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Augmented Reality and the interest for consumers in their Buying Process.

Luís Filipe Correia

152110320

Advisor: Prof. Paulo Amaral

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ABSTRACT:

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Author: Luís Filipe de Oliveira Correia

The purpose of this study is to understand if a technology that is recently available for the majority of the consumers, like Augmented Reality, can be an interesting component in their buying process, and at the same time understand if this technology can be used by the companies to effectively reach the customers.

Augmented Reality is a technology that mixes the real and virtual worlds through proper devices and applications, generating augmented content that is not possible to see without the devices, and it is recently being used by the companies in campaigns and in different ways to promote their products and brands.

From conducting this study, it is possible to understand that the consumers are open to embrace this new technology in their daily lives, and use them in their buying process not only to have fun and entertainment, but also to get discount opportunities before buying a product. It is also understandable that by using this technology to promote products and create new campaigns, the companies can establish a strong relation/connection with the customers by reaching them in different and original ways, getting their attention and participation in specific campaigns.

ACKNOWLEDGMENTS:

Writing this dissertation has been a very interesting process, with which I have learned a lot about Augmented Reality technology and its possibilities for the consumers in their Buying Process. However, even being very interesting, it was also a very difficult process during these months.

First of all, I would like to give my special thanks to my advisor Paulo Amaral, who guided and helped me elaborating and acquire a better knowledge of all the topics developed in this dissertation.

I would also like to thank my parents and my family for always supporting me during my studies, and encouraging me to write this dissertation with enthusiasm until the end.

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1. INTRODUCTION:

Virtual reality and internet have registered during the last years an amazing evolution and began to be applied as a tool to promote, inform people about products, and advertise every kind of products (Li, Daugherty and Biocca, 2002).

This work addresses a specific technology that connects the real and the virtual world with the help of Augmented Reality (AR) Technology (Milgram and Kishino, 1994). This technology allows the users to interact, manipulating and watching 3D virtual media content in a real environment and real time (Azuma, 1997; Krevelen & Poelman, 2010).

Augmented Reality technology has been developed throughout the years and has allowed an easy accessibility and proximity between customers and products through some applications available on mobile systems, such as computers and mobile phones, that have a camera or a webcam incorporated to allow the connection between the virtual and the real world (H. Park & Park, 2010; S. K. Ong et al.2008; Wiedenmaier, et al. 2003).

According to Rachel King (2009), people have been witnessing to the development of this technology and the increasing number of applications and ways to use it (Billinghurst et al. 2003; Wiedenmaier, et al. 2003; Biocca, Owen, Tang & Bohill, 2007). It is possible to see it being used by companies in manufacturing, educational systems, surgery, advertisements, in magazines and in the internet websites. (S. K. Ong et al. 2008; Iordache & Pribeanu, 2009; A. Keally & S. Scott-Young, 2006; Perey, 2011). The increase on advertising through augmented reality is verified also because the technological means that allow seeing this reality are now in the hands of most of the consumers (Perey, 2011), and also due to the use of Internet as a way of advertising and as a product information/aware and buying platform for consumers (Daugherty et al, 2008).

Relevance of the study:

People are the main target of all different types and ways of advertisement with which they are surprised and discreetly guided. But for all this to occur new ideas and new technologies must arise to allow new ways of advertising products (Li, et al. 2003).

In this way, Augmented Reality gives the consumer the possibility to interact, manipulate and visualize virtually a product in a real environment allowing the purchase of products on-line, without the need to go to the store, allowing at the same time the appearance of new and different ways to promote and advertise products and brands (Azuma, 1997; Daugherty et al, 2008).

The reason for studying this technology is, not only due to the actual growing and development of innumerous applications using AR, but also to understand if it is interesting for the consumers to use this new technology in their buying process, or if it has not any kind of influence and it is interpreted as a way of having only an enjoyable experience, because suddenly new ways of doing business can emerge increasing companies' profits.

In order to study and understand it, the key question of this research is: **Can Augmented Reality be an interesting component in the consumers buying process?**

Methodology:

To answer the research question, two types of data are collected. First of all, secondary data is analyzed, allowing the development of a model concerning the functionalities and characteristics of the main themes of the dissertation (Augmented Reality, Customer Relationship Management and Consumer´s Buying Process). This model is the support to formulate the hypothesis.

Finally, to test the hypothesis, quantitative primary data is collected through an online survey that gives the answers to confirm or deny the hypothesis. This survey is made exposing consumers to some images of AR applications that are already available to use through computers, smartphones, and interactive windows. Clothes and watches are some of the products available on the applications.

Different types of applications are used, including virtual dressing rooms (Zugara and Cisco dressing rooms), Augmented Reality interactive windows (Hugo Boss campaign), also some typical AR applications, where the consumer can see the product and try it virtually in the real environment through visual markers (Tissot), and finally, the last application used is an application available for iPhone called Goldrun which uses augmented reality allowing consumers to participate in different activities and campaigns of certain brands, and get for example discount coupons or buy the products of a specific campaign.

The survey is made to verify the characteristics described in the literature review and test the hypothesis formulated to finally answer the main research question.

This dissertation is presented in five chapters. The first chapter represents the introduction to the theme and the following investigation. The second chapter is related to the literature review of the relevant themes for the dissertation like Augmented Reality, Customer Relationship Management (CRM), and Consumer´s Buying Behavior. The third chapter describes the methodology used in the study in order to get the results that will answer the main research question. Following chapter is the discussion chapter, in which the results are analyzed and the final chapter relates to the conclusions taken from the study and the answer to the research question.

Keywords: Augmented Reality; Interaction; Buying Process.

2. LITERATURE REVIEW:

In this chapter, an overall view of relevant themes for this research, such as the Augmented Reality technology, Customer Relationship Management (CRM) and Buying Process are described.

Being the technology in use in this research, this chapter starts with the explanation of Augmented Reality technology, and its evolution across the years, then a brief overview about CRM and its techniques to understand how Augmented Reality fits in these techniques and how it is used to connect customers and companies. Finally, a quick summary of what the Buying Process is, once the main objective of this research is to understand if the Augmented Reality technology can be a useful and interesting tool for the consumers and its buying process.

2.1. Augmented Reality

2.1.1. Definition

Augmented Reality (AR) is a technology that allows the users to see through proper devices, virtual objects that complement the real world, in real time. The user can interact, hold, touch, and manipulate a real object, seeing a new reality with virtual objects superimposed, complementing real environments providing the users with information that they cannot directly detect with their own senses. (Azuma, 1997; Iordache and Pribeanu, 2009).

The main characteristics of an AR system are: combine real and virtual objects; register, in three-dimensions (3D), real and virtual worlds with each other; and interact in real time (Krevelen and Poelman, 2010).

According to Keally and Scott-Young (2006), AR systems have three general functions: Track, Retrieve and Inform.

The system works by tracking objects, based on position and attitude of the user, showing him for example information about the objects. Tracking is necessary to enable registration, which is the process that matches what the user sees in real world, with the virtual content provided by the AR system.

The retrieve function is what enables the system to show information about a specific event, stored in the AR system database.

Finally, the inform function allows to present the retrieved data, in the best way for the user. It can be presented by a visual, audio, or other possible method. (Keally and Scott-Young, 2006)

2.1.2. Applications

Throughout the years, people have been witnessing the development of Augmented Reality technology and the increasing number of applications and ways to use it (Billinghurst et al. 2003; Wiedenmaier, et al. 2003; Biocca, Owen, Tang & Bohill, 2007). It is possible to see it being used by companies in manufacturing (S. K. Ong et al. 2008), educational systems (Iordache & Pribeanu, 2009), collaboration (Billinghurst et al, 2003; Fjeld, 2003) medical applications, advertisements, in magazines and in the internet websites (krevelen & Poelman, 2010; Perey, 2011). The increase on advertising through augmented reality is also verified because the technological means that allow seeing through this reality are now in the hands of most of the consumers (Perey, 2011), and also due to the use of Internet as a way of advertising and as a product information/aware and buying platform for consumers (Daugherty et al, 2008).

In this research the focus is on shopping and advertisement applications, through the use of Augmented Reality for computers, AR interactive windows, AR virtual mirrors, and smartphones.

2.1.3. Displays

In this research, the displays used are visual hand-held and spatial ones, such as laptops, tablets and smartphones, which allow to visually presenting an augmented reality view for the user.

As Krevelen & Poelman (2010) describe, there are three types of visual displays: Video see-through, optical see-through and projective displays.

The authors explain that in video see-through displays, the user sees the real-world captured by cameras that are part of the devices, and the virtual images are combined with the video representation of the real world. Optical see-through displays show the real world through transparent mirrors or lenses, which also works to generate the virtual content of the display application, combining real and virtual worlds. Projective displays show the AR elements of an application projected in real objects.

Regarding the display positioning, from the three categories in which they are classified, head-worn, hand-held and spatial (Krevelen & Poelman, 2010) as mentioned before, the research is focused on applications developed to Hand-held and Spatial display devices.

The hand-held displays category is composed by hand-held video/optical see-through displays as well as hand-held projectors. For a mass market, hand-held displays like mobile phones that show 3D objects or PDA´s are the best suited to introduce AR applications (Mohring et al. 2004; Zhou et al. 2008). The spatial displays can be screen-based video see-through, spatial optical see-through and projective displays. Examples of the displays are computers, or a television, displays that are surrounded by the environment and are placed strategically to show the real environment that the user is viewing captured by the camera, with the virtual components superimposed on the real images (Krevelen & Poelman, 2010).

2.1.4. Tracking, Registration and Sensing

Being a technology that combines the users' view of the reality with computer-generated information on real time (Azuma, 1997), captured by a camera, the place where the user is located needs to be accurately tracked with accurate measurements of the camera pose relative to the real world, in order to have a proper registration of the virtual content (Ong et al, 2008; Park & Park, 2010). Citing the authors Keally and Scott-young (2006), *"registration refers to the process of combining the user´s view of the physical environments with additional information provided by the AR system"*. Together with tracking, sensing the location of other objects is a crucial point for accurate registration to position and combine the virtual objects in the user´s real world (Azuma, 1997). According to Azuma (1997), effective Augmented Reality systems require accurate *"long-range sensors and trackers that report the locations of the user and the surrounding objects in the environment"*.

A wide range of tracking devices is available for AR applications, like mechanical, magnetic, ultrasonic, inertial, radio, vision-based, global positioning systems (GPS) and hybrid sensors (Azuma, 1999).

In the mechanical trackers, there are instruments like telescopic arms and string pulley; magnetic trackers use infrared, radio and optical waves; inertial systems are composed by gyroscopes and accelerometers (Ong et al, 2008); radio tracking methods are centered on ultra wide band radio; Global Positioning Systems (GPS) are able to track through satellites and are commonly used in outdoor environments (Narzt et al, 2003). Finally, the other two methods are the ones that are more important and relevant in our days, which are the Optical/Vision-based tracking systems (Park & Park, 2010) and Hybrid tracking systems (Hollerer & Feiner, 2004).

The vision-based trackers are usually based on fiducial markers and QR codes. These are physical markers in which computer vision techniques are addressed to recognize the marker, calculate camera position and orientation and show the augmented image (Green et al. 2008; Perey, 2011). More recently, markerless or invisible marker-based systems are appearing and are being studied in the AR tracking methods, mainly in mobile AR applications (Park & Park, 2010; Comport et al, 2006).

An intensive study of markerless tracking for Augmented Reality is approached by Comport et al (2006).

According to Genc et al, (2002), the use of markers increases the robustness and decreases the computational requirements. This can be due to the fast and stable detection of the markers (Ong et al, 2008). A disadvantage verified in this type of systems is that if the visual markers are obstructed, totally, or partially, or also out of the field of view, the computer generated content cannot be augmented and prevents the complement of the real environment (Yuan et al, 2004).

According to J.P Rolland et al (2001), there are two types of vision marker-based trackers, which are the inside-out trackers and the outside-in trackers.

Inside-out trackers' systems are the ones where the fiducial markers are all around the environment and the imaging sensor (camera) is attached to the user to determine the position relative to an object. Outside-in tracker systems are systems where the fiducial markers are attached to the user and imaging sensors are placed in the environment to track the markers (J.P.Rolland et al. 2001).

One of the most known softwares available to develop AR applications based on fiducial markers is ARToolkit. This library was created based on a study made by Kato and Billighurst (1999), where they proposed a method for tracking fiducial markers and a calibration method for Head-Mounted Display for a video-based AR system.

Another software available for develop AR applications based on fiducial markers is Studierstube, which was developed and brought to life in the Graz University of Technology, by Wagner, Lanlotz and Schmalstieg (2008).

All of these software tools mentioned above and the further upgrades are based on visual markers, one was developed in the beginning for PC´s (Kato and Billinghurst, 1999), and the other was already built with the purpose of being available for mobile phones (Wagner et al, 2008a; Wagner et al, 2008b).

Hybrid tracking systems refer to a combination of various tracking methods mentioned before (Rolland et al, 2001 cited in Azuma, 2001). For example, hybrid tracking systems can be used for orientation tracking, combining electromagnetic compasses, gravitational tilt sensors, and gyroscopes. Hybrid approaches are currently the most promising and best solution to deal with the difficulties posed by general indoor and outdoor mobile AR environments (Hollerer & Feiner, 2004).

In summary, *"an ideal tracking system reports perfect instantaneous six-degree-of-freedom (6DOF) measurements of the sensor pose (i.e., position and orientation), in any environment, under any motion."* (Neumann et al, 1999)

The focus for this research and the applications in use take vision-based methods, and hybrid methods to track and present the augmented images that the companies want to present on those applications. To be more precise, the applications studied are about products that people use in their dayly activities and life, such as clothes and watches. Most of these applications use fiducial markers such as QR codes for tracking and laptops or Smartphones as the displays (Zugara Fashionista, Tissot), and other applications use markerless hybrid methods based on motion capture or face recognition (Zugara Virtual Dressing Room) for laptops and Smartphones. Other displays used in this research are the Cisco virtual mirrors, and the interactive windows on the shops for the brands campaigns (Hugo Boss). Finally, hybrid methods for outside applications and use of Augmented Reality (GoldRun application) are applied through smartphone cameras, GPS, compass, accelerometer and internet connection, combining image recognition and the understand of 3D world to recognize objects and images and merging augmented reality actions into the scene. Without the need for fiducial markers, the applications are able to see its surrounding environment and make it an interactive world[1]-[2].

[1] http://www.aurasma.com/what-is-it
[2] http://goldrungo.com/

2.1.5. Mobile Augmented Reality

According to Azuma (1999), the ideal situation regarding augmented reality occurs when someone is able to wear or transport an AR display and can walk around anywhere, without restrictions, being able to augment the reality anywhere. The author mentions that an ideal AR display must work both indoor and outdoor, without needing of previous preparation of the environment to perform it (Azuma, 1999).

By going mobile, and providing accurate registration, Augmented Reality systems can offer new ways of presenting new applications, and provide a natural interface for wearable computers, as well as performing applications that usually are performed in indoor environments such as maintenance and repair of vehicles, or also for paramedic activities (Azuma, 1999).

An extensive research about mobile Augmented Reality, how to prepare, perform and direct mobile users attention using Augmented Reality is presented by Biocca et al. (2007).

Initially, as Azuma (1999) describes in his research, the main difficulties that were preventing personal AR systems to go outdoor were the size, weight and power issues of wearable PC systems; the displays that were not able to work effectively in outdoor environments due to the contrast of lighting; and finally, the main difficulty regards accurate tracking in outdoor environments.

In recent years, Augmented Reality overcame some of the difficulties described before, and is already working in outdoor environments, in the streets where millions of people walk (Biocca et all, 2007), and this technology also became mobile (El Choubassi & Wu, 2010; Hallaway et al. 2004). Throughout the years, people have been assisting to the empowerment of the computers and decrease in size, which allowed to the appearance of new mobile wireless devices, and consequently the development of mobile AR systems and applications (S.K.Ong et al. 2008).

Few years ago, a new type of mobile device such as the Tablet PC´s, PDA´s and smartphones became available in the market for everyone, with the promise of starting a new technological revolution (Bodker et al. 2009). These devices have all the necessary hardware to be able to present Augmented Reality to the consumers and are equipped with GPS, compass, camera, accelerometer, gyroscope, and internet connectivity, making a complete hybrid tracking device (Bimber & Rasker, 2005), which make them the best displays to develop AR applications, as studied by Bodker et al. (2009). Not only due to their complete hardware, but also because due to this, companies are able to find new ways of develop their business, extending their services or creating new business opportunities (Bodker et al, 2009).

A recent study about the development and evolution of mobile devices such as tablet PC´s and smartphones has been taken by Craig Foltin, where he shows the importance of these devices in today´s world and how it can possibly save money to a company, by using these mobile devices for Augmented Reality (Foltin, 2012).

About AR applications in the market, according to a research made in 2009 by Rachael King, the total AR market is expected to represent 350 Million USD in 2014, which compared to the 6 Million USD in 2008 represents a huge evolution. Still in this research, it is predicted that from 2009 to 2014, almost 170 Million USD will represent results from mobile Augmented Reality advertisement (Rachael King, 2009).

2.1.6. Limitations of Augmented Reality

As a recent technology available for the mass public, Augmented Reality still presents some limitations. According to Keally and Scott-Young (2006), one of the limitations are the delays in presenting the augmented information properly, at the precise time or position, which is a result of the time needed to process data from the AR sensors and its databases.

