

Master's in Hospitality Management

Artificial Intelligence as a competitive advantage factor in the hospitality industry

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Abstract

This dissertation aims to understand the role of Artificial Intelligence in the customer decision-making process to determine if AI is considered a competitive advantage factor in the hospitality industry. To this end, it is essential to study the potential customer profile to understand which characteristics and factors contribute to influence the choice of a hotel customer.

The topic has been gaining space in different discussion environment and several questions have been raised and debated for a better understanding of this technology and its present and future implications.

In order to achieve the main objective of this investigation, an exploratory study was carried out using a survey as a data collection method that was answered by 268 individuals. Also, an interview to the Evolution Lisboa Hotel Manager was conducted to study the hotel's perception on the adoption of AI and its advantages and disadvantages. The data collected from the surveys was later analyzed using statistical methods. Through the analysis of these results, it is possible to deduce that AI is the least important feature in a hotel when it comes to the customer's purchase decision making in the hospitality industry. However, nowadays individuals are willing to experience some AI tools if it does not interfere with the customer's interaction with humans and when it is possible to exist a symbiosis between humans and machines.

Keywords

Artificial Intelligence, Hospitality Industry, Competitiveness

Resumo

A presente dissertação visa compreender o papel da Inteligência Artificial no processo de tomada de decisões dos consumidores para determinar se a IA é considerada um fator de vantagem competitiva na indústria hoteleira. Para tal, é essencial estudar o perfil dos potenciais consumidores de forma a compreender quais as características e fatores que contribuem para influenciar a escolha de um consumidor.

Este tema tem vindo a ganhar espaço em diferentes ambientes de discussão e várias questões têm sido levantadas e debatidas para uma melhor compreensão desta tecnologia e das suas implicações presentes e futuras.

Para atingir o objetivo principal desta investigação, foi realizado um estudo exploratório utilizando um inquérito como método de recolha de dados que foi respondido por 268 indivíduos. Foi também realizada uma entrevista ao Gestor do Evolution Lisboa Hotel para estudar a perceção do hotel sobre a adoção da IA e as suas vantagens e desvantagens. Os dados recolhidos a partir dos inquéritos foram posteriormente analisados utilizando métodos estatísticos. Através da análise destes resultados, é possível deduzir que a IA é a característica menos importante num hotel quando se trata da tomada de decisão de compra por parte dos consumidores na indústria hoteleira. No entanto, atualmente os indivíduos estão dispostos a experimentar algumas ferramentas de IA desde que não interfira com a interação dos consumidores com os humanos e sempre que seja possível existir uma simbiose entre humanos e máquinas.

Palavras-chave

Inteligência Artificial, Indústria Hoteleira, Competitividade

List of Abbreviations

AAAI Association for the Advancement of Artificial Intelligence

AHRESP Associação da Hotelaria, Restauração e Similares de Portugal

AI Artificial Intelligence

AR Augmented Reality

BDA Big Data and Analytics

CI Check-in

CO Check-out

FR Face Recognition

INE Instituto Nacional Estatística

IOT Internet of Things

MIT Massachusetts Institute of Technology

MT Machine Translation

NLP Natural Language Processing

OECD Organization for Economic Cooperation and Development

PMS Property Management System

RT Recognition Technology

SIL Salão Imobiliário de Lisboa

SWOT Strengths, Weaknesses, Opportunities and Threats

TIC Tecnologias da Informação e Comunicação

UNWTO United Nation World Tourism Organization

VR Virtual Reality

WTO World Tourism Organization

Glossary

Augmented Reality: It is a digital technology, which alters a person's perception of his or her physical environment when viewed through a given device.

Big Data and Analytics: Refer to large data sets, that are too big to be processed through more traditional processing methods and can be analyzed and transform data into useful information for decision-making.

Chatbot: A digital customer service agent that answers questions through text or verbal language, providing useful information as a staff member.

Digital Kiosks: A self-order kiosk that you can simply walk up to and place an order without any assistance.

Internet of things: The inclusion of internet connectivity in everyday devices and appliances that do not normally have these capabilities. It can turn these devices or appliances into 'smart' objects that are able to send and receive data and communicate with each other.

Recognition Technology: Is a form of biometric Artificial Intelligence, which is able to identify an individual, or verify their identity, based on their face alone by comparing a digital image or video frames within a database.

Robots: Machines or any system that have been programed to execute a specific set of tasks or actions automatically.

Virtual Reality: It is a computer technology, which uses images, sounds, and physical sensations to make users feel physically present in a virtual world.

CHAPTER I: Introduction

1.1) Theme's Relevance and Pertinence

This dissertation is part of the research field in Hospitality, in the specific area of Artificial Intelligence. To a better acknowledgement of the research theme, it is important to understand that over the past few years the world has witnessed a significant increase in the number of hotels, both in terms worldwide as well as nationally. At the end of the 20th and beginning of the 21st century, the Internet, social media, websites and mobile applications (Benckendorff, Sheldon, & Fesenmaier, 2014), made the world smaller and changed the rules of the business of and competition among travel, tourism and hospitality industry. This sector has a growth trend quite accentuated and leads the hotel industry to offer, more and more, very similar products and services. Therefore, it becomes essential to diversify the products and services' offer in hotel units to obtain positive results within the competition. According to Marinov (2015), modern tourists are orientated towards offers, for which they are sure, that the services in the destination, the experiences both outdoors and indoors and the hospitality of the local community are on high quality level and are worth the price. With the world constantly changing and with the change of the trends it is essential to innovate and meet the demand's needs as they change.

In today's highly competitive environment, innovation can be defined as the most important component of the corporate strategy of a hotel company, because it gives direction to its evolution (German & Muralidharan, 2001). The application of new technologies such as Artificial Intelligence and Service Automation, leads to unprecedented changes in the way hotels operate with their guests. Artificial Intelligence opens big opportunities to improve operations, increase productivity and ensure a consistent level of quality (Ivanov, Webster & Berezina, 2017). Due to an increasingly competitive environment in the hospitality industry, for the survival of companies, arises the need for hotels to develop their products using technology to provide a faster service with superior quality. Therefore, it is necessary to invest and study the consumer's behavior regarding the implementation of products with artificial intelligence inside the hotel units.

Over the last years, AI has been gaining space and debate in the daily lives of individuals, being present in many aspects of everyday life and the work context. Inside the hospitality industry, the role of AI is still very recent and little studied and there are still few bibliographic references and investigations related to this theme. Therefore, this study

will fill the existing information gap and will provide a study base and data, which will pave the way for further investigations and others related to this topic.

1.2) Investigation's Issues

The future of hospitality industry lies on knowing the customer in an intensely personal way. The term Artificial Intelligence has become more and more popular recently and appearing in various conversations more often in the last years. It is difficult to define AI since the topic is vast and is slightly changing and expanding more and more due to computer innovation development. Over the last decade, researches have become more in-depth with regard to automation of services and the use of robots and Artificial Intelligence in the hospitality industry (Collins, Cobanoglu, Bilgihan, Berezina, 2017). Nowadays, AI is already used in many various spheres today such as in medicine, education, music and games industry, transportation and hospitality.

Artificial Intelligence technologies are in an advanced stage and year by year they develop further on. Technology, and its rapid development is considered one of the key megatrends and driving forces that are seen to shape the future of tourism (Yeoman, 2012) via changes that will impact the way tourism and hospitality providers interact with travelers. It is nearly impossible to capture and identify all the customers' preferences and traits through their traditional feedback surveys and forms, however AI can capture a million data for an enormous number of people and analyze it for different purposes, in a cost-effective way. Moreover, technological advances within tourism create changes in consumer behavior (Urquhart, 2019) and subsequently significant opportunities for tourism organizations to use technology to gain competitive advantage.

The development and implementation processes of AI technologies can be slow, but these innovations provide significant changes to the industries. Even though technologies nowadays are an integral part of everyday human life, they can disrupt old ways of performing things. Slowly, AI have been replacing human jobs, mainly because these technologies can complete tasks and sometimes can even transcend the humans in the work environment. This means someday AI could replace human force entirely and it can be seen as a threat to human employability.

1.3) Objectives and Research Question

According to Quivy & Campenhoudt (1998, p. 44), with the definition of the main research question, it is possible to express as exactly as possible what is intended, serving

as a starting point for the rest of the investigation. It is also important to note that all research is carried out on this issue, since both the theoretical approach and the practice must be related to the research question, so that it is possible, in the end, to answer the defined question. Therefore, the research question of this investigation is “Is the Artificial Intelligence a competitive advantage factor in hospitality?”. To answer this question is essential to analyze the state of the hospitality industry regarding the current use of AI to increase the quality of the guest experience. The main objective of the investigation is to study the AI as a competitive advantage factor in the hospitality industry. Therefore, it is essential to study the potential customer’s profile, to understand, what characteristics and factors contribute can influence the choose of a hotel by the consumer, as well as it is also essential to study the potential customer’s behavior and perspective, in order to understand their motivations. Additionally, the main objective was subdivided into several specific objectives, which correspond to the different chapters in this research. The first specific objective corresponds to the second chapter of this investigation - literature review- and with it is intended to understand the concept of Artificial Intelligence, competitiveness and competitive advantage in the hospitality industry. The second specific objective relates to the third chapter – Artificial Intelligence in hospitality- and corresponds to the study of the main AI trends and its adoption in hospitality by exposing its impact, advantages, disadvantages in the industry. The final specific objective is to describe the impact of using AI in the hotel that is the case study, the Evolution Lisboa Hotel.

1.4) Dissertation’s Structure

In order to achieve the proposed objectives and answer the research questions presented, the formulation of this dissertation is composed of the following structure:

In this first chapter is presented an introduction which corresponds to the framework of this thesis, a definition of the research problem, theoretical and empirical objectives that motivated the elaboration of this study and the dissertation’s structure. The second chapter marks the beginning of the literature review, studying the main authors in the AI area, with special focus on defining concepts and their evolution over time. This section aims the conceptualization and particularities of Artificial Intelligence, competitiveness and competitive advantage, framing and relating them to the hospitality industry. In it is important to emphasize the hospitality’s competitiveness and competitive advantage factors and the relation between AI and competitiveness in the industry. The third chapter

focuses on the Artificial Intelligence in hospitality and its implementation in the hospitality industry. In this section it is mentioned the most common AI trends in hotels, the advantages and disadvantages of its adoption, examples of the most famous pioneer trends and also a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of the AI implementations in hotels. The fourth chapter addresses the case study of the investigation – Evolution Lisboa Hotel. In this chapter it is presented the hotel's characterization as well as a relation between the adoption of AI made in the hotel and the trends presented in the previous chapter. The chapter V exposes the research methodology that applies to the development of the empirical research. In this chapter, the stages and acts of the scientific procedure are described and framed with the theme of the research. Therefore, it is presented the problem and objectives of the study as well as the data collection method used on the investigation. In Chapter VI, the main results collected through the surveys will be presented, analyzed and discussed. Lastly, and as chapter VII it is presented the final considerations where it is given answer to the specific and general objectives of the investigation and also to the research question. In addition, a general assessment of the dissertation is carried out, which includes its contribution to scientific knowledge, its main limitations and guidance in terms of future investigations.

