (FROM SPSS OUTPUT)

Service Quality Questions

Moving on to the next dimension in the model, Service quality, this variable was measured through 8 questions representing the four items in the SERVQUAL model using a 7-point Likert scale.

From the responses present in table 8, the following conclusions can be made:

- The distribution of responses is located in the upper half of the scale which indicates participants, from their perception, agree that Virtual Assistants can provide good service quality;
- The SERVQUAL dimension respondents better rate is responsiveness where 31% to 32% agree that the Virtual Assistant is never too busy to respond to user requests and is always willing to help customers. Interestingly, it is also where there exists a bigger positive difference in rating comparing with the previous offline retailer experience (last column of table 8);
- When it comes to Assurance, in specific to confidence, the offline retailer has a better score than the Virtual Assistant even if small which can indicate security and privacy uncertainties respondents have that come with the technology;

- Additionally, in the Empathy dimension, with even a smaller difference, the previous offline experience has a better score when it comes to understanding a specific need. This can be linked with the fact that in an offline experience there is human interaction whereas the Virtual Assistant is a machine;
- For the remaining dimension, Reliability, participants seem to trust the information a VPA provides just as much as the Offline Retailer.

		Strongly Disagree	Somewhat Disagree	Disagree	Neither Agree or Disagree	Agree	Somewhat Agree	Strongly Agree	**Mean values**	**Mean values - offline retailer**	**Dif**
Reliability	A Virtual Assistant... [Provides accurate information]	1,6%	5,5%	12,3%	16,6%	24,9%	**30,0%**	9,1%	4,84	4,81	0,03
	A Virtual Assistant... [Keeps its promises]	2,8%	6,7%	11,9%	22,5%	**24,5%**	21,7%	9,9%	4,64	4,6	0,04
Responsiveness	A Virtual Assistant... [Is never too busy to respond to user requests]	3,2%	1,6%	8,3%	12,3%	12,3%	**31,2%**	**31,2%**	**5,47**	**3,76**	**1,71**
	A Virtual Assistant... [Is always willing to help customers]	3,2%	1,2%	10,3%	11,1%	10,7%	**32,4%**	31,2%	**5,47**	**4,16**	**1,31**
Assurance	A Virtual Assistant... [Instills confidence in customers]	5,1%	7,1%	11,9%	22,1%	**23,3%**	21,7%	8,7%	**4,51**	**4,72**	**-0,21**
	A Virtual Assistant... [Has the knowledge to do its job]	3,6%	6,3%	9,9%	16,6%	20,6%	**26,9%**	16,2%	4,9	4,87	0,03
Empathy	A Virtual Assistant... [Gives users individual attention]	4,7%	6,3%	10,7%	13,8%	16,2%	21,7%	**26,5%**	5,02	4,45	0,57
	A Virtual Assistant... [Understands the specific needs of users]	6,3%	9,5%	13,0%	17,4%	**21,3%**	20,2%	12,3%	**4,47**	**4,49**	**-0,02**

TABLE 8 - DISTRIBUTION OF RESPONSES (%) TO THE SERVICE QUALITY SCALE AND COMPARISON WITH THE OFFLINE EXPERIENCE (FROM SPSS OUTPUT)

Customer Satisfaction Questions

Regarding the Customer Satisfaction scale, participants were asked to compare the two experiences (VPA and offline) and rate 3 statements related to this construct.

Similar to the Service Quality construct, the majority of respondents acknowledge that in comparison with their offline retailer, the VPA experience would be better than their expectation which is a positive indicator for disconfirmation. Moreover, more than 70% of the participants would be satisfied with a VPA purchase experience which is also supported by the mode and median with the value of 5 in every question.

	Much Worse than expected	Somewhat worse than Expected	Worse than Expected	Neither better or worse than expected	Better than Expected	Somewhat better than expected	Much better than expected
Overall, the benefits you would receive by purchasing through a Virtual Assistant would be:	0%	0,79%	4,35%	20,16%	**37,94%**	27,67%	9,09%
	Very Dissatisfied	Somewhat dissatisfied	Dissatisfied	Neither Satisfied or Dissatisfied	Satisfied	Somewhat Satisfied	Very Satisfied
Considering everything, how satisfied would you be with the overall purchase experience?	0,40%	1,19%	1,98%	20,95%	35,18%	**30,83%**	9,49%
	Much Worse than Average	Somewhat Worse than Average	Worse than Average	Neither better or worse than Average	Better than Average	Somewhat Better than Average	Much Better than Average
Compared with your offline purchase experience, how would a purchase through a Virtual Assistant be?	0,40%	3,16%	8,30%	22,13%	**28,46%**	27,67%	9,88%

TABLE 9 - DISTRIBUTION OF RESPONSES (%) TO THE SATISFACTION SCALE (FROM SPSS OUTPUT)

Customer Loyalty Questions

Finally, the last construct evaluated was Customer Loyalty. To measure it, it was used 3 item questions the participant would rate using once more a 7-point Likert scale. The questions used demonstrated behaviour loyalty and attitudinal loyalty.

From table 10, it is possible to infer that the answers are favourable for the three questions, however for attitudinal loyalty the score is not as strong as for behaviour. There is the intention to purchase/repurchase using a VPA but not as much to recommend and even encourage which can be related to the fact that most of the participants never experienced this type of purchase.

	Strongly Disagree	Somewhat Disagree	Disagree	Neither Agree or Disagree	Agree	Somewhat Agree	Strongly Agree
I am inclined to purchase/repurchase through a Virtual Assistant	2,8%	4,7%	12,3%	17,8%	**27,3%**	21,3%	13,8%
I would recommend purchasing through a Virtual Assistant to others	1,2%	5,5%	11,1%	21,7%	**27,3%**	20,9%	12,3%

TABLE 10 - DISTRIBUTION OF RESPONSES (%) TO THE CUSTOMER LOYALTY SCALE (FROM SPSS OUTPUT)

4.3 – Hypothesis Testing

In this section, the investigation will focus on testing the Hypothesis previously formulated. To do so, a reliability test was conducted prior to the beginning of the hypothesis testing so as to guarantee the consistency of measurement over time (Drost, 2011).

Given this, the Cronbach's Alpha Coefficient was calculated for all item questions in table 2 and 3. The alpha values ranged from 0,638 and 0,941 as seen in table 11 which present as high values. The highest value belongs to the Service Quality and Customer Loyalty questions (0,941). From the output given, if we removed the item CL1 from the testing, Customer loyalty would improve to a 0,955 coefficient, however, as this is not a significant change for an already high score, all items were kept. Moreover, the following variables with the highest coefficient are Convenience (0,902), Customer Satisfaction (0,9), Interactivity (0,887) and Personalization (0,876). For this last construct, when removing AIVA 2.2, the coefficient would better to 0,887, nonetheless, as changes would be minimum, all items were again kept. The lowest value is linked to the "Automation" item questions (0,638), however, in none of the cases where we could remove one question the alpha value would improve, and so, items weren't changed.

Dimension	Cronbach's Alpha Coefficient	Items	Cronbach's Alpha if Item deleted
AIVA - Automation	0,638	AIVA 1.1	0,589
		AIVA 1.2	0,635
		AIVA 1.3	0,499
		AIVA 1.4	0,541
AIVA - Personalization	0,876	AIVA 2.1	0,851
		AIVA 2.2	0,887
		AIVA 2.3	0,805
		AIVA 2.4	0,823
AIVA - Convenience	0,902	AIVA 3.1	0,872
		AIVA 3.2	0,86
		AIVA 3.3	0,881
		AIVA 3.4	0,88
AIVA - Interactivity	0,887	AIVA 4.1	0,86
		AIVA 4.2	0,833
		AIVA 4.3	0,861
		AIVA 4.4	0,865
Service Quality	0,941	SQ 1	0,933
		SQ 2	0,936
		SQ 3	0,933
		SQ 4	0,932
		SQ 5	0,933
		SQ 6	0,927
		SQ 7	0,934
		SQ 8	0,934
Satisfaction	0,9	ST 1	0,841
		ST 2	0,856
		ST 3	0,875
Customer Loyalty	0,941	CL 1	0,955
		CL 2	0,844
		CL 3	0,901

TABLE 11 - CRONBACH'S APLHA COEFFICIENTS (FROM SPSS OUTPUT)

Now that all the constructs were deemed reliable, hypothesis testing was conducted in order to answer the research questions. In the survey conducted, the scale used in all item questions was the Likert Scale, in order to perform the necessary tests, the variables were transformed from ordinal to scale using their mean values. The mean was the chosen location variable as it was, in every case, easily interpreted representing a clear opinion and nor the median or the sum provided a better indicator.

As referred before, the first main purpose is to understand if a Virtual Personal Assistant as a sales channel, through its unique characteristics, can positively influence Customer Loyalty. Subsequently, it was seen that Customer Satisfaction and Service quality have in other research been a positive influencer for loyalty, so this investigation will also test if the four VPA benefits can positively influence the two Loyalty antecedents and if they too can impact loyalty in this scenario.