Another limitation that was already mentioned before, refers to the marker-based tracking methods and the fact of when the marker is occluded or is out of the field of view of the displays, the augmented image cannot be displayed and this leads to the failure of the goals of the augmented reality application, being unable to present virtual content in real environments (Yuan et al, 2004).

According to Bimber and Raskar (2005), two things that can still be limiting and are a challenge for the future of Augmented Reality are the display technology and the real-time rendering. The challenges in display technology are about optical limitations such as the limited field of view a person has with the AR displays and technical limitations such as resolution and human-factor limitations. Regarding real-time rendering, this challenge is related to the ability of AR devices to present the graphical elements on top of the real world environment in a fast and realistic manner.

Still according to the authors, a last goal that must still be pursued and that may be limiting AR is the presentation of the computer generated content that should be as real as possible, in such a way that the user cannot distinguish what is real and what is virtual.

There is also a limitation in location based tracking that occurs when the GPS accuracy in some location is very poor and on indoor tracking is not available. To respond to this limitation, Junaio, an augmented reality browser based on optical tracking capability, uses LLA markers (latitude, longitude, attitude markers) which can overcome the limitations that GPS has when providing locations[3].

Finally, according to Krevelen and Poelman (2010), another possible source that can be an obstacle for Augmented Reality is social acceptance, however as it was mentioned before, according to the expectations about AR markets presented by Rachael King´s (2009) research, social acceptance may not be such a difficult challenge to overcome related to this recent technology.

[3] http://www.junaio.com/publisher/llamarker

2.2. Customer Relationship Management (CRM)

In the last decade, the increased competition, the markets globalization, the technologic development and the quick changes in consumer's preferences have caused a constant actualization on companies, not only on their range of products and services available, but also of their systems and internal procedures (Chalmeta, 2005).

Clients do not only search for a product anymore, they want a personalized treatment according to their own necessities. For this reason the companies should give a great importance on creating value for the customer, not only through a product or service, but also through a better communication (Chen & Popovich, 2003).

Following this short introduction, a CRM overview is presented for a better understanding of this concept.

2.2.1. Definition of CRM

The concept of CRM is a relatively new concept, and for that reason, there are many attempts of defining it, and still, there is not a universal definition for this concept (Bose, 2002; Dyché, 2001; Lancaster & Jobber, 2009; Buttle, 2004).

However, independently of what the authors define, CRM is a management tool that focuses on the customers (Buttle, 2004) and that also focus on developing and retaining customers, through increased satisfaction and loyalty (Walton & Xu, 2005).

According to Buttle (2004), the recent history begins with the concept being used to describe software applications that automates the marketing and sales processes and other functions of the companies' services, and the author gives the example of the Siebel Systems Inc, that in 1993 created a software that allows the management of the relationships with clients, as well as storing clients information in order to have a personalized relation with each client.

But the concept of CRM relates also to the process that involves the development of the market with the final objective of building and maintaining the best relation with the clients (Zablah et al. 2004). According to the authors, CRM seeks not only the establishment and maintenance of the relationships with clients, but also seeks to assure the higher profitability of these relationships.

Payne (2006), states that CRM is a business approach that seeks to create, develop and improve relationships with carefully targeted customers, in order to increase its value and the company´s profitability, thus maximizing shareholder value.

According to Buttle (2004), CRM can be viewed under three perspectives: strategic, operational and analytic. The strategic perspective refers to CRM as being the center of a company´s strategy, with the objective of collect new clients, maintaining the existing ones, and in this way creates higher added value than the competitors. The operational perspective relates to the automation of the company´s functions through the application of systems and information technologies (IT) to their services, sales force and marketing. Finally, the analytical perspective relates to the data mining application, which is the collection and analysis of clients' data, helping to search standards that can generate competitive advantages, through the market segmentation (Buttle, 2004).

Peelen (2005) states that CRM must be viewed always taking first in consideration four main elements, which are: customer knowledge; relationship strategy; communication; and the individual value proposition.

2.2.2. Objectives and Benefits of CRM

Such as the various definitions, various authors also state different objectives and benefits of CRM (Greenberg, 2001; Wilson et al. 2002; Burnett, 2001).

Greenberg (2001) states that an organization should implement CRM due to the following objectives and benefits: increasing revenue, improve global forecast and pipeline management, improve win probability, reduce cost of sales, increase sales representative productivity and promote sales representative retention.

Wilson et al. (2002) defend that the CRM objectives focus on increasing business opportunities. The way of doing it is by improving the process of communication with the right customers, providing the right offer, at the right time and through the right channel for each customer.

The benefits for a company by doing this include the increasing of customer retention and loyalty, achieve higher customer profitability and create value for the customer (Wilson et al. 2002).

According to Burnett (2001), the objectives of CRM are divided into three categories, which are cost saving, revenue enhancement and strategic impact. The author states that a company can benefit from implementing CRM by win rates, increase margins, improve customer satisfaction rates and decrease general sales and marketing administrative costs.

Another benefit of CRM solutions is linking together the different departments of an organization, once the touch points (where the customer interacts with the firm) are linked together with other business units (Eckerson & Watson, 2000; Chen & Popovich, 2003).

Ed Peelen (2005), mention that the interaction points, by which the customer can interact with the firm are: media (television or radio), website, e-mail, telephone and personal sales and services employees.

2.2.3. CRM Functionalities

Relating to CRM functionalities, the five most popular activities, as described by Lin et al. (2010) are information sharing, customer involvement, long-term partnership, joint problem solving and technology-based CRM.

. Information Sharing

This CRM function is related to the sharing of essential and exclusive information between the manufacturers and their customers, through interactive activities (McEvily and Marcus, 2005). Such information regards for example to sales promotion and new product introduction (Mentzer et al. 2000).

Fang et al. (2007), refer that by sharing proper information between manufacturers and clients allows the emerging of new value creation opportunities.

Across the years, organizations have invested in CRM programs, and designed new forms of relating with the customers. This allowed customers to interact with suppliers, sharing information between them. Also, through the internet these new technology methods are more convenient for customers, creating value for both parts (Roberts et al. 2005).

. Customer Involvement

Customer involvement is understood as the participation of customers in new product development activities, technical meetings and other activities related to the products and services of an organization. This is an important issue because usually, who defines and provide for example market trends and directions, as well as technical support in the process are the customers (Sin et al. 2005).

CRM does not only relate to provide products and services to the valuable customers. Through the interaction with customers, the company must understand and take into account not only their needs, but also the services provided and the way of communicating the products to them (Peppers ad Rogers, 2004). As the authors state, when a company listens to customers about their needs or wants, they are collaborating and being involved with the companies on the products' sales.

According to Jain & Singh (2002), an organization is now focused on customer participation, capturing customer's responses and ideas, to have a better performance when developing products and services in a competitive market environment. The organizations are now familiar to the need of communicating with customers, learning about loyalty, satisfaction and customer´s complaints, being then capable to understand what is good and what is failing in the organization, as well as serving more efficiently their customers.

With the customer participation in the company´s new product and service development, the customer satisfaction increases, as well as their loyalty to the brand, and it will also lead to the increasing of the brand aware and corporate image (Lagrosen, 2005; Gungor and Bilgin, 2011).

. Long-term Partnership

In order to maximize the long-term performance of a business in terms of customer satisfaction, the company should build, maintain and enhance long-term and mutually beneficial relationships with its target buyers (Sin et al. 2005). To build a long term partnership, a high degree of commitment and mutual trust between the parts are needed. They must be willing to provide resources to maintain and reach both parties goals (Handfield & Bechtel, 2002).

To take the best from this relationship between customer and companies, CRM allows the marketers to understand the lifetime value of each customer and thus allowing the company to decide with which customers they should invest in customized offers. This serves to become more profitable focusing on profitable customers (Jain and Singh, 2002).

According to Lin and Germain (2004), relationships based on mutual trust and understanding allows manufacturers to keep a closer partnership with customers, becoming easier to identify customer demands, allowing to provide accurate pricing schemes, promotion activities, and retailing and marketing strategies.

. Joint Problem Solving

This functionality is related to the collaboration between customers and manufacturers to be able to solve the problems together when they face an adverse situation (McEvily and Marcus, 2005). This will help the companies to have a better understanding and being able to respond to more valuable needs of customers (Maklan et al. 2008).

With the voluntary participation of customers in solving problems together with manufacturers, this would influence in the success of product and market development, once customers could provide valuable assistance in solving product design or technical process problems (Ritter & Walter, 2003).

. Technology-based CRM

Technology-based CRM respects to the manufacturers use of computer technologies in various CRM activities, offering technological assistance such as data storage, data mining and CRM software systems to the customers (Sin et al. 2005). According to Dyché (2001), the use of information technology helps to understand and communicate in a more effective way with the customers.

By using information technologies in CRM activities, the companies are able to increase the capability of collect, store, analyze and share customer information, in a way that helps them to respond accurately to the individual customer needs, attracting and retaining customers (Butler, 2000), being essential for a successful CRM performance to have accurate customer data (Abbot et al. 2001).

Concluding this functionality, Sin et al. (2005) state that CRM software systems gives companies the tools to provide at a lower cost, greater customization with better quality.

2.2.4. CRM implementation

The implementation of CRM brought the increasing of competitiveness to many companies, being verified mainly through the increasing of the profits and the decreasing of operational costs (Chen & Popovich, 2003). The authors defend that for a successful implementation of CRM, technological applications (technology) are necessary, as well as a good organization of processes of the company (processes) and of its human resources (people).

Through CRM systems it is possible to store clients' data and analyze it, and take from data mining patterns of consumption, which allow a better knowledge of the company´s clients and also helps to generate better business opportunities. This goes in the way of the main objective of CRM that is to create added value for the client and for the company (Buttle, 2004).

The optimization of the internal processes of a company represent an important step to a successful implementation of CRM, as Chen and Popovich (2003) mention, it is necessary that an organization builds their strategy and processes focusing on the client and clients' preferences.

According to Greenberg (2001), the CRM systems allow the companies to have a unique and integrated vision of the clients through the utilization of analytical tools, to manage the relationships with the clients in an efficient way, and also to improve the effectiveness and efficiency relating to the management of the company´s relationships with the clients.

2.2.4.1. Management of the company/clients relationships

The main reason for the companies' willingness to build long-term relationships with the clients is purely economic. This is, if a company can satisfy its clients, than they will stay with the company during longer time, increasing loyalty and generating higher profits (Buttle, 2004).

According to Hitt et al. (2007), a real competitive advantage has to be difficult to copy, is unique, sustainable, superior to the competition and applicable to multiple functions. Some sources of competitive advantage are clients satisfaction and loyalty, which are critical factors of success once they generate clients' mouth-to-mouth advertisement, also helping to sell the brand, when the experience is good (Rowley and Dawes, 2000).

The clients show their loyalty in different ways. They can choose to stay with the company, increase the number or frequency of purchases, or both. Having this into account, the importance of loyal clients is related not only to the increase of profits, but also to decrease the costs of getting new clients, as it was said before, loyal clients also sell the brand making mouth-to-mouth advertising (Lawson et al. 2006).

The advantage of CRM relates to the fact that it improves the business performance through the satisfaction and loyalty of the clients (Buttle, 2004).

The figure below shows this relation between the satisfaction and loyalty of the client, and the business performance.

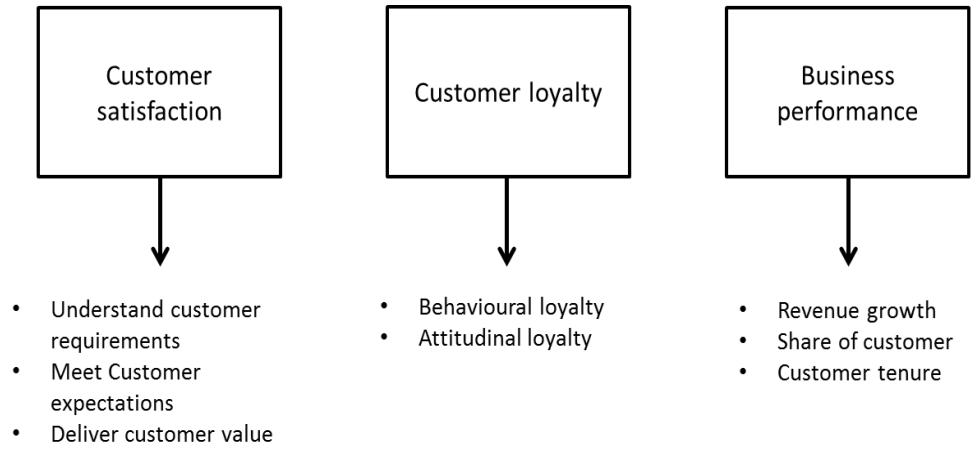


Figure 1: Customer satisfaction, loyalty and business performance (Buttle, 2004)

According to the author, an organization that understands the needs, expectations and preferences of their clients will certainly create added value to them, and increase their satisfaction. The satisfaction created works as a way of direct publicity, and consequently, the customers' loyalty to the company gets stronger.

But CRM is not only about creating a loyalty program. These programs play two types of functions in the implementation of CRM. First, they allow the company to collect important data about their customers that can be used to get new clients, retain the actual clients and develop new activities. Secondly, they create a barrier to the exit of customers (Buttle, 2004).

According to Swift (2001), to a relationship occur, the communications must follow two-way hand, in an integrated, registered and managed way, because only with historical data, details of transaction and communications a relationship can be effectively maintained.

In this research, the applications studied are related with interaction of the customers in certain campaigns, and to try different objects through Augmented Reality, using technological devices to approach the customer.

2.3. Consumer´s Buying Behavior

The information that will be briefly presented in this main topic is taken from a series of books that explain the stages and aspects of Consumer´s buying behavior, and a theory developed by Ajzen (1991) called the Theory of Planned Behavior (TPB).

According to Solomon (2010), consumer behavior is

"*the study of the processes involved when individuals or groups select, purchase, use or dispose of product, services, ideas, or experiences to satisfy needs and desires."*

2.3.1. Consumer´s Buying Process

In this first topic of the buying behavior of the consumers, the starting point refers to the consumer decision making process, and what is involved in it. According to S.Ratneshwar and David Glen Mick (2005), the stylized stage model is the best to define the decision making process. This process is composed by six stages (as the figure shows):

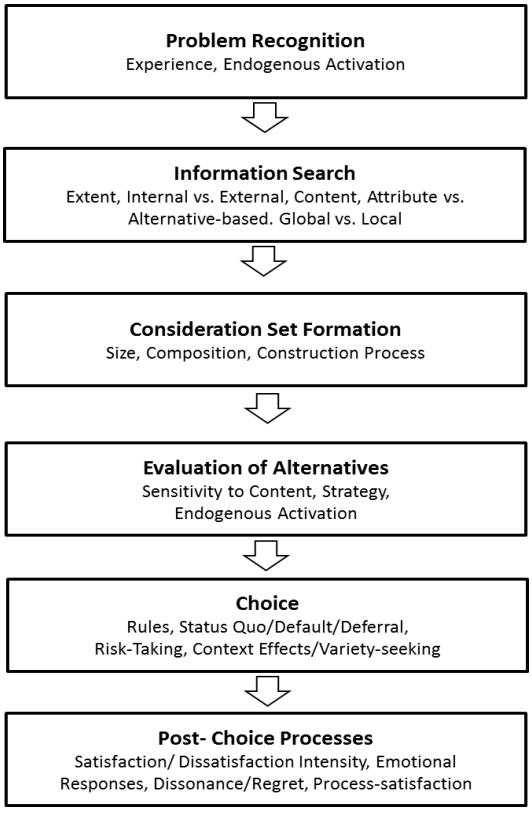


Figure 2: Decision Making Process – Stylised Stage Model (S. Ratneshawr & Glen Mick, 2005)

According to this model, the consumer decision making starts with the **recognition of a problem** or the arousal of a need by the consumer. Problem recognition is usually defined as the consumer detection of a discrepancy between the actual state and the desired state of a consumer. Changes in the desired state can occur due to various circumstances, such as personal circumstances, marketing circumstances or social comparisons.

After the recognition of the problem or need, the consumer will start to pursue for information (**Information search stage)**. The information searched by the consumers can be characterized according to several dimensions such as: the extensiveness of the research; the direction of the research, that can be internal, based on knowledge and memory, or external, based on the environment; the type of information searched; and the structure of the search (alternative-based or attribute-based and global or local) (S.Ratneshwar and David Glen Mick, 2005).

After the search for information, and based on that search, consumers put "on the table" all the options available and selects a set of options that he seriously feel like he will consider when making a purchase or consumption decision, in other words, from all the available options, the consumer forms a consideration set that will be seriously taking into account. This stage is called the **consideration set formation stage.** This set can be characterized by their size, composition, and the process by which they are generated.

Following the generation of the consideration set, comes the **evaluation of alternatives stage**, in which the consumers summarize the information that they examine about the attributes of the alternatives. This evaluation will afterwards lead to the choice of one of the alternatives **(choice stage)**. According to the authors, this process is characterized by some factors such as: the rules used that lead to the chosen alternative; the decision maker´s preference for status-quo, default option, or choice deferral; the attitude of the decision maker´s relating to the risk (attitudes towards new products and eagerness; risk aversion and risk taking attitudes); and finally the sensitivity to context of choice and preference for variety.