CHAPTER II: Literature Review

2.1) Tourism and Hospitality Prospects and trends

In recent years, the importance of tourism development has significantly increased in most countries. Tourism development affects the economy and the gross domestic product level through job creation and increase of the demand for goods and services (Rao, 2014). The development of tourism is intrinsically linked to global development. The transmission of culture between people, knowledge of history and language is source of a modern paradigm of management and planning based on people, heritage and culture. Tourism is a dynamic system that is influenced by its external environment with changes in the consumers' behavior that impact the tourist demand supply. Actions towards tourism development should be implemented considering global trends that shape the future of tourism and local conditions and peculiarities that determine the current and potential state of the development. Today, new tourism trend emerges in post-lockdown era, caused by the pandemic. The purpose of this chapter consists in identifying and analyzing main trends and prospects for tourism and hospitality industry, after the pandemic.

Until the beginning of 2020, the global tourism had grown significantly being influenced by the globalization and technological advances. The OECD (2018) identified 4 mega-trends that will shape the future of tourism and hospitality by 2040. Those mega-trends are evolving visitor demand, sustainable tourism growth, enabling technologies and travel mobility. The growth of global tourism was supposed to continue but it stopped in the beginning of the year. Nowadays, the world is facing unprecedented health and economic crisis caused by the COVID-19 pandemic, which led to national quarantines and travel restrictions. Additionally, different forms of economic activity, especially tourism, suffered given an immediate crash in the sector. The evolution of the lodging trends is closely related to consumer behavioral changes that are consequently influenced by globalization, technological changes and environmental awareness.

Globalization is one of the main topics in this area, resulting in a greater ease for tourists to cross borders, translating into a greater number of international tourists, as well as greater competition between destinations. However, globalization affects more than just people, resulting in a greater flow of information, technology, capital, goods and services, and has great economic importance, shaping national economies (Aramberri, 2009). According to Giddens (1990), globalization is "the intensification of worldwide social relationships that link distant localities in such a way that local events are conditioned by events happening many miles away and vice versa." This phenomenon has significantly contributed to international tourism. Michael Olsen, quoted by A. Lockwood & Medlik (2003), states that "the information era and globalization will continue to drive changes in the way the future consumer will conduct business with the hospitality industry." The tourism and hospitality sector are, probably more than most others, facing a sharp change and at a galloping pace and globalization is one of the factors that has contributed the most to the affirmation of tourism as an industry in the 21st century. The advances made in transportation over the last couple years that have enabled global mobility are particularly significant. Fast trains, road systems, low airfares, etc. are improving the ease of travelling more often and in less time. In addition, the use of mobile devices has changed the way travelers interact with the destination and how they research it. According to Kellar (1996), the market has undergone a significant expansion in recent years. New destinations have sprung up and large tourism companies have been created, that are not dependent on any nation and have branches all over the world. However, one of the disadvantages of globalization is the facilitation of viruses' contamination. Due to the

ease of travel, COVID-19 spread much faster, causing a pandemic and consequently a health and economic crisis that we are living today. At the same time, the crisis could be an opportunity to rethink the tourism sector and focus on emerging trends for the development of tourism.

A positive aspect of the pandemic is the environmental upgrade due to the reduction of air, sea and land pollution. The idea of sustainable tourism has been recognized at many international levels, as an approach that should result with environmental, social and economic benefits to all types of tourism (Lazano-Oyola, 2012). Sustainable tourism is defined by the WTO (2005) as “tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities. Tourists are increasingly aware of sustainable development, and environmental concerns are an important issue to which tourists, destination managers and businesses pay more attention, especially to the climate changes and natural resource depletion. Also, according to Chen (2014), sustainability is an important feature when choosing a hotel, since the greater awareness of environmental causes, as well as the greater pressure on organizations to minimize their negative impacts on the environment, make this an important issue for the hotel industry as well. Managing tourism based on sustainable principles ensures long term life quality for local community as well as to the quality of visitor's experience (Bramwell & Lane, 1993; Hall & Lew, 1988; Stabler, 1997; Choi & Sirakaya, 2006). United Nations (2016) has characterized climate change as "the preeminent geopolitical and economic challenge of the 21st century that rewrites the global equation for development, peace, and prosperity".

This topic is becoming very relevant in the last decade but only a few years ago it started to have a big impact in the hospitality industry and in the decision-making process by guests. Sustainability has been one of the most noticeable hospitality trends of recent times, with a growing number of hospitality businesses promoting their eco-friendliness (TreeScapes, 2021). Yeoman (2012) states that sustainable architecture meets the customers' needs by building hotels with eco-friendly design, increasing efficiency through, for example, more efficient air-conditioning and heating systems, use of solar panels, and sustainable building materials. Because of the expansion of tourism and hospitality industry comes economic growth, increases in employment levels, social progress and the protection of natural resources when used with moderation (Pinto da Silva, Brandão & Sousa, 2019). It is important for companies to ensure that every

innovative service should be sustainable (Ozturkoglu, Fari, & Saygili, 2019), and to adopt sustainable long-term policies which not only respect the environment but also promote the economy and social equity. The World Tourism Organization (WTO) has created instructions for implementing principles of sustainability in all types of tourism by means of the sustainable tourism development guidelines and management practices.

As it has been discussed in this chapter, the COVID-19 pandemic had significant effects on mobility and caused an imminent economic recession. The dramatic drop in international tourism has led to predictions centered in short distance travel, which could be carried out for the remainder of the year, and much of 2021 (Rajmil, 2020). Domestic tourism is a very important topic nowadays and overall, an essential tool for regional economic development. After the first lockdown and the closing of restaurants, travel agencies, hotels etc. most countries have decided to invest in domestic tourism to stimulate the country's economic activity. Companies and public entities have joint to support the tourism sector, creating solutions for the big recession as an incentive to internal demand (Turismo de Portugal, 2020). Also, according to Haxton (2015), domestic travel decreases the impact of seasonality in tourism and improves the attractiveness of the city, which helps to support the local economy and to promote employment. One word that has gained appeal, and it is closely related to domestic tourism is “staycation”. This is a play on words between “staying at home” and “taking vacation”, or “taking a vacation while staying at home”. Nowadays, and when debating the decrease in tourism during the present Pandemic crisis, the word “staycation” has started to appear in different proposals. The focus on domestic markets and the “staycation” trend has begun to grow since the lockdown and quarantine in the middle of 2020. Staycation can be defined as a local travel practice, also called proximity tourism (Jeuring & Haartsen, 2017), although being different from other types of domestic tourism such as secondary residences. Staycation is considered more of a trip because the traveler can choose to return and spend the night at home during vacation. According to De Bloom, Nawijn, Geurts, Kinnunen & Korpela (2016), an unfamiliar culture or a different environment can provide people with the same feeling of remoteness, although people are still in their town and with this, the perception of what is considered tourism has been broadened. From this perspective, tourist activities coexist in everyday life since it is possible to feel like a tourist or act as one in your own town. Staycation or domestic tourism, to spend the holidays in times of economic crisis, can be a way of helping the

tourism industry in difficult contexts. People need tourism and this is a great strategy in which all parties can benefit: tourism operators, local communities, the countries' economy, and above all, the tourists themselves. This crisis could be an opportunity to rethink the development of tourism and to look for new methods and in therefore, authorities in some countries have already introduced staycation holiday vouchers (Knežević Cvelbar & Ogorevc, 2020).

2.2) Artificial Intelligence

*The rise of powerful AI will be either the best or the worst thing
ever to happen to humanity. We do not yet know which.*

- Stephen Hawking (2014)

Artificial intelligence is a branch of science that uses the characteristics of human beings' intelligence and applies it in algorithms to a machine. According to the Oxford English Dictionary, artificial intelligence is defined as the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

The origin of this concept emerged in 1950, by one of the pioneers in computation machines, Alan Turing. This mathematician and logician were involved in researching machine intelligence problem, and his first "computer intelligence" mention was made in 1947. In 1950, Alan Turing wrote the article "Computing Machinery and Intelligence". (The Elements of AI, 2018). In the paper he formulated the question "Can machines think?", and to answer the question Alan Turing proposed what has become known as the Turing Test ¹ to determinate if a machine was capable of thinking. This test was an adaptation of a Victorian-style competition called "imitation game" that was introduced

¹ The Turing Test

The Turing Test's goal is to define AI possibilities, which are close to human ones. In the test, a person interacts with two hidden players, A and B, where one is a computer, and another one is a human. Communication is happening by written messages in a chat. A person should investigate, who is who from the players, based on received answers. If a person cannot determine a computer from one of the players, it means that the computer has passed the test and it is equivalent to humans (in a general natural language conversation), and it then has reached intelligence on a human level. According to the test, a creature considered intelligent if an observer from another intelligent could not distinguish it. Even though computer programs had been passing the quiz, the test was measuring the intelligent computer behavior, rather than whether it is intelligent (The Elements of AI, 2018.)

by Turing in his 1950 paper “Computing Machinery and Intelligence” which aimed to describe the possibilities of programming a computer so that its behavior proved to be intelligent (Buchanan, 2005). Alan Turing is rightfully considered to be the father of computer science (The Elements of AI, 2018) as well as it is usually associated this year to the birth of this concept.

In 1956, the scientist John McCarthy arranged a conference at Dartmouth University, along with Marvin Minsky, Nathaniel Rochester and Claude E. Shannon to discuss artificial intelligence. This conference aimed to find out how a machine could simulate the different aspects of artificial intelligence and solve problems that until then only humans could solve. (McCarthy, Minsky, Rochester & Shannon, 2006). It was in that year that the term “Artificial Intelligence” was officially formulated. In the following years of this conference many researchers that attended it had their recognition as the founding figures of artificial intelligence (Bostrom, 2014). Subsequently, AI research centers were built in Carnegie Mellon University along with the Massachusetts Institute of Technology and Stanford and faced new challenges creating systems that can solve problems in an efficient way limiting the research and building systems that can learn for themselves. Many achievements have been made in disciplines, such as Natural Language Processing (NLP), Machine Translation (MT), Robotics, etc. (Shi, 2011; The Elements of AI, 2018).

Defining artificial intelligence should start with understanding the term “intelligence”. Veale (2001) explains that the problem with defining AI comes from the extreme difficulty of defining “intelligence”. The Encyclopaedia Britannica defines intelligence as the ability to adapt effectively to the environment, by making a change (Britannica, 2001). The intelligence of a human being includes different capabilities, such as coping with complex environments, understanding objects, learning, perceiving and applying knowledge with judgement and decision making, gaining experience through knowledge, problem analysis and problem-solving, etc. Artificial Intelligence aims to imitate and enhance human intelligence.