Therefore, starting with the loyalty antecedents – satisfaction and service quality – and their relationship with the AIVA variables (H3 and H4), the chosen method of evaluation was the Multiple Linear Regression. As stated, a VPA is characterized by four benefits:

Automation, Personalization, Convenience and Interactivity, as such, the Multiple Linear Regression Model will show if the characteristics are related and can explain the variance of the dependent variable.

AIVPA and Customer Satisfaction

The Multiple Linear Regression test was conducted on the AIVA variables and Customer Satisfaction and the model obtained was valid (ANOVA test with sig equal to 0,000, in appendix B.1). In other words, the dependent variable, Satisfaction, is explained at least by one of the independent variables.

When analysing in detail, even though the model is valid, not all variables are explanatory of the dependent variable. In this case, when looking to the sig from multiple regression model summary, it is seen that Automation (sig t-test = 0,344) and Personalization (sig t-test = 0,659) have sig values above 0,05 and should be removed from the model as they do not significantly influence satisfaction (table 12).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3,444	0,246		13,984	0,000		
	Automation	-0,052	0,055	-0,058	-0,948	**0,344**	0,812	1,232
	Personalization	-0,025	0,057	-0,034	-0,442	**0,659**	0,507	1,973
	Convenience	0,148	0,059	0,206	2,505	0,013	0,453	2,207
	Interactivity	0,256	0,055	0,365	4,642	0,000	0,498	2,009

a. Dependent Variable: Satisfaction

TABLE 12 - MULTIPLE LINEAR REGRESSION MODEL COEFFICIENTS - SATISFACTION

With this, a new multiple regression model was estimated without Automation and Personalization. In this new output, present in table 13, all of the variables have sig values lower than 5%, which means they all are useful to explain Customer Satisfaction.

In this new model in appendix B.2, the R^2 value is 0,233 which indicates that Convenience and Interactivity will explain 23,3% of Satisfaction's variance. Returning to the original hypothesis, from table 13, it is clear that all Beta values are positive which prove that Convenience and Interactivity positively influence satisfaction and can be translated into the following equation, in a standardized solution:

Satisfaction = 0,181***Convenience** + 0,342***Interactivity**

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3,314	0,220		15,081	0,000		
	Convenience	0,129	0,054	**0,181**	2,405	0,017	0,544	1,837
	Interactivity	0,240	0,053	**0,342**	4,560	0,000	0,544	1,837

a. Dependent Variable: Satisfaction

TABLE 13 - FINAL MULTIPLE LINEAR REGRESSION MODEL COEFFICIENTS - SATISFACTION

According to the equation, it is evident that interactivity is the variable that most impacts satisfaction with a Standardized $\beta = 0{,}342$ and so, the more interactivity is present in the VPA, the higher the satisfaction. As for Convenience, with a Standardized $\beta = 0{,}181$, when increasing a unit in Convenience it will affect Satisfaction in 0,181.

Finally, it is still necessary to verify if the model follows the assumptions needed to conduct multiple linear regressions (outputs present in appendix B.3). In this case, the residual terms aren't correlated with the independent variables, as the component is 0 as the mean as well. Also, the residuals are assumed to be independent as the Durbin- Watson value is 1,754 which is closed to 2. Regarding the independent variables, one can conclude there is low multicollinearity or low correlation between them as the TOL indicator is higher than 0,1 and the VIF is lower than 5.

AIVPA and Service Quality

For assessing the relationships between the AIVPA benefits and Service Quality, the same method was used and conducted – Multiple Linear Regression. For this dependent variable, the ANOVA test presented a sig value below 5% which suggest the model is valid and at least one of the independent variables will be useful to explain Service Quality (sig = 0,000).

Analysing the model summary, once more, not all variables are explanatory of the dependent one. In this model, Automation (sig t-test = 0,635) proved not significant to explain the variance in Service Quality (summary present in appendix C.1). The test was, then, conducted for the three relevant variables and the output can be shown in the table below.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0,653	0,203		3,214	0,001		
	Convenience	0,403	0,052	**0,427**	7,821	0,000	0,453	2,206
	Interactivity	0,325	0,048	**0,351**	6,769	0,000	0,502	1,990
	Personalization	0,137	0,048	**0,142**	2,851	0,005	0,542	1,844

a. Dependent Variable: Service_Quality

TABLE 14 -FINAL MULTIPLE LINEAR REGRESSION MODEL COEFFICIENTS - SERVICE QUALITY

The R^2 for this model, present in appendix C.2, is 0,664 meaning that Personalization, Convenience and Interactivity can explain 66,4% of the Service Quality's variance. Analysing the Standardized Beta values, one can conclude that all independent variables positive influence Service Quality as they are all positive. The variable which most positively influences is Convenience with a standardized $\beta = 0{,}427$ indicating that the more convenience is offered, the better the perception of quality of the service provided. The second highest standardized Beta value is for interactivity with $\beta = 0{,}351$ and lastly, personalization positively impacting in $\beta = 0{,}142$. The model and relationships can be summarized into the following equation:

Service Quality = 0,427***Convenience** + 0,351***Interactivity** + 0,142***Personalization**

Finally, the model assumptions went through verification. The assumptions that there is no correlation between the independent values is validated as the residual component is 0 and the distribution follows the normal distribution as observed in the histogram and scatterplot in the appendix C.3. Regarding the multicollinearity assumption, the TOL value is always >0,1 and the VIF is below 5 which indicates there is no correlation between the independent variables.

Satisfaction and Service Quality impacts on Customer Loyalty

Having tested the VPA assistant on the loyalty antecedents, this investigation will now test if Customer Satisfaction and Service Quality in this scenario also have a positive impact on Customer Loyalty (H1 and H2).

For this, two simple linear regressions were conducted where satisfaction and service quality acted as independent variables and Customer Loyalty as the dependent variable. The relationships can then be translated into the following regression equations, in a standardized solution (outputs from the simple regression models in appendix D and E):

Customer Loyalty = 0,839***Satisfaction**

Customer Loyalty = 0,422***Service Quality**

From their high Beta values, we can conclude that both positively influence Customer Loyalty. From the two, Satisfaction acts as both the best predictor (R^2 = 0,704) and the biggest influencer - $\beta = 0{,}839$ – increasing a unit in satisfaction will almost increase another unit in Customer Loyalty. Moreover, Satisfaction alone can explain 70% of Loyalty's variance which proves the model close to perfection.

In regard to Service quality, we can conclude that the higher this variable is, the higher loyalty can be, however, in oppose to satisfaction, the model fit is R^2 = 0,178 indicating that it is a valid model but not as explanatory as satisfaction was, accounting for 17,8% of Customer Loyalty's variance.

AIVPA and Customer Loyalty

The last test conducted, regarding Hypothesis 5, accounts for the relationship between the four characteristics of Virtual Personal Assistants and Customer Loyalty, which is, the main purpose of this research. For this, similarly to the Satisfaction as Service Quality tests, a Multiple Regression Model test was performed.

All of the assumptions were met, residuals are independent as the Durbin Watson value is 1,8 which is close to two and they follow the normal distribution with a 0 mean. Further results present in appendix F.1.

The model obtained was valid as the ANOVA (appendix F.2) test gave an output of sig=0,000, meaning that at least one of the variables will be helpful to explain the variance of Customer Loyalty. Even so, as shown in the table below, not all variables were deemed significant when analysing the results of the t-test and Automation (sig=0,746) and Personalization (0,177) weren't helpful in this model.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	2,958	0,347		8,527	0,000		
	Automation	-0,025	0,077	-0,021	-0,324	**0,746**	0,812	1,232
	Personalization	-0,109	0,080	-0,109	-1,352	**0,177**	0,507	1,973
	Convenience	0,175	0,083	0,181	2,109	0,036	0,453	2,207
	Interactivity	0,333	0,078	0,350	4,285	0,000	0,498	2,009

a. Dependent Variable: CLoyalty

TABLE 15 - MULTIPLE LINEAR REGRESSION MODEL COEFFICIENTS – CUSTOMER LOYALTY

Referring to Convenience shown in table 15, we can conclude that the Beta values are positive, and so, convenience has a positive influence on Customer Loyalty. Nonetheless, the best predictor is interactivity with a standardized solution of $\beta = 0{,}350$, indicating that an increase in Interactivity will positively influence Loyalty in 0,350. As for the model fit, the R^2= 0,177 (appendix F.3) meaning that this model only explains 17,7% of Loyalty's total variance.

Summarizing this section, the following table presents the results of the hypothesis section:

	H1	H2	H3				H4				H5			
			H3.1	H3.2	H3.3	H3.4	H4.1	H4.2	H4.3	H4.4	H5.1	H5.2	H5.3	H5.4
Result	Valid	Valid	Reject	Reject	Valid	Valid	Reject	Valid	Valid	Valid	Reject	Reject	Valid	Valid

TABLE 16 - SUMMARY RESULTS FOR EACH HYPOTHESIS TESTING

4.4 – Further Analysis and Sample Cluster Characterization

Talked about in the literature, in countries where all VPA features are available, adoption for this technology is concentrated in ages below 30 (Kinsella, B., 2019). Moreover, in most past similar research, previous experiences were used to measure the different constructs and loyalty (Geffen et al., 2002; Wallace et al., 2004).