The last stage is the **Post-choice stage** and this stage is a result of the choices made by the decision makers, which according to the authors can lead to satisfaction or dissatisfaction with the outcomes; different emotions experienced in response to desirable or undesirable outcomes; can influence the nature of post-decisional dissonance; and the satisfaction with the decision-making process independent of its outcome (S.Ratneshwar and David Glen Mick, 2005).

During all the consumer´s buying process, the consumer is affected by some factors that marketers may not influence, but that must be taken in attention when targeting consumers. Such factors may have significant impact on consumers purchase decisions, and include cultural factors, social factors, personal factors and psychological factors (Kotler et al. 2005). The following section focuses on these factors that influence consumer behavior.

2.3.2. Consumer Behavior

Consumer behavior is not only the way how consumers buy the products, but it means much more than that. It is also the understanding of several set of decisions that the consumers take when choosing and buying a product such as what, why, when, how often and how much to buy. Consumer behavior has specific characteristics like being dynamic, changing constantly over time, and evolving over time (Hoyer and Maclnnis, 2004).

In order to understand consumer behavior, there is the need to assess how people made and make their purchasing and consumption decisions (Blackwell et al. 2001), always considering that a decision is the result of choosing an alternative from two or more possible options (Schiffman and Kanuk, 2002).

Not only marketing activities are an important part on consumer incentives to buy a product, but also other factors present in consumers' environment affect the buying incentives, like for example changes in the economy, technology, politics, and culture. All these aspects together (marketing and environment) form what Kotler et al (2005) call "the buyers black box", which will then lead to consumers responses (Kotler et al. 2005).

As it was said before, there are a set of factors that affect consumers buying process and that may not be influenced by marketing activities. According to Kotler et al. (2005), the factors influencing behavior are cultural, social, personal and psychological factors, as the figure shows.

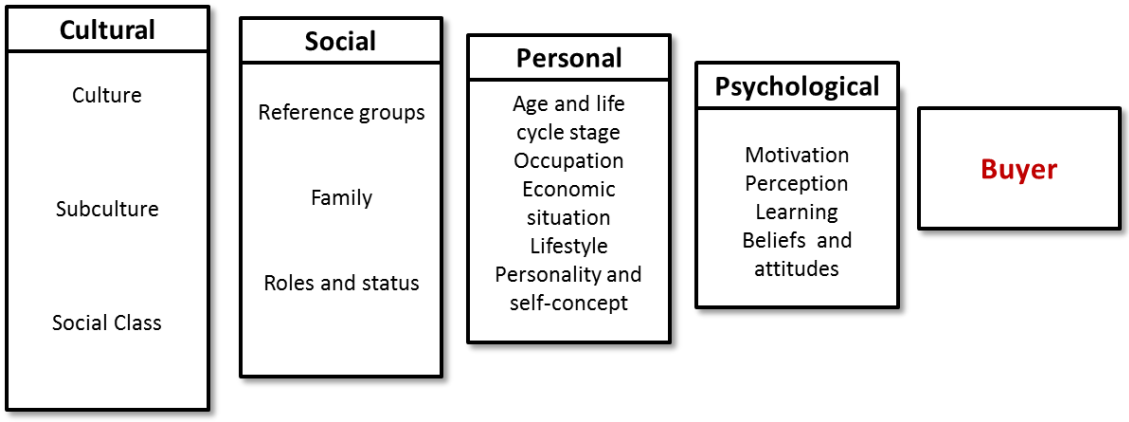


Figure 3: Factors influencing behavior – Principles of Marketing (Kotler et al, 2005)

2.3.2.1. Cultural Factors

First a definition of culture is presented to start this sub-section, and this definition mention that culture is a complex of values, ideas, attitudes and other meaningful symbols that allow humans to communicate, interpret and evaluate as members of society (Blackwell et al. 2001). Still in the culture definition, Shciffman and Kanuk (2001) define it as the sum of learned beliefs, values and customs helping to determine the behavior of members of a given society as consumers.

Culture is a key element in purchase behavior due to two reasons, one is because it affects all stages of consumer choice, and the other reason is because it employs a major influence on the reason why people from different cultures buy and consume the products (Blackwell et al. 2001).

This factor (culture) is appointed as being the primary reason connected with a person´s wants and behavior. However, different cultures and different societal groups have their specific behaviors and needs that may be different from other cultures, and the extent to which it influences the behavior may differ between countries. Each cultural group can be also identified by different groups, known as subcultures, which takes in account the people with common life experiences and situation, such as nationality, religion, geographical areas (Kotler et al. 2005). Finally, other cultural factor that influences society and lead people to different behaviors is the social class, which is constituted by other variables like occupation, income, education and wealth (Blackwell et al. 2001).

These groups known as subcultures are very important for marketers due to the fact that many of the subcultures allow the creation of different market segments (Kotler et al. 2005).

2.3.2.2. Social Factors

Taken from the book Principles of Marketing (Kotler et al, 2005), the second main factors influencing consumers buying behavior are social factors. This category includes factors such as the consumer´s small groups, family, social roles and status.

. Groups

Groups can be divided in membership groups and reference groups. Membership groups are groups in which a person belongs and have direct influence on consumer's behavior.

Reference groups are groups that can have a direct (face-to-face) or indirect influence on people´s attitudes and behaviors. According to the authors, people are constantly influenced by reference groups that they do not belong, and they give the example of aspirational groups, which are groups in which the individual wishes to belong to, such as a young football player that hopes and wants to be a star like his idol, and play professional football.

These reference groups are important for marketers, once they try to identify the reference groups of their target markets. Reference groups are also important because they expose people to new behaviors and lifestyles, influence people´s attitudes and self-concept, and create pressures that may help to affect a person´s attitude towards brands and products choices.

. Family

Family is one of the most important social factors influencing consumers buying behavior. This factor is a very interesting one for marketers, once they want to understand the roles and influences that family members such as husband, wife and children have on purchase decisions.

The authors show in their book how husband-wife involvement can vary according to the product category and by stage in the buying process, and also how children can be a strong influence on the family buying decisions.

This is important for marketers to understand the family decisions and target their campaigns to the influencers on the family.

. Roles and Status

Usually a person belongs to a wide range of groups, such as family, clubs and organizations. In each of these groups, a person performs certain roles and has his/her status.

A role is connected to the activities that a person is expected to perform within the group, and each role a person perform in a group carries on with it a status that usually is given by the view of society.

When choosing products, people normally act appropriately according to their roles and status. The authors give the example of a working mother that plays various roles in her daily life, such as being a brand manager in her company, a wife and mother in her family and a fan when she goes to her favorite sports events. According to her status, as a brand manager she will buy clothes according to the role and status she has in her company.

2.3.2.3. Personal Factors

The third main factors affecting buyers decisions, as Kotler et al. (2005) show, are personal factors. These factors are constituted by personal characteristics like buyer's age, economic situation, occupation, lifestyle, personality and self-concept.

Across human lifecycle, people change their choices about products, according to different factors. This change in products demand made by persons depends on occupation, financial status and also depends on the stage in the life of the consumers. The lifestyle of a person takes an important part on influencing and affecting his activities, interests, opinions, and also affects the products choice (Kotler et al, 2005).

According to the authors, these are the personal factors that influence the consumers buying process:

. Age and Life-cycle

The goods and services that people buy during their lives are constantly changing over their lifetime, and this can be connected with factors like age in products like food, clothes, furniture and recreation, but can also be related to the stage of the family life-cycle.

Marketers usually set their targets according to life-cycle stages and develop products and campaigns for each stage.

According to the authors, traditional family life-cycle stages include young singles and married couples with children. However, recently, marketers are giving and increasing attention and importance to nontraditional groups such as unmarried couples, singles marrying later in life, childless couples, same sex couples, single parents, and parents with young adult children returning home.

. Occupation

A person´s occupation is another factor that influences the products and services bought by them. The authors give the example of blue-collar workers that usually buys more rugged work clothes, instead of executives that buy more business suits.

Marketers in this aspect try to identify the occupational groups that fit better with their products or services, and sometimes companies even specialize in making products needed by a specific occupational group.

. Economic situation

A person´s economic situation also affects the choice of products by consumers. There are marketers that study the trends in personal incomes, savings, and interest rates and if the studies made appoint for a recession, marketers can make changes in their products or services such as reposition, redesign and re-price their products.

. Lifestyle

The authors define lifestyle as the person´s pattern of living as expressed in his or her activities, interests, and opinions. They mention that people coming from the same subcultures, social class and occupation may have different lifestyles. Lifestyle involves measuring these three dimensions (activities, interests and opinions). Activities include things like work, hobbies, shopping, sports, and social events; interests are related to food, fashion, family and recreation; and opinions regards opinions about themselves, social issues and business products, as the authors describe.

Lifestyle is a factor that captures the person´s whole pattern of acting and interacting in the world. This concept can help marketers understand changing and how consumers values affect buying behavior because consumers do not buy only products, they buy the whole concept, values and lifestyle those products represent.

. Personality and Self-concept

Another personal factor influencing buying behavior is personality, which the authors define as the person's unique psychological characteristics that lead to relatively consistent and lasting responses to one´s own environment. This concept is usually linked to characteristics such as self-confidence, dominance, sociability, autonomy, defensiveness, adaptability, and some others that the authors describe. The personality is something that helps to analyze consumer behavior relating to certain products or the brands chosen by them.

In fact, consumers are not the only ones with personality, the brands also have their personality, and due to that, consumers are most likely to choose and buy products from the brands which have personalities that match their own ones.

Brand personality is defined as the specific mix of human traits that may be attributed to a particular brand. These traits are identified as being sincerity, excitement, competence, sophistication and ruggedness.

Another concept related with personality is used by marketers to better understand consumer behavior and be more efficient in their activities. This concept is what the authors call self-concept, which indicates that people´s possessions contribute and reflect their identities.

2.3.2.4. Psychological Factors

The last group of factors influencing buying behavior is the group of psychological factors, and this group is composed by: motivation, perception, learning and beliefs and attitudes

. Motivation

Needs are not the same as motives, because many times, the needs does not become sufficiently intensive to motivate a person to act. A need becomes a motive when it reaches a certain level of intensity. The authors define motive as *"a need that is sufficiently pressing to direct the person to seek satisfaction."*

There are some theories about human motivation that were studied by psychologists, and two of the most famous are the theories of Sigmund Freud and Abraham Maslow, and are now described.

Freud´s Theory of Motivation:

In this theory, Freud assumes that people are not conscious about the psychological factors that lead them to have certain behaviors. Freud suggests that people do not completely realize their motivations, once the things that may lead them to that behavior may have come due to a dream that a person had, or obsessive behavior, or even in psychoses.

Maslow´s Theory of Motivation:

In this theory, Maslow tries to explain why people satisfy particular needs at a certain time. According to Maslow, human needs are performed according to a hierarchy, from the most pressing to the least pressing ones.

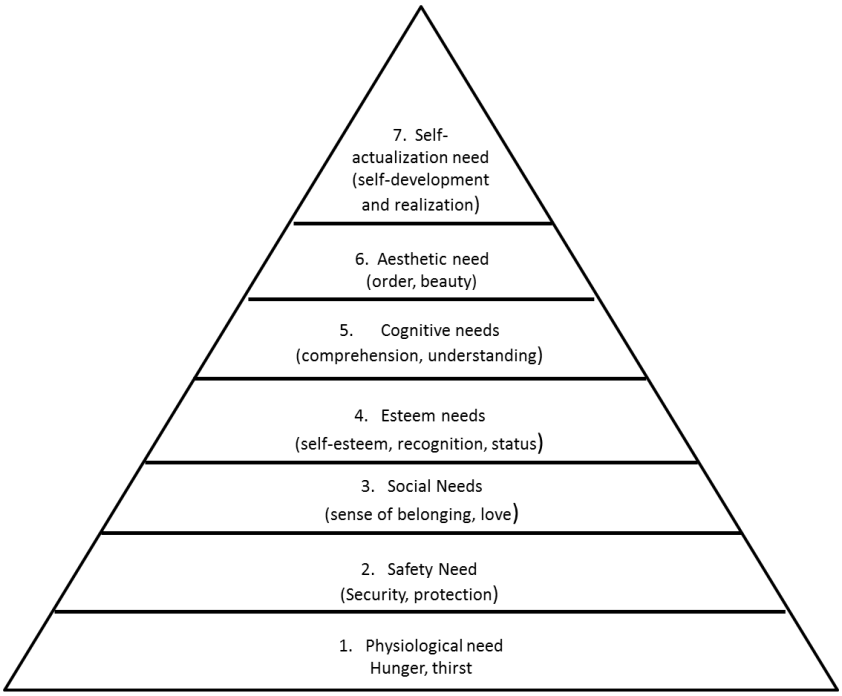


Figure 4: Maslow Hierarchy of Needs (Kotler et al, 2005)

As the Maslow pyramid shows, the human needs are divided in order of importance, beginning with physiological needs, then in second place safety needs, in third are the social needs, then the esteem needs, followed by cognitive needs, aesthetic needs and finally self-actualization needs.

The person try to satisfy first the most important needs, which are the ones on the basis of the pyramid, and then as each important need is satisfied, the next more important is the one to be satisfied.

Different cultures and countries are more motivated for different aspects of the pyramid (Kotler et al. 2005).

. Perception

Perception is defined by the authors as *"the process by which people select, organize and interpret information to form a meaningful picture of the world."*

People with the same motivations can act differently in a specific situation due to the different perceptions of the situation by each person. People receive information through the human five senses (sight, hearing, smell, touch and taste), however, each one of them receives, organizes and interprets this information in an individual way.

The different perceptions that people form about the same stimulus can happen due to the three perceptual processes that the authors explain and identify as being *"selective attention, selective distortion and selective retention."*

According to the definitions given by the authors, the process of selective attention is *"the tendency of people to screen out most of the information to which they are exposed"*; the process of selective distortion refers to *"the tendency of people to adapt information to personal meanings"*; and selective retention is *"the tendency of people to retain only part of the information to which they are exposed, usually information that supports their attitudes and beliefs."* Due to these three processes, marketers need to work hard to make their message being understood by the target they want to achieve (Kotler et al. 2005).

. Learning

This factor is defined as the changes that occur in an individual´s behavior, arising from experience (Kotler et al. 2005). Learning makes that the consumers include the past experiences they had when buying products, and integrate their previous knowledge with the new information received from the market and product (Blackwell et al. 2001).

According to Kotler et al. (2005), *"learning occurs through the interplay of drives, stimuli, cues, responses and reinforcement."*

A strong internal stimulus that calls for action is called a drive. This drive becomes a motive when it is directed to a particular stimulus object. Cues are defined as minor stimuli that define when, where and how the person responds. The response is what a person actually does according to the stimuli generated by the cues, and finally reinforcement is related to the experience a person has or had with a product/brand, for example if a consumer bought before a product from a certain brand, and the experience was rewarding, then, the next time the consumer is searching for a product of the same brand, the responses will be reinforced according to the past experience with the brand (Kotler et al. 2005).

The learning factor is important for marketers because with the knowledge about the learning theory, they can be able to "*build up demand for a product, by associating it with strong drives, using motivating cues and providing positive reinforcement"* (Kotler et al. 2005).

. Beliefs and Attitudes

Beliefs and attitudes are acquired by doing and learning, and are able to influence buying behavior. A belief is *"a descriptive thought that a person has about something"* and can be based on real knowledge, opinion or faith, and can carry or not an emotional charge. This is important for marketers because the beliefs that the persons have about products and services are what makes up product and brand images that affect buying behavior.

Regarding the attitudes, this concept is defined as *"a person´s relatively consistent evaluations, feelings and tendencies towards an object or idea."* These attitudes emerge regarding religion, politics, clothes, food and many more things.

A company should try to link its products into existing attitudes instead of try to change attitudes, because changing attitudes is very difficult due to the difficult adjustments that a change in one attitude requires in other attitudes that a person usually has (Kotler et al. 2005).

2.3.3. Theory of Planned Behavior

The Theory of Planned Behavior (TPB) was developed by Azjen (1991) and its antecessor, the Theory of Reasoned Action was developed by Azjen and Fishbein (1980) and have been widely studied mainly in themes associated with personal and community quality of life.

The TPB is a theory of behavioral choice, in which the main focus is to predict the track a person will pursue according to what is available to that person (Jon Arnold et al. 2006).

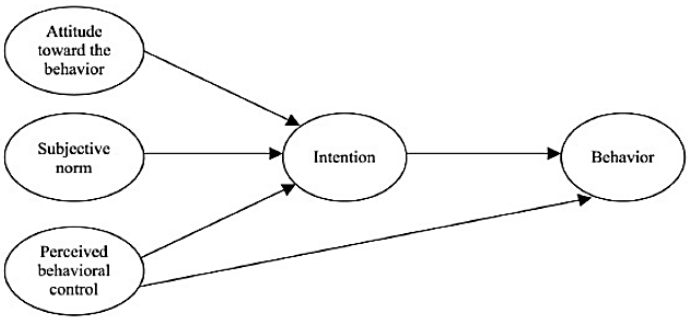


Figure 5: Theory of Planned Behavior (Azjen, 1991)

According to Azjen (1991), the Theory of Planned Behavior proposes that the three core elements of this theory that helps to predict intention are attitude, subjective norm (SN) and the person´s perceived behavioral control (PBC), and those three proposed elements were later confirmed in a meta-analysis (Armitage & Conner, 2001). According to this theory and the proposes of it, what takes people to have a certain behavior are the intention to perform that behavior, and how a person believes that the behavior is under his/her own control, which is defined as the perceived behavioral control (PBC).