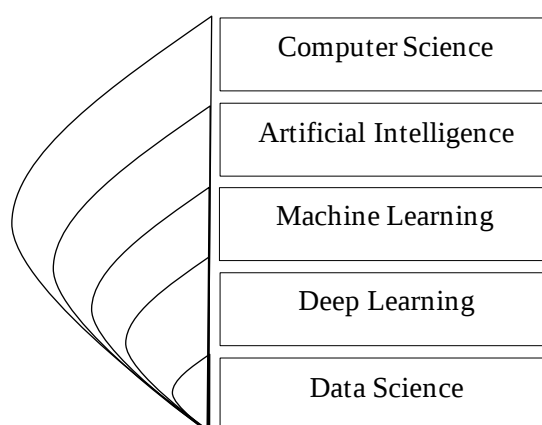
Artificial intelligence is associated with the ability of machines to understand and use human language and then progress and work on their own. The authors McKinsey & Company define AI as the ability of a machine to perform cognitive functions associated with human minds such as the perception, reasoning, learning and problems solving (Chui & Malhotra, 2018). Also, Jaya (2019), describes Artificial Intelligence as the combination

of algorithms that can be taught to machines to effectively perform tasks and solve problems. AI has been defined in many ways following four approaches which are Thinking Humanly, Thinking Rationally, Acting Humanly and Acting Rationally (Russell & Norvig, 2010). Therefore, Nils J. Nilsson, a professor and investigator, describes AI as an area that concerns with the intelligent behavior of the artifacts. This “intelligent behavior” involves five faculties such as: perception, reasoning, learning, communication and performance in complex contexts (Nilsson, 1999). The same author argues AI’s long-term goals are two: “development of machines that exploit these faculties like humans or, if possible, even better”; “To understand this type of behavior, whether on machines, humans or animals”. According to Mendes (1997), the term AI is linked to the development of specialist systems, with the objective of solving problems in specific areas. These expert systems are based on rules pre-defined by experts. Lustosa (2004) states that AI is already present in many companies around the world, through Data Mining, being a fundamental part of the decision-making process, because it generates information of extreme strategic relevance that are not always observed by human analysts. The author also refers that we can also find AI when we observe network management systems, e-commerce, and distance education (e.g. e-learning). Costa (2009) states that AI includes the methods, tools and systems to solve problems that typically require the use of human intelligence. Other living systems also have complex problem-solving intelligence and capabilities, adapting to new realities. Thus, AI can also be regarded as the ability to systematize problem solving by observing the complex systems existing in living nature. Mesquita (2017) presents a more recent perspective which says that AI is defined as a set of items (e.g., algorithms, robotics and neural networks), which allows software to have intelligence capabilities compared to that of a human being, including the ability to learn from minimal human interference through databases.

The AI field is a subfield of computer science, and it includes several subareas. These fields can be data science, statistics, machine learning, deep learning, etc. Data science is a part of computer science, that studies problems of analyzing, processing, and presentation of data in digital format. Data science is a concept to unify statistics, data analysis, machine learning, and their related methods to understand phenomena with data (Hayashi, 1998). Machine learning is one of the biggest subfields in AI. According to Shi (2011), the learning process includes four stages: processing collected information from the environment; understanding and gaining experience; improving acting performance

based on received knowledge; discovering the correct way of behavior and adapting to the environment. Machine learning can be defined as systems, that improve their performances time after time by completing tasks and getting more experience and data out of the processes. Machine learning can be autonomous as well as follow instructions. Machine learning research field enables machines to work on, obtain and evaluate knowledge automatically, and additionally uncover human thinking and learning principles, improving human learning efficiency because of this (Shi, 2011). Deep learning is similar to machine learning because uses a multilayer system to extract features with transformations. Each subsequent layer receives the output of the previous layer at the input. The input into the system is passed through each one of the units in turn. This way, deep learning allows to understand and learn more complex structures, without requiring a huge amount of data (The Elements of AI, 2018). The Computing Sciences Accreditation Board (CSAB) defines computer science as a discipline that involves the understanding and design of computers and computational processes. Computer science is the systematic study of algorithmic processes - their theory, analysis, design, efficiency, implementation, and application - that describe and transform information (Denning et al., 1989).

Figure 1 - The hierarchical relation of Computer Science with AI, Machine learning, Deep learning and Data Science



Adapted from Zohuri & Moghaddam, 2020

2.3) Competitiveness

Competitiveness is seen by several authors as a concept that lacks a universal definition in a way that is presented as a multidimensional concept. Therefore, there are several

competitiveness definitions in the literature which leads to the difficulty in defining a specific concept. Researches on competitiveness start with the work of Porter (1990) on the competitiveness of nations. The author defined national competitiveness as an outcome of a nation's ability to innovatively achieve, or maintain, an advantageous position over other nations in key industrial sectors. The Organization for Economic and Cooperation and Development (1992), defines competitiveness as “the degree to which a country can, under free and fair market conditions, produce goods and services which meet the test of international markets, while simultaneously maintaining and expanding the real incomes of its people over the longer term”. According to Porter (1998), competitiveness is in the center of a company's success or failure and determines whether it is appropriate to the activities that contribute to favorable performance, such as innovation, a cohesive culture or good implementation. Even though this concept remains difficult to explain, Huggins (2000) argues that competitiveness is obviously seen as involving elements of productivity, efficiency and profitability as a means of achieving rising standards of living and increasing social welfare. Clark & Guy (1998) believe that competitiveness depends upon the firms in the country competing both in domestic and international markets.

In the tourism and hospitality sector, the concept competitiveness is always approached first as the competitiveness of a destination. Therefore, the choice of a destination will determine the competition between the destination's companies, which include the airlines companies, tour operators, tourist services and accommodation. According to Barros (2005), the competitiveness of a country derives from the performance of its enterprises, which certainly include the hotel industry.

The hospitality industry is immersed in a highly uncertain and competitive environment (Claver-Cortés, Molina-Azorín & Pereira-Moliner, 2006). The hospitality industry is much wider and more complex than ever because we are referring to a variety of sub-industries that encompass and on which depends. This sector is immersing more and more in a globalized and dynamic business environment, in which tourists have changed their preferences and, both hotels and destinations, are competing in an increasingly aggressive way (Harris & Mongiello, 2001; Patiar & Mia, 2009 & Poon, 1993). Therefore, it is becoming harder to stay competitive in the market (Claver-Cortés et al., 2006). The competitiveness leads to a very similar offer of the products and services. Consequently,

it becomes necessary to diverse and customize the offer of hotel units to obtain positive results in competitiveness.

Dupeyras & MacCallum (2013), refer to competitiveness in tourism as the ability of the place to optimize its attractiveness for residents and non-residents, to deliver quality, innovative, and attractive services to consumers and to gain market shares on the domestic and global marketplaces, while ensuring that the available resources supporting tourism are used efficiently and in a sustainable way. According to Yeung & Lau (2005), the same concept is seen as “the ability of a hotel to attract and satisfy its costumers making them reach competitive advantages over its competitors”. As hotels operate in a competitive and dynamic environment, they need to use the information effectively to improve hotel performance and compete with other hotels (Berezina, Bilgihan, Cobanoglu, & Okumus, 2016).

2.4) Competitive advantage

In the same line as the competitiveness’ definition, it is important for all companies to strive to have an advantage over their competitors. Nowadays, these concepts have become very frequent and significant because the world has become more and more a global place, where it is crucial that companies develop strategies in a way that can add value for the customers by achieving a competitive advantage and by adapting themselves to the uncertain environment, understanding the customer’s changing needs, keeping up with the trends and responding to new market entries.

The competitive advantage is achieved when a company competes with other companies within the same market and is persistently more profitable than its rivals (Grant, 2000). The same author refers that the competitive advantage theory states and business should pursue policies that create high-quality goods to sell at high prices in the market. Ansoff (1997) argues that the competitive advantage “seeks to identify specific properties and individual combinations of products and markets which give the company a strong competitive position”. According to Porter (1985) competitive advantage is in the center of a company’s performance in competitive markets. The competitive advantage arises fundamentally from the value that a company is able to create for its buyers and that exceed the cost of manufacturing by the company (Porter, 1985, p.3). According to the same author, the notion that fundamentals the development of a strategy is the achievement of a sustained competitive advantage of the company. For Barney (1991, p.102), a firm

has a competitive advantage when it implements a value creation strategy that cannot be simultaneously implemented by any other current or potential competitor. According to (Edelman, Brush, & Manolova, 2005), for a company to obtain a competitive advantage, must make a clear option in terms of a generic strategy. Therefore, this generic strategy leads to the obtention of one of two basic types of competitive advantage: cost leadership or differentiation. The figure 2 presented below, enlightens the company's positioning in terms of generic strategy that leads to obtaining a sustained competitive advantage.

Figure 2 - Porter's Generic Strategies

		Competitive Advantage	
		Cost	Differentiation
Competitive Scope	Narrow Market Scope	1) Cost Leadership	2) Differentiation
	Broad Market Scope	3a) Cost Focus	3b) Differentiation Focus

By: Porter 1980

The differentiation and cost leadership strategies seek competitive advantage in a broad market scope. On the other hand, the differentiation focus and cost focus strategies are adopted in a narrow market scope. According to Porter (1980, 1985), the companies that would perform better would be those that managed to apply one of the three generic strategies. The same author argued that a firm's strengths ultimately fall into one of two headings: cost advantage and differentiation; and by applying these strengths in a broad or narrow scope, results in three generic strategies: cost leadership, differentiation, and focus.

1) Cost leadership strategy

In this strategy, the goal is to produce high volumes of standardized products, with little differentiation, at low-cost and make it available to a very large customer base. According

to Porter (1980, 1985), this strategy compared to rivals, facilitates companies to achieve results above average, even if the structure of the industry is not supportive. On the other hand, in this generic strategy there can only be one cost leader in the industry because otherwise, the battle for market share between different companies that aspire cost leadership would lead to a price war that would be disastrous for the structure of the industry in long-term. Additionally, this strategy makes the company's structure more flexible and defends it against customer and suppliers with great negotiation capacity and places it in a more favorable position in the face of the emergence of substitutes. Therefore, the strategy of cost leadership defends the company from the 5 competitive forces because the negotiating capacity of customers and suppliers, in the limit, eliminates the less efficient companies.

2) Differentiation

This strategy aims at the broad market that involves the creation of a product or service that is considered as unique in its industry. For Porter (1980, 1985), in the generic differentiation strategy, the company seeks to be unique in dimensions valued by buyers, and the singularity is compensated with a “premium-price”. Usually, it is associated with premium price product, the design, brand image, technology and innovativeness, product quality or customer service. According to the same author, the differentiation strategy facilitates the companies to achieve results above average, through the loyalty that customers less sensitive to the price establish, by valuing the unique aspects of the company. On the other hand, the differentiation allows the company to obtain a higher margin price-costs and creates protection against the 5 forces of the industry, due to the difficulty of rivals in imitating the company.

3) Focus strategy: Cost and differentiation

In the focus strategy the company adapts itself in order to serve its strategic target better than the competitors that seek to serve the entire industry. The target must be narrow enough to allow the company to serve more efficiently and more effectively, focusing in particular: on the type of customers, segment or product line, variety of the distribution channel or geographic area. In the cost focus strategy, the company must serve narrow market niches, generally target the smallest buyers in the industry and in the differentiation focus the company must aim to produce customized and differentiated products for a small number of target market segments.

