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The influence and impact of Artificial Intelligence in the Consumer Decision-Making Process: Comparing Generation X with Millennials

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MSc in Management of Services and Technology

Supervisor:
Professor Mónica Mendes Ferreira, Invited Assistant Professor
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BUSINESS
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Resumo

A Inteligência Artificial é atualmente considerada como uma das tecnologias mais emergentes e que maior impacto terá tanto na sociedade como nas empresas. Para além da sua utilização a nível organizacional, em termos operacionais, a sua utilização na forma como interage com os consumidores é igualmente importante e requer atenção e desenvolvimento. Não são todas as pessoas que têm a mesma adaptabilidade para a utilização de novas tecnologias e é por isso que se torna importante perceber quais as diferenças que diferentes gerações têm quanto a este tópico. Por isso, o principal objetivo desta dissertação é perceber qual a real influência e impacto que a utilização de IA pode ter no processo de decisão de compra do consumidor, uma das componentes do marketing que atualmente é mais estudada por parte dos especialistas na área, comparando a Geração X com a dos *Millennials*. Com este objetivo, um questionário foi desenvolvido cujo objetivo foi estudar qual a influência e impacto que os participantes sentiram em cada fase do processo de decisão de compra do consumidor, através de aplicação de IA. Dentro das diferentes fases do processo foram criados cenários fictícios, onde estão implícitos a utilização de uma aplicação de IA para uma melhor compreensão das questões e também do objetivo da pesquisa. Com uma amostra final de 211 participantes, os resultados sugerem que a IA pode ter influência em algumas fases do processo, mas não em todas, independentemente da geração a que os participantes pertençam.

Palavras-chave: Inteligência artificial, processo de decisão de compra do consumidor, geração X, Millennials

Classificação JEL: M31 Marketing e O33 Technological change: choices and consequences; Diffusion processes

Abstract

Artificial Intelligence is currently considered to be one of the most emerging technologies and that will have the greatest impact on both society and companies. In addition to its use at an organizational level, in operational terms, it's also used in the way it interacts with consumers is equally important and requires attention and development. Not all people have the same adaptability for the use of new technologies and that's why it's important to understand the differences that different generations have on this topic. Therefore, the main objective of this dissertation is to understand the real influence and impact that the use of AI can have in the consumer decision-making process, one of the marketing components that is currently more studied by specialists in the area, comparing Generation X with Millennials. With this objective, a questionnaire was developed whose objective was to study the influence and impact that the participants would feel at each stage of the consumer purchase decision process, through the application of AI. Within the different stages of the process, fictitious scenarios were created, where the use of an AI application is implicit for a better understanding of the questions and also of the research objective. With a final sample of 211 participants, the results suggest that AI may have an influence on some phases of the process, but not on all, regardless of the generation to which the participants belong.

Keywords: Artificial intelligence, consumer decision-making process, generation X, Millennials

JEL Classification: M31 Marketing and O33 Technological change: choices and consequences; Diffusion processes

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List of Abbreviations

AI – Artificial Intelligence

ANI – Artificial Narrow Intelligence

AGI – Artificial General Intelligence

DF – Degrees of freedom

EUROP - European Robotics Platform

GenX – Generation X

H – Hypothesis

IoT – Internet of Things

KMO – Kaiser-Meyer-Olkin

Chapter 1 - Introduction

1.1. Research Theme

Technological advancements have been a constant feature of organizations, which has led to changes in what are the business paradigms. These advancements have been "*improve the knowledge of potential organizations in managing customer needs and delivering offerings*" (Kumar, Rajan, Venkatesan & Lecinski, 2019, p. 135).

Artificial Intelligence has been a subject of research and development and where it's use, and application are still subject of debate. As already mentioned, many companies, from different areas of business, have tried to develop and build operational models based on Artificial Intelligence. However, this technological aspect is still quite recent and unknown for what are all its potential.

With the emergence of these new technologies, such as Artificial Intelligence, the way in which marketing is handled has also changed. These new techs have allowed the creation of new communication and interaction tools between companies and consumers. However, there are still some opinions of experts and researchers in the field of marketing that differ. Many point to Artificial Intelligence as a sustainable marketing tool that can become a competitive advantage, but other authors argue that this technology is seen only as a trend and that its possible use is still too premature for the current knowledge about this tech (Dell Technologies, 2018).

In order to understand the influence and impact that new technologies, such as Artificial Intelligence, have on marketing, is to study and have a perspective on how consumer decision making works and to integrate technologies in the different phases of this process. This process, referred to as the consumer decision-making process, is carried out through five stages in which the consumer takes over the entire process of purchasing a product, either because there is a need for it, or in response to stimulus that a company, through the your marketing, send it to your consumers. It is in this context that AI comes in and can play a central role in this process (Schiffman & Wisenblit, 2015). This component makes up the first phase of the process and all the other 4 can and should be supported by Artificial Intelligence. Nevertheless, scientific studies on these two areas and how they come together are still almost nonexistent. This is due to the fact that technology is still at the beginning of its adaptation and use by Portuguese

companies and, therefore, they are receptive to the impact on the consumer decision-making process.

Although consumers are seen as a whole by companies, it is important to understand if they all behave and react in the same way when they are in contact with new technologies. Thus, two generations will be used as a basis for comparison in this study, the Generation X and Millennials. These generations have similar consumption methods characteristics and technologies but differ in some important aspects (Twenge, Campbell, Hoffman & Lance, 2010).

1.2. Chapters Division

In this context, the present work intends to evaluate the influence and impact that Artificial Intelligence can have on the consumer decision making process. To do so, the research is divided into the following chapters: 1. The literature review where all the important definitions and characteristics for this paper refer to the components of the purpose of this research: AI, consumer decision making process, generation X and Millennials; 2. After the literature review has been made and based on this, the conceptual model is designed specifically for this research with the formulation of the hypotheses to be studied in this work, specifically. 3. The methodology where the research approach, data collection and development of the survey is described. It's also described the methods and scales used into the questionnaire. 4. Regarding to the findings, it's here where the data is validity and the results are shown. All the data is analyzed, according to the hypothesis in study. 5. In the last chapter, the conclusions, limitations of the research and recommendations are made based on the results obtained in the previous chapter.

Chapter 2 - Literature Review

2.1. Internet of Things

The creation of the Internet, as we know it, revolutionized the way the world works, the way people communicate with each other and how organizations works too. Examples of Internet applications that have revolutionized society are obtaining information in a faster way, the possibility of communicating through a chat platform, among others. With this, we are quickly entering in an era of the "*Internet of Things*". This new era is described as *"... an era of even more pervasive connectivity where a very wide variety of appliances will be connected to the web"* (Sethi & Sarangi, 2017, p. 1).

The term IoT can be defined as a simple interaction between physical and digital words, through the internet. According to Lampropoulos, Siakas and Anastasiadis (2019, p. 3) *"IoT pursues to pervade our everyday environment and its objects, linking the physical to the digital world and allowing people and "things" to be connected anytime, anywhere, with anything and anyone ideally using any network and service"*. This means that IoT is emerging as a future technology which can interconnect every object, in every area, such as in every business area.

The application and uses of IoT can bring advantages to companies both internally and externally. Internally, it can be used to process databases, helping in the creation of new production models with the aim of optimizing resources, to define strategic objectives in order to act in the market, to creates automatic machines to be used in the production area, etc. Externally, IoT can be used as a form of interaction between consumers and the company, with the aim of improving the consumer experience and being able to influence their decision. Of all the technologies coming from IoT, the most developed and that has been used mostly is Artificial Intelligence. In the following pages, the types of intelligence developed and how this technology (AI) can be an asset for companies, will be described.

2.1.1. Artificial Intelligence

2.1.1.1. AI Concept's Evolution

Since the early years when the creation of technologies, which today are given as basic and guaranteed (e.g. internet), the world has always tried to develop more and better technologies that can serve as a support for the survival of human beings. AI is one of those.

In 1959, in a summer workshop called the "Dartmouth Summer Research Project on Artificial Intelligence", presented one of the first scientific definitions of what would be Artificial Intelligence, defined as a science and engineering that can make intelligent machines McCarthy (2007). Years later, in 1970, and based on the definition made by McCarthy, Alan Turing and Claude Shannon tried to develop it with more technical concepts and better understanding for specialists in the field. With this, years later, McCarthy was considered as the father of Artificial Intelligence.

As the years went by, the research tools used for the development of this type of technologies have been improved and nowadays, the common and broadly definition for AI is the system's capability of get external data, learn form that data and use those teachings to achieve goals and objectives, and tasks that require adaptation by the technology (Kumar *et al*., 2019). AI can be divided into two different categories, which differ in the ability that technology can make. The criterion used to classify these two categories are based on capabilities of AI compared to human intelligence (Joshi, 2019; Haenlein & Kaplan, 2019). The two categories are:

Artificial Narrow Intelligence (ANI)

Also known as **"Weak" AI**, is AI technology that exists in our world today. This means that this AI is programmed to perform a single task. Examples of applications of this AI category are the possibility to play chess, checking the weather or the ability to filter information on websites (Joshi, 2019);

Artificial General Intelligence (AGI)

Also known as **"Strong" AI** refers to machines that are capable to exhibit human capabilities. In other words, AGI can perform intellectual tasks and interpret feelings that only a human being can. This category of AI is still very receptive from scientists, since there is no certainty that a machine can think, reason, feel and have the ability to make decisions and judgements like humans (Haenlein & Kaplan, 2019);

2.1.1.2. Types of AI

As mentioned before, AI is considered one of the most unexplored and complex technology ever created. However, it's implementation by majority of the business leaders, in different industries, has made the development and knowledge of AI increasingly and, at this moment, it's possible to identify 4 types of AI. The criterion to determining the types of AI is the level

of functionality that an AI system can replicate human abilities (Joshi, 2019). Based on this criterion, it's possible to classify AI in two different ways, already explained. The first one is based on classifying AI machines on their likeness to the human mind. The second one is based on the capability of the machine to "think", "act" and "feel" like humans do. That said, the four types of AI are: reactive machines, limited memory, theory of mind and self-awareness.

Reactive Machines

Reactive machines are the most basic type of AI system. This system is purely reactive and cannot form memories or use past experiences to influence present-made decisions; their only purpose is to react to currently reactive situations. Other characteristic of this type of AI, it's that they cannot use memory to improve their operations based on the same. They will always behave based on the way that they were programmed.

An existing example of a reactive machine is Deep Blue, the first chess playing supercomputer created by IBM in the mid-1980s. This machine was used to play against the chess Grandmaster Garry Kasparov, in 1997 (Hintze, 2016).

Limited Memory

This type of AI, Limited memory, is defined as a comprised of machine learning models that can get knowledge from previously learned information, store data, or operations from the past. Despite having the same functions as of reactive machines, limited memory learns from the past by observing actions or data fed to them in order to build experiential knowledge.

An example forms of this type of AI it's the autonomous vehicles. These autonomous vehicles use limited memory, a combination of observational and preprogrammed knowledge to properly drive. These cars use this technology to read the environment where they're, detect patterns, observe the movement of other cars vehicles and people their line of vision (Hintze, 2016).

Theory of Mind

Unlike the two previous types of AI where it's possible to find physical examples, the next two are still concepts that are being developed. The theory of mind is the next type of AI that researchers are trying to innovate.

The theory of mind is the decision-making ability to the extent of a human mind, but by machines. Although there are already machines that can show humanlike capabilities (e.g. voice assistants), none of these are still fully capable of meeting the minimum requirements, like normal conversations with humans. For this to be possible, it is necessary that these machines can perceive the thoughts and emotions of the people, as individuals, in order to understand how human beings, think.

The closest physical example that fits this type of AI is Sophia, the humanoid bot created by Hanson Robotics, in 2016. "She" presents physical likeness to a human being and an ability to see and respond to interactions with appropriate facial expressions (Hintze, 2016).

Self-Awareness

Considered as the final stage of AI development, self-aware AI involves machines that have human-level consciousness. This form for AI isn't currently in existence but would be considered the most advanced form of AI known to man. This type of AI will allow machines to have and understand emotions, beliefs, needs and desires. Where theory of mind only focuses on the aspects of compression and replications of human practices, self-aware AI takes it a step further by implying that it can be described as self-guided thoughts and reactions (Hintze, 2016).

2.1.1.3. AI applied to Business

The use of AI by current large companies (e.g. Google, Amazon, Facebook, etc.) has only started to be made in the last decade. With the increasing use of this type of new technologies, such as AI, some authors argue that we are ready for the 4th industrial revolution (Pires, 2017) or time called as the "Era of Computing". According to Qin and Jiang (2019, p. 338) *"The rise of artificial intelligence (AI), a set of disruptive technologies which simulate human intelligence and realize machine intelligence, has come under the limelight in many countries and industries"*. This technology it's a tool that is increasingly present not only in each person's social life but also in the business world. Companies try to use it. However, this concept remains very vague and most of the companies are still afraid of the effects that new technologies may have, given the constant changes in their markets.