The behavior is affected by PBC both directly and indirectly (through intention). Regarding the intention, this phase can be influenced not only by PBC but also by subjective norm and attitude toward the behavior.

Attitude is determined by the person´s beliefs about the outcomes of the behavior that is "on the table" to take, and the person´s evaluation of those outcomes, favorable or unfavorable.

Subjective norm is related with a person´s perception of what other´s think about that behavior in question, as well as the extent to which the person wishes to comply with the wishes of others (Azjen, 1991).

However, across the years, and as John Arnold et al (2006) describe in their article about this topic, there have been suggestions in order to extend the theory of planned behavior, by adding another variables. Usually there are two variables discussed to add to the theory, the first is moral obligation, or sense of duty, and the second variable is personal identity.

According to moral obligation, Kurland (1995) suggest that some behaviors have a moral dimension and are based on what a person feel as to be right and also what is attractive and feasible. The other extension is related to identity, and some researches cited by Arnold et al (2006) show that sense of identity is a possible cause that leads to the person´s behavior in question.

Some studies cited by the authors propose that people usually try to put their sense of self through their occupational choices, and therefore it is possible that person´s perceptions of their group-related characteristics are able to influence their behavior.

The figure below shows the Extended Theory of Planned Behavior, as john Arnold et al (2006) present.

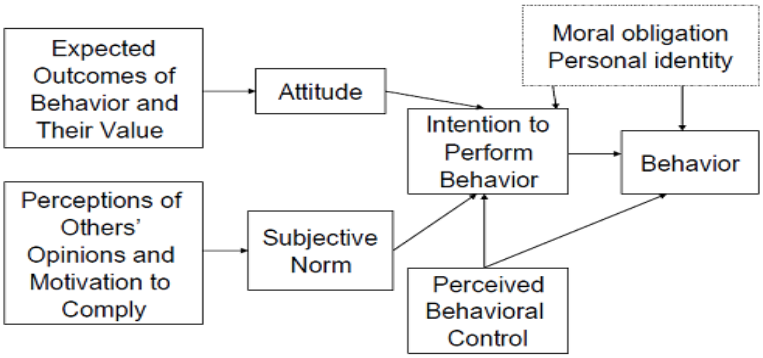


Figure 6: Extended Theory of Planned Behavior (Arnold et al. 2006)

In this chapter, an overview of the relevant themes for this dissertation such as Augmented Reality, CRM and Buying Behavior were described, and in the next chapter the methodology applied in the study is described, taking into account what is described in the literature review chapter, in order to be able to answer to the main research question and understand if the Augmented Reality technology can be an interesting component in the consumer´s buying process.

3. METHODOLOGY:

In this chapter, the methodology used in the research to reach the main goal of the dissertation is presented.

In this research, both primary and secondary data are used to develop the methodology. Primary data is collected through quantitative methods, more precisely through an online survey answered by the consumers. However, in order to develop the survey, secondary data is collected to be possible to develop the hypothesis to study.

Methodology's first step is to develop a model based on secondary data presented on the previous chapter, collecting the characteristics of Augmented Reality, the CRM objectives and the Consumer Buying Process, which help to formulate the hypothesis to be studied, and further questions that will be answered by the customers.

After the development of the model, the hypotheses are presented and the survey is developed to be answered by the consumers. The details are explained further on the methodology.

The first step in the survey is to make a pre-test version with a small group of respondents in order to validate the questions of the survey, and after the pre-test and its analysis, the final survey is developed to a larger audience and is available to answer.

Finally, the data collected in the survey is analyzed and treated to present the results achieved.

To reach the purpose of this research (verify if augmented reality can be interesting for consumers and in consumers buying process) the aspects that are studied are: to understand how consumers view and react to the commodity/convenience of the AR applications used in the research; verify if the possibility of interaction with the virtual object through AR create favorable attitudes towards the products; and explore different consumer choices in the different applications, namely when they face discount opportunities.

3.1. The Model:

As mentioned before, the first step to develop the methodology is to create a model in which the researcher can formulate the hypothesis to study and the questions that will be further directed to consumers.

This model is based on what is already described in the literature review chapter, taking relevant characteristics, advantages and disadvantages of the technology and processes described before. After joining these aspects, the hypotheses to be studied are presented, and the questions to ask to the customers emerge from these hypotheses, in order to achieve the final goal and the purpose of this research, answering the research question.

The first task of the model is to write down the main characteristics of the Augmented Reality technology, CRM and Buying Process, taken from the literature review in order to establish the hypothesis.

By taking the characteristics of the three main themes of this dissertation to form the model, it is also important to understand the contributions of each dimension to answer the main research question.

First, the Augmented Reality characteristics give a great contribution once they allow understanding if the consumers are familiarized with the technology and what are the characteristics that give them high value when using AR, which contributes to understand if the technology is interesting for the consumers.

Second, the Customer Relationship Management objectives allow understanding and analyzing if the campaigns and applications used in the research are a differentiating factor in the market, and if they can create a connection between the company and the consumer. This dimension of the model is very important once it permits to verify the real use of the AR technology in the applications and campaigns, and the interest and willing of the consumers in participating in the campaigns and use the applications, being part of their Buying Process.

Finally, by analyzing the previous two dimensions of the model, it is possible to understand where, when and in which phase of the Buying process the consumer can use the AR technology, being an interesting factor for them in this process.

3.1.1. AR Characteristics

Following the literature review, the various characteristics of the AR technology collected and presented by some authors are now summarized in the first step of the model.

First, as Azuma (1997) and Iordache and Pribeanu (2009) present, with Augmented Reality, the user can interact, hold, touch and manipulate a real object, being able to view a new reality with virtual objects superimposed, providing information that consumers cannot see with their own senses. This is basically translated in three main characteristics found by the authors, which are **combine real and virtual** environments in **3D**, **register** the content in **3D** and **interact in real time**.

According to Keally and Scott-Yong (2006), apart from track the object and match the real and virtual, AR systems also perform the **inform** function, providing the information about a specific event in the best way for consumer.

Further on the literature review, the mobility and outdoor possibilities for Augmented Reality technology are addressed. What is verified in the recent years is that AR is now working in indoor and outdoor environments, and is becoming mobile everywhere through the new display devices available in the market such as mobile phones (Azuma, 1999; Biocca et al, 2007; El Choubassi & Wu, 2010; Hallaway et al. 2004). In summary, this situation adds the characteristics to the technology: **mobility; portability; and commodity.**

Finally, as it was previously referred, this is a recent technology available to the mass public, and AR market is now growing and starting to become more familiar to the consumers, as Rachael King (2009) and Perey (2001) presents in their articles. This leads to a particular characteristic that is the **novelty** of Augmented Reality technology for consumers.

3.1.2. CRM Objectives

According to the CRM objectives and characteristics, by the definitions described on the previous chapter, CRM is a management tool focused on the customers, particularly in **develop** and **retain** customers, through **increased satisfaction** and **loyalty** (Walton & Xu, 2005).

From the point of view of Buttle (2004), CRM has the objective of **collect** new clients and **maintain** the existing clients, which allow creating higher value added for the clients than the competitors. This author also states that CRM is a management tool that through **storing client's data** is able to help generating competitive advantages, through the market segmentation.

Other authors also add that another objective is to assure the **higher profitability** from these relationships with clients (Zablah et al. 2004).

3.1.3. Consumer´s Buying Process

Finally, according to Consumer´s Buying Process, as S.Ratneshwar and David Glen Mick (2005) state, this process is divided in six phases – Problem Recognition; Information Search; Consideration Set Formation; Evaluation of Alternatives; Choice and Post-Choice – which are affected by many factors leading to the consumer´s final decision (Kotler et al. 2005).

The table that is now presented is a summary of all the characteristics described before.

What is intended with this model is to try to understand if the AR technology is already familiarized within the consumers, understanding which are the characteristics most valued by them, the characteristics that make them use this technology, and finally understand if the campaigns made by various brands create or not interest in the consumer, being used in a strategic way, differentiating these brands from their competitors. These aspects will be key-points to understand if the AR technology is interesting to the consumers and how it can be an element in their buying process.

Augmented Reality	**CRM**	**Buying Process**
Combine real and virtual in 3D	**Create, develop** and **improve** relationships with clients	Problem Recognition
Register in 3D	Increase **satisfaction** and **loyalty**	Information Search
Interact in real time	Create **higher value added**	Consideration Set Formation
Inform	Higher profitability	Evaluation of Alternatives
Mobility	**Store** clients information	Choice
Portability		Post-Choice process
Commodity		
Novelty		

After the analysis of the main characteristics, the next step is to formulate hypothesis, according to the main objective of the research. The hypotheses are formulated and then, they are confirmed or denied by the answers to the questions made in the survey for the consumers.

3.2. Hypothesis Formulation

As mentioned before, the purpose of this research is to verify if augmented reality can be interesting for consumers and consumers buying process. To answer this question, after summarizing the characteristics of the main themes, the hypotheses to test in this research are now developed and explained.

To form the hypothesis, the characteristics described in the model are taken in account. First, it is taken in account the novelty characteristic of a new technology like AR trying to understand how the consumers see it and feel about it. Posteriorly it is analyzed the interactivity of this technology, understanding how the interaction between consumers and the applications affect their interest and willing to use this technology on their lives and Buying Process. After this, it is important to understand how the AR technology and the applications are presented to the consumers, taking from the model the interactivity, commodity, portability and mobility characteristics, it is intended to understand if the technology and applications present its content in a way that is easy and comfortable to the consumer, which can have impact on consumers interest to use this technology. Another important issue is to understand how the companies can approach the consumers, what kind of campaigns can be made, and what kind of characteristics do the customers' value most in the AR applications. Finally, taking the CRM objectives from the model, it is important to understand in which way the companies and customers can be connected to each other, and if this connection can be maintained in the future.

Having all this in account, the hypotheses are now presented and explained:

H1: The factor Novelty creates attention and curiosity to consumer – this hypothesis is developed to help understanding if a recent technology like AR is already familiar in the mind of the consumers, and if they are available and willing to use it. This helps to understand if this technology can be interesting for the consumer because if it is verified it means that the consumers are open to include it on their daily life, and consequently on their buying process when they go shopping.

H2: The interactivity of the AR systems creates favorable attitudes on consumers – Through the interactivity, the consumer is directly connected to the content of the AR applications, which can be able to lead to a higher interest in the utilization of this technology, and in the participation of campaigns made by the brands, increasing the interest for the consumers in the buying process.

H3: The AR technology presents the content in a convenient and comfortable way for the consumer – If this hypothesis is verified, by presenting the content in this way it is expectable that the users feel more willing to use the technology more often and making part of their buying process.

H4: The consumers prefer applications that generate rewards and fun – the purpose of this hypothesis is to verify which characteristics are more valued by consumers in the applications, trying to understand which can be the companies' best approach to present this technology to consumers, being more interesting for them and being entertaining and a differentiator factor for their buying process.

H5: Through the interactivity of the applications a connection between the consumer and the brand is created – having interactivity between the consumer and the applications content, this hypothesis try to verify if the user feels connected to the brand and if he/she would use the applications again and participate in campaigns made by the brand, which would allow the user to use this technology in the buying process, and would translate in an efficient CRM practice through this technology, being able to collect, keep and retain consumers.

In a nutshell, the hypotheses studied to contribute to the final objective of the research are:

H1: The factor Novelty creates attention and curiosity to consumer
H2: The interactivity of the AR systems creates positive attitudes on consumers
H3: The AR technology presents the content in a convenient and comfortable way for the consumer
H4: The consumers prefer applications that will generate rewards and fun
H5: Through the interactivity of the applications a connection between the consumer and the brand is created

The study of these hypotheses through the survey, permits to reach the final objective of the research, answering the main research question that is: Can Augmented be an interesting component in the consumers buying process?

If these hypotheses are confirmed, then it is possible to say that this technology is interesting for the consumers as well as in their buying process and it is possible to understand how brands can approach the clients in a strategic way through the AR applications and CRM techniques.

After developing the hypothesis, the questions presented in the pre-test survey to a small group of people are developed in a way that connects the questions to the hypothesis previously established.

For a better understanding of the connection between the questions and the hypothesis, and what they test, a pre-test is made and the set of final questions asked to the consumer in the main survey is now presented, already with the pre-test feedback and having in account each one of the hypothesis separately:

The first two questions are about the age and gender of the respondents, so, they are not directly connected to the hypothesis.

1 – What is your age?

. 1 to 14 years

. 15 to 24 years

. 25 to 34 years

. 35 to 44 years

. 45 to 54 years

. More than 54 years

2 – Gender:

. Feminine: . Masculine:

H1: The factor Novelty creates attention and curiosity to consumer.

3 – Have you ever heard about Augmented Reality technology?

Yes: No:

4 – Have you ever tried any application?

Yes: No:

5 – Would you install on your mobile phone/computer an application so you can take advantage of Augmented Reality?

Yes: No:

6 – Being a technology that has been growing, the novelty of this technology by itself creates interest in using and learn more. Please classify this statement on a scale from 1 (strongly disagree) to 6 (strongly agree).

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

H2: The interactivity of the AR systems creates favorable attitudes on consumers.

7 – If you already tried Augmented Reality, please indicate on a scale of 1 to 6, what is the degree of satisfaction obtained with this type of interaction?

.Very unsatisfied .Unsatisfied .Quite unsatisfied .Quite satisfied .Satisfied .Very satisfied

9 – After viewing the images, what do you feel about the virtual interaction/involvement with the product/campaign? Please classify this statement on a scale from 1 (strongly disagree) to 6 (strongly agree).

Uninteresting

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Unrealistic

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Useful

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Funny

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Appellative

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Difficult to use

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Other:

10 – On a scale from 1 (strongly disagree) to 6 (strongly agree), the interaction and experimentation (virtual) of a product before the final purchase decision is revealed:

Convenient

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Attractive

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Informative

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Funny

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Insignificant

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

H3: The AR technology presents the content in a convenient and comfortable way for the consumer.

8 – On a scale of 1 (Very hard) to 6 (Very easy), indicate the degree of ease that this type of technology provides:

.Very hard	.Hard	.Quite hard	.Quite easy	.Easy	.Very Easy

10 – On a scale from 1 (strongly disagree) to 6 (strongly agree), the interaction and experimentation (virtual) of a product before the final purchase decision is revealed:

Convenient

.Strongly disagree	.Disagree	.Disagree somewhat	.Agree somewhat	.Agree	.Strongly Agree

Attractive

.Strongly disagree	.Disagree	.Disagree somewhat	.Agree somewhat	.Agree	.Strongly Agree

Informative

.Strongly disagree	.Disagree	.Disagree somewhat	.Agree somewhat	.Agree	.Strongly Agree

Funny

.Strongly disagree	.Disagree	.Disagree somewhat	.Agree somewhat	.Agree	.Strongly Agree

Insignificant

.Strongly disagree	.Disagree	.Disagree somewhat	.Agree somewhat	.Agree	.Strongly Agree

H4: The consumers prefer applications that generate rewards and fun.

(Example) Goldrun (H&M; Nike) – Allows, through your smartphone and AR technology, to participate in promotional campaigns of some brands, in various points of the map previously stipulated

11 – Which of these characteristics would lead you to use any of the presented applications? (Please choose a maximum of three)?

. Convenience
. Possibility of discounts
. Fun/Entertainment
. Quality of presentation
. Novelty
. Being closer to reality
. Other:

12 – After viewing the images, which of the application seemed to be more interesting/advantageous?

. Zugara
. StyleMe
. Montras de RA
. Goldrun
. Tissot

H5: Through the interactivity of the applications a connection between the consumer and the brand is created.

(Example) Tissot Reality (Tissot touch collection) – Allows the consumer, through a computer and a printed paper bracelet available on the website, to check on your own pulse the collections of Tissot watches.

13 – If you were in any of the presented situations (of the images), what would you feel relating to the brand?

Please answer on a scale from 1 (strongly disagree) to 6 (strongly agree).

Distance

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Connected (to the brand)

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Trust

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Valued (by the brand)

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Motivation

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

Other:

14 – Please classify this statement on a scale of 1 (strongly disagree) to 6 (strongly agree):

The utilization of these applications can be a key-element for future purchases.

.Strongly disagree .Disagree .Disagree somewhat .Agree somewhat .Agree .Strongly Agree

3.3. Survey Methodology

This research has the final objective of understand if the Augmented Reality technology can be interesting for consumers and its buying process, and which are the best approaches by the companies to the consumers through this technology. To understand this, a pre-test is firstly made to a small group of people in order to validate the survey questions previously developed, and then a quantitative research approach is taken and is developed through an online survey, directed to a large number of consumers.

The main purpose of the pre-test and the survey is to understand if consumers are familiar to the Augmented Reality technology and its applications, and also the possibilities they can have with it, in order to verify or deny the hypothesis established, that will further give the answer to the main research question.

3.3.1. The Pre –Test

The designed pre-test is a web-based interview made by video-call to a small group of people, where the survey questions initially developed are exposed and the images of the applications are shown. The purpose of this pre-test is to understand if the respondents perceive the questions in the correct way according to the purpose of this study.

3.3.2. The Pre-Test Sample

As mentioned before, the pre-test is made to a small number of respondents and it is performed in order to understand if the questions previously developed are well perceived by the respondents or if they need any adjustments according to the answers of the pre-test.