2.4.1) Factors that can influence the achievement of a competitive advantage

A company can gain competitive advantage by performing strategically important activities in an economic or better way than the competitors. There are several factors that can influence a firm in order to achieve a competitive advantage, such as internal factors and external factors. This analysis is based on the theories of Business Strategy, an explanatory model of competitive advantage, where it was defined that competitive advantage was explained by internal factors and external factors of the company (Vasconcelos & Cyrino, 2000). Therefore, it is possible to understand that the internal factors depend exclusively on the organization and can be modified to achieve competitive advantage. Some examples of the internal factors are the product offered by the company, the quality of the service provided, the human resources, the marketing used, the price and the technology and innovation. On the other hand, the external factors are not controlled by the organization but can be decisive in the process of obtaining competitive advantages. These factors can be infrastructure and facilities to support the destination, the characteristics of the destination, the conditions of the demand and the attitude of the local communities.

- Product

The intensity of the competition in the hotel industry grows due to an increase in the number of units operating, the introduction of new products (goods and services) and the entry of non-traditional products into the market (Kim & Oh, 2004). In this sector, rivals are mostly determined according to the similarity of prices, market segments and proximity (Mathews, 2000). However, the hotels can reduce the degree of rivalry created by competing hotels by differentiating their products (Enz, 2010). Campos-Soria, García & García (2005), reveal that the quality of the product provided and, consequently, customer satisfaction, have a positive and direct effect on the competitiveness of a hotel. Therefore, it becomes essential to offer high quality products and services, innovation and subsequent improvement of these and, also, personalized customer service, which can lead a hotel company to be the market leader (Patiar & Mia, 2009). In order to survive in increasingly competitive markets, hotel managers should be aware that the solution involves the evolution and differentiation of products (Knowles, 1998). In differentiation strategies, the emphasis is on creating value through singularity. According to Enz (2010),

this is the key to the success of hotel businesses, as customers are willing to pay more for the uniqueness of a service.

- Service quality

Choi & Chu (1999) believed service quality is difficult to define and argued that as hotel products and services become more homogeneous, it is crucial for hotels to provide high quality services to differentiate themselves from their competitors. The service quality in hotels is a fundamental aspect for its competitiveness (Botelho, 2010). According to Marques (2007), the quality, as a necessary element to meet the customers' expectations, should be the first concern for the hotel managers. Additionally, Lewis and Booms (1983), defined service quality as how well the service delivered meets customers' expectations, where delivering a quality service means conforming to customers' expectations.

- Human Resources

People represent the central point in all aspects of activity in the hospitality industry, from creation and design to the development and delivery of services (Lashley, 2001; Mullins, 2001; Failte Ireland, 2005). The role of human resources and its efficient management in creating quality has been widely recognized as one of the most important elements in improving an organization's competitiveness (Baum & Kokkranikal, 2005, p. 86). It is extremely important to train employees and give them continuous training, in order to potentiate them and encourage them to be ambitious, not letting them feel that their work is monotonous or of little importance (Rojo, 2000). Therefore, trained and motivated staff present a vision of responsibility with the hotel, reveal greater concern in the satisfaction of the services provided to customers and take as a priority the well-being and safety of customers (Bayraktaroglu & Kutanis, 2003; Tavitiyaman, Qu & Zhang, 2011). However, another important factor considered very relevant to the improvement of motivation and satisfaction of the employee inside of the organization is the compensation for their effort and dedication. Higher salaries and compensation, monetary or not, attract and retain employees, in addition to maintaining appropriate levels of motivation (Rego, Cunha, Gomes, Cunha, Cabral-Cardoso & Marques, 2015).

- Marketing

A competitive advantage is the achievement of superior performance through differentiation to provide superior customer value or by managing to achieve lowest delivered cost (Jobber, 2007, p. 21). Due to the increasing competition in the hospitality industry, it becomes more important for hotels to invest in marketing activities to attract and retain guests and distinguish themselves from their rivals in order to remain competitive (Keh, Chu, & Xu, 2006; Brown & Ragsdale, 2002). In fact, faced with a highly competitive environment, it has become essential for the survival of companies to formulate a marketing strategy that strengthens the company's operations and increases the quality of service (Hwang & Chang, 2003). The effective marketing efforts have a positive influence on the company's performance, however, to do so, it is necessary to analyze the market and implement the right strategies, not forgetting that the client is in the central focus of the decision making (Cizmar & Weber, 2000). These organizational goals should consist in determining and sustainably satisfying the needs and desires of target customers, more effectively and efficiently than their competitors.

- Price

As it has been stated in the previous chapter, the cost leadership strategy facilitates companies to achieve results above average (Porter, 1980, 1985). When discussing the price factor in hotel units, it is important to address the price-quality ratio (Hwang & Chang, 2003). The price becomes a factor of competitiveness when, for the same level of quality of the offer, or the similarity of services, the price differs (Tsai, Song & Wong, 2009). Therefore, the competitiveness of lower prices, changes in prices, or special prices, make a product/service more attractive than that of its competitor, leading to increased competitiveness of the hotel unit.

- Technology and innovation

According to Porter (1990), the innovation can be used as a tool adopted to understand new and better ways of competing in a market and, in that case, it may go through improvements that apply through modification or diversification of new products, new marketing approaches or new technological applications. According to Barros (2005) and Tsai et al, (2009), arises a high interest in identifying and analyzing technology as an internal factor in achieving competitive advantage in a hospitality unit. Nyheim, McFadden & Connolly (2004) refers that technology represents an important strategic asset in obtaining competitiveness and Tavitiyaman et al. (2011), adds it is an essential

component in the strategic planning process of the hotel's performance and in the customer service improvement. It is important to note that technology is dramatically changing the way services are designed, developed and delivered (Meuter, Bitner, Ostrom & Brown, 2005). Technological investments can help the hotel companies to develop skills and competences that lead to several results that are related with low costs, added value, speed, agility and customer service (Bilgihan et al., 2011). Lee & Allaway (2002), stated that self-service technologies are widely used in delivering different services and, if used correctly, can reduce the organizations' labor costs, just as they offer customers additional services that increase their satisfaction. In a world of business that is constantly changing, technology is an essential competitive tool to win over and retain customers (Wong & Kwan, 2001). The technological evolution, for the success of a hotel establishment, or even a company, is crucial because if the entity does not keep up with new technologies, it will no longer be able to meet the needs of customers, which are constantly changing, as well as the environment that surrounds them (Connolly & Olsen, 2000). Orfila-Sintes, Crespi-Cladera & Martinez-Ros, (2005) state that if technological innovation leads to better and rapid reaction to the changing environments conditions and if the innovation is integrated in the company strategy, technology can be seen to improve competitiveness.

CHAPTER III: Artificial intelligence in hospitality

3.1) The adoption of artificial intelligence by the hospitality industry

The hospitality industry has been growing significantly over the past few years, leading to a market where the products and services offered are all very similar. Therefore, it has become necessary for the companies to differentiate and innovate in order to obtain positive results towards the competition. In today's highly competitive environment, innovation is defined as the most important component of the corporate strategy of a hotel company, because it gives direction to its evolution (German & Muralidharan, 2001). The future of this industry relies on knowing the customer in an intensely personal way, being able to identify and capture all the traits and preferences that define the guest to provide a more personalized and with superior quality service. With the world constantly changing, and with it the trends, it is essential to innovate by adopting new technologies into the hotels. According to the Adoption of Artificial Intelligence in Hospitality (n.d.), the adoption of Artificial Intelligence in hospitality sprung from the fact that it has the

power to impact and transform the industry completely. Given the rising need for smart automation of existing processes, AI has entered the traditional hospitality to enhance hotel reputation, drive revenue and improve customer experience.

The emergence of new technologies related to Artificial Intelligence such as chatbots, Internet of Things, Big Data and Analytics, Recognition Technology, Augmented and Virtual Reality, Robots and Digital Kiosks are changing the hospitality industry and the guests' perceptions and needs. AI is one of the most strategic assets that allows a hotel to improve their performance and competitiveness. Managers of tourism corporations have understood that technologies can make life easier in working conditions for employees and improve their services and attract more guests as well. With the use of technology, the aim is to further improve the quality of a tourist experience (Uriely, 2005). Innovative technologies add value and personalize the stay but overtaking them can destroy the human relationships that guests are looking for and appreciate (Kazandzhieva, 2016). Previous studies indicate that hotel technology implementations can improve customer satisfaction, increase productivity and reduce costs, which can result in a competitive advantage. (Camisón, 2000; Cobanoglu, Corbachí & Ryan, 2001; Collins & Cobanoglu, 2008, David, Grabski, S & Kasavana, 1996; Siguaw & Enz, 1999; Van Hoof, Verteeten, & Combrink, 1996).

Mobile technologies, virtual reality and virtual assistants are modern examples of technologies used in hospitality that are powerful marketing tools for increasing customer loyalty, enhancing customer interactions and customer experience (Adukaite, Reimann, Marchiori, Cantoni, 2013; Wang & Fesenmaier, 2013; Dickinson, Ghali, Cherrett, Speed, Davies, Norgate, 2014; Barragáns-Martínez & Costa-Montenegro, 2015; Howell & Hadwick, 2017). After the internet, this type of technologies has started to develop dramatically, bringing wireless communications, smartphones and mobile apps into life. Nowadays, travelers usually embrace a “digital-first” approach, because of the rise and evolution of mobile devices. This means that since the moment of booking the hotel until after the check-out day, the customers use their mobile phones for every single basic task in the process. Smartphones are a game changer for the hospitality industry to improve their services because in the day-to-day people are already used to use smartphones for everything with just one click or tap. Smartphones can assist the guests in several ways such as searching for hotels, making a reservation, accessing the room key, making online payments, ordering room service, monitoring the loyalty program account, controlling

the room environment (e.g., temperature settings and lighting), etc. Today's guests are all about convenience, so providing a more mobile-friendly experience and ally it to the technological innovations adopted by a hotel contributes to the enhance of the guest's experience.

In the table below, it is demonstrated the main examples of the adoption of Artificial Intelligence by the hospitality industry, considering the different stages of travelling.

Table 1 - Adoption of AI considering different stages of travelling

	Artificial Intelligence Tools
Pre-arrival	Chatbots Virtual Reality Augmented Reality
Arrival	Concierge Robots Recognition Technology Mobile Check-in/ Digital Kiosks
Stay	Front desk/ Concierge/ Room-service/ Cleaning Robots Chatbots In-room smart technologies (Internet of Things) Mobile room key
Departure	Concierge Robots Chatbots Mobile check-out/ Digital Kiosks
Assessment	Chatbots

Source: Own construction based on: Revfine (2020); Erdem et al., (2009); Parvez (2020); Creative Pool (2020); Ivanov, Webster & Berezina, (2017); Kim & Qu (2014).