The development of this type of technology has allowed companies to rethink some business processes in four domains areas (Møller, Czaika, Bax, & Nijhon, 2019). However, in order to

gain some results is those areas, it's crucial that use of AI is aligned with the firm goals (Kumar *et al*., 2019):

- **Optimize Operations:** Reduce excess stocks, optimize production (in terms of time as well as natural resources), predict more precise demand;
- **Engage Customers:** Offer a better experience, knowing better consumer's needs, influence their decisions making (this one will be focused in the next pages);
- **Employee Efficiency:** The use of AI predicts and automatize repetitive tasks;
- **Products Innovation:** The use of AI can drive us to the creations of new products.

However, the use of AI by companies in Portugal is still scarce or nil, compared to most European and International companies. They are still planning how they should apply AI to their internal processes, within the different areas. This statement can be verified according to report of the Microsoft and EY (2018) where none of the surveyed Portuguese companies had yet adopted AI in their business.

2.1.1.4. AI applied to Marketing

Today's marketers are all looking for new ways to find and attract their ideal audience. But in the fast-paced and ever-evolving digital marketing landscape, it's getting harder to reach all the consumers and get results. Marketing organizations and areas have been try to create and purpose an ecosystem to form a kind of "intimacy" between AI and consumers (De Bruyn, Viswanathan, Beh, Brock, & von Wangenheim, 2020). In order to reach this intimacy, companies have been investing a large amount of in research and development applications, machines and programs that can be implemented in the **Communication** area. This technology for the Communication area is **Voice Assistants** and **Chatbots**, among others.

Voice Assistants

Considered one of the best and popular AI applications, voice assistant's - machines are bots powered by AI, voice recognition and natural language processing answer questions and conversations audibly in order to answer the questions/needs that users have. These questions can be like ask a quick question, play music, check weather/news or even send a text or email (PwC, 2017). Some examples of voice assistant are *Siri* from Apple, *Cortana* from Microsoft, *Alexa* from Amazon and more recently *Google Now* from Google. Based on report from PwC,

they predict that the usage of Voice Assistant's machines will increase but their functionality and consistency must improve, at the same time.

However, some changes are expected in what are the companies' marketing strategies, using Voice Assistants (Agrawal, Kapur, Nibber & Yun, 2018). Some of them are: the possible deep relationship between Virtual Assistants and consumers than brands and a higher rate of satisfaction from to customers because Ai applications will know a lot of about customers;

Chatbots

Typical conversations are only considered to be between two or more people but Chatbots promise to change that. Chatbots are software applications that use a spoken human speech for the purpose of simulating a conversation or interaction with a real person. Today, chatbots are most commonly used in the customer service space performed by living, breathing human beings and customer satisfaction reps. One example of a chatbot application is the *Alphonde,* created by *Laredoute,* that offers advice for a perfect look, being an online personal assistant (PwC, 2017).

2.1.1.5. Ethics and Threats of AI

The development of "thinking" machines, in addition to bringing added value and opportunities to improve how companies operate, also brings ethical implications that must be considered. Although there is an increasing effort on the part of private entities, such as The European Robotics Platform (EUROP) in trying to create codes of ethics but it's too early to say that a formalization of codes of ethics will be achieved sooner (Bird *et al*., 2020). According to Chao (2019, p. 2), the development of AI *"... comes out the fact that machines may have responsibility, so the machines should have ethical attributes."*. However, those ethical attributes they can be dubious because each person / society has its own sense of morality and different moral codes. This means that there is no uniform "manual" of what is right or wrong. All these ethical issues have caused many researchers to focus on the development of AI on more central issues such as the ability to analyze and judge all the situations they have addressed. Furthermore, it is important that machines, that have the ability to think, also have the ability to make mistakes and learn through those mistakes, something that can take a long time to develop, considering that it is a characteristic of a human being (Vakkuri & Abrahamsson, 2018).

Another important issue that the development of artificial intelligence and its robotic systems has raised is the possibility of robots replace human workers in various industries (Walch, 2019). According to a 2017 report by the Mckinsey Global Institute, it is predicted that by 2030, automated systems will be between 400 and 800 million jobs, with 375 million people having to change job categories entirely. However, many researchers believe that these robotic systems are not appearing to remove jobs from people but to help them with their professional tasks (Walch, 2019).

2.2. Consumer Behavior

The consumer behavior is one of the most researched aspects in marketing areas. Considered as one of the aspects that can demonstrate better how costumers think and act, is also important to explain this concept for a better understanding of the next topics. The consumer behavior can be defined "*as the processes involved when individual select, purchase, use or dispose of products, services, or experiences to satisfy needs and wants*" (Solomon, 2015, p. 28). This concept is considered as one of the most important in the area of marketing since it manages to study and understand which products and brands consumers buy. With this, it is possible to realize *"why they buy them, when they buy them, where they buy them, how often they buy them, how often they use them, how they evaluate them after the purchase, and whether or not they buy them repeatedly."* (Schiffman & Wisenblit, 2015, p. 30).

Bearing in mind that each consumer behaves differently from the others, this means that there are external factors that influence. These factors are considered factors such as socio-cultural, such as cultural and sub-cultural, reference groups or even through family and interpersonal communications. These factors turn out to be extremely important for marketers as they must understand how they are in society and because part of them influence consumers (Schiffman & Wisenblit, 2015; Solomon, 2015).

Due to the distinctiveness of consumers, it is important that marketers understand the needs and wants of different consumers, the differences between different consumer personalities as well as their tastes. Based on this, a criterion is used where marketers study 3 consumer variablesh are: **demograpichs** (e.g., age, gender, family structure), **geograpichs** (e.g., nationality, residencia area) and **psychograpichs** (e.g., values, beliefs, lifestyles) (Schiffman & Wisenblit, 2015; Solomon, 2015).

Thus, it will be possible to better understand how the decision making concept and its derivatives work, based on this concept of consumer behavior.

2.3. Consumer Decision-Making

The concept of decision making can be defined as a rational process of selecting the alternatives that is expected to result in the most preferred outcome. According to Shrestha, Ben-Menahem and von Krogh (2019, p. 66), this process *"... involves identifying ad listening the alternatives, estimating their consequences, and comparing the accuracy and efficiency of each of these consequences."*. This concept has advanced and become an important topic in the marketing society, helping understand better the costumers (Stankevich, 2017).

Based on the characteristics that lead the consumer to make a purchase decision, such as external, sociocultural factors or the lack (or not) of information regarding the desired / needed product, there are 3 different types of decision making (Solomon, 2015), which are:

- **Habitual:** This type of decision-making is described as a choice that it's referred as "routine" decision making. This happens because consumers don't seek information when a problem is recognized. The choice is simple based on habit (Solomon, 2015);
- **Collective:** It's when several decision makers are involved. This means that others people participates in the problem solving. When more than one person decide which product/services they acquire for multiple persons (Solomon, 2015);
- **Cognitive:** This type of decision making is the most traditional and considered the right model to be used in order to understand how the consumer behaves. Here , the customers act carrefully and search for much information as they can and evalute in detail all the alternatives they have (Solomon, 2015).
-

Considering that the cognitive decision-making type is the basis for studying the consumer, it will be covered in more detail in the following topic.

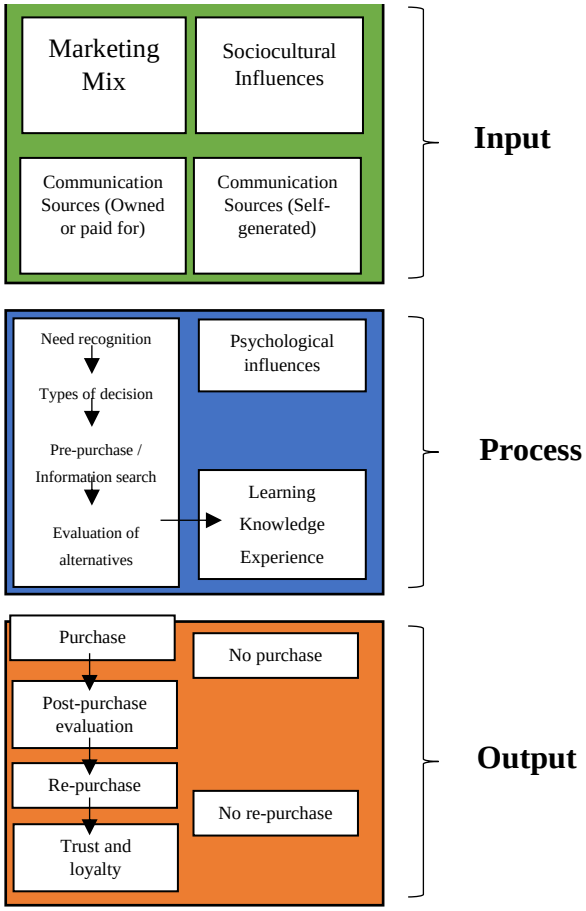
2.3.1 Consumer Decision-Making Model

Gilbert (1991) suggested a model for consumer decision-making which has 2 levels of factors that influence the consumer. The first level of influences is close to the person and includes psychological influences, such as perception, learning, personality/attitude and motivation or energizers. The second level of influences includes those that have been developed during the socialization process and include reference groups, family influences, socioeconomic influences and cultural influences.

Some years later, this model was improved and nowadays it's a concept in greater detail that is able to help marketers to have a perception of how consumers behave and developing marketing strategies.

Based on the previous literature review, the cognitive decision-making model is considered as the most capable of helping and understanding the consumer. This model consists in three different stages that results in the selection of a single product in favor of the other options (Schiffman & Wisenblit, 2015; Solomon, 2015). These three stages are: **Input**, **Process** and **Output** (as Figure 1).

Figure 1 - Consumer decision-making model



Source – Schiffman and Wisenblit (2015)

Input

The input component of the consumer decision-making model is the stage when the purchase situation is affected by external influences such as the marketing mix strategies (which have the objective of to each, inform and persuade consumers to buy the product) designed by the brand, the sociocultural influences like family, friends, social class, and the communication from the marketing mix (Schiffman & Wisenblit, 2015).

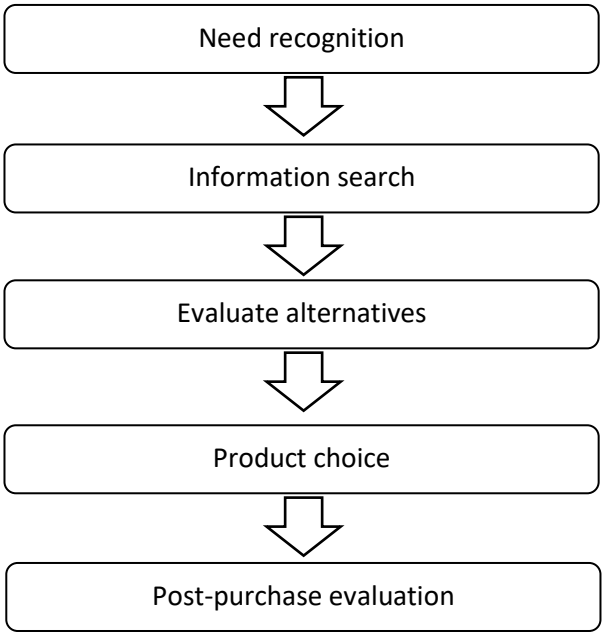
Process

The process component is related with how consumers make the buying decision. To reach a better understanding of this stage, it's important to get in mind some internal influences (e.g. personality, motivation, attitudes) because they affect de consumer's decision-making process. In this stage, it's necessary to consider some stages that are part of these process (Schiffman & Wisenblit, 2015; Solomon, 2015). The stages are need recognition, information search, evaluate alternatives, product choice and post purchase evaluation.

- **Need recognition:** Consider as the start of the consumer's decision-making process, this variable occurs when a "problem", "need" or "want" is recognized. This "problem" or "need" is recognized when the consumer feels that this new product will satisfy an existing need. There are two types of need recognition. The first is the *actual state* type which is when the consumer recognizes that he has a problem when his product no longer works and needs a new one. The other type is the *desire state* which is when a consumer wants a new product even though the need doesn't exist (Panwar, Anand, Ali, & Singal, 2019).
- **Information Search:** Once the consumer recognizes the need, he begins to search for information on possibilities of filling that need. The information search is the process of collects information about the product that fulfills your need. Information collected is not only about stuff and on things but also from other people via recommendation and through previous experiences that consumer may had. It's also important for the consumer make a pro's vs. con's list to help make him decision (Panwar *et al*., 2019)..
- **Evaluate alternatives:** This stage occurs when the consumer has all the information collected, deduce which are the best alternatives for him need and, finally, determined what will satisfy him need. It's also in this stage that the costumer will begin to seek for the best deal that can be based on price, quality or other factors that are important for the consumer (Stankevich, 2017).
- **Product choice:** Evaluated all the alternatives, the consumer has now decided based on all the information gathered what to acquire. At this stage, the consumer has come to a logical conclusion of what he will buy and why (Stankevich, 2017).
- **Post-purchase evaluation:** This stage is considered as the key stage for the company side and for the customer likewise. In this stage, if the consumer find that the product

has matched or exceeded the promises made and him own expectations, he will potentially influence other potential customers in the stage 2 (information search).