The number of people who took part on the pre-test is 10 and all of them answered the questions through a video-call interview. Their ages are between 20 and 34 years old. According to the pre-test survey, 60% of the respondents are women and 40% and men.

3.3.3. Pre-Test Results

In this section the pre-test results are presented and analyzed.

Analyzing the interviews, what is possible to say is that the majority of the respondents (8 out of 10) already heard about Augmented Reality technology, only two of them never heard about it. However, all of the respondents showed available and interested in learning more about it and even start using it on their smartphones or computers.

When people see the images of the applications, everyone showed positive attitudes (happiness, interest, smile, curiosity) about this new way of promoting brands and shopping, and also about the interaction and entertainment that is possible with this technology.

The limitation with this pre-test is that the people who have never tried any application and had no knowledge of this technology, they are answering the questions only based on what they see and feel about the images of the AR applications studied, while the respondents that already tried some kind of applications are able to give more precise answers, answering not only based on what they see and feel about the images but also on what they have experienced before with this technology. This situation can be perceived as a little obstacle to the real results and real opinions about this technology, but, according to all the respondents, by presenting the images and sequences of images showing how the applications work is the best way to present the technology in the main survey to the larger audience. The respondents when questioned about if the applications must be presented with images or videos, all of them said the best way is to present the applications through images in the survey, once they do not want to spend a lot of time making a survey and have to watch videos to answer the questions.

As a conclusion, even with a small sample of 10 people, the interviews made and the respondents' answers both reflected a positive understanding and positive feedback about the questions developed in this study, however, they also helped to make some changes in the attributes presented in the questions to improve the survey. The changes were made on the question 7 and 11. On the question 7, one attribute (difficult to use) was added to the previous attributes (uninteresting, unrealistic, useful, funny and appellative) following the suggestion of 2 of the respondents who felt that this technology and the applications could be difficult to use.

On the question 11, the attributes "distrust" and "approximation/approach" were taken out and were replaced by the attributes "connected (to the brand)" and "valued (by the brand)", because it would not make sense to have in one question attributes that are opposites like "distance" and "approximation/approach", or "trust" and "distrust". With these changes, the attributes that are presented in the survey are: distance, connected (to the brand), trust, valued (by the brand), motivation, and the option other to give the possibility to the respondents to write other feelings they can have relating to the brand when they put themselves as the users of the applications presented.

A great part of this small group (80% of the respondents) is familiarized with the AR technology, and showed favorable feelings and attitudes about the interaction with the products and campaigns through this new technology, and new way of presenting content, being all of the respondents available and interested in using this technology to take advantage of the possibilities it can bring them. However, there are still doubts when the question is about the characteristics that would lead them to use the AR applications, being fun/entertainment, convenience and the possibility of having discounts very close to each other in the choices of the respondents. This question can be further analyzed in the survey, where the sample and the number of answers is much bigger than the pre-test sample, allowing to eliminate the doubts and state more precise analysis and conclusions about it.

As it was said before, the purpose of this pre-test is to understand if the respondents understand the questions in the right way and if the initial questions needed any modification. After this pre-test, some attributes initially stated in the questions were changed, as it is presented above, and the survey questions already corrected with the changes are the questions previously presented in the methodology.

3.3.4. The survey

The designed survey is a web-based survey, spread through the Internet on Facebook and through emails.

The survey uses a six point balanced Likert scale in order to have positive or negative answers, avoiding the neutral point of the five point Likert scale, making the indifferent respondents answer for one side or another. The use of a six point Likert scale instead of a four point Likert scale is based on a study of Carolyn C. Preston and Andrew M. Colman (2000), which shows that the reliability was higher for six point than four point scales, as well as the validity and discriminating power. According to the authors, scales with small numbers of response are generally less valid and less discriminating than scales with more response categories. Another reason to use a six point scale is because short scales like the four point scales proved to be unfavorable, not allowing the respondents to express their feelings adequately. Finally, according to the authors, the six point scale is the most valid and discriminating scales (Preston and Colman, 2000).

When developing the survey, the randomization option is used in some of the questions, allowing the attributes to be shown in a different order to each respondent, and not presenting attributes in a specific order like the negative attributes first and positive attributes after.

The survey contained some conditions in the questions made in order to make the respondents answer the questions that match with their profiles. It is also used the randomization option for the questions that present attributes in order to appear differently to each consumer, not appearing the negative attributes first and the positive attributes next in the question. This randomized presentation of the attributes is made in order to avoid biased answers.

3.3.5. The survey sample

The web based survey was designed to a general audience, through the Internet, via Facebook or emails. One limitation of this situation is that only a person who has internet is able to respond and be part of this survey.

The survey was exposed to approximately 380 people and was viewed by 219 people. From the total group of persons who viewed the survey, 178 of them started the survey, from which 150 completed it and 28 dropped out after start. From the 150 respondents who completed the survey, their ages are comprised between 15 and 54 years old, being almost 70% (104 out of 150 respondents) people between 15 and 24 years old, and around 21% of the respondents are in the group range of 25 to 34 years old, which means that almost 91% (90,66%) of the sample is composed by young people (Table 1). According to gender, 74% of the respondents are men and 26% are women (Table 2).

From this point on, the number of respondents that is taken into account is the 150 respondents who completed the survey.

3.3.6. The survey results

The survey answers collected help to find and describe the results to reach the final conclusions in order to answer the research question.

The analysis is made connecting the questions to the hypothesis individually, being able to confirm or deny each hypothesis to reach further conclusions.

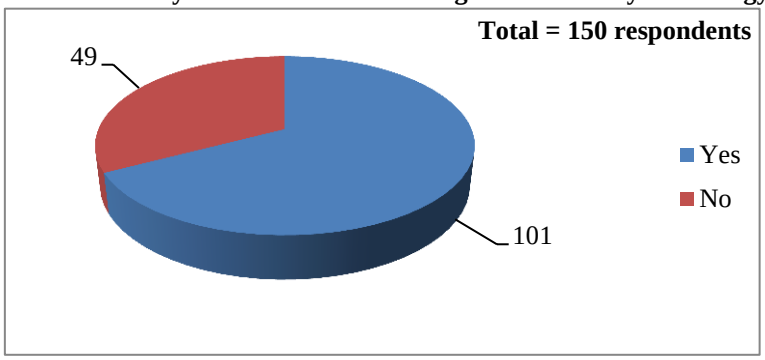
H1 - The factor Novelty creates attention and curiosity to consumer.

The first hypothesis about the novelty of the AR technology evolves the questions 3, 4, 5 and 6.

Q3: Have you ever heard about Augmented Reality technology?

Analyzing the results, 101 respondents (around 67%) of the respondents already heard about AR technology and 49 (33%) are not familiar with this technology (Exhibit 1). With this data, it is possible to conclude that this technology is already known by a great majority of the respondents.

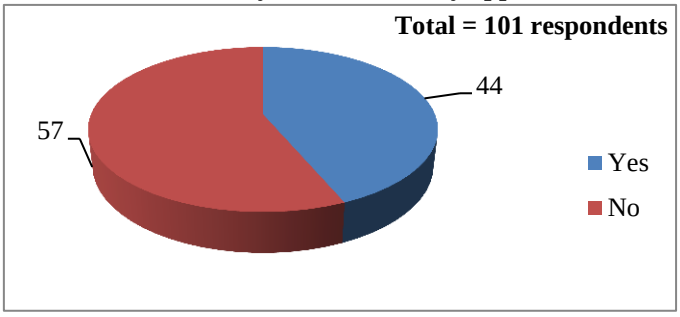
Exhibit 1: Have you ever heard about Augmented Reality technology?



Q4: Have you tried any application?

From the 101 respondents who answered positively to the previous question, 44 of them tried an Augmented Reality application and 57 did not try any application (Exhibit 2). This shows that this technology is familiar to the persons but as it is a new technology and it is not yet much disclosed many people did not tried yet the possibilities that Augmented Reality can bring to them.

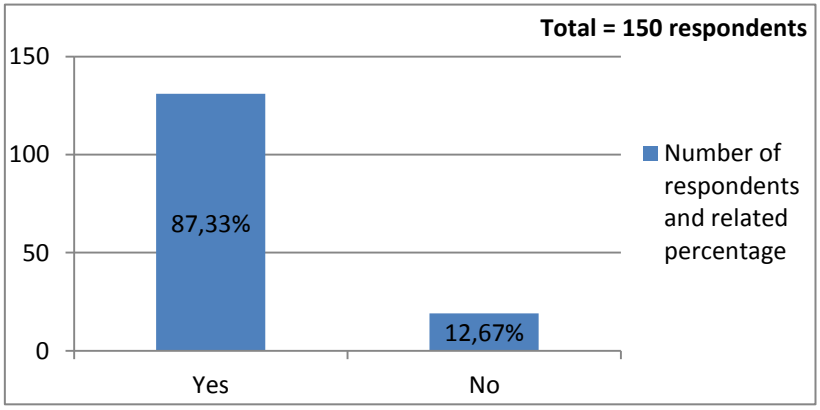
Exhibit 2: Have you ever tried any application?



Q5: Would you install on your mobile phone/computer an application so you can take advantage of Augmented Reality?

From all the 150 respondents, even without trying or hearing about the AR technology, around 87% (131) of them said that they would install an application in order to take advantage of this technology and only 13% are not interested in installing any application (Exhibit 3). This means that the respondents are totally open and available to at least have the possibility to being able to try Augmented Reality and its possibilities.

Exhibit 3: Would you install on your mobile phone/computer an application so you can take advantage of Augmented Reality?

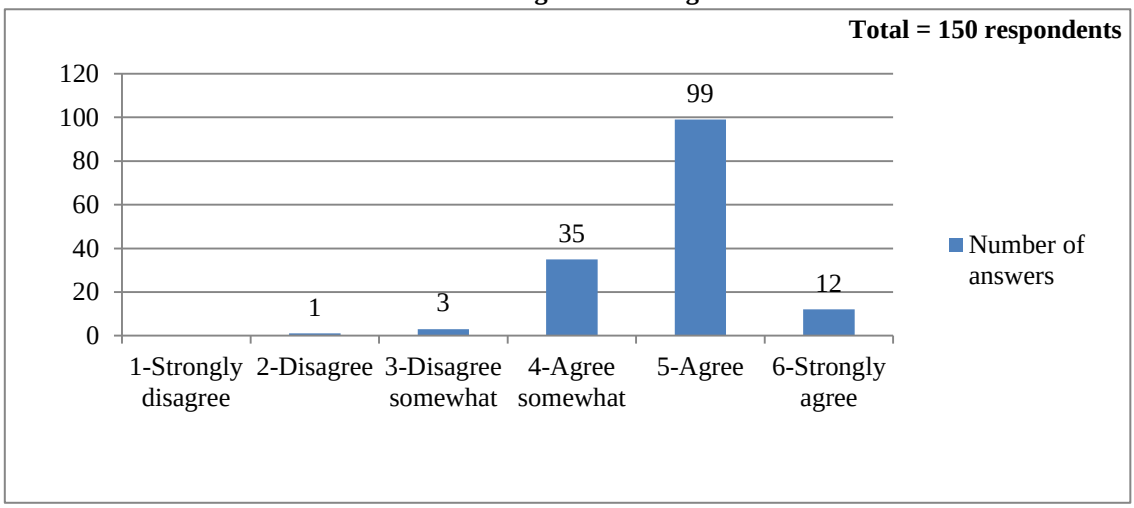


Q6: Being a technology that has been growing, the novelty of this technology by itself creates interest in using and learn more. Please classify this statement on a scale of 1 (strongly disagree) to 6 (strongly agree).

About the novelty of the AR technology, the majority of the inquired agree that novelty is an important factor to create interest in use and learn more about the technology. From the 150 respondents, 4 of them are not in concordance with the statement, and the others showed to be in concordance with the statement, where 23.33% agree somewhat, 66% agree and 8% strongly agree that novelty is an important factor and create interest in the consumer (Exhibit 4). Overall results for this question show an average result of 4.787 out of 6 points (Table 6), which is very positive for the analysis and it is possible to state that novelty is indeed an important factor for the interest of the consumer.

The answers to each one of these four questions are definitely favorable to the research and allow the confirmation of the first hypothesis that stated that the novelty of the AR technology creates interest and curiosity in the consumers once the respondents are familiarized and available to try this technology and also confirming that the novelty is an important factor that makes them want to learn more about the technology.

Exhibit 4: Being a technology that has been growing, the novelty of this technology by itself creates interest in using and learning more.



H2: The interactivity of the AR systems creates favorable attitudes on consumers.

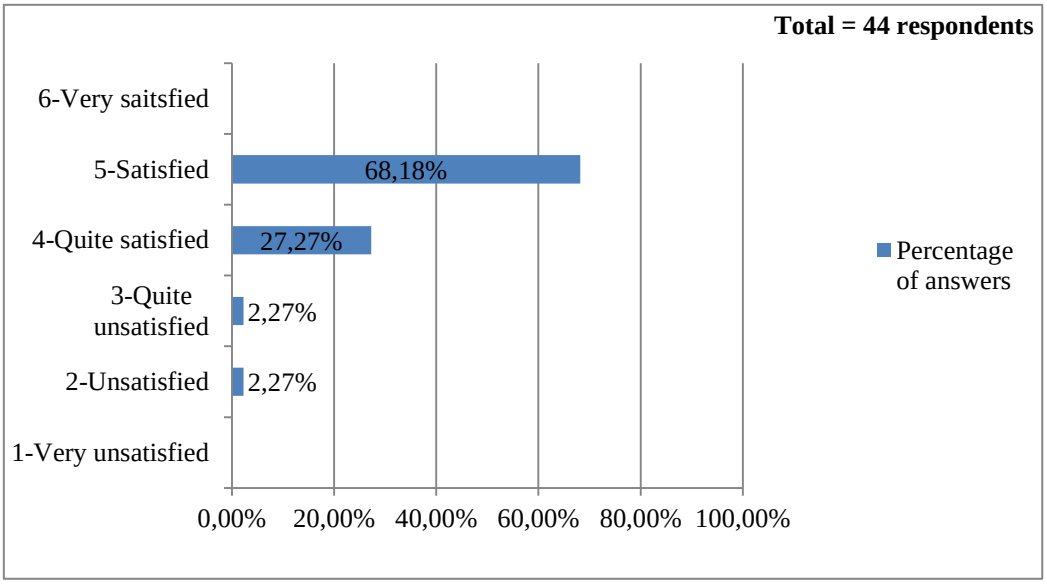
The questions number 7, 9 and 10 are the questions that allow taking conclusions about the second hypothesis.

Q7: On a scale if 1 (Very hard) to 6 (Very easy), indicate the degree of ease that this type of technology provides:

This question can only be answered by those respondents who already tried Augmented Reality and according to the survey results, from the 44 respondents who already tried Augmented Reality, 30 of them (68,8%) are satisfied and 12 (27,27%) are quite satisfied with the applications, and only two respondents show negative attitudes, being unsatisfied and quite unsatisfied (Exhibit 5). The overall results show an average score for this question of 4.614 out of 6 points (Table 7), mainly due to the approximately 95% of positive answers.

With these answers, it is possible to conclude that AR technology is user friendly, which leads to consumers' positive attitudes about the interactivity that this technology and the applications can provide.

Exhibit 5: Degree of satisfaction obtained from the people who already have tried Augmented Reality.



Q9: After viewing the images, what do you feel about the virtual interaction/involvement with the product/campaign? Please answer this question on a scale of 1 (strongly disagree) to 6 (strongly agree): uninteresting; unrealistic; useful; funny; appellative; difficult to use.

For all the 150 respondents, after viewing the images presented in the survey, the great majority show positive answers relating to the virtual interactions with products or campaigns, agreeing that the interaction is very interesting, appellative, funny and useful, even being a little bit unrealistic but it seems also easy to use for the majority of the respondents (Exhibit 6 and Table 8).

According to the answers presented both on Exhibit 6 and Table 8, about 90% of the respondents disagree and strongly disagree that this virtual interaction is uninteresting, with an overall average score of 1.800, showing that the interaction provided by this technology and applications is interesting for the consumers.

Concerning the realism or unrealism of this interaction and involvement with the products and campaigns, here the answers are more spread, where 36% of the 150 respondents disagree and almost 35% disagree somewhat about the unrealistic attribute. There are 27 respondents who agree somewhat that this interaction is unrealistic and only 5 respondents agree (4) or strongly agree (1) that this technology provides unrealistic interactions with products/campaigns.

About the usefulness of these interactions, from the 150 complete answers, 142 respondents answered positively to this attribute, from which 93 respondents agree, 31 agree somewhat and 18 strongly agree that the interaction and involvement with a product or campaign through Augmented Reality is useful. The overall average result is 4.787 which show the great number of positive answers relating to the usefulness of the involvement with products or campaigns.