Hence, in order to better analyse the results obtained by this hypothesis, this investigation will now understand if there are differences in the answers of the different age groups and the ones who had past purchase experience with the VPA for the behavioural loyalty construct as it is the most agreed upon concept for loyalty.

For this, an ANOVA test for equality of means was conducted for the both independent variables. Regarding age group, assumptions were firstly verified:

- Leven test (sig = 0,109) where we did not reject H0 indicating the variances are equal;
- N>30, so according to the Central Limit Theorem, normality can be assumed;
- Samples are independent.

ANOVA

I am inclined to purchase/repurchase through a Virtual Assistant

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,290	5,000	0,458	0,198	**0,963**
Within Groups	571,979	247	2,316		
Total	574,269	252			

TABLE 17 - ANOVA TEST BETWEEN AGE GROUPS AND BEHAVIORAL LOYALTY

Table 17 clearly shows that there are no significant differences between the mean of answers (sig=0,963 > 0,05) as we do not reject H0: the mean of answers for all age groups is equal. This result is also supported by the descriptive output present in the appendix G.

In regard to previous experience, the same test was conducted. Assumptions were also verified and present in appendix H. According to table 18, there are significant differences between the two means as sig < 0,05 and we can reject H0. In order to find out where, as there are only two means, the descriptive statistics will be analysed.

ANOVA

I am inclined to purchase/repurchase through a Virtual Assistant

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17,213	1,000	17,213	7,756	**0,006**
Within Groups	557,056	251	2,219		
Total	574,269	252			

TABLE 18 - ANOVA TEST BETWEEN PREVIOUS EXPERIENCE AND BEHAVIORAL LOYALTY

Descriptives

I am inclined to purchase/repurchase through a Virtual Assistant

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
No	202	4,68	1,532	0,108	4,47	4,90	1	7
Yes	51	**5,33**	1,306	0,183	4,97	5,70	3	7
Total	253	4,81	1,510	0,095	4,63	5,00	1	7

TABLE 19 - DESCRIPTIVE ANALYSIS OF THE ANOVA TEST BETWEEN PREVIOUS EXPERIENCE AND BEHAVIORAL LOYALTY

From table 19, it is clear that for the participants who had already purchased through a virtual Assistant expressed higher levels of behavioural loyalty indicating that if this test was conducted based on previous experiences, results could differ from the ones obtained.

Being a new technology where adoption while promising is uncertain, it becomes relevant to know who the future client will be and how he can be characterized so as to better target him in the future. This line of thinking was the basis of the second main objective of this dissertation: to provide more information about the future buyer.

To do so, a Cluster analysis was conducted on the survey output. For this analysis, only respondents who have been in contact with a personal assistant were chosen as usage habits are only available for these participants and they account for the majority of responses (76% of the sample). The method used was a non-hierarchical clustering – K-means – as it aims to minimize total variance intra-clusters optimizing the output (Arai & Barakbah, 2007).

Nonetheless, this method does depend on an initial "K" of clusters, and so, a hierarchical clustering technique through the Ward method was performed. The variables introduced for the clusters were the hypothesis item questions, the demographic and technology adoption queries will afterwards be accounted if association with the cluster is high.

From the dendrogram present in appendix I, two possible solutions were presented, 3 clusters or 4 clusters. In order to select the final solution, a frequencies table was conducted, and with a better adequacy and sample representation, a 3-cluster solution was chosen.

Ward Method

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	69	35,8	35,8	35,8
	2	87	45,1	45,1	80,8
	3	37	19,2	19,2	100,0
	Total	193	100,0	100,0	

TABLE 21 - WARD METHOD OUTPUT OF A 3 CLUSTER SOLUTION

Ward Method

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	69	35,8	35,8	35,8
	2	87	45,1	45,1	80,8
	3	24	12,4	12,4	93,3
	4	13	6,7	6,7	100,0
	Total	193	100,0	100,0	

TABLE 20 - WARD METHOD OUTPUT OF A 4 CLUSTER SOLUTION

With a final solution of clusters, the K-means clustering technique can now be applied. From the output present below, a final Cluster Centre solution can be analysed (table 22) and clusters characterized, however, for one to know which characteristics are best to profile, one must conduct an ANOVA test where characteristics are more relevant the higher the F value is.

Final Cluster Centers

	Cluster		
	1	2	3
Automation	3,15	2,11	3,70
Personalization	4,338	2,580	5,647
Convenience	4,17	3,23	5,83
Interactivity	3,610	2,716	5,333
Service_Quality	3,82	3,28	5,60
Satisfaction	3,94	5,58	5,42
Customer_Loyalty	3,09	5,53	5,21

TABLE 22 - FINAL CLUSTER CENTER FOR 3 CLUSTER SOLUTION

ANOVA

	Cluster		Error			
	Mean Square	df	Mean Square	df	F	Sig.
Automation	25,098	2	1,167	190	21,515	0,000
Personalization	100,030	2	0,892	190	**112,154**	0,000
Convenience	93,340	2	1,008	190	**92,575**	0,000
Interactivity	97,124	2	1,109	190	87,614	0,000
Service_Quality	88,670	2	0,847	190	**104,699**	0,000
Satisfaction	46,177	2	0,554	190	83,310	0,000
Customer_Loyalty	95,593	2	0,960	190	**99,608**	0,000

The F tests should be used only for descriptive purposes because the clusters have been chosen

TABLE 23 - ANOVA TEST FOR VARIABLE ASSOCIATION WITH THE CLUSTERS

Before profiling each cluster, a Crosstabulation between the demographic and technology adoption questions was conducted in order to choose the variables with most association with the clusters and provide a richer profile. For scale questions, Eta measurement was used and for the nominal variables, Cramer's V measure was analysed (descriptive output present in appendix J).

	Cramer's V	Eta	Result
Age	0,264	-	**Valid**
Gender	0,01	-	Reject
Nationality	0,05	-	Reject
Education level	0,211	-	**Valid**
Retail area distance	0,172	-	Reject
Employment area	0,329	-	**Valid**
Hierarchical level	0,172	-	Reject
Monthly Internet shopping	-	0,196	**Valid**
Purchase through VPA	-	0,135	**Valid**
Currrent use for Google Search	-	0,055	Reject
Current use for Music App	-	0,132	**Valid**
Current use for e-mail	-	0,074	Reject
Current use for calls/texts	-	0,012	Reject
Current use for smart home	-	0,101	**Valid**

TABLE 24 - ASSOCIATION MEASUREMENT WITH CLUSTERS (FROM SPSS OUTPUT)

Given this, we can now conduct cluster profiling:

1. **Cluster 1 – "The traditional basic user"**

   The traditional basic users are mostly aged 40 years old (60%) or more and have a high education level as 53% of participants have a master's degree. 33% come from a management background and 21% come from a military employment. Consumers from cluster one purchase 1 to 2 times per month (82%), have never purchased though a VPA but 39% have used it for connecting to a music app.

   From their perception of a Virtual Assistant, cluster one acknowledges the personalization and convenience benefits but are indifferent to the service quality it provides and do not show high levels of loyalty.

2. **Cluster 2 – "The open to explore user"**

   50% of the respondents from cluster two have at least 50 years old whereas the other 50% equally represents other ages. In this cluster, 40% have achieved the bachelor's degree and the other 60% represents high school diploma or a master's degree. They mostly work or in an IT and Engineering job (27%) or a Military employment (27%). 77% of customers from cluster two currently purchase at least once per month and 23% purchase 3 or more. 50% have already purchased through a VPA but mostly don't use it for music apps or smart home controls.

   From their perception, they do not see benefits in Personalization features and are indifferent to Convenience and Service Quality however they do seem interested in purchasing/repurchasing through the Virtual, showing high levels of loyalty.

3. **Cluster 3 – "The heavy user"**

   Customers from cluster 3 are mostly young as 53% are below 30 years old. They have high education levels with 51% with a bachelor's degree, 32% with a master's and 10% with a doctorate degree and currently work in the Management area (34%), in the Military (23%) and in an Education or Cultural area (16%). Cluster 3 purchases generally once per month but 30% already purchase three or more times. Only 30% have purchased through a VPA but 53% already uses it for music apps interactions and 30% uses it for smart home controlling.

   From their perception, they perceive benefits from the personalization and convenience and they do believe VPA will provide a quality service also exhibiting high levels of loyalty.

5 – Conclusion and Implications

5.1 – Results Discussion and Conclusion

Projections and Statistics show us that Virtual Personal Assistants are, with no doubt, growing every day and conquering the countries they are launched in. The US adoption case is the most popular, nonetheless, countries closer to home in terms of both location and culture are, too, a good predictor for a Portuguese adoption and success. In Italy, 35% of users already purchase through VPA for clothing and technology items and 31% use it for wholefood items (Statista, 2020).