Figure 2 - Consumer decision-making process



Source - Author's elaboration

Output

The output component refers to the post-decision aspect that consists itself in the post-purchase evaluation of the purchase. In this phase, consumers can do three different types of purchases. The first one is when the purchase is a trial, this means that's when the consumers attempt to evaluate the products when they use it for the first time. The second one is when consumers acquire a smaller quantity of a products because they are not familiar with that specific brand. The last type is when the consumers are encouraged to buy a product through such promotions, coupons or even free samples (Schiffman & Wisenblit, 2015).

2.4. Generation Theory

2.4.1. Generation Theory

The first concept of generation theory was introduced by Manheim (1952) in sociology and psychology fields. This concept has been developed over the years until today and the current definitions is *"… a group of individuals born and living contemporaneously who share common*

knowledge and experiences that affect their thoughts, attitudes, values, beliefs, and behaviors" (Clark, 2017, p. 3). In the world we live in, there are currently 4 defined generations, which are: the **Silent Generation**, who born between 1925 and 1942; the **Baby Boomers**, who born between 1943 and 1960; the **Generation X**, who born between 1961 and 1981; and **Generation Y** (known as Millennials), who born between 1982 and 2001 (Russell Calk & Patrick, 2017; Venter, 2017). These destinations between times are different, in each of them, since historical and social events occurred that affected the way the individuals of each generation behave, and this is due to the beliefs that each one has. This means that they will have the same "generational personality" (Russel Calk & Patrick, 2017).

However, it is not possible to state that all individuals of a generation are born and raised with the same values and beliefs, taking into account that there are other variables such as the cultural and / or socio-economic context in which they live, and which may have an influence on their behaviors and beliefs (Clark, 2017).

Although the generations to be focused on are Generation X and Millennials, it is equally important to describe the others as well. Regarding the Silent generation, this one grew up during the Great Depression and many individuals of this generation fought or were children during the World War II, they're characterized as patriotic, civic-minded, have a sense of pride and determination, tending to work hard. They're also loyal and disciplined (Clark, 2017). As for Generation X, they grew up during the fall of the Soviet Union, experienced a situational epidemic and economic uncertainty. They're characterized as independent individuals, commitment to their employing organizations, searching for a company that can offer work-life. For Generation X, it's more important to live their life's and have a lifestyle with freedom and flexibility and their work (Schiffman & Wisenblit, 2015; Twenge, Campbell, Hoffman, & Lance, 2010).

Some authors defend the existence of a new generation, called **Generation Z**, which is made up of individuals who were born between 2000 until today. This generation is defined as being highly "connected". Individuals that are growing and developing in a totally digital reality and that is the first generation to earn less from their parents (Schiffman & Wisenblit, 2015). However, this generation will not be considered in the scope of this study, since there is still no uniformity on the part of the researchers, regarding their characteristics.

2.4.2. Generation X

The Generation X (or Gen X) are the group of people who born between 1961 and 1981 (Russell Calk & Patrick, 2017; Venter, 2017) and is considered one of the most educated generations in history (Lissitsa & Kol, 2016). This generation has experienced several historical and important events for the world as we know it today such as the fall of the Soviet Union, the AIDS epidemic and the economic uncertainty (e.g. the recessions in the early 1980s and 1990s) (Twenge, Campbell, Hoffman, & Lance, 2010; Duxbury & Ormsbee, 2020). The main characteristics attributed of this generation are individualism, self-reliance and skepticism (Lissitsa & Kol, 2016). These characteristics are due to the fact that this generation was born at a time when the first divorces began to appear, which made this generation begin to become independent at a young age and to look at the concept of family in a different way (Lissitsa & Kol, 2016).

Regarding the use of technologies. this generation was born and grew up at a time when the new technologies that we take for granted today, such as computers, mobile phones, even the internet, were beginning to emerge in the existing society thus being considered as "tech-savvy" (Twenge, Campbell, Hoffman & Lance, 2010).

At work, this generations tends to get new skills of their jobs in order to use towards in new opportunities that can appear what makes them lees committed to their employing organizations. They are considered as emotionally happy workers and willing to always want to get a new and better education (Chuang, 2019). At the same time, this generation expects to achieve some work life balance, a factor in which they give a lot of importance (Twenge, Campbell, Hoffman & Lance, 2010).

Another important characteristic of Generation X is that they give a lot of importance to the opinion of others. This happens because they have a certain level of insecurity in them, which makes them feel the need to *"... reassurance that their choices are sound."* (Lissitsa & Kol, 2016, p. 30).

2.4.3. Millennial's Generation

Considered as the most largest and capable generation to enter in workforce (Russell Calk & Patrick, 2017), Millennials or Generation Y are people who were born between 1982 and 1999 (Twenge, Campbell, Hoffman, & Lance, 2010). This generation is the first one who have grew up with a high interaction with a technological world, such as computers, mobile advices, etc. where the most developed means of communication. Dubbed "digital natives", this generation

spends hours communicating through communication tools like social networks, over the internet (Venter, 2017). All this growth together with the technologies, makes this generation still be described as a generation that presents a different understanding from the other generations, with regard to the way of thinking and obtaining and processing information. (Maulding, Peters, Roberts, Leonard & Sparkman, 2012). Other general characteristics of this generation is the fact that they present a high level of individualism and altruism and they are considered as the ultimate multitasking persons (Twenge, Campbell, Hoffman & Lance, 2010). In a more interpersonal environment, especially in family relationships, Millennials are shown to be the least independent generation. This behavior is due to the fact that throughout its growth, this generation seems to have overprotective parents and that expose them to the dangers that existed. These parents were thus known as "helicopter-parents". All these attitudes that Millennials grew up with, made them feel special, confident, capable of overcoming any obstacles and open to discover new cultures, which differ from their own. (Anderson, Baur, Griffith & Buckley, 2017). This generation thus demonstrates having a great connection with the family through social networks and on any technological advice (Venter, 2017).

At work, Millennials are characterized by to be quicker to change jobs, due to objective of gain work experience in different areas, look for business trips, presenting less importance of a work centrality lifestyle. This means that this generation values work-life balance, looking for a purpose, through activities outside the work area (Anderson *et al.*, 2017). Millennials are also more likely to be motivated by extrinsic rather than intrinsic rewards (Twenge, Campbell, Hoffman & Lance, 2010). Regarding wages, this generation shows to be quite sensitive to the amount of wages earned and that, at the same time, it expects to be well paid and to be promoted quickly (Johnson & Ng, 2015). They also seem to have no hesitation in exposing what they really think they deserve, which means that they can sometimes break the rules (Venter, 2017). Although, it’s possible to say that this generation is unique and special in certain fields. However, certain characteristics that they present may be different from other generations, a subject that will be analyzed in the next point, in comparison with the generation mentioned earlier.

2.4.4. Generation X vs. Millennials

Based on the descriptions made earlier, in relation to the characteristics that define baby boomers and millennials, it is now important to understand, from a more specific and detailed

point of view, how the two generations behave and what influence them in the time of their purchase decision making using existing technologies today.

Starting by comparing the epochal events that each generation lived, it is possible to say that both grew up and saw the world in different ways. Generation X, as previously mentioned, was born and grew up at a time when the political situation at the global level was very disturbing. The second world war had already ended but the consequences that it had caused were still very present. The Soviet Union had fallen, Germany was still divided, and the world was in an economic uncertainty. Regarding Millennials, they were born and were created at a time when the world economy was already stable, where technologies were something that were already part of human life (Clark, 2017; Duxbury & Ormsbee, 2020).

Millennials was born and grew up at a time when the use of new technologies was more normal and present in society, being therefore considered "digital natives" (Venter, 2017). The means of communication that they use turn out to be technological via cell phones, texting and instant messaging. How they are so present in these technologies and in the applications they have, such as social networks, this turns out to be the biggest factor that influences Millennial's buying decisions (Sullivan & J. Hyun, 2016). When compared with Generation X, this one went thought the entire period of technological evolution and the rise and devolvement of the media (Lissitsa & Kol, 2016). For this reason, Generation X are less dependent on smartphones than the millennials.

Shopping is something that is increasingly possible to do online. However, the behavior that individuals exhibit, also ends up being changed, with the presence of new technologies. The Generation X, in this case, they already recognize that the internet is like a new way of shopping but that it is still not the main means used by them. They preferred to make purchases based on traditional search. (buying physically). They're used to hear the features and all the explanations about the products (Lissitsa & Kol, 2016). Therefore, and based on these little differences between generation X and millennials, according with their links with technology, Millennial's consumers are those who use the internet the most, more specifically interactive media platforms, to shopping online. (Sullivan & J. Hyun, 2016).

Table 1 - Key characteristics of Generation X and Millennials

Generation	**Generation X**	**Millennial**
Year of born (Russell Calk & Patrick, 2017; Venter, 2017)	1961 – 1981	1982 – 2001
Aged at 2020	59 – 39	39 – 19
Epochal events (Clark, 2017; Duxbury & Ormsbee, 2020)	The fall of the Soviet Union; AIDS epidemic; Economic uncertainty;	September 11th; Digital Age;
Personnel Values (Twenge, Campbell, Hoffman and Lance, 2010; Lissitsa & Kol, 2016; Venter, 2017)	Individualism; Self-reliance; Skepticism;	Individualism; Altruists; Ambitious;
Technological Characteristics (Twenge, Campbell, Hoffman and Lance, 2010; Venter, 2017)	"Tech-savvies"	"Digital Natives"

Source - Author's elaboration

Chapter 3 – Conceptual Model and Hypotheses Formulation

3.1. The Conceptual Framework

During this dissertation, it's possible to affirm that consumer decision-making process is a component that has been increasingly considered and studied in order to understand how consumers think and act. Alongside this, the development and use of new technologies are increasingly and the way in which they impact the lives of different consumer groups, such as Baby Boomers, GenX and Millennials are relevant and significant for a better interaction between companies and consumers.

The development of new technologies, such as **AI**, it is shown to be an evolution in advanced technology that will allow to obtain information much more quickly and in a more intuitive way. In this way, both companies and consumers, have used these technologies for their own personal benefit. On the part of companies, in trying to anticipate the movements of consumers and thus manage to create a desire to buy in them. On the part of consumers, the use of these technologies is due to the fact that they provide information and obtain products / services in an easier and faster way (Edelman & Singer, 2015). However, AI is still in his early adoption level by companies and consumers. This is because scientific studies by academic researchers, on how this high-tech really affects consumers are still insufficient. But as already mentioned by other authors, this has great potential and is expected to be an asset for all companies, in the way they get the consumers.

Considering that, it's important understand how AI can influence some aspects of the consumers. The application of these new high techs, such as AI, will be carried out based on the ***Consumer Decision-Making Model*** **from Schiffman and Wisenblit (2015) and on the** ***Cognitive Decision-Making Process*** **from Salomon (2018).** Within this model, only the phase of the **process** will be focused because it's in this phase where the consumer makes the decision to buy a product / service based on external factors, as already discussed in the literature review.

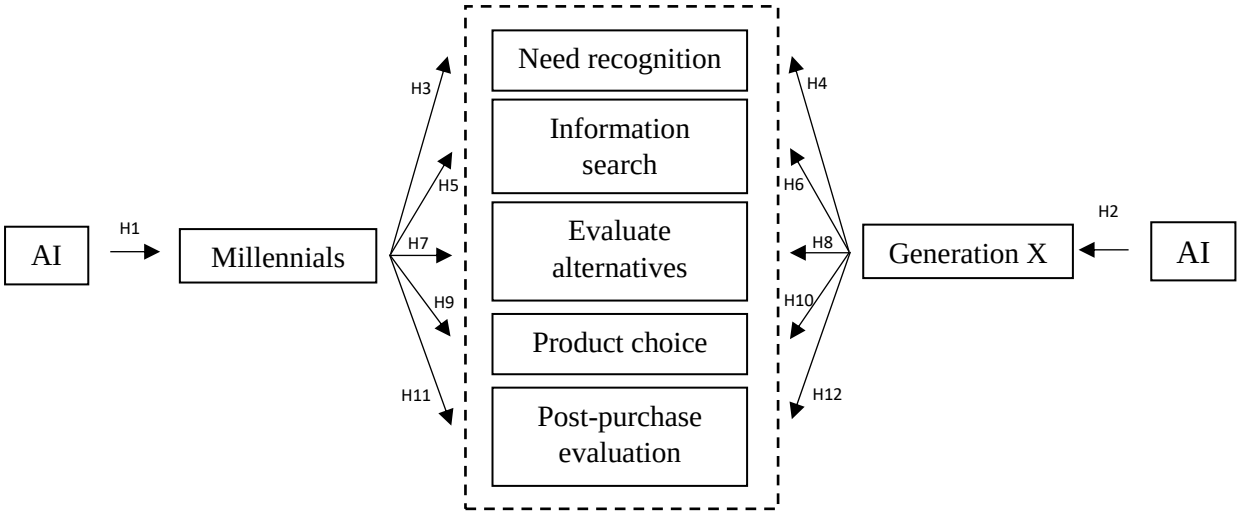
In order to be able to perceive in a more effective way how impacted the consumer decision-making model can be, all the five stages already explained in Literature Review (**need recognition, information search, evaluate alternatives, product choice and post-purchase evaluation**) will be studied individually in order to understand how AI can affect each one of them.