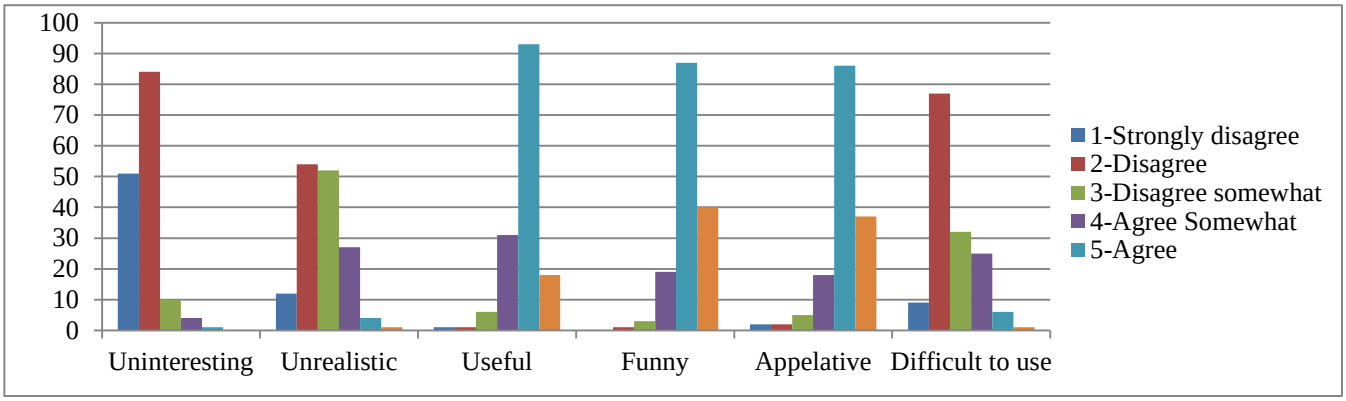
There is also an entertainment side in these interactions with the products through Augmented Reality, which is confirmed by the 146 respondents that give positive answers when asked if the interaction/involvement with a product/campaign is funny. From all the respondents who completed the survey, 40 of them (26,67%) strongly agree that the interaction through AR is funny, 58% agree with it and 12.67% agree somewhat. Only 2.67% of the respondents answered negatively to this attribute. The average score for this attribute is 5.080 which show that the respondents feel that the AR applications can bring fun to their buying process.

When asked if the involvement is appellative, the results show also very positive outcomes, being 141 respondents giving positive answers about it. The answer commonly given by the respondents (57.33%) is that they agree that the involvement with the products/campaigns is appellative, and only 9 respondents showed negative feelings about this characteristic. Overall mean is very close to 5.000 out of 6.000 which is a result of the very positive answers given.

Finally, about the difficulty or ease to use, the answers were also positive for the research, being 51.33% of the respondents disagreeing that the interaction with product/campaign through the applications is difficult to use and 32 respondents disagree somewhat. However, there is a significant number of respondents (25 out of 150) who somewhat agree that this technology is difficult to use when interacting with products or campaigns.

Overall results about the attributes studied for this question, showed positive outcomes for the research where the great majority of respondents always answered and contributed positively to the research, stating that the interaction/involvement with the products/campaigns is funny, interesting, appellative, easy to use, useful and kind of realistic.

Exhibit 6: After viewing the images, what do you feel about the virtual interaction/involvement with the product/campaign? (Absolute values)



Q10: On a scale from 1 (strongly disagree) to 6 (strongly agree), the interaction and experimentation (virtual) of a product before the final purchase decision is revealed: convenient; attractive; informative; funny; insignificant.

The respondents also agree that the interaction and experimentation of a product before the final purchasing is a very important factor relating to the applications presented to them, revealing that it is very funny and attractive to be able to interact with campaigns and try a product before buying, being also convenient and informative. This interaction/experimentation is definitely not insignificant for the consumers (Exhibit 7 and Table 9).

Analyzing the attributes in a more detailed way, when talking about the convenience of the interaction and experimentation of a product before the buying decision, 96% of the 150 respondents showed positive answers about the, from which the majority (101/150) agreed that this possibility is very convenient to them and only 5 respondents answered negatively to this attribute.

About the attractiveness of the experimentation and interaction before buying, 147 respondents answered positively, being 32 of them answering that they strongly agree with the attractiveness and 96 agree with it. No one disagreed or strongly disagreed with this attribute, being only 3 respondents saying that they somewhat disagree with the attractiveness of trying a product through an AR application before the final purchasing decision. These strongly positive results are shown by the total average score of 5.047 out of 6 points.

When the question relates to the information that the interaction and experimentation brings to the consumer, the majority of the inquired (47%) say that they only agree somewhat and almost 40% agreed that it can be a source of information. These answers are still positive to the research. However, the experimentation through these applications before buying may not be such an informative tool for the consumers.

The interaction and experimentation is also considered to be funny. From the 150 respondents, 145 answered positively, being the majority of them (98) saying that they agree that it is funny to try a product before buy with Augmented Reality technology. Only 5 respondents did not think in the same way, saying that they disagree or somewhat disagree with the funny attribute.

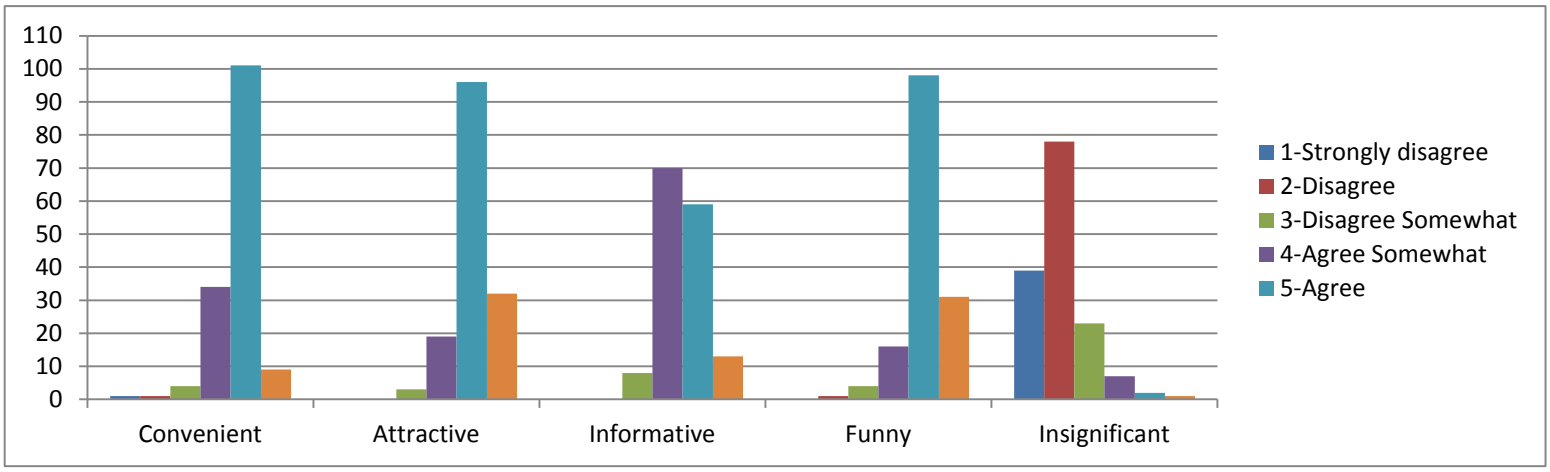
Finally, 140 people answered that the possibility to interact and try a product before the purchasing decision is not at all insignificant, in which 39 strongly disagree, 78 disagree and 23 disagree somewhat. From the 150 completed surveys, only 10 people answered that this possibility can be insignificant, in which 7 people agree somewhat with this statement, 2 agree and 1 strongly agree. However, the results are very positive to the research, with an overall average score of 2.053 out of 6 points, which shows that the majority of respondents confirming that it is significant for them to have the possibility to try first the products, even being virtually, and then decide if they buy or not those products.

With this question it is possible to understand that the possibility to interact and try the products through the Augmented Reality applications has a positive impact on the consumers, and is important for them, being significant, funny, attractive, convenient and also informative.

With the analysis to these three questions, it is possible to understand that the consumers perceive the AR technology as being user friendly, the interaction/involvement with products/campaigns is important because it is funny, interesting, appellative and useful, bringing something new to their buying process and finally it is possible to understand that the experimentation of a product before the final purchase decision is important and it is an advantage for the consumers.

With these conclusions, it is now confirmed the second hypothesis of this study about the positive attitudes that consumers show relating to the interactivity of the AR systems and applications.

Exhibit 7: The interaction and virtual experimentation of a product before the final purchase decision is: (Absolute values)



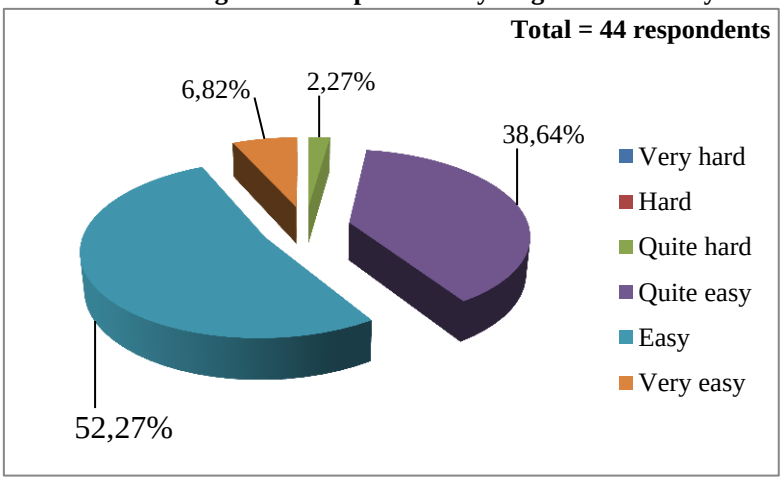
H3: The AR technology presents the content in a convenient and comfortable way for the consumer.

According to the convenience and the way this technology presents the technology, the respective survey questions are the questions 8, 9 and 10. Once again, the results show up positive and satisfactory.

Q8: On a scale of 1 (very hard) to 6 (very easy), indicate the degree of ease that this type of technology provides:

From the 44 respondents who have tried an AR application before, only one feels that the technology is quite hard to use. The majority of the respondents feel that this technology is quite easy (38.64%) or easy to use (52.27%) with an average score of 4.636 out of 6 points (Exhibit 8 and Table 10).

Exhibit 8: Degree of ease provided by Augmented Reality.



Q9 and Q10:

In these questions, for the analysis of this hypothesis, the focus is only on 3 of the attributes presented. On question 9 the focus is on the "difficult to use" attribute, and on the question 10, the attributes to focus are "convenient" and "informative". After the visualization of the images presented on the survey to all the 150 respondents, they felt it is easy to use (Table 8) and also agree that the interaction with a product before the final purchase decision is convenient (67.33%) and informative (142 respondents answered positively) (Table 9), being comfortable for the consumers. By being informative, and easy to use, it is also a way to show that the way the content is presented is convenient to the consumer.

With the analysis to these questions, what is possible to see is that the consumers who already tried an AR application found it easy to use, and after the presentation of the images to all the consumers, they feel that this technology must be easy to use and the interaction with a product before buying is convenient and informative.

With the conclusions presented above, the third hypothesis is confirmed and it is possible to say that this technology presents the content in a convenient and comfortable way to the consumer, which makes it easier to be introduced and used in their buying process.

H4: The consumers prefer applications that generate rewards and fun.

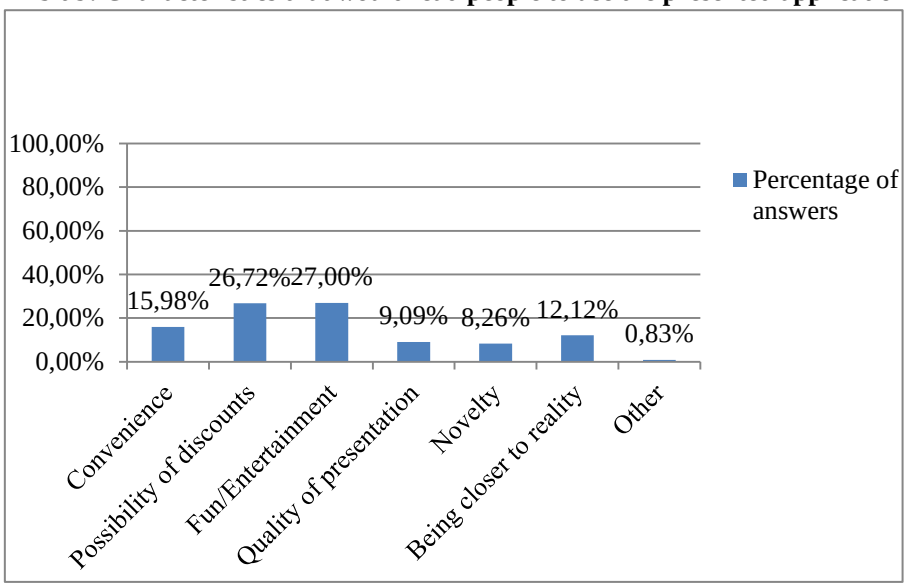
To study this hypothesis, questions 11 and 12 are now analyzed. In what concerns the fourth hypothesis, this is the hypothesis where the pre-test interviews did not show clear answers, being the characteristics of convenience, possibility of discounts and fun/entertainment revealed to be very close to each other in the opinion of the consumers.

This question is now clarified with the web survey, where the sample is much bigger than the pre-test and where the consumers after seeing the images of the AR applications presented, can choose up to three characteristics that would lead them to use any of the applications presented.

Q11: Which of these characteristics would lead you to use any of the presented applications? (Choose a maximum of three characteristics).

According to the H4, it is stated that consumers prefer applications that generate rewards and brings fun to their experience. The answers revealed very interesting results and clarified the doubt created in the pretest. From the 150 consumers, there are 363 choices of characteristics and the main characteristics that the consumers consider as making them use the applications presented are fun/entertainment (27% of the 363 choices) and the discounts possibility this technology can bring (26.72%). The third characteristic that consumers valued more is the convenience that the AR technology and applications can bring (15.98%). Some consumers (3 out of 150) also state other reasons that could make them use Augmented Reality, such as saving time (which can be included in the convenience), filtering products, designing and use for simplified services (Exhibit 9).

Exhibit 9: Characteristics that would lead people to use the presented applications.

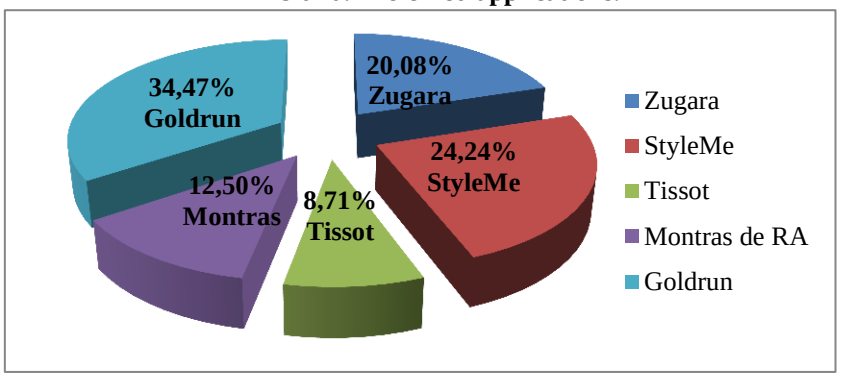


Concluding the analysis to this question, it is now possible to state the two main reasons for using the applications presented in the survey, and clarify the doubts created on the pre-test. For the consumers, the first main reason to use the AR applications is for fun/entertainment, and the second main reason is to take advantage from the discount possibilities that the applications presented in the survey are able to provide.

Q12: After viewing the images, which of the applications seemed to be more interesting/advantageous? (Please choose a maximum of two applications).

Analyzing this question, all the 150 respondents give 264 answers, once they could chose up to two applications. The applications preferred by the consumers are Goldrun (which includes both fun and possibility of discounts), collecting 34.47% of the 264 answers, and the other two applications preferred are Cisco StyleMe (24.24%) and Zugara (20.08%), which can be not only fun and entertaining, but also very convenient applications (Exhibit 10 and Table 12). These answers are coherent with the previous question about the characteristics that would lead consumers to use the applications.

Exhibit 10: Preferred applications.



Concluding the study of the fourth hypothesis, with all the answers given by the consumers, being fun/entertainment and the possibilities of discounts the main reasons that would lead them to use an AR application, and being Goldrun the application preferred by the consumers, it is possible to confirm that the consumers prefer applications that can generate rewards and fun to their buying process.

H5: Through the interactivity of the applications a connection between the consumer and the brand is created.

To conclude the analysis of the survey, the answers to the questions directed to the final hypotheses are the questions 13 and 14, which are made to understand if the interactivity of the applications creates a connection between consumers and brands.

Q13: If you were in any of the presented situations (of the images), what would you feel relating to the brand? Please answer on a scale of 1 (strongly disagree) to 6 (strongly agree).

When placing the consumers as the users of the applications presented, the group of respondents also showed positive answers relating to their feelings with the brand, agreeing that they feel to be closer to the brand (54% of the 150), valued by and connected to the brand (51% and 62%). The consumers also agreed that they feel motivated with the brand when positioning in the users place (62% of 150).

The consumers answered positively about trusting in the brand even not being as significant as the other feelings (Exhibit 11 and Table 13). Analyzing in more detail the results, 8% of the inquired strongly disagree that they feel distant to the brand when using this technology, 54% disagree and 18% disagree somewhat. From the 150 completed answers, 21 somewhat agree that they feel distance to the brand, 7 agree and 2 strongly agree that they are distant to the brand. The total average points is 2.573 out of 6 points, which shows that the majority of people disagree that they feel distance to the brand when using the AR applications presented.