Predicting which store the customer is more likely to return to is becoming imperative in modern retail (Dixon et al., 2005), as such, testing different sales channels for loyalty purposes is a common topic widely discussed in literature (Geffen et al., 2002; Wallace et al., 2004; Carpenter & Fairhurst, 2005) Despite that, even with an increasing importance and usage rates as a sales channel, there is still no evidence on the impact a VPA purchase can bring.

With all of this in mind, this research proposed a framework to test if the VPA could positively impact Customer Loyalty and further studied the respondents profile wanting to provide more information on how a Portuguese customer behaves and what he values. The answers and findings from these tests will now be discussed and reflected on.

As a prior note, since there was no experimentation and the sales channel was evaluated through its four unique benefits, it is only when the four sub-hypotheses are proven that one can conclude that the general hypothesis is valid.

Regarding the proposed framework, it can be divided into two main sections:

- Satisfaction and Service quality tests on Customer Loyalty;
- AIVPA tests on Satisfaction, Service Quality and Customer Loyalty;

The first section aimed to study the impact on the loyalty antecedents – satisfaction and service quality – on Customer Loyalty (H1 and H2). Both constructs were expected to become validated from the extensive previous literature on the matter. For satisfaction, the relationship with loyalty was early discovered and widely accepted, existing today, numerous examples that this construct is one of the most important predictors of Loyalty (Oliver, 1999; Dixon et al., 2005). Similarly, Service Quality, as a key success factor and differentiator for any company

that offers a service (Wong & Sohal, 2003) has also been proved as a predictor for Loyalty as showed in literature (Gwinner et al., 2003).

From the separate simple linear regressions preformed, the hypothesis were validated, meaning that both constructs were found as positive influencers of Customer loyalty and important variables the VPA should tackle. Satisfaction proved as the strongest predictor with a 70% model fit and a high positive Beta-value proving a very strong linear relationship ($\beta = 0{,}839$). Service Quality even with a lower level of model fit (R^2=18%), can still prove as important in achieving loyalty ($\beta = 0{,}422$).

The second section of the framework studied if the Virtual Assistant could positively impact the loyalty antecedents – satisfaction and service quality (H3 and H4) – and lastly Customer Loyalty (H5). In general, from the multiple linear regression models preformed, in all three cases, one can't conclude that the VPA has a positively influence on them for not all sub-hypothesis were validated. For Satisfaction and Customer Loyalty, the constructs deemed not significant to explain the dependent variables (sig higher than 5%) were Automation and Personalization whereas for Service Quality, only Automation was excluded.

Through the descriptive statistics, Automation is seen, for most of the inquired as beneficial but not as a fit for their type of purchase (Table 4). This can be linked with a cultural issue as Portugal is one of Europe's countries with the lowest online shopping penetration rate (45% vs 72% UE average) and highest offline commercial area offer (0,27m2 per habitant vs. 0,19m2 UE average) (Teixeira, A., 2020), suggesting demand in the country is still concentrated in the offline channels and that the population is still not prepared for automatic shopping.

In regard to personalization, the results obtained were not expected as only in the Service Quality test (H4.4), Personalization was found influential. In the descriptive analysis (table 5), most of the inquired see the variable as beneficial and previous literature provides findings linking personalization with purchase intention or service satisfaction (Ball et al., 2006; Lee and Park, 2009) supporting the validation of the hypothesis 4.4. Nonetheless, according to Lee and Park (2009), the attitude towards personalization can be affected by one's trust in the service provider. As shown in literature, one of the biggest barriers in Portugal for online shopping concerns Privacy and Security issues (Teixeira, 2020). This finding is also supported by this thesis' questionnaire where 30% of the respondents who did not have an interest in using a Virtual Assistant claimed privacy issues hence the biggest challenges for e-commerce

today can be used as benchmarks for Virtual Assistants and could have influenced the attitude towards Personalization.

Concerning Convenience, this construct was in the three multiple linear regression models and found significant and positively influential for the dependent variable (H3.3, H4.4 and H5.5). These results are in line with previous research which has already proven that the higher the convenience offered in the decision-making process and the purchase itself will lead to higher levels of satisfaction, service quality and loyalty (Seiders et al., 2007; Roy et al., 2018). In specific, for the Service quality test, Convenience presented the highest Beta value (β=7) and interestingly, in the descriptive statistics of Service Quality (table 8), the biggest positive difference between the offline retailer and the VPA was in the responsiveness construct which accounted for the service convenience. This is also supported by a study of PwC in 2020, where it is shown that one of the Critical Success Factors for success in e-commerce in Portugal is higher convenience in both product availability and ease of process (PwC, 2020).

For the last construct, Interactivity, in addition to be found statistically significant in the Multiple Linear Regression tests, it also presents high positive Beta levels for all three constructs (β satisfaction=4,5; β service quality=6,7; β loyalty=4,3). Previous research concerning this construct supports this finding presenting that interacting with the customer in certain touchpoints and providing a more human experience leads to higher Customer Satisfaction (Ballantine, 2005; Yoo et al., 2010). Moreover, the answers for Interactivity questions had one of the highest scores with a mode of 6, suggesting that respondents find this characteristic extremely beneficial which can also be linked with cultural issues as Portuguese consumers prefer an offline experience where this variable is the most present but not as much available in a website customer journey.

Finally, in order to fulfil the second research objective, a Cluster Analysis was conducted so as to profile the respondents and provide clear targets based on their preferences and habits. The results provided by the three clusters and the descriptive analysis conducted on the responses are consistent with the current usage of VPA worldwide. According to Statista (2018), the two main uses for the technology is “web search” and “playing music” which are in line with the results from figure 3. This indicates that the country is following a similar evolution as other countries where the technology is highly utilized. Regarding age, results from the ANOVA test for behavioural loyalty didn’t find differences between the answers of the various age groups (table 17) which differ from previous studies that show that adoption is

mostly located within younger ages (Kinsella, B., 2019). In spite of that, the Cluster analysis presented one of the clusters – "The heavy user" – where the majority of respondents is below 30 years old and present higher levels of loyalty whereas cluster 1 – "the basic user" – which holds the majority of respondents older than 40 years old and low levels of loyalty which is more consistent with the adoption behaviour of other countries. In other words, although not evident from the test of equality of means, age does influence the probability of usage and acceptance.

The three clusters showcased follow an increasing line of adoption, Cluster two – "the open two explore" – and Cluster three account for 64% of the of the sample and are open to use and adopt which is a strong predictor for the technology in the country.

In conclusion, although not being able to fully answer the first research question and prove the VPA positively impacts the various constructs, the empirical findings and the literature review contributed with various implications on the matter.

Firstly, this study reinforces once more the loyalty antecedents variables as extremely important and demonstrates that in a country under developed for the online experience (low penetration rates), a new channel with non-visual but interactive features can provide a better perceived service quality (table 8) in comparison with the offline option suggesting a market opportunity for the technology.

Secondly, it provides a different scope of study. As stated earlier, most of the research focuses on the offline channel (physical stores) (Wallace et al., 2004), the online channel (websites) (Geffen, 2002; Yen & Gwinner, 2003), on only one loyalty antecedent (Wong & Sohal, 2003) or in different industries (Carpenter & Fairhurst, 2005). For that, this dissertation offers an approach on what a new channel can impact important variables such as loyalty and its antecedents as well.

Thirdly, although not proving most of the hypothesis, this study provides information on how the Portuguese customer behaves when faced with new attributes widely present in online channels, such as, customer personalization. This construct is highly supported as beneficial for the dependent variables in previous research but discarded in the tests conducted providing a relevant addiction to the existing literature.

Finally, this dissertation also provides through distinct targets, different characteristics, needs and behaviour. To think globally and act locally means understanding local preferences

and cultural differences for better integration and results. Although this phrase was firstly used for environmental purposes, it has been the basis for companies who look to internationalize (Amey, J., 2010) and should also been considered in this topic.

5.2 – Theoretical and Managerial Implications

The outputs presented from this study provided some contributions already discussed, nevertheless, these findings must be reflected on so as to understand their implications for both theory and managers today. As mentioned in the beginning of literature, one must always be aware of what new tendencies are changing the scenery to adequately prepare and evolve (Grewal et al., 2016).

Firstly, this study contributes to the existing literature by providing information on a new sales channel as well as its implications on critical performance indicators like loyalty or satisfaction. Moreover, it reinforces the usage of the methodology present in other literature showing that perception provides a good indicator but not as exact as past experience.

Additionally, this study focused on the unique benefits a VPA offers. These constructs have individually been studied in previous research (Ballantine, 2005; Lee & Park, 2009), nonetheless, the present study contributed with both different results (Personalization) and with an addition to literature as for Automatic Shopping, there is no previous study on the topic.

Regarding specifically Automation, even if it is still not perceived as valuable for the respondents, it is a characteristic present in new channels as mentioned in literature, such as, smart domestic appliances (ex: smart refrigerators) and so a better preparation of the mass market is needed and suggested for a better integration and results.