In order for this study of AI in the consumer decision-making process to be refined to detail, this will be a study based on two different generations where which one presents considerable

differences in terms of their characteristics as consumers and users of new technologies (Sullivan & J. Hyun, 2016; Venter, 2017). Based on the characterization made in the Literature Review by both generations, it is therefore relevant to understand how AI can influence both ones, with the purpose of both using the same tools in their different stages. Finally, it is also the objective of the research to understand the level of knowledge and perception that both generations have of the new high techs, such as AI.

As a result of this components studied, a framework model was developed in order to understand the impact of AI in the consumer decision making process, analyzing and comparing the generations of Millennials with the Generation X. The Figure 3 presents the model.

Figure 3 - The Research Framework



Source - Schiffman and Wisenblit (2015); Salomon (2018); Author's elaboration

This model represents an overview on what the purpose of this dissertation is and what the hypotheses to be studied, topic that will be addressed below.

3.2. Hypotheses Formulation

Based in the framework model created before, the development of hypotheses is important to measure the importance and the impact that AI technologies can have in Generation X and Millennials' generations, when used in their decision-making process.

As already mentioned, the development of new technologies and their application in real life is something that is increasingly trying to be achieved by organizations. However, its immediate use is still a little addressed issue due to the disadvantages and complications that these high-techs can show (Qin & Jiang, 2019). Considering this, it's important to formulate hypotheses that can help to better understand and measure what is the perception that both generations have of AI and the impact that this can have on the consumer decision-making process. The hypotheses are proposed as follow, and further findings and conclusions topics will be used to prove if they can be accepted or not.

H1: **Millennials' generation has a positive perception Artificial Intelligence;**

The development of these new technologies is still a topic that makes researchers have divergent opinions. Their applicability is still under development, which makes the experiences with AI also difficult to be evaluated with concise results. For these to be experiments, people need to know the technology first and understand what its real capabilities are. For this reason, H1 was formulated to be possible to evaluate the level of perception that each generation, Millennial in this case, has about AI.

H2: **Generation X has a positive perception of Artificial Intelligence;**

With the same objective as H1, the hypothesis 2 (H2) was formulated to be possible to evaluate the perception that Generation X has of AI.

H3: The "Need recognition" stage can be impacted by AI, in the generation of Millennials;

H4: **The "Need recognition" stage can be impacted by AI, in Generation X;**

At this stage, the recognition of a need is made by one or more factors such as "want", "problem" or "need". This need ends up being satisfied when the consumer feels that the new product / service fulfills all the requirements that he seeks. Thus, the two hypotheses described above (H3 and H4) intend to understand whether the use of AI can cause this effect, in both generations.

H5: The "Information search" stage can be impacted positively by AI, in the generation of Millennials;

H6: The "Information search" stage can be impacted positively by AI, in the Generation X;

With the ability to be one of the phases in which AI can be more used and practical, this phase is when the consumer begins to look for the necessary information so that the existing need is realized. Consequently, a comparison between the information of the various possibilities is made so that you can understand which is the best option. Thus, the hypotheses 5 and 6 (H5 and H6) were defined to understand how the use of AI apps can help to collect the necessary information at this stage.

H7: The "Evaluate alternatives" stage can be done through AI, in the Millennials' generation;

H8: The "Evaluate alternatives" stage can be done through AI, in the Generation X;

After all the necessary information has been collected, the evaluation of the various possibilities is made based on the pros and cons of each possibility. Thus, the hypotheses 7 and 8 (H7 and H8) were developed to study whether the use of AI can have a direct impact at this stage.

H9: The "Product choice" stage can be influenced positively by AI, in the Millennials' generation;

H10: The "Product choice" stage can be influenced positively by AI, in the Generation X;

After evaluating all decisions, the consumer reaches the conclusion of which product / service he wants and what he is going to buy. Thus, hypotheses 9 and 10 (H9 and H10) refer to how AI can influence this decision, on the part of the consumer.

H11: The "Post-purchase evaluation" can be done through AI, in the Millennials' generation;

H12: The "Post-purchase evaluation" can be done through AI, in the Generation X;

Considered as the most important stage of all the process, it is in this process where consumers tend to give feedback about the product they bought. Thus, hypothesis 11 and 12 (H11 and H12) were formulated to understand if the customers feels confident giving their feedback through an AI application.

Table 2 - Hypothesis description

Hypothesis	Description	Based on
H1	Millennials' generation has a positive perception Artificial Intelligence	Popenici and Kerr (2017); Author's elaboration
H2	Generation X has a positive perception Artificial Intelligence	
H3	The "Need recognition" stage can be impacted by AI, in the generation of Millennials	
H4	The "Need recognition" stage can be impacted by AI, in the Generation X	
H5	The "Information search" stage can be impacted positively by AI, in the generation of Millennials	
H6	The "Information search" stage can be impacted positively by AI, in the Generation X	
H7	The "Evaluate alternatives" stage can be done through AI, in the Millennials' generation	
H8	The "Evaluate alternatives" stage can be done through AI, in the Generation X	
H9	The "Product choice" stage can be influenced by AI, in the Millennials' generation	
H10	The "Product choice" stage can be influenced by AI, in the Generation X	
H11	The "Post-purchase evaluation" can be done through AI, in the Millennials' generation	
H12	The "Post-purchase evaluation" can be done through AI, in the Generation X	

Source - Author's elaboration

Chapter 4 – Methodology

4.1. Research Design

Bearing in mind that the purpose of this study is to measure the impact that Artificial Intelligence can have at all stages of the consumer decision- making process, a **descriptive research** was conducted. This type of research will be used for this study since it is the one that is most appropriate to measure the performance of variables that are specific to marketing (Mooi, Sarstedt & Mooi-Reci, 2018). In addition, this research is based on an **empirical approach**, which means that all the conclusions come from the data collected through the methods to be used and not from theories or abstractions.

4.1.1. Population

The population is defined as a group of individuals in which it's interested to make judgements (Mooi, Sarstedt & Mooi-Reci, 2018). In this case, the population selected for this research are the Portuguese people. Also as already mentioned along this study, two generations are the focus to study the impact of AI. Bearing in mind that the development of AI applications in Portugal is still very scarce, as was verified in the Literature Review, it is possible to state that the contact that the population in question has with AI is still reduced. This is due to the lack of investment in this area by companies. Therefore, the minimum requirement to be part of the sample is that you have daily contact with some social network. Furthermore, it is equally important that participants are part of the two generations under study (Generation X and Millennials).

4.1.2. Data Collection

Since the data that is collected has a specific propose, the type of data gather is classified as **primary data** (Mooi, Sarstedt & Mooi-Reci, 2018). To this, an online questionnaire was developed and created (**quantitative research**). This questionnaire was inserted in *Qualtrics*, an online questionnaire software, and was written in Portuguese, since it is the mother tongue of the possible participants and also for a better understanding of the survey questions, to become clear and interpreted easily. The way this questionnaire reached the participants was through the main social networks such as: Facebook, Messenger, Instagram, LinkedIn and WhatsApp.

4.1.3. Questionnaire Construction

The construction of the questionnaire was made based on the literature review and in such a way that it also becomes clear and intuitive for the participants. Before the questionnaire was completed and released to participants, a pre-test was carried out with a sample of ten people of different ages (five people belonging to Generation X and other five to the Millennials generation), academic qualifications and styles of lives. This pre-test was used to understand which adjustments were necessary for a complete understanding of it for the final inquiry survey (Mooi, Sarstedt & Mooi-Reci, 2018).

Regarding the way the questionnaire was built, it is divided into three parts with a total of twenty-three questions. The first part corresponds to the participants' perception of AI and what its possible applications are, with a total of seven questions, out of the twenty-three totals. To study the participants' understanding of AI, they were asked to answer multiple choice and rank questions according to the Likert scale. The Likert scale is a type of response scale used to the participants rate their level of agreement, regarding the statement (Mooi, Sarstedt & Mooi-Reci, 2018). In this part, the Likert scale that was used was the seven-point scale, where the participants can rate the statements from one (strongly disagree = 1) to seven (strongly agree = 7). In the second part, each respondent was invited to classify statements about their actions and behaviors at the different stages of the decision-making process. To this end, three different fictional scenarios were created so that it was possible to evaluate your choices as close to reality as possible. One of the scenarios created encompasses three phases together (information search, evaluate alternatives and product choice) since they end up being phases that take place simultaneously and also to facilitate the interpretation of the situation by the participants. This part has a total of ten questions. In this part, the Likert scale used was the three-point Likert scale (strongly disagree = 1; strongly agree = 5) since it allows to decrease the questionnaire's length and also because it is easier to be answered. The thirty and last part is related with the respondents' social demography information (gender, which generation the participants belongs, academic background, etc.) in which the question of which generation the respond belongs have a big importance for this study. This part has a total of six questions.

4.1.4. Stimulus

To obtain a better perception of the real impact that Artificial Intelligence has on the consumer decision-making process, in two different generations, the questionnaire needs to have a

fictional scenario where technology is used and also a market of interest to the participants. To this end, 3 scenarios were built where the technology is applied by companies, all of them fictitious (e.g. brand X). One of the applications of AI that were used were the ones previously mentioned in the literature review, such as chatbots. The other feature was AI's ability to gather information from all products, from different brands, and compare them automatically, showing which is the best option. In this away, this allowed participants to feel some identification with the AI applications described and thus obtain more concise answers.

Experience 1 – Chatbot in a travel agency

1. *A travel agency X, which follows on social networks, uses a chatbot (program that allows have digital conversations with a human user) to show you and explain to you a new travel itinerary that the agency has.*

Experience 2 - Comparative database with all products on the market for a brand of phones

2. *Imagine that you want to purchase a smartphone and that the brand Y gives you all the necessary information about this product. In addition to providing information about its products, the Y brand also makes a comparison with similar products, from competing brands, using AI applications.*

Experience 3 – Chatbot in an undefined market

3. *Imagine that you buy a certain product, of a certain brand and that, after the purchase, the brand gets in touch with you through a chatbot so that you can give your feedback regarding the product you bought, whether positive or negative.*

4.1.5. Measures

Considering that the aim of the study is to understand the impact that AI can have on the consumer decision-making process, 3 different scenarios were created for the different phases of the process, as explained above. In addition to this, questions were also created that make it possible to understand what the participants' perception of this technology is, since they are two generations with different characteristics. To measure them, a multi-item scale was designed

with Likert-type items from 1 to 5, for each stage of the process, and a Likert-type item from 1 to 7, for the perception and how impactful AI can be on the participants. The items to be analyzed were adapted from studies already carried out. In addition, they were also adapted to the current study since they are old studies. The following table shows which items and where they were used.

Table 3 - Constructs and Items

Construct	Items	Adapted from
Participant perception	**A1.** I consider AI as a very important technology that will be part of everyday life; **A2.** I consider AI as a very useful technology for personal use; **A3.** I am aware of the moral and ethical issues that AI raises (ability to think like a human even though it is a machine); **A4.** I consider AI as an asset for several areas (health, retail, catering, among others)	Hill and Hill (1998); Karaatli, Ma and Suntornpithug (2010); Mishra and Jain (2012); Author's elaboration
Need recognition	**B1.** I trust the AI application used (chatbot) to let me know about this new product / service; **B2.** This product / service solves a personal need that I had. **B3.** I have the desire to consume this product/service;	
Information search	**C1.** I trust in the information that this brand gives me; **C2.** The brand gives me all the necessary information about the product through the AI features. **C3.** I trust in the AI's application to give me information about the product;	
Evaluate alternatives	**D1.** I think the comparison made by the Y brand an asset. **D2.** I trust the product comparison made by the Y brand with the other competing brands. **D3.** I trust the AI application to compare this brand with the others;	
Product choice	**E1.** The comparison made was decisive for opting for the Y brand with the remaining competing brands. **E2.** I will consider buying the product of this brand. **E3.** The application of AI was crucial to choose the product to be purchased;	
Post-purchase evaluation	**F1.** The brand demonstrates concern about whether the consumer liked the product or not. **F2.** I don't mind giving my opinion to a chatbot; **F3.** I explain my whole opinion about the product purchased to the chatbot.	