3.2) Artificial Intelligence trends in hospitality industry

3.2.1) Chatbots

According to Alex Soft (2019), chatbots have emerged as one of the most popular technology trends in the hospitality industry today because of the idea that automation and self-service play an essential role in improving customer service in terms of accuracy, cost-effectiveness, and speed. Over the past few years messaging service has grown and spread quickly around the world and advanced AI techniques in combination with

machine learning have made a big progress to improve the quality and simplicity of customer service, online payments and bookings through the chatbots created by the companies. Nowadays, customers are constantly short on time and looking for quick answers, so the chatbots provide a convenient conversational interface that engages customers and solves their problems quickly.

A chatbot, also known as virtual agents, instant messaging bots and artificial conversational entities, is a computer program that can respond to text or verbal commands and questions, providing advice as a human staff member (Allison, 2012). It is a form of digital technology which is prepared to intelligently understand simple questions and provide answers instantaneously in order to mimic the kind of interactions a customer might have with a real employee. The main purpose of the integration of chatbots in hotels is to automate and improve customer service while delivering content and inquiring the guests, collecting data and save costs on staff.

One of the advantages of using chatbots is that the customer waiting time is eliminated, so that customers can receive service at their own convenience. For example, in the hospitality context, customers do not have to wait in queue for basic functions like booking a room; chatbots can give them a visual representation of the available options, their tariffs and help them make reservations (Dash & Bakshi, 2019). Even before the customers start the booking process, this AI technique can ask intelligent questions and provide help giving recommendations like attractions to visit, things to do, places to eat, etc. and collect the guest's preferences in order to encourage their stay, as well as guarantee a personalized experience.

Another advantage is personalization. Chatbots are virtual assistants that sustain client information to the agent continuously so that the operator can give the client better information and solutions based on current needs and earlier conversations. Thus, they help hotels to customize customer experience at every phase of the visitor cycle, from the pre-arrival stage to the post-departure stage. This increases brand loyalty and chances of repeated visits (Dash & Bakshi, 2019). With chatbots, companies will gain valuable knowledge about the customers' preferences and habits which will help creating a better, accurate and proper system of guest profiling. Additionally, data collected from chatbots can help the company to improve and enhance the services as it will be aware of what

guests like or dislike. This can give an opportunity to create personalized offers that can lead to guest loyalty (AlexSoft, 2019).

All this advantages to the customers, are also benefits to the company and to the employees because it reduces the workload for the staff, avoiding repetitive tasks and allowing them to have time and space to focus on tasks that require more application. Therefore, they will be more productive and work at their maximum efficiency. The usage of AI as an agent of conversation is more cost-effective than human-aided support (Mott, Lester & Branting, 2004).

Another important advantage from the use of chatbots is the increasing of the direct bookings and the up-sell and cross-sell opportunities. According to Revfine (2020), during the booking process, the chatbot might use the information gathered in order to push relevant additional options, such as breakfast or spa services. If a particular room is selected, a chatbot could make a recommendation for a room upgrade. Lastly, the use of chatbots in the hospitality industry allows the hotel to keep in touch with the customers after their stay in order to receive feedback and to continue promoting the hotel and its services.

3.2.2) Internet of Things

According to Moreau (as cited in Dlodlo, Gcaba & Smith, 2016), IoT is considered a major research and innovation stream leading to numerous opportunities for new services by interconnecting physical and virtual worlds with huge amounts of electronic devices distributed in houses, vehicles, streets, buildings and many other public environments.

IoT is defined as a network that can connect with anything anytime and anyplace by technologies of RFID (Radio Frequency Identification), WSN (Wireless Sensor Network) and 3G/4G/5G mobile communication, according to an agreed protocol, to identify, locate, track, monitor and manage smart objects (Mingjun, Zhen, Wei, Xishang, Xiaofei, Chenggang & Jinghai, 2012). It collects, sends and receives data over the existing platform of network infrastructure, turning previous unintelligent devices into smart ones. This tool consists mainly of an overlay and interconnection of the physical and virtual world (Ma, 2011), through the creation of wireless networks of objects (Nazarov, 2010) where things/objects have a unique identification, are connected to the internet and have processing power that allows them to sense and respond to changes in their environments.

One of the biggest advantages of using this technology is the automated guestroom. Some studies indicate that several in-room technologies are being introduced to provide better guest experience (Erdem et al., 2009; Cobanoglu et al., 2011). According to Revfine (2020), IoT allows guests to control the heating, ventilation and air conditioning systems from one place, or even just specify a temperature and allow the various devices to automatically regulate the room to that temperature and the television. The implementation of in-room technology has not only improved the in-room services but also provided new ways of entertainment (Barker, Kandampully & Lee, 2003).

From the hotel's owners and building maintenance perspective, the staff can benefit greatly from the data collection with the use of IOT in the guestrooms. It involves providing hotel staff with up-to-the-second information about the operating status of different devices and appliances and alerting those staff to any warning signs that might be indicative of deterioration, or unusual performance (Revfine, 2020). This type of predictive maintenance plays an important role in this new trend as it recognizes damage items and alerts the maintenance personnel before the issue escalates. In addition, this also allows the hotel's housekeeping to use occupancy sensors to determine when a guest room or conference room has been vacated and is ready to be cleaned (Igor Tech, 2020). This technology is used in many different areas in order to help automate the processes, improve efficiency, provide a better customer experience making it more personalized and speedier, offer value-added services.

Modern digital travelers want to use the entertainment at hotels in the same way they do at home, through online services with their own devices, tablets or laptops. It is, therefore, increasingly likely that customers will pay less attention to an in-room TV (Horner, 2013). From the guest's perspectives, IOT in hospitality plays a significant role for a comfortable and customized stay. With mobile integration and engagement, hotels' platforms can over time easily memorize guest's specific comfort preferences through the previous data, anticipate the guest's needs and providing a unique personalized hospitality experience.

3.2.3) Big data and analytics

The hospitality industry is a data rich industry which captures huge volumes of data of different types where the effective use of analytics can change dramatically how business is run. Traditionally, the products offered by the hotel industry are characterized by a high level of homogeneity and according to Berezina, Bilgihan, Cobanoglu, & Okumus

(2016), since they operate in a competitive and dynamic environment, hotels need to utilize information effectively in order to improve hotel performance and compete with other hotels. The competitive advantage in today's hospitality industry is driven more and more by the ability to anticipate the customers' needs which can be executed using data analytics in the correct way. Hoteliers should seek to harness the power of big data to establish or maintain competitive advantages through personalized customer service (Mariani, Borghi, Kazakov, 2019). Big data and analytics are playing a crucial role in digital transformation efforts of organizations in the tourism and hospitality industry, thus driving greater effectiveness and efficiency and the strategy to define new business models and bring successful change (Evans, 2020; MicroStrategy, 2018). In the hospitality industry, big data analytics has enabled business decision-makers in their strategic planning purposes in hospitality markets, hospitality management, customer relation management and destination marketing (Miah, Vu, Gammack, & McGrath, 2017). Therefore, for analytics to be a game changer for hospitality, the organizations need to recognize the importance of decision making using their historical data in order to create reports and using advanced analytics to help the company. One of the latest Euromonitor International travel industry reports confirms that Big Data and Analytics is expected to be the most influential technology impacting the industry in the next five years (Bremmer, 2019), followed by artificial intelligence and the Internet of Things.

Big Data is usually referred to as huge data sets consisting of unstructured, semi-structured, and structured data that can be electronically processed to analyze and transform data into information useful for decision-making (Rezaee, Dorestani & Aliabadi, 2018). Within hospitality management, these data sets are most associated with customer behavior and interactions. The importance of the big data is not about the amount of data collected, but how the company analyses it and how are they used to create a model that can predict the customer's needs. Data analytics supports business decision-making and analytic insight (IBM, 2014), research insight (Fitzgerald, McCarthy, Carton, O'Connor, Lynch & Adam, 2016) and enables large volumes of data to be reviewed in a user-friendly fashion (Mazumder & Dhar, 2018). The big data analytics is more and more a factor that allows companies to obtain competitive advantage in the market as it plays a leading role in understanding consumers, competitors, their own market characteristics, the environment, the impact of new technologies and suppliers (Xiang, Schwartz, Gerdes & Uysal, 2015).

Big Data Analytics has a profound impact on gaining consumer insights, improving process efficiency and enhancing the consumer experience (Vinod, 2012). This means that this AI tool can increase customer segmentation according to booking trends and behavior. The use of big data and customer segmentation, helps the company to analyze the customer data and allows the organizations to make the perfect marketing approach by categorizing customers into market segments, making it easier to understand guest preferences.

Customer experience has always been overriding customer philosophy within the hospitality industry and with the implement of the big data analytics the companies can use the information collected to make better decisions regarding their customers. More specifically, big data can help businesses to identify trends among the customers, similarities and marketing opportunities. This can enable marketing messages to be sent, based on time, location and other data, allowing more targeted promotional content to be delivered (Revfine, 2020).

Another advantage of using Big Data and Analytics is that the improvements in cloud infrastructure and hardware supporting this tool have decreased the costs of these services and have improved their performance (Mazumder & Dhar, 2018). These technological advances provide significant opportunities for gain competitive advantage. The efficient uses of data and analytics drive process and cost efficiencies and strategy and change (MicroStrategy, 2018).

3.2.4) Recognition technology

Recognition technology (FR) is one of the biggest emerging technology trends, especially in hospitality. In this area, hotels must deal with a large number of customers at the same time, and it is considered a priority to deal with them efficiently. According to Revfine (2020), Face Recognition (FR) is a form of biometric artificial intelligence which is able to identify an individual or verify their identity by comparing a digital image or video frames with the faces contained within a database, matching up based on the unique facial features. To date, recognition technology is used by security services, law enforcement, technology companies and is becoming more common in the hospitality industry.

Today's society are posing several challenges to hotels, such as the need to reduce fraud and increase consumers' security (Chan & Lam, 2013), the increasing appetite of

consumers for personalized services (Chathoth, Ungson, 2014), and the development of online platforms for consumers to express their sentiment regarding their experiences (Nusair, Bilgihan, Okumus, 2013). RT has revealed to be very important concerning security, being used to easily identify people, to accept specific customers access to some facilities and to keep unauthorized ones out. According to the NEC Corporation (2018), Facial Recognition Systems could facilitate fast and less intrusive automatic authentication while ensuring a low error rate. This works for quickly identify the presence of people with history of bad behavior, undesirable guests or visitors and help to prevent crime by alerting the hotel staff accurately. The use of RT allows companies to recognize faces or fingerprints and can learn the customer's ID photo during check-in and check-out within 1-3 min (Parvez, 2020), which allows the customers to check-in and check-out without time waste (Unal & Tecim, 2018).

Facial recognition systems are promising in hotels, as they can optimize legacy consumer tasks, such as authentication, payment, etc. (Morosan, 2020), allowing the guests to confirm a payment using their facial recognition on a smartphone or a camera provided by the company. The use of RT is mostly driven by the need to increase productivity and save time to minimize human interference as it could be used to process payments on the check-out or in the hotel's restaurant or shops, in order to speed up the processes and with no need to interact with a staff member.