Moreover, in spite of not linking a VPA store experience to higher levels of loyalty, it was still seen that some of it's unique attributes have strong links with the variables studied. The findings for Convenience and Interactivity proved as a clear competitive advantage and brands and retailers must take that into account when designing their VPA store and features.

Finally, although there was no direct link proven, through the cluster analysis, it was shown that this worldwide tendency has an opportunity in the Portuguese market who is either open to explore and experiment or actually eager to use. Nonetheless, as seen, VPA will face some barriers e-commerce faces today that mainly come from lack of investment in online technology (Teixeira, 2020) and companies must learn from those findings and counter them for better results.

5.3 – Limitations and Further Research

This dissertation, as any investigation, faced some limitations that should be addressed for a better understanding of the results and even for future research on the matter.

The biggest limitation met was conducting this test on a country where experimentation wasn't possible basing all of the results on customer perception. From the ANOVA test preformed to explore if previous usage had an influence on behavioural loyalty (table 18), the results show that respondents who had already purchased through a Virtual Assistant had higher loyalty scores which is consistent with the methodology followed by literature where previous experience was always used (Geffen et al., 2002, Wallace et al., 2004). It would be interesting to conduct the same test after the technology is available and reflect on the reality versus the predictions here showcased.

In addition to this, although the sample was homogenous in terms of age, there was a big weight of respondents who in other countries are from a group more reluctant to adopt (Kinsella, 2019). Even though the ANOVA test does not support that results would differ if the age representation was different, the cluster analysis afterwards conducted, shows there is a higher interest in a younger age-group. With this, conducting this test on a younger sample today will also be relevant as the youth today is the adults of tomorrow and that could provide a better understanding of the evolution of the technology.

Lastly, from the results, analysis and market information, privacy and security issues are one of the biggest challenges e-commerce faces in Portugal and could have influenced the results attained. Therefore, further researchers could also study the impact on customer trust which is also one of the proven loyalty antecedents (Dixon et al., 2015) and understand its relationship with the technology.

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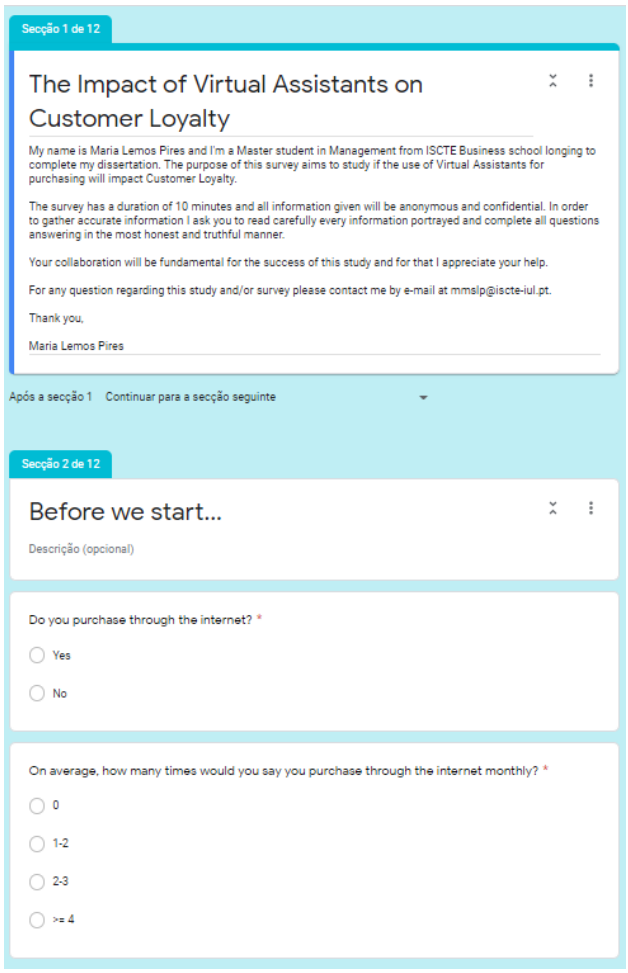
7 – Appendix

7.1 – Appendix A: Questionnaire



Secção 1 de 12

The Impact of Virtual Assistants on Customer Loyalty

My name is Maria Lemos Pires and I'm a Master student in Management from ISCTE Business school longing to complete my dissertation. The purpose of this survey aims to study if the use of Virtual Assistants for purchasing will impact Customer Loyalty.

The survey has a duration of 10 minutes and all information given will be anonymous and confidential. In order to gather accurate information I ask you to read carefully every information portrayed and complete all questions answering in the most honest and truthful manner.

Your collaboration will be fundamental for the success of this study and for that I appreciate your help.

For any question regarding this study and/or survey please contact me by e-mail at mmslp@iscte-iul.pt.

Thank you,

Maria Lemos Pires

Após a secção 1 Continuar para a secção seguinte

Secção 2 de 12

Before we start...

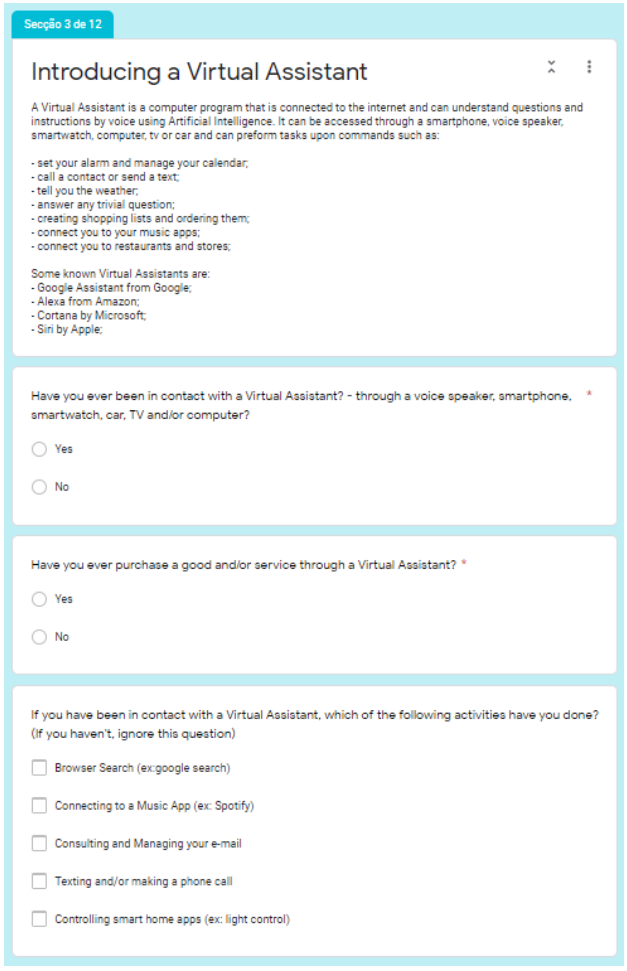
Descrição (opcional)

Do you purchase through the internet? *

- Yes
- No

On average, how many times would you say you purchase through the internet monthly? *

- 0
- 1-2
- 2-3
- >= 4



Secção 3 de 12

Introducing a Virtual Assistant

A Virtual Assistant is a computer program that is connected to the internet and can understand questions and instructions by voice using Artificial Intelligence. It can be accessed through a smartphone, voice speaker, smartwatch, computer, tv or car and can preform tasks upon commands such as:

- set your alarm and manage your calendar;
- call a contact or send a text;
- tell you the weather;
- answer any trivial question;
- creating shopping lists and ordering them;
- connect you to your music apps;
- connect you to restaurants and stores;

Some known Virtual Assistants are:
- Google Assistant from Google;
- Alexa from Amazon;
- Cortana by Microsoft;
- Siri by Apple;

Have you ever been in contact with a Virtual Assistant? - through a voice speaker, smartphone, smartwatch, car, TV and/or computer? *

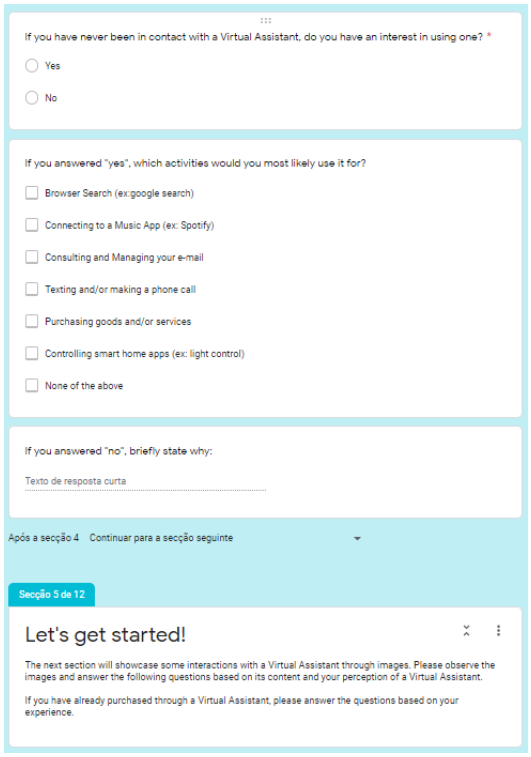
- Yes
- No

Have you ever purchase a good and/or service through a Virtual Assistant? *

- Yes
- No

If you have been in contact with a Virtual Assistant, which of the following activities have you done? (If you haven't, ignore this question)

- Browser Search (ex:google search)
- Connecting to a Music App (ex: Spotify)
- Consulting and Managing your e-mail
- Texting and/or making a phone call
- Controlling smart home apps (ex: light control)



If you have never been in contact with a Virtual Assistant, do you have an interest in using one? *

- Yes
- No

If you answered "yes", which activities would you most likely use it for?