Source - Author's elaboration

Chapter 5 – Findings

5.1. Procedure

After closing the questionnaire in *Qualtrics*, 317 responses were extracted from there and submitted into the *IBM SPSS Statistics 26* program. In total, only 211 were considered useful considering the existence of incomplete responses.

5.1.1. Reliability and Validity Analysis

In order for the hypotheses to be tested, it is necessary to first analyze the consistency and quality of the data measured by the scales used. For this, the reliability analysis to be used in this case will be the Cronbach's alpha coefficient.

The Cronbach's alpha coefficient is an indication of internal consistency and should be greater than or equal than 0.7 (ranging from 0 to 1) indicating that reliability is accepted (Cho & Kim, 2015). Therefore, the tests were carried out and it is possible to affirm that all values exceed the minimum required, as it is possible to see in Table 3.

Table 4- Reliability analysis

Cronbach's Alpha coefficient

	Participant Perception	Decision-making Process Stages					Total
		Need Recognition	**Information Search**	**Evaluate Alternatives**	**Product Choice**	**Post-purchase Evaluation**	
Millennials	0.796	0.784	0.812	0.703	0.883	0.798	0.852
Generation X	0.717	0.906	0.871	0.870	0.964	0.861	0.924

Source - Author's elaboration

Regarding to the validity part, an exploratory factor analysis was conducted in order to verify the validity of the questionnaire structure. To make it possible, two tests were used, which are **Kaiser-Meyer-Olkin (KMO)** and **Bartlett Spherical** tests. The KMO test is used to measure the proportion of the sample variance. The value varies between 0 and 1 and what is considered acceptable are values above 0.6. Regarding to the Bartlett Spherical test, it is used to verify the

existence of a correlation between the variables. The value of this test must be less than the level of significance (p> 0.05).

In Annex 1 it is possible to find the results obtained from the tests described above. Thus, the test values show that the conditions of both tests are respected and that the variables have good structural validity.

5.1.2. Model Hypotheses Validation

Since the research model is composed of hypotheses and these must be accepted or rejected, for this purpose they will be validated through the Student's T-test. All the hypotheses will be validated with the **Independent Sample Student's T-test**. This type of test is used to determine if there is a significant difference between the means of two groups, which may be related in certain features (Larry Wasserman, 2000). For the H3, the test that will be used will be **Paired Sample Student's T-test**, with the aim of study the mean differences between the perception that both generations in study have of AI.

Bearing in mind that two different Likert-scales were used for the different hypotheses, then two different hypothesized population means will also be established. For the cases where a 7-point Likert scale was used, the mean established is 5.5 since 5 is the neutral choice (H0 $\mu \leq 5.5$ and Ha $\mu > 5.5$). So, this becomes an acceptable value to be able to get conclusions. Regarding the hypotheses that were tested with a 5-point Likert scale, the value for get conclusions is 3.5 (H0 $\mu \leq 3.5$ and Ha $\mu > 3.5$). It should also be reiterated that all tests will have a significant value of 5%. This means that the null hypothesis is rejected if the sig. (p-value) of the test is less than 0,05 ($p<0.05$).

However, to be able to analyze the information of the variables, it is necessary to first check some assumptions inherent to the Student's T-test (Larry Wasserman, 2000).

A. The observations consist in independent groups;
B. There are no significant outliers;
C. The dependent variables are approximately normally distributed;
D. Must have homogeneity of variances.

The graphics that support the assumptions B and C can be seen in Annex 3. The assumption D is verified during the test of hypothesis (the sig. value from Levene's test must be higher than p-value, to have homogeneity of variances).

5.2. Data Analysis

5.2.1. Social demographic Analysis

In total of 211participants, Table 4 shows the participants' socio demographic data with absolute and relative frequencies.

Table 5 - Social demographic characterization

Variable	Variable Classification	Absolute Frequency	Relative Frequency (%)
Gender	Female	118	55.9
	Male	91	43.1
	Prefer not to say	2	0.9
Generation	Baby Boomer	0	0
	Generation X	92	43.6
	Millennial	119	56.4
Education Level	Basic school	1	0.5
	High school	41	19.4
	Bachelor's degree	81	38.4
	Master's degree	84	39.8
	PhD's degree	4	1.9

Source - Author's Elaboration

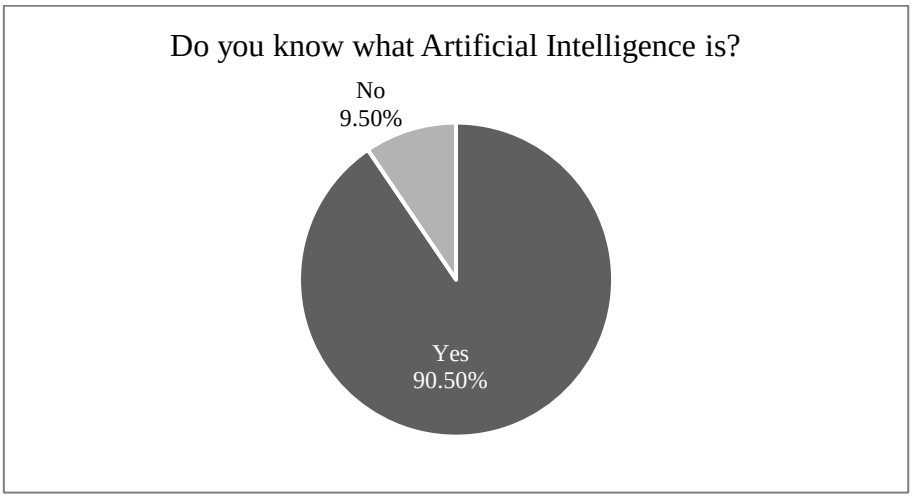
Only **gender, generation and education level** were analyzed since they're considered the most relevant variables. (To see all the social demographic characterization, it is possible to find in Annex 2) According to the Table 4, more than half of the participants are female with a percentage of 55.9% and 43.1% corresponding to the male participants. Regarding the generation to which the participants belong (one of the most relevant data for this study), 56.4% of the participants belong to the generation of Millennials and 43.6% to Generation X. This variable is balanced, which ends up being important for the purpose of the study. About the educational level that participants have, 38.4% of participants have or are finishing a bachelor's degree and 39.8% of participants have or are also finishing a master's degree. Regarding the participants with Basic School, High School and PhD degree, these are the ones with the lowest representation with 0.5%, 19.5% and 1.9%, respectively.

5.2.2. Descriptive analysis

In this section, the objective of the descriptive analysis is to describe coefficients (e.g. mean, median mode) that summarizes the data related with the research in progress. The analysis is made to two questions about AI asked in the questionnaire, comparing the two generations under study.

Regarding the question ***"Do you know what Artificial Intelligence is?"***, of the 211 total responses obtained, there was a frequency of 191 positive responses ("Yes"), corresponding to 90.5%, and 20 negative responses ("No"), corresponding to 9.5%.

Figure 4 - Participants know what AI is



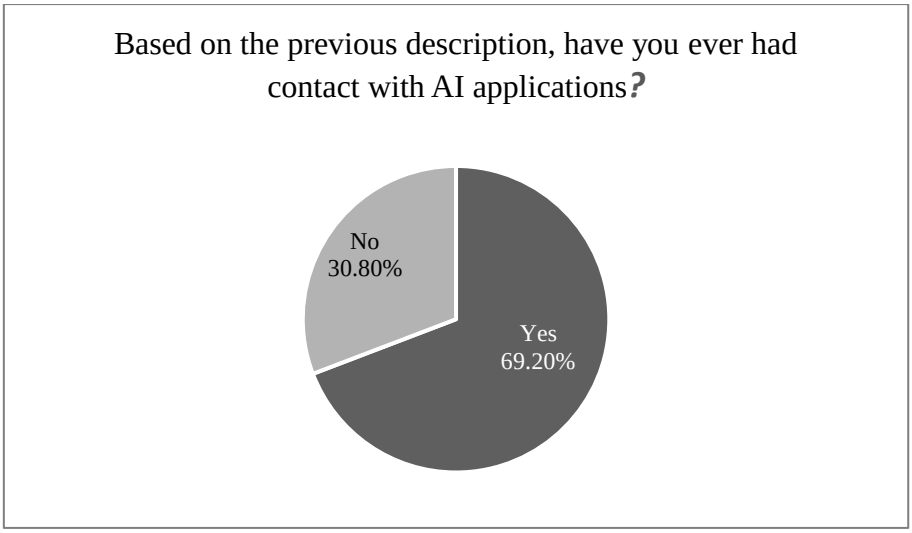
Source - Author's elaboration

As for Millennial generation, of which 119 answers correspond, it is possible to verify that 89.9% of the participants already know what AI is, with the remaining 10.1% claiming that they don't know what it is. Regarding to Generation X, of the 92 responses obtained by participants belonging to this generation, 91.3% of them claim to already know about what AI is and 8.7% claim the opposite (Annex 4). These values obtained are quite identical, what demonstrate that both Generation X and Millennials are aware of the existence of this new technology, that it is increasingly present in people's daily lives, which shows the importance and greatness that it already presents.

Regarding to the question ***"Based on the previous description, have you ever had contact with AI applications?"*** (into the questionnaire was given a brief description of what Artificial Intelligence is all about, aided by a video demonstration of one of the applications of this

technology), from 211 responses, 69.2% said that they already had contact with any of the AI applications, with 30.8% saying that they have not yet (Figure 5).

Figure 5 - Participants already had contact with any AI application



Source - Author's elaboration

According to the participants belonging to the Millennial generation, of the 119 who answered the questionnaire, 78.2% answered affirmatively regarding possible contact with AI applications, with 21.8% saying no. Relatively to Generation X, from the 92 responses, 57.6% said that they already had contact with any AI application, with 42.4% saying that they have not yet (Annex 4). These values show some discrepancy between generations. These discrepancies may be due to the fact that both generations have different technological characteristics, which makes them more or less receptive to try new technologies., In the case of Millennials, the values presented are understandably higher, compared to Generation X, since Millennials are considered as "Digital natives", that is, individuals who were born in an era where technology was already quite developed and that made part of their growth, as already discussed in Literature Review.

5.2.3. Hypothesis Testing

In this section, all hypotheses were tested using the statistical method mentioned in the previous section. The objective is to understand what the relationship between the dependent variables and the independent variables is. The hypotheses were tested in pairs since they are hypotheses that intend to evaluate the same construct, differing only in the generation (independent variable).

5.2.3.1. Participant's Perceptions of AI

All participants (Generation X = 92 participants & Millennial = 119 participants) were to classify the items to be studied in a 7-point Likert scale, in order to express what are their perceptions about AI, according to the items used for. After that, the data were collected and tested, and the results were obtained through Independent Sample Student's t-test.

H1: Millennials' generation has a positive perception Artificial Intelligence;

H2: **Generation X has a positive perception of Artificial Intelligence;**

As shown in Table 5, both generations have a lower mean than that intended for the null hypothesis to be rejected statistically (Generation X: M = 5.20; Millennial: M=5.48). However, it is noteworthy that the Millennials presents a mean very close to the neutral mean. In order to be able to reject the hypotheses completely statistically, it is also necessary to check the p-values obtained for each of the items under evaluation (p-value must be greater than the confidence interval of 0.05).

Table 6 – Group statistics of "Participant perception" - GenX vs. Millennial

	Items	Items mean	Mean	Std. Deviation	Std. Error Mean
Generation X	A1	5.42	5.20	0.953	0.103
	A2	5.04		1.014	0.113
	A3	4.91		0.831	0.099
	A4	5.43		0.797	0.088
Millennial	A1	5.62	5.48	0.870	0.081
	A2	5.05		0.898	0.087
	A3	5.50		0.928	0.087
	A4	5.73		0.772	0.073

Source - Author's elaboration

Through Table 6, it is possible to analyze the p-values for each item. All items (with the exception of A3) obtained a statistical p-value higher than the level of significance used (p(A1)=0.245; p(A2)=0.969; p(A3)=0.004; p(A4)=0.067), which means that the null hypotheses under study must be not rejected since do not exist the necessary statistical parameters for them to be accepted.