Face recognition allows for information to be associated with a specific person's face and is able to access that information when it detects that person's presence. If guests give their consent, face recognition can provide hotel patrons with a more personalized experience, especially for return guests (Hospitality Tech, 2018). This helps to understand the customers, improve the service quality and the customer experience, helps to optimize the process and create specific market strategies towards them. Therefore, hotels are able to collect and process a more detailed customer database automatically with face recognition technology.

3.2.5) Augmented Reality

Augmented reality (AR) has emerged as an important concept in the hospitality industry because it allows hotels to enhance the physical environment they are selling. According to Kong et al., (2019), AR systems enable humans to access digital information through a layer of information positioned on top of the physical world. Augmented reality (AR)

enhances the real-world environment, providing context-sensitive information of the users immediate surroundings by overlaying computer-generated content onto their direct view through a device (Han, Jung, & Gibson, 2014; Dieck & Jung, 2017). This technology' popularity has increased rapidly, gaining increased industry and academic attention over the past 5 years, and nowadays AR is considered to be "one of the most revolutionary inventions in recent years" (He, Wu, & Li, 2018, p.127).

Augmented Reality creates enhanced experiences, and is widely recognized as an effective tool to enhance interaction with, and perception of the real world environment (Tussyadiah, Jung, & Dieck, 2017). This technology enhances the guests' knowledge regarding the hotel unit, both pre, during and post-experience. AR has the potential to truly revolutionize all aspects of travelling as the next iteration of our interface with technology, and a truly immersive one (Creative Pool, 2020). Therefore, customers can benefit from this AI trend by interactively previewing, the hotel room, the lounge, the common areas, the restaurant and many more environments they are interested before they actually book it.

Another concept related to AR is the beacon technology that works through Bluetooth, allowing marketers to send important information to the customers when they are in specific locations (Revfine, 2020), sending virtual keys to the guests, allowing them to unlock their door room through their mobile phone, sending them a map of the hotel surrounding area or an advertisement for discount or promotion.

3.2.6) Virtual Reality

Augmented reality (AR) is often compared with virtual reality (VR) but while VR is a technology that creates a non-physical reality through information and communication systems (Gutiérrez, Vexo & Thalmann, 2008), Augmented Reality enhances the real-world environment in real-time (Revfine, 2020).

This is an emerging technology for the hospitality industry because it has the power of making believe that the person is present in a virtual world by providing interactive 3D surroundings simulated by a computer and allows potential customers to see every room in the selected hotel, the lobby and all amenities long before they arrive at the hotel through VR technology (Best Western, 2016). In the hospitality industry, the implementation of VR technology is becoming an advantage because it saves the guests

time of reading the descriptions of what they intend to buy, providing the important information that customers tend to ask before buying as well as on arrival and offers them a chance of experience and simulate multiple senses for themselves.

3.2.7) Robots

Throughout the world, the hotel service scenario is taking a shift towards AI and robotics (Huang & Rust, 2020). The use of artificial intelligence in the field of robotics within the hospitality industry have emerged as one of the most popular trends and it is becoming a promising application for this sector. The main reason why this trend is emerging so quickly is because it is a valuable solution for the hospitality industry, and it can improve automation and self-service tasks which play a very important role in the customer experience. Service automation describes the process of using machines to perform a certain sequence of operations when providing a particular service (Collier, 1983). From the service provider's perspective, service automation saves costs and improves operations and management (Kattara & El Said, 2014; Ivanov, Webster & Berezina, 2017). Kuo, Chen & Tseng, (2017) indicates that service innovation using robots can improve hotels' sustainable competitiveness.

Robots are machines or any system that have been programmed to execute a specific set of tasks or actions with great precision and efficiency, automatically. In the specialized literature, robots are defined as "intelligent physical devices" (Chen & Hu, 2013, p. 161) with a certain degree of autonomy, mobility, and sensory capabilities that allow them to perform intended tasks (International Organization for Standardization, 2019). In the context of hospitality, service robotics are one of the most transformative technological innovations to date (Ivanov & Webster, 2019a). Service robots, as the name suggests, are designed to perform useful tasks, which are people-oriented, through physical and social interactions (Ivanov, Webster & Berezina, 2017). The use of this technology has been revolutionizing the hospitality industry and starting to impact the basic tasks previously performed by humans. Robots are being used to greet guests at hotel receptions, serve food as waiters in restaurants, deliver room service orders, clean floors and swimming pools, cut grass at hotels' green areas, provide information at airports, and cook food in automated kitchens (Ivanov, Webster & Berezina, 2017).

One of the main advantages of adopting this AI trend in a hotel involves the way they are affecting the customer experience. Automating service processes may improve process

management, quality control, demand prediction, and create cost savings (Ivanov et al., 2017; Ivanov & Webster, 2019a; Noone & Coulter, 2012a). As such, the utilization of service robots was, in many cases, observed to create consistent, affordable, hospitable, and healthier service offerings. Robots can enhance service experience and reduce the hospitality firms' operational costs (Belanche, Casaló, & Flavián, 2020). The CI/CO process can easily be made by automation and artificial intelligent services which are able to receive, collect and process information, instantaneously, and even ask questions and understand the answers given by the customers, interacting as normal as human beings. The check-in provided by a robot enables guests who had a hard day or wish for less interaction, to lay low during their stay and at the same time providing excellent customer service. This kind of robots are prepared to help with typical questions that are usually made in the act of the CI and CO, but also during the stay, such as the location of the elevators, directions to a certain room or recommend places to visit. Therefore, this type of service is a welcoming appeal to the property and research in the field of hospitality and technology stated the improved guest experience as one of the main advantages of hotel technology applications (Brewer, Kim, Schrier, & Farrish, 2008).

According to Ivanov, Webster and Berezina (2017), the recent increase of robotics in this industry relates to the increased cost-effectiveness, better resource utilization, more accurate demand prediction, better quality control, improved process management and the removal of human error. The removal of human error is considered one of the main advantages of implementing robots in hotels because they can work 24/7, as they do not get tired, do not get bored and are prepared to perform endless functions which can be accomplished with high levels of precision, a greater degree of accuracy and consistency that humans would not be able to. This benefit of adopting robots as an AI trend into a hotel, can additionally relieve the staff members from ordinary repeated tasks, to perform other most important guest-related tasks, which is why shortage of labor is considered one of the primary reasons of adopting robots, according to J. Bowen & Morosan (2018).

3.2.8) Digital Kiosks

With the evident increase in self-service technologies across industries, users are becoming accustomed to interact with automated systems (Kiosk Market Place, 2013). This sector is investing in digital kiosks to improve services and enhance customer satisfaction. Digital kiosks are a modern approach to efficient hotel service that can be a

successful addition to each hotel's strategy (Makarem, Mudambi & Podoshen, 2009; Ostrowski, 2010; Lui & Piccoli, 2010; Shaw, 2004). Digital kiosks are machines where the users can walk up to and place an order without any assistance.

Hotels implemented self-service kiosks that enable customers to complete check-in and check-out process automatically without involving front desk agents (Kim & Qu, 2014). During this check-in process, the guests can select between several languages, and it will be shown to them the several room types available, giving them an opportunity to upgrade. Here, guests can check-in using their name or confirmation number and even scan an identity document. The guest can review the hotel check-in and stay policies, fills in the required information and confirms all with the fingerprint or face recognition. This process enables guests to complete the check-in and check-out procedures and create their room key without any assistance from front desk staff and automatically receives his/her hotel bill on his email (Ivanov et al., 2017; Shin & Perdue, 2019). Once this procedure is complete, the kiosk delivers a guest keycard. Automated check-in kiosks take workload from the staff so they can work on more important things as enhancing the customer service. Regarding the check-out process, guests only need to enter their room number and credit card on the digital screen. This way, digital kiosks provide full automation of check-in and checkout operations in hotel services.

Digital kiosks used in hospitality contribute to improving the guest experience by increasing customer choice and convenience, reducing waiting times and increasing guests' control over the arrival and departure process. The implementation of digital kiosks provides a potential opportunity to increase revenue through upselling and one-to-one marketing offers of additional services. Using digital kiosk will generate customer satisfaction towards enhanced-ordering experiences (Dixon & Kimes, 2012).

3.3) Disadvantages of adopting AI by hospitality industry

As it has been said in the previous chapter, the advantages of adopting AI trends by the hospitality industry are very significant although there are some disadvantages as well. One of the biggest disadvantage of bringing these technologies into a hotel unit is the employability threat. According to Larivière, Bowen, Andreassen, Kunz, Sirianni, Voss, Wunderlich, De Keyser (2017), "technology may also replace employees altogether in service encounters". In an environment where the tasks that are very monotonous, it is easy to automate them. Tasks such as customer care and document classification or

identification are more and more based on technology and automation and less on human work. Therefore, the use of AI in the hospitality industry aims to free the staff from tasks that are considered mundane and do not challenge people's creativity. By reducing the workload from the staff there would be more space for intellectual development in tasks where the human presence is more needed. T. Rust (2018) argues that the substitution of human jobs by AI technology mainly occurs at the task level and that such substitution can free up part of the work effort of the human employees and can also enhance the productivity of the human employees. Nowadays, robots and other AI techniques are only being used as a supplement to the staff but there is a significant possibility that this can rise to intelligent robots that will be programmed to perform all sort of tasks with no human involvement at all. This scenario obviously would result in an ocean of unemployment for the people in the hospitality industry.

In the previous chapter, security was considered an advantage of using the facial recognition technology and big data and analytics. However, security can also be considered a disadvantage of using AI technologies in hotels. The hospitality industry handles with a large amount of data and customer personal details, which makes it a desirable target for hackers. Hotels are vulnerable to cybercrimes through a variety of avenues that break with the traditional physical security measures deployed across the hospitality industry. Keeping guests and their assets — both physical and digital — safe is paramount to preserving both the image and financial security of hotels (Security Intelligence, 2017). Hospitality companies face unique challenges in the protection of their networks and sensitive data. As organizations increasingly deploy internet-connected devices and services to improve guest experiences, the complexity of protecting the network against cyber threats grows (Fortinet, n.d). Customers are already much aware of this problem in today's world and understand that it is possible that this can happen to them in a hotel, during their stay. Therefore, if an event like this occurs, it can compromise the guest's loyalty and harm the upcoming bookings. Information technology, cybersecurity, and risk professionals need to work together to protect their organizations from cyberthreats.

Another disadvantage of the adoption of AI, especially the robots technology, is the financial capacity of each company. Machines need repairing and maintenance which need plenty of costs. It's creation requires huge costs as they are very complex machines. (Towards Data Science, 2019). Also, the initial investment is very high, as they can be

quite expensive to purchase. While the return of the investment can be substantial, and quite often occur in a short space of time, the company's cash-flow should be sustainable in the meantime. On the other hand, robots do not require a salary so this can be seen as a long-term investment.