- Browser Search (ex:google search)
- Connecting to a Music App (ex: Spotify)
- Consulting and Managing your e-mail
- Texting and/or making a phone call
- Purchasing goods and/or services
- Controlling smart home apps (ex: light control)
- None of the above

If you answered "no", briefly state why:

Texto de resposta curta

Após a secção 4 Continuar para a secção seguinte

Secção 5 de 12

Let's get started!

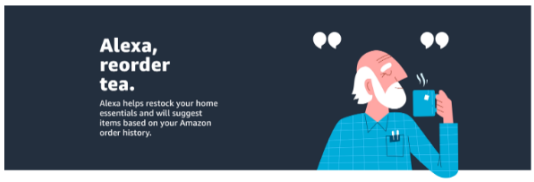
The next section will showcase some interactions with a Virtual Assistant through images. Please observe the images and answer the following questions based on its content and your perception of a Virtual Assistant.

If you have already purchased through a Virtual Assistant, please answer the questions based on your experience.

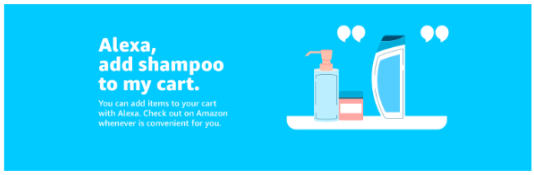
Please observe the images below and based on its content and your perception of purchasing through Virtual Assistant, answer the following questions

If you have already purchased through a Virtual Assistant, please answer the questions based on your experience.

source: amazon.com



source: amazon.com



Please rate your level of agreeance with the following statements, considering the images showed and your perception of purchasing through a Virtual Assistant being 1- Strongly Disagree and 7- Strongly Agree *

	1	2	3	4	5	6	7
You would spend extra effort on a purchase	○	○	○	○	○	○	○
You would waste time making a purchase	○	○	○	○	○	○	○
This type of purchase would be exactly what you were looking for	○	○	○	○	○	○	○
This type of purchase would perfectly fit your needs	○	○	○	○	○	○	○

Please observe the images below and based on its content and your perception of purchasing through Virtual Assistant, answer the following questions

If you have already purchased through a Virtual Assistant, please answer the questions based on your experience.

source: http://www.businessfranchiseaustralia.com.au/latest-news/"hey-google-ask-domino's-my-last-saved-order"

source: amazon.com

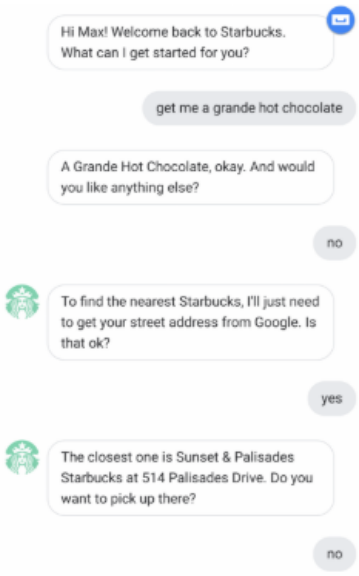
Please rate your level of agreeance with the following statements, considering the images showed and your perception of purchasing through a Virtual Assistant being 1- Strongly Disagree and 7- Strongly Agree *

	1	2	3	4	5	6	7
A Virtual Assistant has options for personalizing wish lists	○	○	○	○	○	○	○
A Virtual Assistant has recognition of one's name	○	○	○	○	○	○	○
A Virtual Assistant has personalized shopping features	○	○	○	○	○	○	○
A Virtual Assistant has personalized product selection aids	○	○	○	○	○	○	○

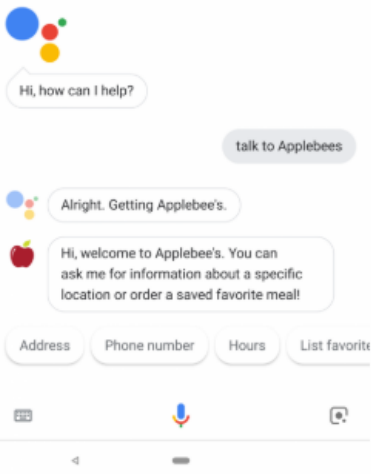
Please observe the images below and based on its content and your perception of purchasing through Virtual Assistant, answer the following questions

If you have already purchased through a Virtual Assistant, please answer the questions based on your experience.

source: https://venturebeat.com/2017/11/28/ebay-now-lets-you-start-shopping-with-google-assistant-smart-speaker-and-finish-on-your-phone/



source: https://venturebeat.com/2017/11/28/ebay-now-lets-you-start-shopping-with-google-assistant-smart-speaker-and-finish-on-your-phone/



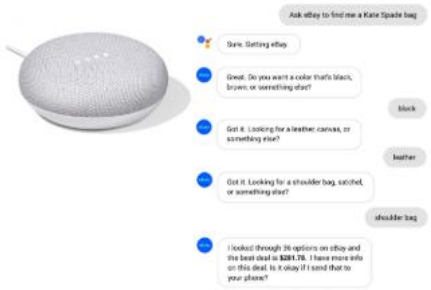
Please rate your level of agreeance with the following statements, considering the images showed and your perception of purchasing through a Virtual Assistant being 1- Strongly Disagree and 7- Strongly Agree *

	1	2	3	4	5	6	7
A Virtual Assistant is available when I need it	○	○	○	○	○	○	○
A Virtual Assistant is available through various ways	○	○	○	○	○	○	○
The information received from a Virtual Assistant makes it easy to chose what to buy	○	○	○	○	○	○	○
I would be able to complete my purchase quickly	○	○	○	○	○	○	○

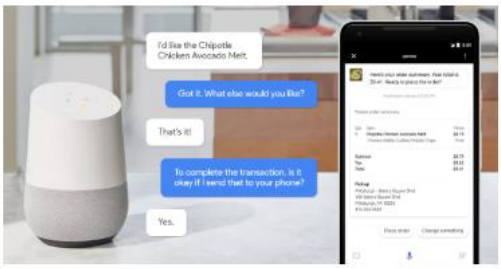
Please observe the images below and based on its content and your perception of purchasing through Virtual Assistant, answer the following questions

If you have already purchased through a Virtual Assistant, please answer the questions based on your experience.

source: https://venturebeat.com/2017/11/28/ebay-now-lets-you-start-shopping-with-google-assistant-smart-speaker-and-finish-on-your-phone/



source: http://www.appsdoandroid.com/2017/11/google-assistant-ja-suporta-apps-em.html



Please rate your level of agreeance with the following statements, considering the images showed and your perception of purchasing through a Virtual Assistant being 1- Strongly Disagree and 7- Strongly Agree *

	1	2	3	4	5	6	7
This Virtual Assistant would allow me to communicate easily with the company if I ever had a specific question or wanted to purchase a product	○	○	○	○	○	○	○
The Virtual Assistant would have the ability to respond to my specific requests for information so I could access it quickly and efficiently	○	○	○	○	○	○	○
The Virtual Assistant would give me some control over the content I wanted to see	○	○	○	○	○	○	○
The Virtual Assistant would make me feel like it wants to listen to its visitors	○	○	○	○	○	○	○

Now that we've showcased some Virtual Assistant purchase characteristics, please rate the following statements based on your perception until now.

If you have already purchased through a Virtual Assistant, please answer the questions based on your experience.

1 - Strongly Disagree
7 - Strongly Agree

A Virtual Assistant... *

	1	2	3	4	5	6	7
Provides accurate information	○	○	○	○	○	○	○
Keeps its promises	○	○	○	○	○	○	○
Is never too busy to respond to user requests	○	○	○	○	○	○	○
Is always willing to help customers	○	○	○	○	○	○	○
Instills confidence in customers	○	○	○	○	○	○	○
Has the knowledge to do its job	○	○	○	○	○	○	○
Gives users individual attention	○	○	○	○	○	○	○
Understands the specific needs of users	○	○	○	○	○	○	○

Now please recall the last purchase you have made through a physical store of a retailer of your choice and answer the following questions.