When the question is related to the feelings of being valued by the brand through these applications, the majority of the consumers answered positively, where 13.33% of them strongly agree with the feeling of being valued by the brand, 51.33% agree, and 22.67% agree somewhat. The positive answers together represent 87.33% of the total answers (150). On the other side, 7.33% disagree somewhat that they feel valued by the brand through these applications, 4% disagree and 1.33% strongly disagree, which makes a total percentage of 12.67% from the 150 answers. The majority of the people agree about feeling valued by the brand when they are placed as the users of the applications presented, which can lead to a connection between both, the consumer and the brand.

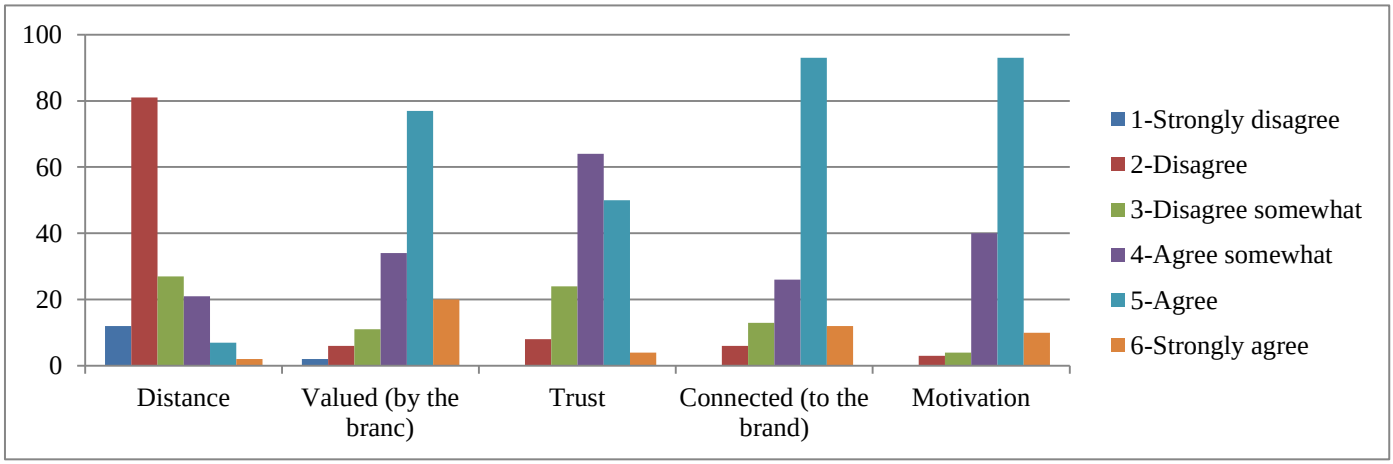
Relating to trust, the consumers still have some doubts about trusting in a brand through this kind of application, and that is the reason why 42.67% of the respondents only agree somewhat that they trust the brand by using these applications, and 33.33% agree with this feeling. There is also a significant percentage of answers (16%) saying that they somewhat disagree about trusting the brand through the AR applications. This means that even being open and available to try the AR technology, the consumers are not yet completely informed about it and so, that can be one of the reasons why they do not completely trust in a brand when using the AR applications presented in the survey.

From all the 150 respondents, 62% (93) agree about feeling connected to the brand when they put themselves as the applications users, 17.33% agree somewhat with that and 8% strongly agree. From the negative side, 8.67% disagree somewhat and 4% disagree, which means that they do not feel to be connected to the brand when using the applications. Due to the positive answers verified in this question, the total average score is 4.613 out of 6 points.

Finally, the great majority of the consumers (62%) agree that they feel motivation when they see themselves as the users of the applications presented, 26.67% agree somewhat and 6.67% strongly agree. On the opposite side, only 7 respondents answered negatively about this feeling, being 4 of them saying that they somewhat disagree and 3 saying that they disagree about feeling motivation relating to the brand, when playing the users role.

As a conclusion to this question, after analyzing in detail the answers given by the inquired, it is possible to say that the consumers feel that they are closer to the brand when using the AR applications, they feel that they are valued by and connected to the brand, they feel motivation relating to the brand, and they also feel, even with some reticence's that they can trust the brand when using this kind of applications. These answers all together give an important contribution to the research, being understandable that a connection might be created between the customer and the brand through the AR technology and its applications.

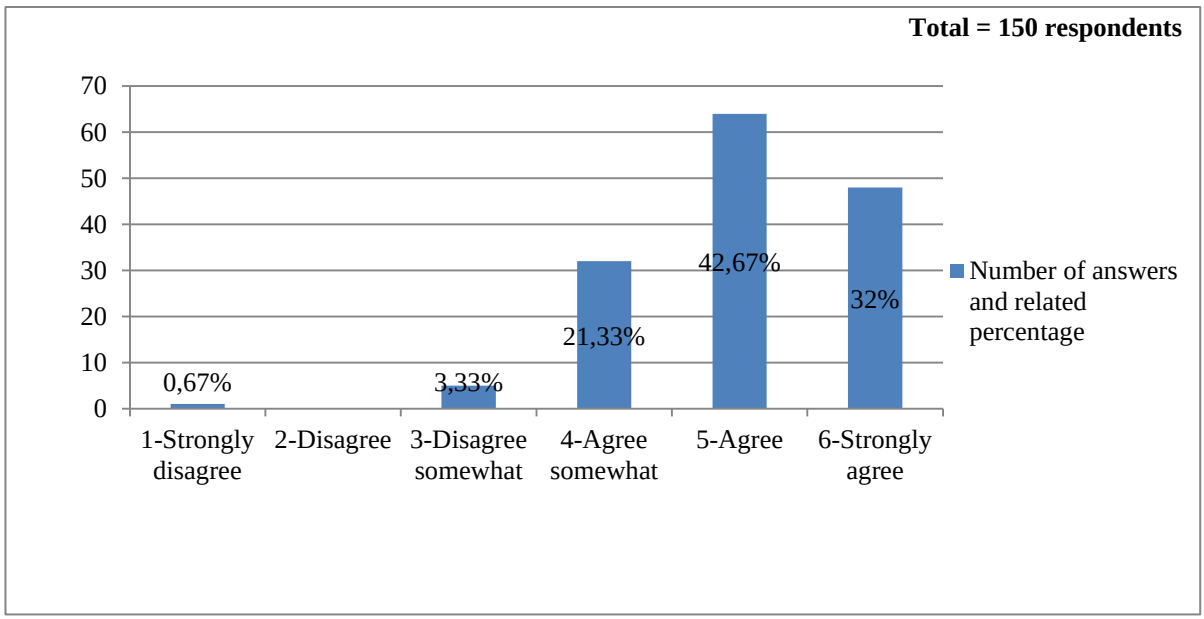
Exhibit 11: If you were in any of the presented situations (of the images), what would you feel relating to the brand? (Absolute values)



Q14: Please classify this statement on a scale of 1 (strongly disagree) to 6 (strongly agree): The utilization of these applications can be a key-element for future purchases.

The answers to this question showed the connection between the brand and the consumer, as 144 of the 150 respondents showed very positive answers and agreed that these applications can be a key-element for future purchases. From all the inquired, 32 agree somewhat with the question statement, 64 agree and 48 strongly agree with the statement. On the other hand, only 5 people (3.33%) disagree somewhat, and only one strongly disagrees that the AR applications presented can be a key-element for future purchases (Exhibit 12 and Table 14).

Exhibit 12: The utilization of these applications can be a key-element for future purchases.



All these answers together show that this technology and the applications studied can definitely be one of the instruments to include in the consumers buying process, differentiating brands from the competitors and get new clients, retain existent and enhance the loyalty of the consumers, creating an important link and connection between brands and consumers.

With the conclusions of these two questions that are stated above, the fifth hypothesis is verified and indeed, a connection between the consumers and brands is created through the utilization of the AR technology and the interactivity of its applications.

Survey Conclusions:

To conclude the analysis of the survey and summarizing the conclusions aroused above, the answers show that a great part of this group is familiarized with the AR technology, but only a small number already tried an Augmented Reality application because it is still a new technology that is being introduced in the consumers' life. They also showed favorable feelings and attitudes about the interaction with the products and campaigns through this new technology, and new way of presenting content. The consumers also feel that this technology and the applications studied present the content in a convenient and comfortable way and also that this technology is easy to use being able to reach a large number of consumers.

After the doubts created with the pretest, the web survey showed what the consumers prefer and what would lead them to use the AR applications being fun/entertainment and the possibility of discounts the main reasons for the consumers to introduce and use AR technology in their buying process.

Finally, the answers to the survey showed that through the use of AR applications it is possible to create a relation between the consumers and the brands, which can lead to long relations, and can create loyalty and trust, once the majority of the people agree that the utilization of AR applications is a key-element for their future purchases, making part of their buying process.

Introducing the next section of this dissertation, it is the chapter where the final conclusions are presented and the main research question is answered, understanding if the Augmented Reality technology can be interesting for consumers and their buying process, and what are the best ways for companies to reach the consumers according to their preferences.

4. CONCLUSION

In the final chapter of this dissertation, after the survey results analysis and conclusions aroused, it is now time to answer the main research question and state the final conclusions.

As it was stated before, the main purpose of this dissertation is to understand if Augmented Reality can be an interest technology for consumers and their buying process.

To analyze this question, a model which contains the main characteristics of the three main themes of the dissertation (Augmented Reality, CRM and Consumers Buying Process) was developed and the hypotheses were established taking in account this model.

After these two steps, a survey was made to the consumers in order to test the hypotheses, understanding if the consumers are already familiarized with the AR technology, if they reveal positive attitudes after watching the images of the applications studied in this dissertation, if they feel that this technology through the applications presents the content in a comfortable and convenient way, being user-friendly for the consumers, if it is possible to create a continuous link and connection between the consumer and the brand that uses this technology to promote their products and develop campaigns, and finally, understand which are the best ways for the companies to reach the consumers and get their attention.

After the analysis of the survey, the main conclusions aroused and previously described in the last chapter about the survey answers and the survey results are that the consumers are already familiarized with the technology, but not all of them use it due to its novelty. Second, the consumers show positive attitudes regarding the interaction with products and participation in campaigns through the AR technology and the applications presented in the survey. Third, the consumers feel that this technology is user-friendly and the content is presented in a comfortable and convenient way for them, which brings convenience and comfort also to their buying process. Fourth, the best way to reach and call the attention of the consumers is to develop applications that can be able to entertain them, but can also give rewards and discounts on their buying process.

Finally, the fifth conclusion is that by using AR technology and the applications to promote company´s products and developing campaigns, the consumers will feel linked and connected to the brand and this technology can turn to be a key-element for the consumers' future purchases and for their Buying process.

It is also possible to conclude that most of the applications (Zugara, Style Me, Tissot and Goldrun) are used to present the products to consumers before they buy, or to make specific campaigns (Goldrun and Augmented Reality Windows) for certain products in order to attract the consumers. By knowing the preferences of the consumers with the survey, where consumers showed that they would use the AR technology and its applications in order to have fun/entertainment and get discounts/rewards, the companies can use this technology straight to the point, differentiating themselves from other companies and attracting the consumers to what they are interested in their buying process.

With the confirmation of all the five hypotheses developed on the methodology, the results presented and previously analyzed were very positive for the study of the main research question and it is now possible to answer this question and state that the Augmented Reality technology is interesting for the consumers in their Buying Process.

According to the conclusions aroused, it is now possible to say that due to the growing familiarity that consumers are having with this new technology and its applications; due to their positive attitudes and feedback relating to the applications studied; and also due to its user-friendly characteristic, the consumers are willing to introduce the AR technology in their Buying Process and take advantages of the possibilities that it can bring to them in their daily processes of purchasing, thus changing the way they usually did their purchases before, using different tools and features to develop and complete their Buying Process and being part of the companies campaigns through the AR technology.

4.1. Future Research

As a new and growing technology for the consumers, Augmented Reality technology still needs to be studied among the consumers and their behavior and utilization.

This dissertation contributes to understand if this technology has potential to be an important element to include in the consumers buying process in the near future, once the consumers are getting familiarized with it. As the number of computers and smartphones is increasing, also the number of Augmented Reality applications and possibilities to use it on the daily life is increasing.

With this dissertation it is possible to understand that the consumers are willing to use or introduce the Augmented Reality technology in their buying process to participate in campaigns, get discounts and try products before buying. However, for future research, it is important to study and measure how these campaigns and applications are achieving results and being used by the consumers, what is the actual participation and engagement of the consumers in these campaigns and applications, and finally study and measure the percentage of products bought with the help of these campaigns and applications.

If this future work is done, then it is possible to understand the real contribution of Augmented Reality not only for the consumers but also for the companies and businesses that use this technology.

4.2. Limitations

Every study has its limitations, and this is not an exception. In this part of the dissertation the main limitations of the contribution of this survey for the study are presented.

The first limitation is that being a web based survey, only people who have internet access can answer the survey, even if in our days a great part of the population has internet access.

The second limitation is that the survey is available for a number of people that can be considered small in relation to the main public and the consumers in general.

The third and more important limitation is the limitation that was already presented when the pretest was made, that is the fact that the respondents are answering based on images, which may not be the best way to present a new technology like Augmented Reality, but as it was said before, according to the pretest respondents this is the best way in a web based survey to present it because people do not want to spend a lot of time watching videos of the applications. Having this in account, the people who already tried an Augmented Reality application before answer this survey can be able to give more precise answers because they are answering not only based on the images of the applications presented, but also on their previous experience, while those respondents who never tried any application before are answering only based on the images and explanations of the applications presented which may not generate such precise and accurate answers.

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6. APPENDIX

Appendix I

Intro
I am a student of Catolica Lisbon School of Business and Economics and I am writing a master thesis about Augmented Reality and some of the applications and possibilities the consumers can have with it.
This survey is about a technology called Augmented Reality, which allows the consumers to see virtual and real content together through devices like smartphones/computers (and others), interacting with different kinds of products and participating in campaigns made by the brands for the consumers. In the second part of the survey you will be able to see images that show some Augmented Reality applications.
Thank you for your help.

Part I:

What is your age?
1. 1 to 14 years
2. 15 to 24 years
3. 25 to 34 years
4. 35 to 44 years
5. 45 to 54 years
6. More than 54 years

Gender
1. Feminine
2. Masculine

Have you ever heard about Augmented Reality technology?
1. Yes
2. No

Have you ever tried any application?
1. Yes
2. No

Would you install on your mobile phone/computer an application so you can take advantage of Augmented Reality?
1. Yes
2. No

Being a technology that has been growing, the novelty of this technology by itself creates interest in using and learn more. Please classify this statement on a scale from 1 (strongly disagree) to 6 (strongly agree).

	1-Strongly disagree	2-Disagree	3-Disagree somewhat	4-Agree somewhat	5-Agree	6-Strongly Agree
	❑	❑	❑	❑	❑	❑

If you already tried Augmented Reality, please indicate on a scale of 1 to 6, what is the degree of satisfaction obtained with this type of interaction:

	1-Very unsatisfied	2-Unsatisfied	3-Quite unsatisfied	4-Quite satisfied	5-Satisfied	6-Very satisfied
	❑	❑	❑	❑	❑	❑

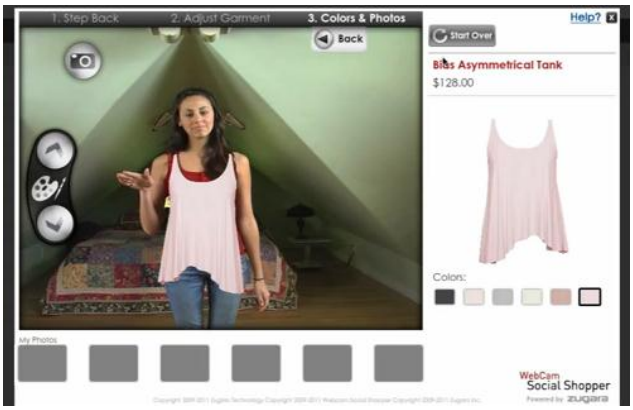
On a scale of 1 (Very hard) to 6 (Very easy), indicate the degree of ease that this type of technology provides:

1. 1-Very hard
2. 2-Hard
3. 3-Quite hard
4. 4-Quite easy
5. 5-Easy
6. 6-Very Easy

Part II:

In this study some Augmented Reality applications are used, which are now described and presented:

Zugara webcam social shopper – Allow consumers to try/verify clothes at their own houses through the computer.



Cisco StyleMe – Used in shops as a virtual mirror/virtual tester that lets you experience, choose, see in your body the clothes available in the store, through Augmented Reality, automatically adapting them to your body, without the need of go to the dressing rooms to try them.

Tissot Reality (Tissot touch collection) – Allows the consumer, through a computer and a printed paper bracelet available on the website, to check on your own pulse the collections of Tissot watches.

Augmented Reality Windows (Montras de Realidade Aumentada) – Allows consumers to interact with the brand through their own shop windows. This is normally used in brands promotional campaigns.





Goldrun (H&M; Nike) – Allows the consumer, through a smartphone and Augmented Reality technology, to participate in promotional campaigns of some brands (takeing photos, getting instant discounts and buying products), in various points of the map previously stipulated.



After viewing the images, what do you feel about the virtual interaction/involvement with the product/campaign? Please answer this question on a scale from 1 (strongly disagree) to 6 (strongly agree).