Table 7 - Independent Sample t-test - Participants perception

Independent Sample Student's t-test

Items	Levene's test		t-test					Null Hypothesis
	F	Sig.	t	df	Sig. (2-tailed)	95% Conf. Interval Lower	Upper	
A1	1.775	0.184	-1.184	209	0.245	-0.533	0.137	Not Reject
A2	0.216	0.643	-0.039	209	0.969	-0.360	0.346	Not Reject
A3	5.225	0.215	-2.938	209	0.004	-0.998	0.194	Reject
A4	4.938	0.265	-1.844	209	0.067	-0.613	0.20	Not Reject

Source - Author's elaboration

Analyzing the items that obtained a mean lower than the neutral mean of 5.5, it is possible to state that there was at least one item (A2. "*I consider AI as a very useful technology for personal use*") that in each generation proved to be inferior in relation to the remaining (M (Generation X) = 5.04; M (Millennials) = 5.05) which made it have a negative impact on the final mean. In addition to this, in Generation X there was also one of the items (A3. "*I am aware of the moral and ethical issues that AI raises (ability to think like a human even though it is a machine);*") analysis that proved to have a negatively influence in this generation (M (Generation X) = 5.91). Finally, it should be noted that Millennials obtained a higher average in all items, compared to Generation X (Generation X: M(A1)=5.42; M(A2)=5.04; M(A3)=4.91; M(A4)=5.43 | Millennials: M(A1)=5.62; M(A2)=5.05; M(A3)=5.50; M(A4)=5.73).

Thus, according to the p-values obtained being lower than the confidence interval (except item A3) and the means of both generations being lower than the neutral mean, **H1 and H2 are rejected**.

5.2.3.2. The influence of AI in Consumer Decision-making Process

All the hypotheses to be tested from here aim to understand what impact the use of AI can have on the consumer decision-making process, comparing Generation X consumers and Millennial consumers. On a 5-point Likert-type scale, participants were asked to classify statements that are used as variables to assess the influence of AI, in each of the phases of the decision-making process. All the results were obtained through SPSS, using the **Independent Sample Student's t-test**, since it is intended to compare two results from the same independent variable. In these tests, the measures used to identify whether null hypotheses should be rejected or not will be the neutral mean of 3.5 (explained previously; H0 $\mu \leq 3.5$ and Ha $\mu > 3.5$) and also the p-value that should be greater than the significance interval of 0.05.

H3: The "Need recognition" stage can be impacted by AI, in the generation of Millennials;

H4: **The "Need recognition" stage can be impacted by AI, in Generation X;**

As evident in Table 7, Millennial generation has a mean score slightly higher, in statistics terms, than the neutral mean value of 3.50 (M(Millennials)=3.55). This is the first evidence that will allow us to reject the null hypothesis. To reject the null hypothesis completely, it is also necessary to check the p-values obtained from each of the items to be analyzed ($p<0.05$).

Table 8 - Group statistics of "Need recognition" stage - GenX vs. Millennials

	Items	Items mean	Mean	Std. Deviation	Std. Error Mean
Generation X	B1	3.52	3.39	0.917	0.099
	B2	3.32		0.878	0.098
	B3	3.33		0.847	0.093
Millennial	B1	3.75	3.55	0.864	0.080
	B2	3.46		0.822	0.077
	B3	3.43		0.748	0.071

Source - Author's elaboration

As shown in Table 8, all p-values have higher values than the level of significance used (p(B1)=0.074; p(B2)=0.243; p(B3)=0.321). This shows that the null hypothesis should not be rejected since it does not fulfill the premise that the p-value should be less than the level of significance.

Table 9 - Independent Sample Student's t-test - Need recognition stage

Independent Sample Student's t-test

Items	Levene's test		t-test					Null Hypothesis
	F	Sig.	t	df	Sig. (2-tailed)	95% Conf. Interval		
						Lower	Upper	
B1	3.398	0.067	-1.797	209	0.074	-0.476	0.022	Not Reject
B2	0.447	0.505	-1.171	209	0.243	-0.386	0.098	Not Reject
B3	2.861	0.097	0.995	209	0.321	-0.112	0.341	Not Reject

Source - Author's elaboration

Analyzing the values of the two tables, it is possible to get some important conclusions. Regarding do the item B1 (*"I trust in the AI application used (chatbot) to let me know about this new product/service"*) which aims to evaluate the degree of confidence that the participants have to know new products / services of a given brand, both generations had an mean value higher than the neutral mean. However, it is important to note that the mean obtained for this item is higher for Millennials, compared to Generation X (Generation X: M(B1)=3.52; | Millennials: M(B1)=3.75). This shows that both generations have sufficient confidence in this technology to fulfill this purpose of making new products known. For the item B2 *("This product / service solves a personal need that I had"*), where it was intended to understand whether that information, provided by the chatbot, would create a need at the moment the chatbot contacts the participant, this has the lowest mean of the three items of Generation X (Generation X: M(B2)=3.32) while in Millennials, this item had an mean value of M(B2)=3.46. Finally, regarding to item B3 (*"I have the desire to consume this product/service")* where it was intended to understand whether this information would be possible to create the feeling of desire in the participant, through AI technology. The mean obtained from the two generations in these items are relatively lower than the neutral mean of 3.5 (Generation X: M(B3)=3.33; | Millennials: M(B3)=3.43).

Consequently, **H3 and H4 are rejected** since they do not fulfill the statistical requirements do be possible to reject the null hypothesis.

H5: The "Information search" stage can be impacted positively by AI, in the generation of Millennials;

H6: The "Information search" stage can be impacted positively by AI, in the Generation X;

Table 9's results suggests that the information search stage's mean is statistically and significantly higher than the neutral mean of 3.5, in the Millennial generation (M(Millennials)=3.76). In turn, Generation X obtained a mean below the neutral mean, which is very close to that value (M(Generation X)=3.48. However, it is not possible to accept the rejection of the null hypothesis, as the first statistical evidence.

Table 10 - Group statistic of "Information search" stage - GenX vs. Millennials

	Items	Items mean	Mean	Std. Deviation	Std. Error Mean
Generation X	C1	3.47	3.48	0.820	0.090
	C2	3.53		0.837	0.088
	C3	3.43		0.824	0.087
Millennial	C1	3.68	3.76	0.866	0.076
	C2	3.92		0.754	0.069
	C3	3.66		0.858	0.070

Source - Author's elaboration

As evident in Table 10, all the items of this variable have a p-value below the level of significance (p(C1)=0.031; p(C2)=0.001; p(C3)=0.029). These values allow us to say with certainty that the null hypothesis is rejected.

Table 11 - Independent Sample's t-test - Information search stage

Independent Sample Student's t-test

Items	Levene's test		t-test					Null Hypothesis
	F	Sig.	t	df	Sig. (2-tailed)	95% Conf. Interval Lower	Upper	
C1	0.339	0.561	-2.167	209	0.031	-0.479	-0.023	Reject
C2	3.531	0.056	-3.462	209	0.001	-0.601	-0.165	Reject
C3	0.335	0.551	-2.168	209	0.029	-0.479	-0.030	Reject

Source - Author's elaboration

The results obtained in the two tables show that Millennials had a higher mean in each of the items of this variable, compared to Generation X. In the item C1 ("*I trust in the information that this brand gives me*") Generation X had a lower average than Millennials (Generation X: M(C1)=3.47 | Millennials: M(C1)=3.68). Regarding to the item C2 ("*The brand gives me all the necessary information about the product through the AI features"*), both generations had mean values greater than 3.5 and these items also have the mean values with the highest value of the entire variable under study (Generation X: M(C2)=3.53 | Millennials: M(C2)=3.92). Lastly, regarding to the item C3 ("*I trust in the AI's application to give me information about the product"*) the two generations had the lowest values of the three items of this variable, the mean of Millennials was above 3.5 and of Generation X do not (Generation X: M(C3)=3.43 | Millennials: M(C3)=3.66).

Thus, **H5 and H6 are accepted** (null hypothesis is rejected) according to all statistical evidence of the test.

H7: The "Evaluate alternatives" stage can be done through AI, in the Millennials' generation;

H8: The "Evaluate alternatives" stage can be done through AI, in the Generation Y;

In Table 11, the results show that Generation X and Millennials had a higher mean statistically than the neutral mean, with M=3.57 and M=3.94, respectively. Comparing both, it is possible to verify that the mean of Millennials is significantly higher than that of Generation X. As a first statistical evidence, so far both hypotheses can be accepted, according to their means.

Table 12 - Group statistics of "Evaluate alternatives" stage - GenX vs. Millennials

	Items	Items mean	Mean	Std. Deviation	Std. Error Mean
Generation X	D1	3.74	3.57	0.971	0.101
	D2	3.47		0.977	0.102
	D3	3.48		0.908	0.095
Millennial	D1	4.19	3.94	0.704	0.065
	D2	3.69		0.861	0.079
	D3	3.92		0.754	0.069

Source - Author's elaboration

Assessing the second statistical evidence necessary to draw conclusions regarding the hypotheses, the Table 12 shows that all items in this variable had p-values higher than the significance level of 0.05 (p(D1)=0.000; p(D2)=0.022; p(D3)=0.000).

Table 13 - Independent Sample's t-test - Evaluate alternatives

Independent Sample Student's t-test

Items	Levene's test		t-test					Null Hypothesis
	F	Sig.	t	df	Sig. (2-tailed)	95% Conf. Interval Lower	Upper	
D1	4.545	0.076	-1.937	209	0.000	-	-	Reject
D2	2.462	0.118	-1.748	209	0.022	-0.472	0.028	Reject
D3	3.700	0.068	-1.823	209	0.000	-	-	Reject

Source - Author's elaboration

In this variable, both Generation X and Millennials obtained an average higher than the neutral mean established. In the item D1 ("*I think the comparison made by the Y brand an asset*") Millennials had a significantly higher value compared to Generation X, although both were above 3.5 (Generation X: M(D1)=3.74 | Millennials: M(D1)=4.19). Regarding to the item D2 ("*I trust the product comparison made by the Y brand with the other competing brands*") Generation X had an mean lower but very close to 3.5 (M=3.47) while Millennials obtained a result of M=3.69. Relatively to item D3 ("*I trust the AI application to compare this brand with the others*") the Generation X again had a result below the mean score of 3.5 but that was very close to this (M=3.48) while Millennials had a mean score of M=3.92.

Thus, **H7 and H8 are accepted**.

H9: The "Product choice" stage can be influenced by AI, in the Millennials' generation;

H10: The "Product choice" stage can be influenced by AI, in the Generation Y;

According with Table 13, the mean of evaluate alternatives stage in Generation X is statically lower than 3.5 (M(Generation X)=3.46) and in Millennials is statically higher than the neutral mean of 3.5, with a M(Millennials)=3.74. Despite being the first evidence to reject or not the

null hypotheses, it is still necessary to verify the p-values of each of the items of the variable under study.

Table 14 - Group statistics of "Product choice" stage - GenX vs. Millennials

	Items	Items mean	Mean	Std. Deviation	Std. Error Mean
Generation X	E1	3.48	3.46	1.000	0.104
	E2	3.42		0.963	0.100
	E3	3.46		0.988	0.102
Millennial	E1	3.71	3.74	0.804	0.074
	E2	3.80		0.732	0.067
	E3	3.69		0.792	0.072

Source - Author's elaboration

As shown in Table 14, only the E2 and E3 items have a p-value which are lower than the significance level of 0.05 (p(E2)=0.002; p(E3)=0.044;). These values are considered enough to reject the null hypotheses.

Table 15 - Independent Sample's t-test – Product choice stage

Independent Sample Student's t-test

Items	Levene's test		t-test					Null Hypothesis
	F	Sig.	t	df	Sig. (2-tailed)	95% Conf. Interval Lower	Upper	
E1	5.900	0.062	-1.901	209	0.059	-0.481	0.009	Not reject
E2	9.740	0.090	-3.209	209	0.002	-0.601	-0.144	Reject
E3	5.100	0.151	-1.849	209	0.044	-0.488	0.016	Reject

Source - Author's elaboration

Analyzing the mean scores of each variable's items, it's possible to conclude that the Millennials had an always higher average compared to Generation X. In the item E1 *("I think the comparison made by the Y brand an asset")*, Millennials had a result of M=3.71 while Generation X had a result of M=3.48. In the item E2 *("I will consider buying the product of this brand"*) Millennials had a result of M=3.80 while Generation X had a result of M=3.42. Lastly, in item E3 *("The application of AI was crucial to choose the product to be purchased"*) Millennials represented a result of M=3.69 while Generation X had a result of M=3.46.

Consequently, **H9 is partially accepted** because one of the three items in this variable did not obtain a sufficient p-value to make it possible to reject the null hypothesis while **H10 is rejected**.

H11: The "Post-purchase evaluation" can be done through AI, in the Millennials' generation;

H12: The "Post-purchase evaluation" can be done through AI, in the Generation Y;

Table 15's suggests that Generation X and Millennials had a higher mean statistically than the neutral mean, with M=3.55 and M=3.66, respectively. Comparing both, it is possible to verify that the mean of Millennials is significantly higher than that of Generation X. As a first statistical evidence, so far both hypotheses can be accepted, according to their means.