1 - Strongly Disagree
7 - Strongly Agree

The Retailer... *

	1	2	3	4	5	6	7
Provides accurate information	○	○	○	○	○	○	○
Keeps its promises	○	○	○	○	○	○	○
Is never too busy to respond to user requests	○	○	○	○	○	○	○
Is always willing to help customers	○	○	○	○	○	○	○
Instills confidence in customers	○	○	○	○	○	○	○
Has the knowledge to do its job	○	○	○	○	○	○	○
Gives users individual attention	○	○	○	○	○	○	○
Understands the specific needs of users	○	○	○	○	○	○	○

Reflecting on the information here presented, your perception of a Virtual Assistant and your current experiences, please answer the following questions

Overall, the benefits you would receive by purchasing through a Virtual Assistant would be: *

	1	2	3	4	5	6	7	
Much worse than expected	○	○	○	○	○	○	○	Much better than expected

Considering everything, how satisfied would you be with the overall purchase experience? *

	1	2	3	4	5	6	7	
Very Dissatisfied	○	○	○	○	○	○	○	Very Satisfied

Compared with your offline purchase experience, how would a purchase through a Virtual Assistant be? *

	1	2	3	4	5	6	7	
Much worse than average	○	○	○	○	○	○	○	Much better than average

I am inclined to purchase/repurchase through a Virtual Assistant *

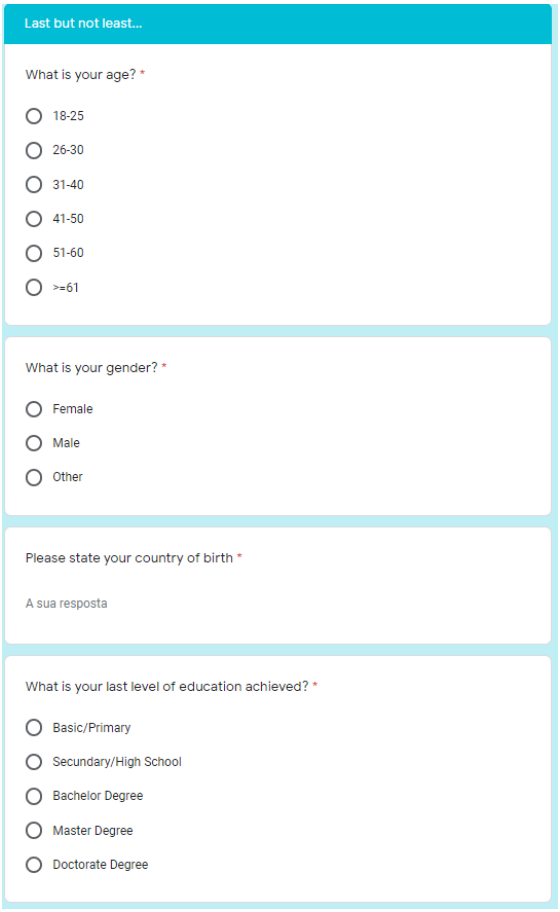
	1	2	3	4	5	6	7	
Strongly Disagree	○	○	○	○	○	○	○	Strongly Agree

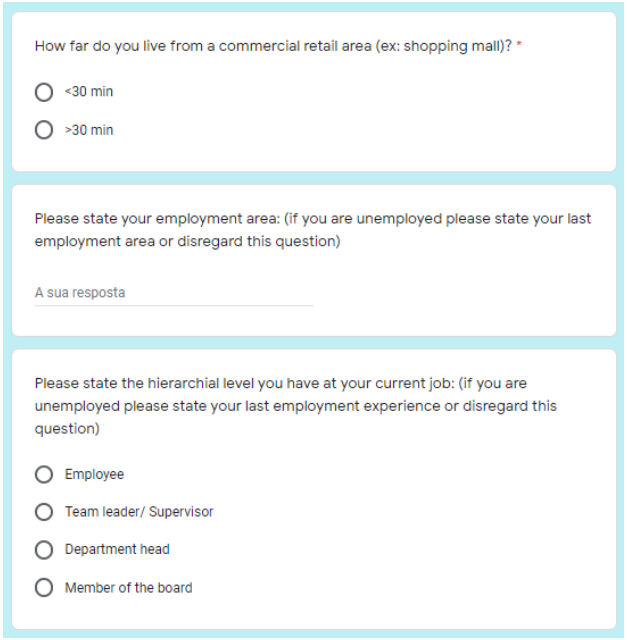
I would recommend purchasing through a Virtual Assistant to others *

	1	2	3	4	5	6	7	
Strongly Disagree	○	○	○	○	○	○	○	Strongly Agree

I would encourage purchasing through a Virtual Assistant to others *

	1	2	3	4	5	6	7	
Strongly Disagree	○	○	○	○	○	○	○	Strongly Agree





7.2 – Appendix B: Multiple Linear Regression test on AIVPA and Satisfaction

Appendix B.1: Validity of the model: ANOVA test.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	62,455	4	15,614	19,308	,000[b]
	Residual	200,553	248	,809		
	Total	263,007	252			

a. Dependent Variable: Satisfaction

b. Predictors: (Constant), Interactivity, Automation, Personalization, Convenience

Appendix B.2: Multiple Linear Regression Model Summary (Final solution)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,483[a]	,233	,227	,89819	1,754

a. Predictors: (Constant), Interactivity, Convenience

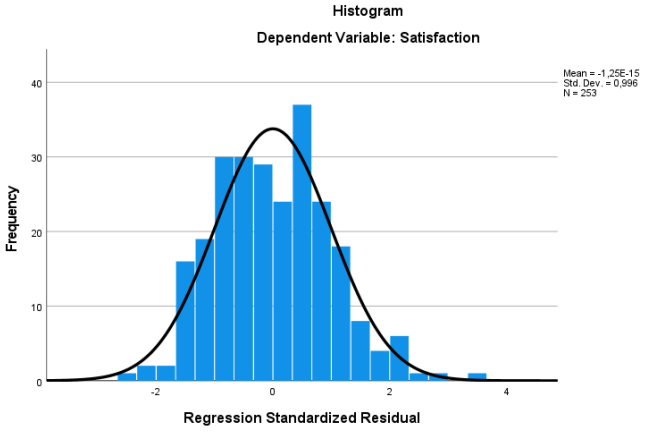
b. Dependent Variable: Satisfaction

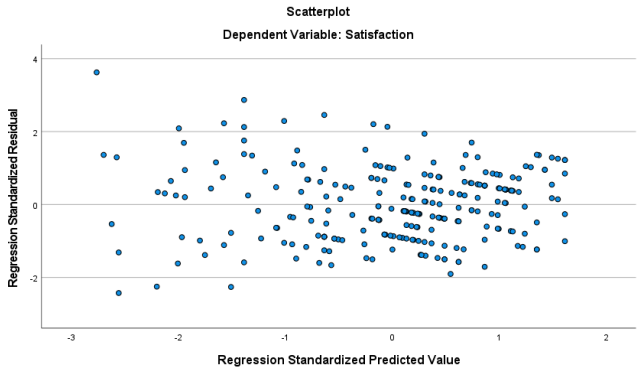
Appendix B.3: Residuals Statistics

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3,7440	5,9028	5,1067	,49329	253
Residual	-2,17901	3,25603	,00000	,89462	253
Std. Predicted Value	-2,763	1,614	,000	1,000	253
Std. Residual	-2,426	3,625	,000	,996	253

a. Dependent Variable: Satisfaction





7.3 – Appendix C: Multiple Linear Regression test on AIVPA and Service Quality

Appendix C.1: Validity of the model: ANOVA test and Rejected model

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	303,462	4	75,866	122,743	,000[b]
	Residual	153,284	248	,618		
	Total	456,746	252			

a. Dependent Variable: Service_Quality

b. Predictors: (Constant), Interactivity, Automation, Personalization, Convenience

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	,619	,215		2,877	,004		
	Automation	,023	,048	,019	,475	,635	,812	1,232
	Personalization	,131	,050	,136	2,629	,009	,507	1,973
	Convenience	,403	,052	,426	7,794	,000	,453	2,207
	Interactivity	,322	,048	,348	6,681	,000	,498	2,009

a. Dependent Variable: Service_Quality

Appendix C.2: Final Model Summary for AIVPA and Service Quality

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,815[a]	,664	,660	,78496	2,083