	1-Strongly disagree	2-Disagree	3-Disagree somewhat	4-Agree somewhat	5-Agree	6-Strongly Agree
Uninteresting	❑	❑	❑	❑	❑	❑
Unrealistic	❑	❑	❑	❑	❑	❑
Useful	❑	❑	❑	❑	❑	❑
Funny	❑	❑	❑	❑	❑	❑
Appellative	❑	❑	❑	❑	❑	❑
Difficult to use	❑	❑	❑	❑	❑	❑

Other:

On a scale from 1 (strongly disagree) to 6 (strongly agree), the interaction and experimentation (virtual) of a product before the final purchase decision is revealed:

	1-Strongly disagree	2-Disagree	3-Disagree somewhat	4-Agree somewhat	5-Agree	6-Strongly Agree
Convenient	❑	❑	❑	❑	❑	❑
Attractive	❑	❑	❑	❑	❑	❑
Informative	❑	❑	❑	❑	❑	❑
Funny	❑	❑	❑	❑	❑	❑
Insignificant	❑	❑	❑	❑	❑	❑

Other:

Which of these characteristics would lead you to use any of the presented applications? (Please choose a maximum of three characteristics)

1. Convenience
2. Possibility of discounts
3. Fun/Entertainment
4. Quality of presentation
5. Novelty
6. Being closer to reality
7. Other

After viewing the images, which of the application seemed to be more interesting/advantageous? (Please choose a maximum of two applications)

1. Zugara (Roupa em casa)
2. StyleMe (Provador virtual)
3. Tissot (Relógios)
4. Montras de RA
5. Goldrun (H&M; Nike)

If you were in any of the presented situations (of the images), what would you feel relating to the brand?Please answer on a scale from 1 (strongly disagree) to 6 (strongly agree).

	1-Strongly disagree	2-Disagree	3-Disagree somewhat	4-Agree somewhat	5-Agree	6-Strongly Agree
Distance	❑	❑	❑	❑	❑	❑
Valued (by the brand)	❑	❑	❑	❑	❑	❑
Trust	❑	❑	❑	❑	❑	❑
Connected (to the brand)	❑	❑	❑	❑	❑	❑
Motivation	❑	❑	❑	❑	❑	❑

Other:

Please classify this statement on a scale of 1 (strongly disagree) to 6 (strongly agree):The utilization of these applications can be a key-element for future purchases.

	1-Strongly disagree	2-Disagree	3-Disagree somewhat	4-Agree somewhat	5-Agree	6-Strongly Agree
	❑	❑	❑	❑	❑	❑

Appendix II

Table 1

What is your age?

Answer	Count	Percent	20% 40% 60% 80% 100%
1 to 14 years	0	0.00%	
15 to 24 years	104	69.33%	
25 to 34 years	32	21.33%	
35 to 44 years	7	4.67%	
45 to 54 years	7	4.67%	
More than 54 years	0	0.00%	
Total	150	100%	

Mean : 2.447 | Confidence Interval @ 95% : [2.320 - 2.573] | Standard Deviation : 0.790 | Standard Error : 0.065

Table 2

Gender

Answer	Count	Percent	20% 40% 60% 80% 100%
Feminine	39	26.00%	
Masculine	111	74.00%	
Total	150	100%	

Mean : 1.740 | Confidence Interval @ 95% : [1.670 - 1.810] | Standard Deviation : 0.440 | Standard Error : 0.036

Table 3

Have you ever heard about Augmented Reality technology?

Answer	Count	Percent	20% 40% 60% 80% 100%
Yes	101	67.33%	
No	49	32.67%	
Total	150	100%	

Mean : 1.327 | Confidence Interval @ 95% : [1.251 - 1.402] | Standard Deviation : 0.471 | Standard Error : 0.038

Table 4

Have you ever tried any application?

Answer	Count	Percent	20% 40% 60% 80% 100%
Yes	44	43.56%	
No	57	56.44%	
Total	101	100%	

Mean : 1.564 | Confidence Interval @ 95% : [1.467 - 1.662] | Standard Deviation : 0.498 | Standard Error : 0.050

Table 5

Would you install on your mobile phone/computer an application so you can take advantage of Augmented Reality?

Answer	Count	Percent	20% 40% 60% 80% 100%
Yes	131	87.33%	
No	19	12.67%	
Total	150	100%	

Mean : 1.127 | Confidence Interval @ 95% : [1.073 - 1.180] | Standard Deviation : 0.334 | Standard Error : 0.027

Table 6

Overall Matrix Scorecard : Being a technology that has been growing, the novelty of this technology by itself creates interest in using and learn more. Please classify this statement on a scale from 1 (strongly disagree) to 6 (strongly agree).

	Question	Count	Score	1-Strongly disagree	2-Disagree	3-Disagree somewhat	4-Agree somewhat	5-Agree	6-Strongly Agree
1.		150	4.787						

Answer	Count	Percent	20%	40%	60%	80%	100%
1-Strongly disagree	0	0.00%					
2-Disagree	1	0.67%					
3-Disagree somewhat	3	2.00%					
4-Agree somewhat	35	23.33%					
5-Agree	99	66.00%					
6-Strongly Agree	12	8.00%					
Total	150	100%					

Mean : 4.787 | Confidence Interval @ 95% : [4.684 - 4.889] | Standard Deviation : 0.641 | Standard Error : 0.052

Table 7

Overall Matrix Scorecard : If you already tried Augmented Reality, please indicate on a scale of 1 to 6, what is the degree of satisfaction obtained with this type of interaction:

	Question	Count	Score	1-Very unsatisfied	2-Unsatisfied	3-Quite unsatisfied	4-Quite satisfied	5-Satisfied	6-Very satisfied
1.		44	4.614						

Answer	Count	Percent	20%	40%	60%	80%	100%
1-Very unsatisfied	0	0.00%					
2-Unsatisfied	1	2.27%					
3-Quite unsatisfied	1	2.27%					
4-Quite satisfied	12	27.27%					
5-Satisfied	30	68.18%					
6-Very satisfied	0	0.00%					
Total	44	100%					

Mean : 4.614 | Confidence Interval @ 95% : [4.420 - 4.807] | Standard Deviation : 0.655 | Standard Error : 0.099

Table 8

Overall Matrix Scorecard : After viewing the images, what do you feel about the virtual interaction/involvement with the product/campaign? Please answer this question on a scale from 1 (strongly disagree) to 6 (strongly agree).

	Question	Count	Score	1-Strongly disagree	2-Disagree	3-Disagree somewhat	4-Agree somewhat	5-Agree	6-Strongly Agree
1.	Uninteresting	150	1.800						
2.	Unrealistic	150	2.733						
3.	Useful	150	4.787						
4.	Funny	150	5.080						
5.	Appellative	150	4.967						
6.	Difficult to use	150	2.633						
		Average	**3.667**						

Uninteresting

	Answer	Count	Percent	20%	40%	60%	80%	100%
	1-Strongly disagree	51	34.00%					
	2-Disagree	**84**	**56.00%**					
	3-Disagree somewhat	10	6.67%					
	4-Agree somewhat	4	2.67%					
	5-Agree	1	0.67%					
	6-Strongly Agree	0	0.00%					
	Total	150	100%					

Mean : 1.800 | Confidence Interval @ 95% : [1.683 - 1.917] | Standard Deviation : 0.733 | Standard Error : 0.060

Unrealistic

	Answer	Count	Percent	20%	40%	60%	80%	100%
	1-Strongly disagree	12	8.00%					
	2-Disagree	**54**	**36.00%**					
	3-Disagree somewhat	52	34.67%					
	4-Agree somewhat	27	18.00%					
	5-Agree	4	2.67%					
	6-Strongly Agree	1	0.67%					
	Total	150	100%					

Mean : 2.733 | Confidence Interval @ 95% : [2.576 - 2.890] | Standard Deviation : 0.981 | Standard Error : 0.080

Useful

	Answer	Count	Percent	20%	40%	60%	80%	100%
	1-Strongly disagree	1	0.67%					
	2-Disagree	1	0.67%					
	3-Disagree somewhat	6	4.00%					
	4-Agree somewhat	31	20.67%					
	5-Agree	**93**	**62.00%**					
	6-Strongly Agree	18	12.00%					
	Total	150	100%					

Mean : 4.787 | Confidence Interval @ 95% : [4.661 - 4.912] | Standard Deviation : 0.782 | Standard Error : 0.064

Funny

	Answer	Count	Percent	20%	40%	60%	80%	100%
	1-Strongly disagree	0	0.00%					
	2-Disagree	1	0.67%					
	3-Disagree somewhat	3	2.00%					
	4-Agree somewhat	19	12.67%					
	5-Agree	**87**	**58.00%**					
	6-Strongly Agree	40	26.67%					
	Total	150	100%					

Mean : 5.080 | Confidence Interval @ 95% : [4.963 - 5.197] | Standard Deviation : 0.728 | Standard Error : 0.059

Appellative

	Answer	Count	Percent	20%	40%	60%	80%	100%
	1-Strongly disagree	2	1.33%					
	2-Disagree	2	1.33%					
	3-Disagree somewhat	5	3.33%					
	4-Agree somewhat	18	12.00%					
	5-Agree	**86**	**57.33%**					
	6-Strongly Agree	37	24.67%					
	Total	150	100%					

Mean : 4.967 | Confidence Interval @ 95% : [4.820 - 5.113] | Standard Deviation : 0.915 | Standard Error : 0.075

Difficult to use

	Answer	Count	Percent	20%	40%	60%	80%	100%
	1-Strongly disagree	9	6.00%					
	2-Disagree	**77**	**51.33%**					
	3-Disagree somewhat	32	21.33%					
	4-Agree somewhat	25	16.67%					
	5-Agree	6	4.00%					
	6-Strongly Agree	1	0.67%					
	Total	150	100%					

Mean : 2.633 | Confidence Interval @ 95% : [2.472 - 2.794] | Standard Deviation : 1.006 | Standard Error : 0.082

Table 9

Overall Matrix Scorecard : On a scale from 1 (strongly disagree) to 6 (strongly agree), the interaction and experimentation (virtual) of a product before the final purchase decision is revealed:

	Question	Count	Score	1-Strongly disagree	2-Disagree	3-Disagree somewhat	4-Agree somewhat	5-Agree	6-Strongly Agree
1.	Convenient	150	4.733						
2.	Attractive	150	5.047						
3.	Informative	150	4.513						
4.	Funny	150	5.027						
5.	Insignificant	150	2.053						
		Average	**4.275**						

Convenient

Answer	Count	Percent
1-Strongly disagree	1	0.67%
2-Disagree	1	0.67%
3-Disagree somewhat	4	2.67%
4-Agree somewhat	34	22.67%
5-Agree	101	67.33%
6-Strongly Agree	9	6.00%
Total	150	100%

Mean : 4.733 | Confidence Interval @ 95% : [4.621 - 4.846] | Standard Deviation : 0.702 | Standard Error : 0.057

Attractive

Answer	Count	Percent
1-Strongly disagree	0	0.00%
2-Disagree	0	0.00%
3-Disagree somewhat	3	2.00%
4-Agree somewhat	19	12.67%
5-Agree	96	64.00%
6-Strongly Agree	32	21.33%
Total	150	100%

Mean : 5.047 | Confidence Interval @ 95% : [4.943 - 5.150] | Standard Deviation : 0.649 | Standard Error : 0.053

Informative

Answer	Count	Percent
1-Strongly disagree	0	0.00%
2-Disagree	0	0.00%
3-Disagree somewhat	8	5.33%
4-Agree somewhat	70	46.67%
5-Agree	59	39.33%
6-Strongly Agree	13	8.67%
Total	150	100%

Mean : 4.513 | Confidence Interval @ 95% : [4.396 - 4.630] | Standard Deviation : 0.730 | Standard Error : 0.060

Funny

Answer	Count	Percent
1-Strongly disagree	0	0.00%
2-Disagree	1	0.67%
3-Disagree somewhat	4	2.67%
4-Agree somewhat	16	10.67%
5-Agree	98	65.33%
6-Strongly Agree	31	20.67%
Total	150	100%

Mean : 5.027 | Confidence Interval @ 95% : [4.916 - 5.138] | Standard Deviation : 0.695 | Standard Error : 0.057

Insignificant

Answer	Count	Percent
1-Strongly disagree	39	26.00%
2-Disagree	78	52.00%
3-Disagree somewhat	23	15.33%
4-Agree somewhat	7	4.67%
5-Agree	2	1.33%
6-Strongly Agree	1	0.67%
Total	150	100%

Mean : 2.053 | Confidence Interval @ 95% : [1.908 - 2.199] | Standard Deviation : 0.911 | Standard Error : 0.074

Table 10

On a scale of 1 (Very hard) to 6 (Very easy), indicate the degree of ease that this type of technology provides:

Answer	Count	Percent
1-Very hard	0	0.00%
2-Hard	0	0.00%
3-Quite hard	1	2.27%
4-Quite easy	17	38.64%
5-Easy	23	52.27%
6-Very Easy	3	6.82%
Total	**44**	**100%**

Mean : 4.636 | Confidence Interval @ 95% : [4.444 - 4.829] | Standard Deviation : 0.650 | Standard Error : 0.098

Table 11

Which of these characteristics would lead you to use any of the presented applications? (Please choose a maximum of three characteristics)

Answer	Count	Percent
Convenience	58	15.98%
Possibility of discounts	97	26.72%
Fun/Entertainment	**98**	**27.00%**
Quality of presentation	33	9.09%
Novelty	30	8.26%
Being closer to reality	44	12.12%
Other	3	0.83%
Total	**363**	**100%**

Mean : 3.066 | Confidence Interval @ 95% : [2.902 - 3.231] | Standard Deviation : 1.598 | Standard Error : 0.084

Table 12

After viewing the images, which of the application seemed to be more interesting/advantageous? (Please choose a maximum of two applications)

Answer	Count	Percent
Zugara (Roupa em casa)	53	20.08%
StyleMe (Provador virtual)	64	24.24%
Tissot (Relógios)	23	8.71%
Montras de RA	33	12.50%
Goldrun (H&M; Nike)	91	34.47%
Total	264	100%

Mean : 3.170 | Confidence Interval @ 95% : [2.979 - 3.362] | Standard Deviation : 1.591 | Standard Error : 0.098

Table 13

Overall Matrix Scorecard : If you were in any of the presented situations (of the images), what would you feel relating to the brand?Please answer on a scale from 1 (strongly disagree) to 6 (strongly agree).

	Question	Count	Score
1.	Distance	150	2.573
2.	Valued (by the brand)	150	4.587
3.	Trust	150	4.120
4.	Connected (to the brand)	150	4.613
5.	Motivation	150	4.687
		Average	**4.116**

Distance

Answer	Count	Percent
1-Strongly disagree	12	8.00%
2-Disagree	81	54.00%
3-Disagree somewhat	27	18.00%
4-Agree somewhat	21	14.00%
5-Agree	7	4.67%
6-Strongly Agree	2	1.33%
Total	150	100%

Mean : 2.573 | Confidence Interval @ 95% : [2.403 - 2.744] | Standard Deviation : 1.064 | Standard Error : 0.087

Valued (by the brand)

Answer	Count	Percent
1-Strongly disagree	2	1.33%
2-Disagree	6	4.00%
3-Disagree somewhat	11	7.33%
4-Agree somewhat	34	22.67%
5-Agree	77	51.33%
6-Strongly Agree	20	13.33%
Total	150	100%

Mean : 4.587 | Confidence Interval @ 95% : [4.422 - 4.752] | Standard Deviation : 1.031 | Standard Error : 0.084

Trust

Answer	Count	Percent
1-Strongly disagree	0	0.00%
2-Disagree	8	5.33%
3-Disagree somewhat	24	16.00%
4-Agree somewhat	64	42.67%
5-Agree	50	33.33%
6-Strongly Agree	4	2.67%
Total	150	100%

Mean : 4.120 | Confidence Interval @ 95% : [3.976 - 4.264] | Standard Deviation : 0.897 | Standard Error : 0.073

Connected (to the brand)

Answer	Count	Percent
1-Strongly disagree	0	0.00%
2-Disagree	6	4.00%
3-Disagree somewhat	13	8.67%
4-Agree somewhat	26	17.33%
5-Agree	93	62.00%
6-Strongly Agree	12	8.00%
Total	150	100%

Mean : 4.613 | Confidence Interval @ 95% : [4.469 - 4.758] | Standard Deviation : 0.903 | Standard Error : 0.074

Motivation

Answer	Count	Percent
1-Strongly disagree	0	0.00%
2-Disagree	3	2.00%
3-Disagree somewhat	4	2.67%
4-Agree somewhat	40	26.67%
5-Agree	93	62.00%
6-Strongly Agree	10	6.67%
Total	150	100%

Mean : 4.687 | Confidence Interval @ 95% : [4.571 - 4.803] | Standard Deviation : 0.725 | Standard Error : 0.059

Table 14

Overall Matrix Scorecard : Please classify this statement on a scale of 1 (strongly disagree) to 6 (strongly agree):The utilization of these applications can be a key-element for future purchases.

	Question	Count	Score	1-Strongly disagree	2-Disagree	3-Disagree somewhat	4-Agree somewhat	5-Agree	6-Strongly Agree
1.		150	5.013						

Answer	Count	Percent
1-Strongly disagree	1	0.67%
2-Disagree	0	0.00%
3-Disagree somewhat	5	3.33%
4-Agree somewhat	32	21.33%
5-Agree	64	42.67%
6-Strongly Agree	48	32.00%
Total	150	100%

Mean : 5.013 | Confidence Interval @ 95% : [4.872 - 5.155] | Standard Deviation : 0.882 | Standard Error : 0.072