Table 16 - Group statistics of "Post-purchase evaluation" - GenX vs. Millennials

	Items	Items mean	Mean	Std. Deviation	Std. Error Mean
Generation X	F1	3.80	3.55	0.975	0.102
	F2	3.48		1.134	0.118
	F3	3.38		1.203	0.125
Millennial	F1	3.97	3.66	0.868	0.080
	F2	3.67		1.128	0.103
	F3	3.34		1.189	0.109

Source - Author's elaboration

As shown in Table 6, all p-values have higher values than the level of significance used (p(F1)=0.182; p(F2)=0.218; p(F3)=0.429). This shows that the null hypothesis cannot be rejected since it does not fulfill the premise that the p-value should be less than the level of significance.

Table 17 - Independent Sample's t-test - Post -purchase evaluation stage

Independent Sample Student's t-test

Items	Levene's test		t-test					Null Hypothesis
	F	Sig.	t	df	Sig. (2-tailed)	95% Conf. Interval Lower	Upper	
F1	2.694	0.102	-1.304	209	0.182	-0.421	0.080	Not reject
F2	0.617	0.433	-1.236	209	0.218	-0.503	0.115	Not reject
F3	0.008	0.527	0.216	209	0.429	-0.291	0.363	Not reject

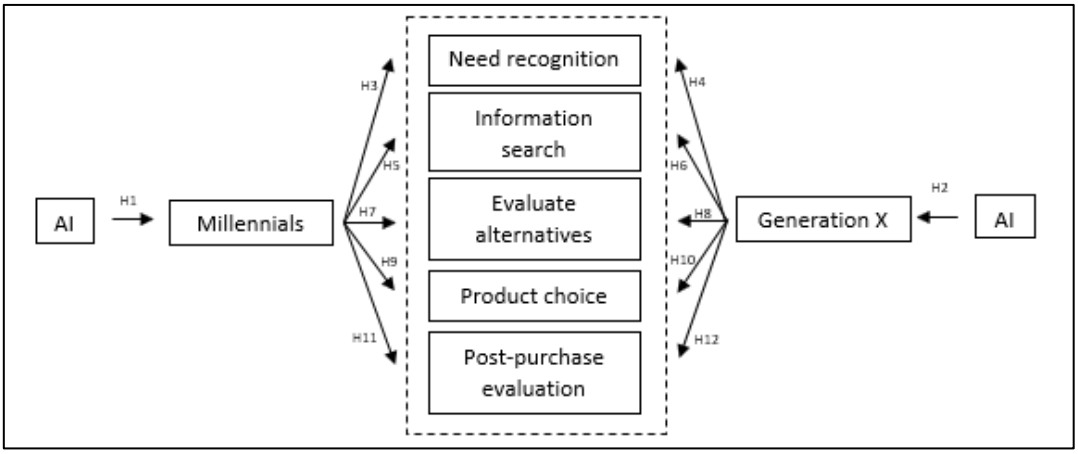
Source - Author's elaboration

Regarding to the mean scores of each variable's items, it's possible to conclude that the Millennials had a higher average in all the items when compared to Generation X. In the item F1 ("*The brand demonstrates concern about whether the consumer liked the product or not*"), Millennials had a result of M=3.97 while Generation X had a result of M=3.80. In the item F2 ("*I don't mind giving my opinion to a chatbot*") Millennials had a result of M=3.67 while Generation X had a result of M=3.48. Lastly, in item E3 ("*I explain my whole opinion about the product purchased to the chatbot*") Millennials represented a result of M=3.34 while Generation X had a result of M=3.34.

Lastly, **H11 and H12 are rejected**.

To conclude:

Figure 6 - Hypothesis validation



Source - Author's elaboration

Table 18 - Hypothesis validation table

Hypothesis	Description	Validation
H1	Millennials' generation has a positive perception Artificial Intelligence	Rejected
H2	Generation X has a positive perception Artificial Intelligence	Rejected
H3	The "Need recognition" stage can be impacted by AI, in the generation of Millennials	Rejected
H4	The "Need recognition" stage can be impacted by AI, in the Generation X	Rejected
H5	The "Information search" stage can be impacted positively by AI, in the generation of Millennials	Accepted
H6	The "Information search" stage can be impacted positively by AI, in the Generation X	Accepted
H7	The "Evaluate alternatives" stage can be done through AI, in the Millennials' generation	Accepted
H8	The "Evaluate alternatives" stage can be done through AI, in the Generation X	Accepted
H9	The "Product choice" stage can be influenced by AI, in the Millennials' generation	Partially accepted
H10	The "Product choice" stage can be influenced by AI, in the Generation X	Rejected
H11	The "Post-purchase evaluation" can be done through AI, in the Millennials' generation	Rejected
H12	The "Post-purchase evaluation" can be done through AI, in the Generation X	Rejected

Source - Author's elaboration

Chapter 6 – Conclusion, Limitations and Implications

6.1. Conclusion

This research aimed to understand how Artificial Intelligence could impact and influence the different stages of the consumer decision making process, in two different generations (Generation X and Millennials). The phases of the consumer decision-making process are need recognition, information search, evaluate alternatives, product choice and post-purchase evaluation. The way in which the impact and influence that AI could have in these phases was studied was through three hypothetical situations created where an AI application was used. In order for this to be possible with greater knowledge from the point of view of consumers, it was also analyzed the level of knowledge and perception that the participants had about AI. After analyzing the different results of the two generations, it is possible to state that there are significant differences in the use of AI, in the different phases of the consumer decision-making process, by the two generations under study. For this, all hypothesis were analyzed and tested according to the results obtained.

Firstly, about the knowledge and perception that the two generations have about AI, both presented a result below the expected, and Millennials showed to have a greater perception of the capacities that AI may have, than Generation X. To study the knowledge and perception of AI, questions about it were made. These results suggest that Millennials have a greater understanding of what AI is and what advantages its use may bring to a personal level, as well as in different business areas. The reasons that may lead to different results are the different characteristics that both generations have. While Millennials were born and developed in an era where technology was already very integrated in society and in people's daily lives, which causes them to have greater acceptance and knowledge of it, those of Generation X are from an era where the technological development was beginning to emerge and that is why look at these new technologies with some fear and skepticism (Lissitsa & Kol, 2016). Another reason that support and justify the results are the fact that Millennials are considered as “Digital natives”, which means that they’re a generation that are very familiar with technology since an early age.

Then, about the need recognition stage of the consumer decision-making process, the two generations returned to show results below the intended ones, which means that both generations do not feel that AI has a great impact at this stage. One reason that the results obtained were these, is the fact that this phase of the process is a phase where it is done through a personal need or desire, which only the consumer can control and recognize. The use of AI applications, at this stage, may arouse the desire for consumption, but this will not always be

the main reason why consumers feel such a need. This means that there is a gap between the "want" and "need" (Schiffman & Wisenblit, 2015). In addition to this, it is also important to note that the connection and trust that exists between consumer and technology is equally important since it is about making a new product known through recent technology. Here, it is also important the different characteristics that the two generations have regarding technologies.

Regarding to the hypothesis proposed about the information search stage, Millennials and Generation X had statistical values that prove the positive impact that AI can have at this stage of the process. This phase of the consumer decision making process is a phase where the consumer seeks information about products that can fulfill the recognized need. This information can be derived from two different sources, the first through past experiences and the second through external sources, which is the case with the collection of information through technology (Schiffman & Wisenblit, 2015). The latter turns out to be quite important since it gives more current information about what you need and is also a quick and direct source of information. Although generation X has the preference of knowing and buying the product physically. This generation also sees the aggregation of information through new technologies as an advantage (Lissitsa & Kol, 2016). In relation to Millennials, they increasingly use new technologies to conduct research and online shopping, which this hypothesis proves (Lissitsa & Kol, 2016).

In respect of evaluate alternatives stage, the findings reveal that these two generation consider AI as an asset in this stage. Have an AI application, which made an evaluation of all existing alternatives, after collecting information, proved to be reliable and saved time by participants from both generations. A main reason for both generations to feel confident in the application of AI in this phase of the consumer decision-making process is the fact that this technology has the ability to gather and compare all information, referring to all products compatible with the need of the consumer, of the different existing brands, in a short period of time. This process, as a rule, usually takes a long time for the consumer, which sometimes causes this phase of the process to be neglected since he only considers a small number of alternatives (Solomon, 2015).

About the product choice stage, the two hypotheses of this phase have different results for the two generations. While Millennials revise their use of AI for the product choice stage, since they often use the internet a lot for online shopping, those from Generation X no longer show the same results. As previously mentioned, even in the Literature Review, Generation X is a generation that has different consumption habits than Millennials. Generation X prefers to make physical purchases and gives great value to the touch and physical visualization of the product

before buying it (Twenge, Campbell, Hoffman & Lance, 2010). These are the main conclusions and reasons for the hypotheses studied in this phase of the consumer decision making process. Finally, about the post-purchase evaluation stage, both hypotheses were rejected for both generations. This rejection shows that both generations are not comfortable in exposing their opinions to an AI application. This phase is considered as the main phase of the entire decision-making process. Despite this, it is noted that both generations do not feel comfortable in exposing their opinions regarding the product they have purchased. This may also be due to the lack of human capacity that AI applications have, which means that human beings do not feel confident to speak and agree matters with AI applications.

In conclusion, this research shows us that there is still a great potential of AI applications in what can serve as a means of communication between brands and consumers. In addition, it is equally important that there is an increasing relationship of proximity between AI and humans so that a relationship of trust begins to be built. The potential for this is very great and it will certainly be the future of society and the way it works.

6.2. Implications

6.2.1. Managerial Implications

As a result of the study, there are some managerial guidelines that should be considered in relation to Artificial Intelligence and how they can be used to influence and impact the consumer purchase decision process.

1. **Better definition of AI and its advantages and disadvantages**

Although there are more and more explanations and demonstrations of what AI is about, what its applications are and how they can contribute to the most diverse areas, it is still notorious that consumers do not have this desired clarity since it is a complicated technology that requires some prior knowledge to make it possible to have an accurate understanding of it. It is therefore necessary to create a general definition and easy to understand for everyone, with the due advantages and disadvantages that this technology, or that its applications have.

2. **Include AI in business in a short to medium term horizon time**

It is clear that Artificial Intelligence technology promises to change the world as we see it and as we live it, not only at the person level, but also in all existing business areas. For this to be

done in a gradual way that does not have a negative impact, it is necessary that large companies begin to study and understand how AI can be integrated into their businesses in the most diverse areas of work. Only in this way will companies be able to progress. It has already been shown that AI is useful and that it can develop sustainable competitive advantages that are capable of bettering the needs of a company, or even of an entire market.

3. **Artificial Intelligence is the future**

As already mentioned in the literature review of this research, AI has infinite and unknown capacities that will be crucial for the development of not only companies, but also society. The same is supported through the results of the participants in the survey, if they show interest in this technology.

6.2.2. Academic Implications

1. **Recognize AI as a marketing tool**

The developed literature review demonstrated that some of the applications of this technology are widely used as a form of communication between companies and consumers. With this, it becomes important that Artificial Intelligence is recognized as a communication tool since it is increasingly used by companies. To this end, many authors are already in research so that they can rectify their theories related to marketing.

2. **Better definition of AI in academic field**

The Artificial Intelligence technology to be studied and used in the intended areas, such as marketing, it is necessary that it has a clear definition applied to this area. All of the definitions that exist and have been explored are general definitions of the technology and can be applied to each existing area of interest. Researchers must develop explanations of how this technology should be applied and used in the marketing field.

6.3. Limitations and Future Research

After research is done, there are some limitations that should be considered for future research in this area. The first to be mentioned is the lack of a proper evaluation scale for this type of themes, where experiences and/or scenarios where technology is applied are intended. In

addition, it would still be important to have a scale on which to evaluate the marketing component studied in this research, the consumer decision-making process.

Second, the questionnaire that served as a basis for the conclusions drawn from this research. Questionnaire participants include only Portuguese people, which greatly limits the scope of this survey. The characteristics that define Portuguese people, with regard to the relationship they have with technology, turn out to be unique and that may influence the results that are intended to be as generalized as possible. In order to obtain more generalized answers, the questionnaire should cover a larger number of possible participants, from other nationalities, cultures and religions.

Third, the means of communication through which the questionnaire was disseminated were only social networks, through the personal account. For the questionnaire to reach a larger number of people, it should have been disseminated and made available by other means, such as physicists through QR code flyers, at specific points such as conferences, libraries, stores, etc. This was not possible due to the circumstances in which the world is today, the COVID-19 pandemic.

Finally, there are few or almost no studies on the application of AI in this marketing component. There is a gap in what are the studies and scientific researches of these two areas together. To this end, researchers must proceed with more general studies and with a focus of greater incidence in these two areas in parallel.