a. Predictors: (Constant), Personalization, Interactivity, Convenience

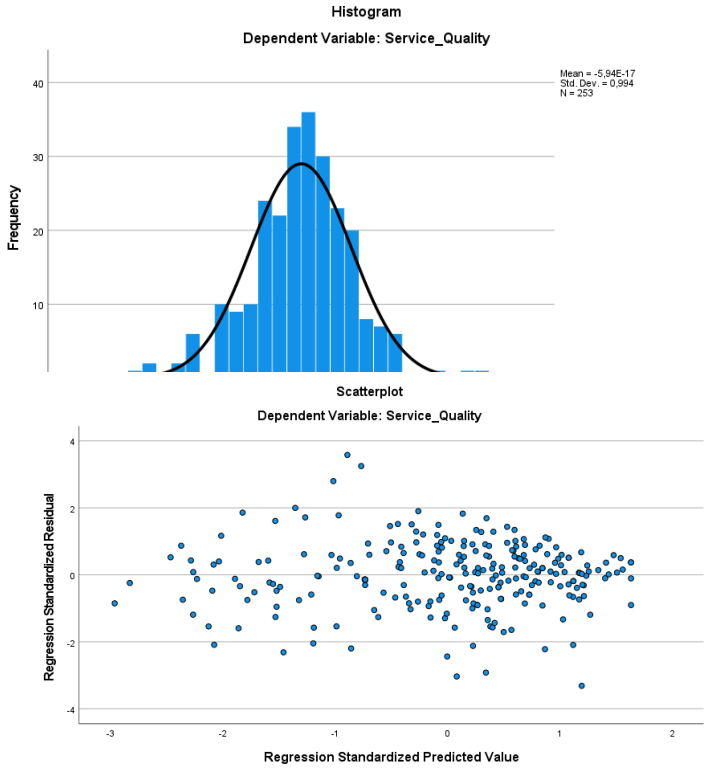
b. Dependent Variable: Service_Quality

Appendix C.3: Assumptions validation

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1,6676	6,7075	4,9160	1,09711	253
Residual	-2,60107	2,81106	,00000	,78027	253
Std. Predicted Value	-2,961	1,633	,000	1,000	253
Std. Residual	-3,314	3,581	,000	,994	253

a. Dependent Variable: Service_Quality



7.4 – Appendix D: Simple Linear Regression on Satisfaction and Loyalty

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,839[a]	,704	,703	,75454	1,910

a. Predictors: (Constant), Satisfaction

b. Dependent Variable: CLoyalty

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-1,006	,242		-4,150	,000		
	Satisfaction	1,138	,047	,839	24,450	,000	1,000	1,000

a. Dependent Variable: CLoyalty

7.5 – Appendix E: Simple Linear Regression on Service Quality and Loyalty

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,422[a]	,178	,174	1,25820	1,865

a. Predictors: (Constant), Service_Quality

b. Dependent Variable: CLoyalty

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2,672	,300		8,905	,000		
	Service_Quality	,434	,059	,422	7,366	,000	1,000	1,000

a. Dependent Variable: CLoyalty

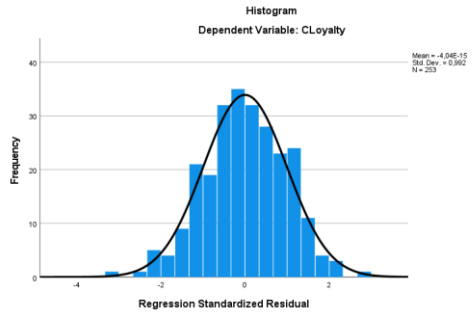
7.6 – Appendix F: Multiple Linear Regression on AIVPA and Loyalty

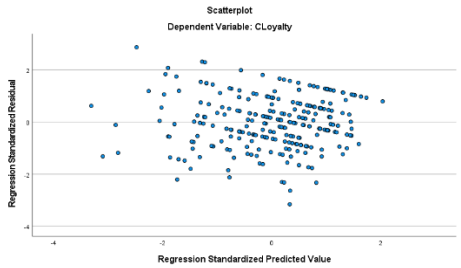
Appendix F.1: Assumptions validation

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2,8780	5,9907	4,8037	,58219	253
Residual	-3,99808	3,63794	,00000	1,25647	253
Std. Predicted Value	-3,308	2,039	,000	1,000	253
Std. Residual	-3,157	2,872	,000	,992	253

a. Dependent Variable: CLoyalty





Appendix F.2: Validity of the model: ANOVA test

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	85,413	4	21,353	13,311	,000[b]
	Residual	397,837	248	1,604		
	Total	483,250	252			

a. Dependent Variable: CLoyalty

b. Predictors: (Constant), Interactivity, Automation, Personalization, Convenience

Appendix F.3: Multiple Linear Regression Model Fit Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,420[a]	,177	,163	1,26656	1,839

a. Predictors: (Constant), Interactivity, Automation, Personalization, Convenience

b. Dependent Variable: CLoyalty

7.7 – Appendix G: Descriptive Statistics from ANOVA output on Age differences in behavioural loyalty

Descriptives

I am inclined to purchase/repurchase through a Virtual Assistant

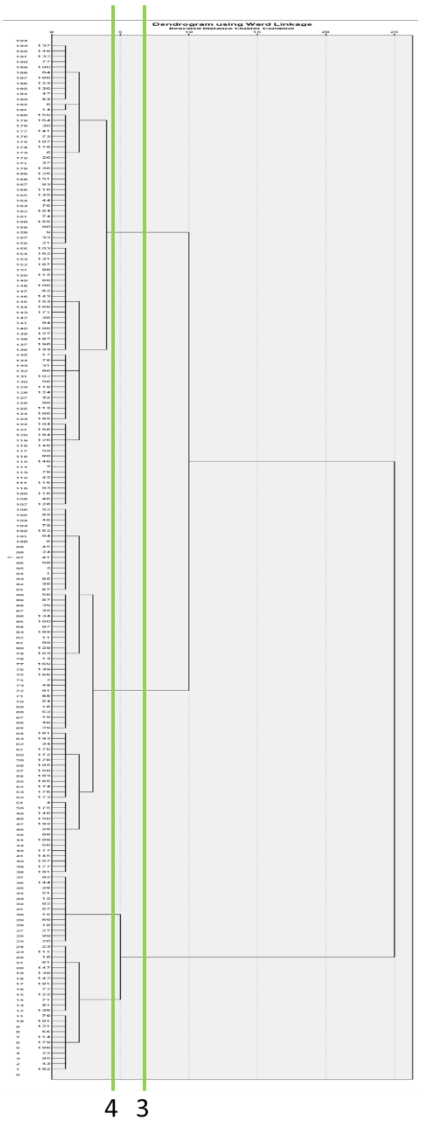
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
18-25	72	4,78	1,376	,162	4,45	5,10	1	7
26-30	20	4,65	1,814	,406	3,80	5,50	1	7
31-40	23	4,74	1,514	,316	4,08	5,39	1	7
41-50	42	5,00	1,514	,234	4,53	5,47	1	7
51-60	80	4,80	1,626	,182	4,44	5,16	1	7
>=61	16	4,88	1,204	,301	4,23	5,52	2	7
Total	253	4,81	1,510	,095	4,63	5,00	1	7

7.8 – Appendix H: Validation of Assumptions

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
I am inclined to purchase/repurchase through a Virtual Assistant	Based on Mean	,942	1	251	,333
	Based on Median	,255	1	251	,614
	Based on Median and with adjusted df	,255	1	250,433	,614
	Based on trimmed mean	,762	1	251	,384

7.9 – Appendix I: Dendogram from Ward Solution



7.10 – Appendix J: Cross-tabulation output for demographic and technology adoption questions and 3 cluster solution

Appendix J.1: Age

Crosstab

Count

		What is your age?						
		18-25	26-30	31-40	41-50	51-60	>=61	Total
Cluster Number of Case	1	11	7	5	12	19	3	57
	2	3	0	6	2	9	2	22
	3	48	12	8	17	21	8	114
Total		62	19	19	31	49	13	193

Appendix J.2: Education level

Crosstab

Count

		What is your last level of education achieved?					
		Basic/Primary	Secundary/High School	Bachelor Degree	Master Degree	Doctorate Degree	Total
Cluster Number of Case	1	0	6	17	30	4	57
	2	0	6	9	7	0	22
	3	2	10	58	36	8	114
Total		2	22	84	73	12	193

Appendix J.3: Employment Area

Crosstab

Count

		Please state your employment area: (if you are unemployed please state your last employment area or disregard this question)										
		Military	Management	Public Function	Health	Law	Education	Retired	Cultural	IT	Engeneering	Total
Cluster Number of Case	1	10	16	4	0	3	8	2	4	0	1	48
	2	4	2	1	0	0	2	1	1	2	2	15
	3	20	30	3	9	2	11	1	3	9	0	88
Total		34	48	8	9	5	21	4	8	11	3	151

Appendix J.4: Internet Shopping Behaviour

Crosstab

Count

		On average, how many times would you say you purchase through the internet monthly?				
		0	at least 1	2 to 3	more than 4	Total
Cluster Number of Case	1	0	47	7	3	57
	2	0	17	2	3	22
	3	5	74	23	12	114
Total		5	138	32	18	193

Appendix J.5: VPA Purchase history

Crosstab

Count

		Have you ever purchase a good and/or service through a Virtual Assistant?		
		no	yes	Total
Cluster Number of Case	1	50	7	57
	2	11	11	22
	3	82	32	114
Total		143	50	193

Appendix J.6: Music App utilization

Crosstab

Count

		Connecting to a Music App (ex Spotify)		
		no	yes	Total
Cluster Number of Case	1	35	22	57
	2	15	7	22
	3	54	60	114
Total		104	89	193

Appendix J.7: Smart Home App utilization

Crosstab

Count

		Controlling smart home apps		Total
		no	yes	
Cluster Number of Case	1	51	6	57
	2	18	4	22
	3	93	21	114
Total		162	31	193