Another drawback of using robots and technologies which require voice recognition, such as chatbots as the internet of things, is that these machines cannot act beyond their pre-programmed range of actions, repeating tasks most of the time. The lack creativity and approach of robots can be considered complex as they won't be completely independent of human supervision (Ivanov & Webster, 2019). In hospitality, the use of these tools directly require interaction with humans who can give largely less predictable answers than machine communication. In addition, Tussyadiah (2020) states that the application of service robots within service industry is not comparable with the service experience of a human waiter. Nowadays, many people still consider very important to have human presence and interaction during a stay, mostly because they do not feel comfortable being attended by robots. The "human touch" is one of the most important aspects of the hospitality industry, as it can determinate if a customer will book a specific hotel or not. The lack of human touch and interaction can be an obstacle to customer satisfaction creating an environment of AI unfamiliarity.

3.4) SWOT Analysis

SWOT, which stands for Strengths, Weaknesses, Opportunities and Threats is a useful tool to understand the characteristics of a business and anticipate the potentials as well as recognizing risks (Parsons, 2018). This tool was developed in the 60's by Kenneth Andrews and Roland Christensen, two Harvard Business School teachers. Nowadays, it is one of the most common tools to analyze companies, industries or countries (Helms & Nixon, 2010). As its name implies, this technique is used to help people or companies to identify their strengths, weaknesses, opportunities and threats, related with the competitors or with the strategic planning. The SWOT analysis is divided into two complementary analyzes. On the one hand, the external analysis corresponds to the main prospects for the evolution of the market in which the company operates. This analysis includes factors that derive from the external environment, that are factors that come from the market and the environment. These factors are uncontrollable by the company, but they are considered fundamental for the perception of the business context analysis. The components of this analysis are: Opportunities, which refer to favorable external factors

that an organization can use to obtain a competitive advantage; and Threats, that are negative aspects of the environment that have potential to harm the organization.

Regarding the internal analysis, this corresponds to the main aspects that differentiate the company or the product from its competitors. These factors derive from the internal environment and come from the product and the company, which means that they can be controlled by the organization with management activities. The components of this analysis are: Strengths, which refer to the company's internal advantages in relation to its main competitors; and Weaknesses, that are the set of disadvantages of the company or product that prevent the organization from action to its maximum potential. These are areas in which the company needs to improve to obtain a competitive advantage.

In order to adopt the newness and trendiness Artificial Intelligence technologies, it is crucial to promote a realistic strategy to embrace it in the hospitality industry.

A SWOT analysis on the adoption of AI by the hospitality industry is shown in table 2.

Table 2 - SWOT Analysis on the adoption of AI by the hospitality industry

	Favorable Factors	Unfavorable Factors
Internal Factors	STRENGTHS • Reduce workload for staff; • Improved privacy and security; • Efficiency and quickness in data collection; • Tailored and personalized offers; • 24/7 customer service; • Customer segmentation;	WEAKNESSES • High initial investment and maintenance costs. • Limited capacity for unexpected situations and fixing errors. • Lack of human interaction/touch;
External Factors	OPORTUNITIES • Increase of mobile engagement; • Staff helpers; • Improved safety and security; • Good environment for introverts or anti-socials; • Solution for mass tourism; • Reduce language/cultural barriers; • Solution for epidemic or pandemic.	THREATS • Lack of job opportunities for people; • Customer data security and privacy;

3.5) Examples of Most Famous and Pioneer Trends

There has been a large amount of Artificial Intelligence applications in hotels around the world. The world's first entirely robot-staffed hotel is situated in Nagasaki, Japan, and it

was inaugurated in 2015. Henn-na is the name of the hotel and “henn” is also a Japanese definition to “change”, which represents the hotel’s commitment for “evolution in striving for the extraordinary sensation and comfort that lies beyond the ordinary”. Throughout the hotel, the robots are used to provide front desk assistance such as check in and check out, storage services and customer information, using AI technologies. The hotel’s intention is to become more efficient while creating a fun and comfortable environment. In addition to robots, the hotel also uses strategies to help the environment, such as automatic sensors for light or the use of a solar system for air conditioning, and also, instead of keys for the rooms or cards, guests can open the doors through a facial recognition system (Henn-na Hotel, 2015).

Figure 4 - Robot Cloak at Henn-na Hotel



Retrieved from: <https://www.h-n-h.jp/en/facilities>

Figure 3 - Front Desk at Henn-na Hotel



Retrieved from: <https://www.h-n-h.jp/en/facilities>

Furthermore, chatbots have become one of the most significant AI trend of today’s eCommerce industry. As it has been said before, in 1950, Alan Turing published his well-acknowledged article “Computing Machinery and Intelligence“, followed by the Turing Test as we know it today. His work was taken with great interest from Joseph Weizenbaum, the German computer scientist and Professor at Massachusetts Institute of Technology. In 1966, Joseph developed the program ELIZA, which aimed at tricking users into believing that they were conversing with a real human being. ELIZA was the first chatbot in the history of computer science. Though the term chatterbot was not coined until 1994 by Michael Mauldin, to describe these conversational programs.

Figure 5 - Software Eliza

```
Welcome to
EEEEEE LL      IIII ZZZZZZ AAAAA
EE      LL      II   ZZ  AA  AA
EEEEEE LL      II   ZZZ  AAAAAA
EE      LL      II   ZZ  AA  AA
EEEEEE LLLLLL IIII ZZZZZZ AA  AA

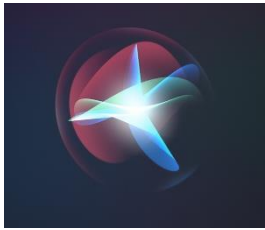
Eliza is a mock Rogerian psychotherapist.
The original program was described by Joseph Weizenbaum in 1966.
This implementation by Norbert Landsteiner 2005.

ELIZA: Is something troubling you ?
YOU:  Men are all alike.
ELIZA: What is the connection, do you suppose ?
YOU:  They're always bugging us about something or other.
ELIZA: Can you think of a specific example ?
YOU:  Well, my boyfriend made me come here.
ELIZA: Is it important to you that your boyfriend made you come here ?
YOU:  He says I'm depressed much of the time.
ELIZA: I am sorry to hear that you are depressed.
YOU:  It's true. I am unhappy.
ELIZA: Can you explain what made you unhappy ?
YOU:
```

Retrieved from: https://en.wikipedia.org/wiki/ELIZA#/media/File:ELIZA_conversation.png

Nowadays, numerous brands have found different ways of integrating a conversational chatbot into their messaging platforms such as Facebook Messenger. Facebook, launched in 2016 a chatbot service that acts like a virtual assistant allowing businesses to provide automated customer service, deliver content and come up with an interactive experience for their customers. Major international companies as Facebook have developed several chatbots both for industrial solutions and research. Some of the most famous are Apple Siri, Microsoft Cortana, Google Assistant, Amazon Alexa. Regarding specifically the tourism and hospitality industry, the most famous can be considered: Skyscanner, which launched a bot for Facebook Messenger to allow flight booking through the app or booking of other services by chatting to an actual human; and Booking.com, which launched a chat tool to allow guests to interact with hotels where they hold a reservation,

Figure 8 - Apple Siri



Retrieved from: Google Images

Figure 7 - Facebook Messenger



Retrieved from: Google Images

Figure 10 - Google Assistant



Retrieved from: Google Images

Figure 9 - Microsoft Cortana



Retrieved from: Google Images

Figure 12 - Booking.com



Retrieved from: Google Images

Figure 11 - Amazon Alexa



Retrieved from: Google Images

Figure 13 - Skyscanner



Retrieved from: Google Images

3.6) Artificial intelligence in hospitality with COVID-19

Nowadays, the tourism and hospitality industry are living for the first time in a crisis that is having disastrous impacts. This sector has witnessed the market growth over the years due to the increase of global tourism driven mostly by the general reduction in flight prices in recent times. The forecasts for the year 2020 were quite positive as it was expected an increase in the number of business trips, as well as individual trips and luxury tourism. However, the appearance of the COVID-19 in China the tourism and hospitality sectors began to feel its first impacts immediately. The COVID-19 crisis has compelled the implementation of travel policies that have badly affected the global economy, significantly impacting the fields of travel, tourism, and hospitality (Pillai, Haldorai, Seo, & Kim, 2021).

The virus led the national government to implement new security measures, leading the country to an economic slowdown, due to the stop of production and restrictions on travelling. Strategies to flatten the COVID-19 curve such as community lockdowns, social distancing, stay-at-home orders, travel and mobility restrictions have resulted in temporary closure of many hospitality businesses and significantly decreased the demand

for businesses that were allowed to continue to operate (Bartik, Bertrand, Cullen, Glaeser, Luca, Stanton, 2020). The disease spread throughout the world and on March 11, 2020, the World Health Organization (WHO) declared the coronavirus a Pandemic, causing a worldwide crisis with far-reaching effects on the hospitality industry. Previous hospitality and tourism researches on a crisis like SARS, Ebola, and Influenza pandemics (Novelli, Burgess, Jones & Ritchie, 2018), provide comparable patterns to COVID-19 but on a very small scale. The present state of this pandemic is full of uncertainties, and its effects are much more severe than the previous pandemics (Gössling, Scott & Hall, 2020).

Due to the strong global impacts created by COVID-19, the hospitality industry will have to function in a completely different way. Humanity will enter the post-crisis new era which will require that this sector adapts its approach to the new traveler. In this post-crisis scenario, society will have to learn to live with the contagion and the companies will have to reactivate the economic activity. Hospitality businesses are expected to make substantial changes to their operations in the COVID-19 business environment in order to ensure employees' and customers' health and safety, and enhance customers' willingness to patronize their business (Gössling et al., 2020).

Many people are unwilling to travel for leisure and avoid staying at hotels (Gursoy & Chi, 2020). As in all crisis situations, communication must assume the main role as a way of approaching customers and with the aim of instigating security for their future trips. The first step in overcoming this crisis is to rebuild the customers' confidence, creating all the conditions for the customers to return to tourism. To recover from the pandemic, hospitality businesses need to bring significant changes in their operations. This involves the guests' health and safety, which can amplify guests' inclination to return to hotels (Gössling et al., 2020). Therefore, it is necessary that companies assure their customers a safe space, free of contamination, focusing on sanitary safety and strict hygiene in order to comply with the new practices. Crises can give birth to high-tech innovations and according to Travel Pulse (2020), COVID-19 has unquestionably accelerated the infusion of new technologies and applications into hospitality operations. With this current COVID-19 turmoil, the hotel sector should consider the possible advantages of AI and its applications like robotics in the industry setting (Zeng, Chen & Lew, 2020). Tech features that might have originally been intended for introduction as novelties or extra conveniences are suddenly becoming necessities in an era where some people are wary of even stepping outside their doors (Travel Pulse, 2020). It is logical that, in times like

this or even in the event of another epidemic or pandemic, companies in this sector integrate automation into service operations to reduce social interaction and offer the customer and the employees' greater safety and security. Hotel operators are beginning to pay closer attention to the potential advantages of Artificial Intelligence and its applications in hotel management practices (Zabin, 2019). As COVID-19 is profoundly infectious (Chan, Yuan, Kok, To, Chu, Yang, Xing, Liu, Yip, Poon & Tsoi, 2020), it is vital to follow physical distancing. Therefore, adopting AI in hotels is a way of providing contactless service improving the guests and staff security. The use of service robots ensures a safe social distance (Ivanov et al., 2020). These robots have been adopted to deliver food, beverages and other items in hotels and restaurants and to guide guests in tourism services (Seyitoğlu & Ivanov, 2020, Jiang & Wen, 2020). In addition, some tasks, such as sweeping, cleaning, disinfecting, and food preparation, have been assigned to robots to diminish the exposure of public areas or food to potential virus carriers (Ramalingam, Yin, Elara, Tamilselvam, Rayguru, Muthugala, Gómez & Zeng et al., 2020).