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Chapter 8 – Annexes

Annex 1 – Reliability and Validity Tests

Kaiser-Meyer-Olkin (KMO) Test

	Participant Perception	Decision-making Process Stages				
		Need Recognition	**Information Search**	**Evaluate Alternatives**	**Product Choice**	**Post-purchase Evaluation**
Millennials	0.723	0.668	0.463	0.642	0.692	0.666
Generation X	0.717	0.714	0.671	0.722	0.754	0.612

Bartlett's Sphericity Test

	Participant Perception	Decision-making Process Stages				
		Need Recognition	**Information Search**	**Evaluate Alternatives**	**Product Choice**	**Post-purchase Evaluation**
Millennials	0.000	0.000	0.000	0.000	0.000	0.000
Generation X	0.000	0.000	0.000	0.000	0.000	0.000

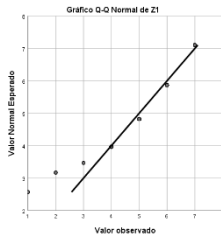
Annex 2 – Social demographic Characterization

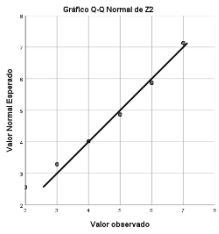
Variable	Variable classification	Absolute frequency	Relative frequency (%)
Gender	Female	118	55.9
	Male	91	43.1
	Prefer not to say	2	0.9
Generation	Baby Boomer	0	0
	Generation X	92	43.6
	Millennial	119	56.4
Education Level	Basic school	1	0.5
	High school	41	19.4
	Bachelor's degree	81	38.4
	Master's degree	84	39.8
	PhD's degree	4	1.9
Employment Status	Student	80	37.9
	Student worker	33	15.6
	Self-employed	10	4.7
	Employee	82	38.9
	Retired	1	0.5
	Unemployed	5	2.4
Monthly Income	< 500€	63	29.9
	500€ - 1.000€	41	19.4
	1.001€ - 1.500€	58	27.5
	1.501€ - 2.000€	30	14.2
	2.001€ - 2.500€	9	4.3
	> 2.500€	10	4.7
Region of Residence	North	10	4.7
	Center	123	58.3
	South	76	36.0
	Autonomous region of the Azores	1	0.5
	Autonomous region of Madeira	0	0

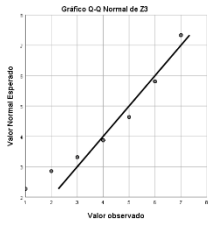
Annex 3 – Student's T-test Assumptions

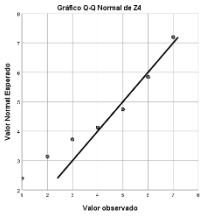
Normality Test

Participant Perception

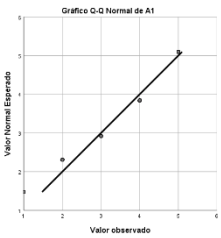


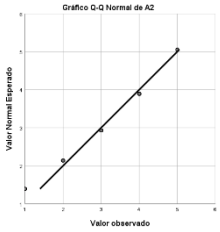


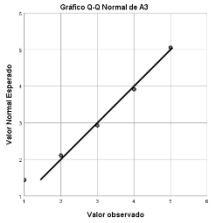




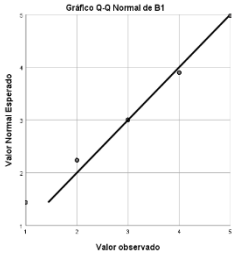
Need Recognition

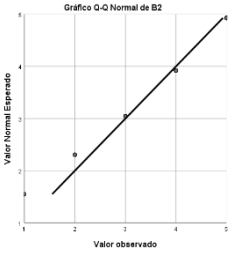


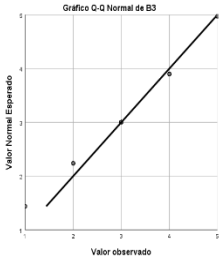




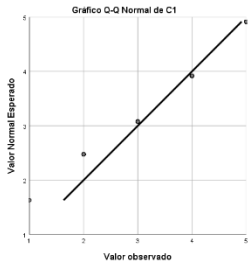
Information Search

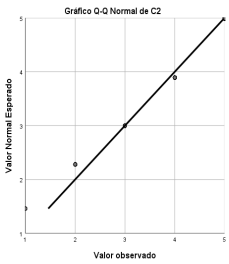


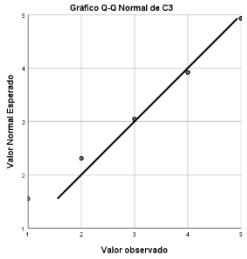




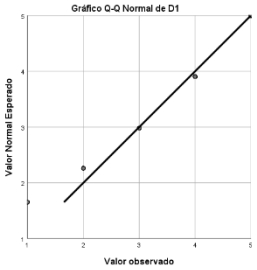
Evaluate Alternatives

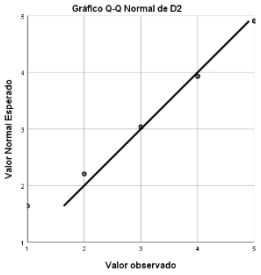


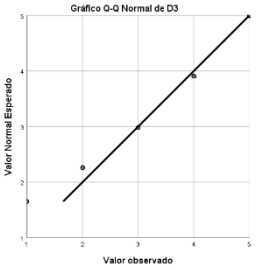




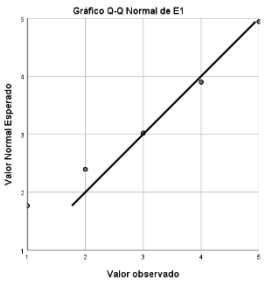
Product Choice

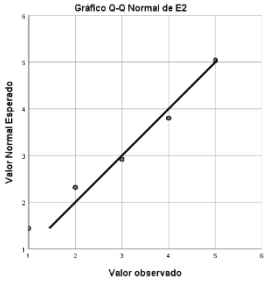


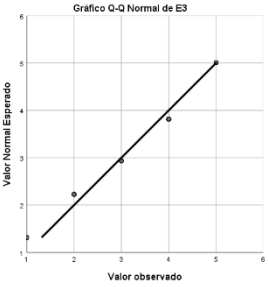




Post-purchase evaluation

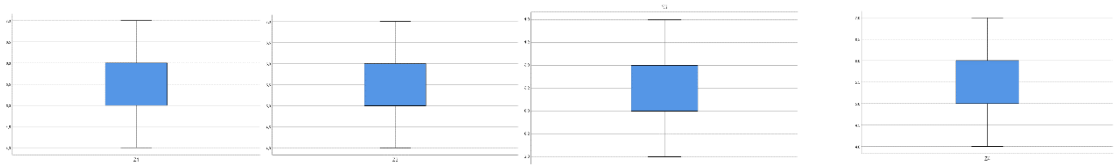




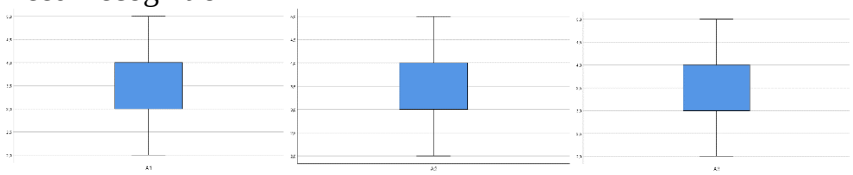


Outliers

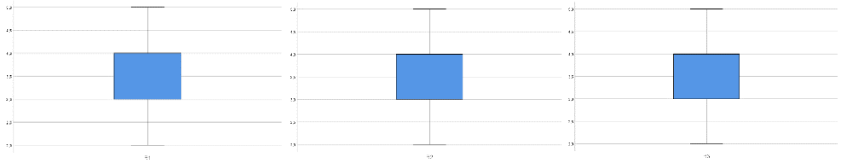
Participant Perception



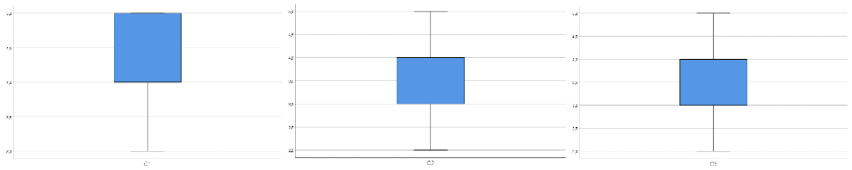
Need Recognition



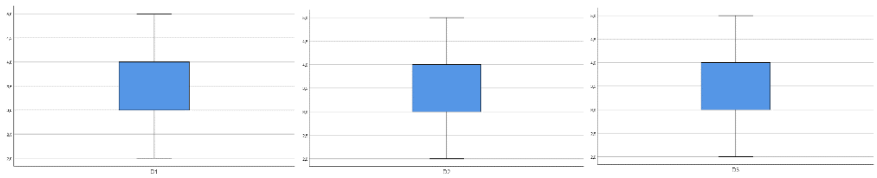
Information Search



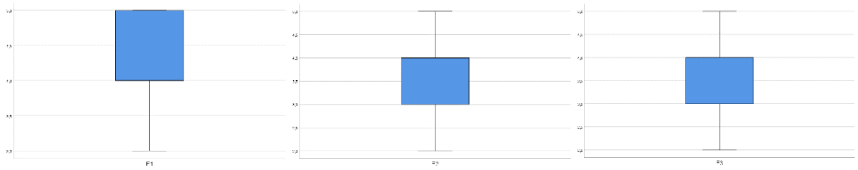
Evaluate Alternatives



Product Choice



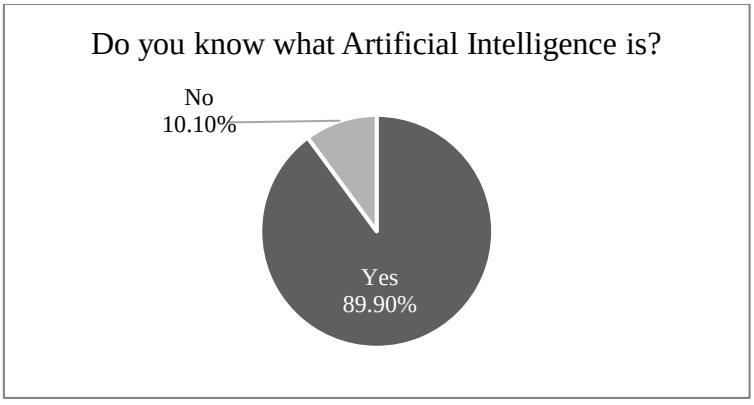
Post-purchase Evaluation



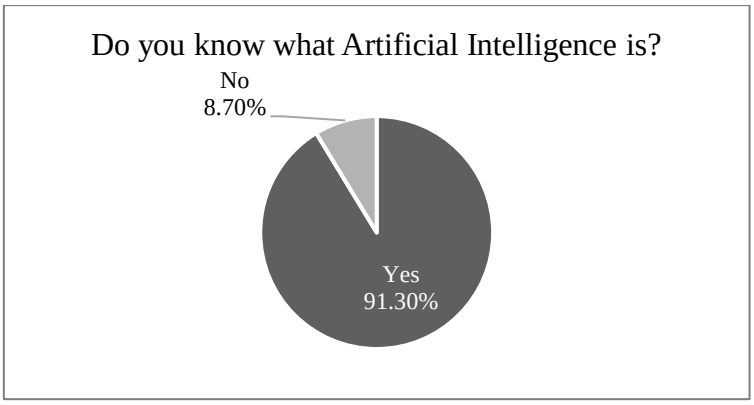
Annex 4 – Descriptive Analysis

Q.: "*Do you know what Artificial Intelligence is?"*

Millennials

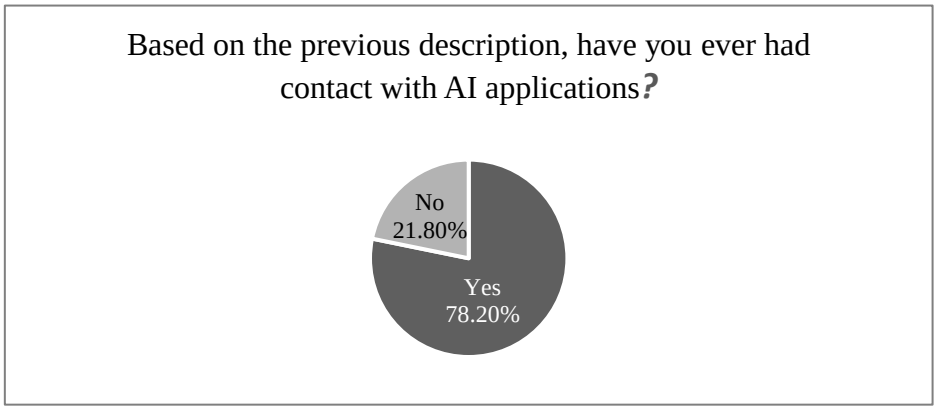


Generation X



Q.: *"Based on the previous description, have you ever had contact with AI applications?"*

Millennials



Generation X