Fully automated hotel check-in systems (e.g., mobile key) or self-service kiosk check-in machines enable customers to have limited interaction with employees (Shin & Perdue, 2019). The same thing happens when considering the chatbots. This technology enables guests to ask all the desirable questions to a virtual assistant, available 24/7, through voice or text, avoiding the physical contact by asking the same questions to the receptionist. Regarding augmented and virtual reality, it applies the same principle stated before.

The growing number of people who use mobile devices such as tablets and smartphones has motivated hotel managers to find new ways of interacting with guests (Amadeus, 2011). Some customers are already very engaged with using their mobile devices for every daily basic task, such as online payments, ordering food, booking a hotel, etc. An increasing number of guests already mentioned that they prefer to place an order and ask for information via mobile devices rather than calling the front desk or meeting with the concierge Eftekari (2014). The lack of physical contact and interaction results from the fact that these AI technologies can be accessed via mobile phone or computer without even having to leave the room and interact with others, promoting social distance.

CHAPER IV: Case Study: Evolution Lisboa Hotel

The Evolution Lisboa is a four-star hotel with 129 rooms, breakfast, lunch and dinner service, a business center and meeting and banquet facilities, a 24-hour fitness and wellness center, a restaurant, a bar, a lounge, a sauna and steam room, a park and an indoor swimming pool. This unit belongs to the SANA Hotels chain which is a Portuguese brand that is part of the AZINOR group. Nowadays AZINOR holds 16 hotel units, 14 of which are in Portugal and the remaining two in Angola and Germany. This hotel chain offers units of 3,4 and 5 stars with a total of 2713 rooms, 151 apartments, 92 meeting rooms and 5900 square meets of wellness facilities. The first hotel of the AZINOR group was SANA Capitol which opened in 1983 although the SANA brand was only created later in the year of 1999.

On February 26th of 2014, in Praça Duque de Saldanha 4, the Evolution Lisboa hotel is inaugurated. This elegant and welcoming hotel is in a privileged area of the city, in the heart of Lisbon's business center between Praça Marquês de Pombal and Praça de Touros do Campo Pequeno. In the center of Saldanha, this hotel is surrounded by other hotel entities, multinational companies, shops and a wide range of restaurants and coffees. Due to its location, there is a vast network of public transportation such as buses, the subway, and the hop-on-hop-off buses which in the eyes of the tourists can be considered as a very important requirement when choosing the accommodation for a visit to the city. It is also important to note that the Portela Airport is located at a 5.6km distance from the hotel which is equivalent to 14 minutes by car or taxi or even 19 minutes by subway. Therefore, according to the "Booking" platform, Evolution Lisboa Hotel has a rating of 9.0 out of 10 in terms of location and in general an 8.9 out of 10.

According to Teixeira, S., (2010) "planning can be seen as the first function at the birth of a company and tends to reduce the uncertainties (and risks) that characterize its environment, particularly in times of great and constant change like the one we currently live in." Before a company knows what path to take, it becomes fundamental to know the goal that is intended to achieve and the mission and vision of the hotel.

According to Lisbon, Coelho, Coelho & Almeida (2013) the constitution of a company or an organization always has, in its genesis, a vision of what it could be and the reasons that justify its creation, supported by a pragmatic idealism of those who lead this will. This vision of the founders, concerning the future of the organization and the path it

should follow towards its development, translates into the mission that they define for the company itself. For Freire (1997), the vision of a company indicates its intentions and wishes for the future without mentioning how to achieve them. Evolution Lisboa Hotel's vision is "to be the city's reference with a 24h proposal standing out as a permanently advanced concept in lifestyle trends, providing a social hub to its "guests" (guests, visitors and residents)".

Lisboa, Coelho, Coelho & Almeida (2011) states that the mission of an organization should reveal its identity and personality, indicate the reason for its existence, define its business and present in an easy and clear way its general objectives and its orientation for progression in the future. The mission of the Evolution Lisboa Hotel is "to position itself as a trend concept, jointly embracing the guests and the local community, being a reference of innovation in hotel service with a philosophy of quality and consolidated prestige".

According to Pinto (2007), values are timeless principles that drive an organization. They define the convictions of the entity that are evidenced in the daily way of proceeding of the entire team and publicly compose what the employer expects from his entire team. The values of the Evolution Lisboa Hotel are innovation, service, prestige, quality and trend.

Each hotel of the AZINOR group has a different concept, a different personality and different qualities which makes each experience different from the previous one. This hospitality product, as well as the brand, show a new stage in the hospitality industry and a new generation of SANA hotels, entirely directed to the future and to a modern and independent consumer. The Evolution Lisboa is part of "a new generation of bold hotels, with a strong technological component, and stands out for functionality, speed of service, innovation and freedom, felt by the client from the first moment. The main highlight of these spaces is that the services can be commanded and controlled directly by the guest. In essence, the effective control of the stay and the activation of services - check in/out, catering, control of the budget of the stay, information about the hotel and the city, and even the equipment in the room - are transferred through a mobile application to the customer's own initiative, regardless of the time and the moment the customer wants to use them.", says the press release in some detail. (Braga, 2018).

In this hotel establishment, the evidence of functionality's concept begins right at check-in, which can be done by the customer, or it can be done by the staff in the reception right beside. The self-service check-in in the digital kiosks is an easy process in which through the machine it is possible to choose a bedroom, make the payment and receive the card/key which does everything, such as opening the bedroom door, activating the elevator, turning the lights on/off in the bedroom, etc. Apart from the features manageable with the card/key, it is also possible to download the mobile app to check-in/check-out, control the budget, get information about the hotel and the city, choose restaurants, control the air conditioning in the room, raise and lower the blinds, etc. Also, customers always have the chance to do everything manually without having to download the app. Besides all this, wi-fi is free, and the app also provides free online magazines and newspapers in the press reader area. Therefore, the app allows you to control everything without having to move to other websites or move at all. On the first floor there is a iMac corner, which is also a modern area of the hotel designed for people to work in a calm and equipped space and on the last floor is the E-relax space where the sauna, gym, indoor swimming-pool and other services are located. As for the rooms, they are divided between COOL and SUPER COOL categories and are designed to be the ultimate in comfort and innovation, and to provide a panoramic view of the city while guaranteeing the existence of a work area and a living area.

In 2020 and 2019 the Evolution Hotel Lisboa was awarded by the KAYAK Travel Awards as one of the Best Hotels in Portugal (appendix 1 and 2). KAYAK's hotel ratings process must have a minimum overall rating of 8.0 and a minimum of 25 reviews published within the previous year to qualify for the KAYAK's Best Hotels. In 2018, the Evolution Hotel won, for the third time in a row, the certificate of excellence awarded by TripAdvisor (appendix 3). This award is awarded to hotels around the world which provide high quality services, and to receive it the establishment must have a 4 or 5 star and be present in the platform at least for 12 months. In the same year, the hotel also received the Xénios award (appendix 4), assigned to João Figueira as the best young hotel manager. This is a Hospitality Excellence Award, through which the "Associação de Diretores de Hotéis de Portugal" (ADHP) recognizes the dedication of hospitality workers subdivided in categories such as best hotel manager, best room manager, best F&B manager, best marketing and sales manager, best young hotel manager, best human potential manager and best outsourcing company and "Carreira" (career) award. In 2016,

the award “Revelation of the Year” awarded by the “Boa Cama Boa mesa” guide, (appendix 5) which belongs to the Expresso newspaper, was assigned to the Evolution Lisboa Hotel for the "boldness, creativity and technological innovation". In the same year, the hotel was distinguished as “Recommended Accommodation” (appendix 6). Also in 2016, the Evolution Lisboa Hotel won the Guest Review Award (appendix 7) with a score of 9.1 and 9 (out of 10), respectively. This award is provided by Booking and is assigned to the properties in Booking that have as a minimum score 8 out of 10, in the comments made in Booking, either by guests or by entities that have visited the hotel. In 2016, the Evolution Lisboa Hotel received the AHRESP award (appendix 8) in the Concept/Brand category. In the same year, the hotel also won by the SIL awards, the Best Real Estate Development in Tourism (appendix 9). This type of awards aims to highlight several people, entities, projects that were evidenced by their qualities, competencies and goals.

Figure 16 - Digital Kiosk at Evolution Lisboa Hotel



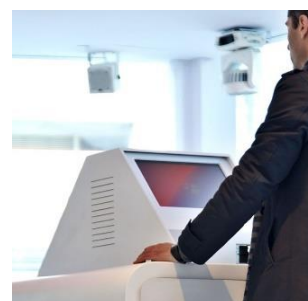
Source: Evolution Lisboa Hotel Website

Figure 15 - iMac Corner at Evolution Lisboa Hotel



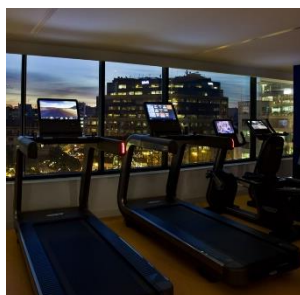
Source: Evolution Lisboa Hotel Website

Figure 14 - Self Check-in at Evolution Lisboa Hotel



Source: Evolution Lisboa Hotel Website

Figure 19 - E-relax Space - Gym



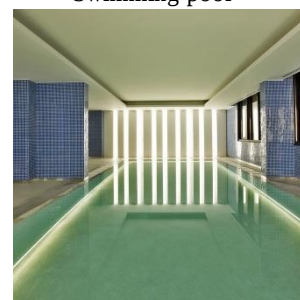
Source: Evolution Lisboa Hotel Website

Figure 18 - E-relax Space - Sauna



Source: Evolution Lisboa Hotel Website

Figure 17 - E-relax Space - Swimming-pool



Source: Evolution Lisboa Hotel Website

Figure 20 - Cool Room - Double Bed



Source: Evolution Lisboa
Hotel Website

Figure 21 - Cool Room - Twin Beds



Source: Evolution Lisboa Hotel Website

Figure 22 - Super Cool Room



Source: booking.com

CHAPTER V: Research methodology

Regarding the depth of the research, and according to Saunders, Lewis & Thornhill (2016), it can be exploratory, descriptive or explanatory. This study has exploratory nature because the intent is to acquire a first understanding of the issue, getting an overview of the theme (Coutinho, 2011 & Gil, 2006). An exploratory study was conducted using as data collection instrument a survey that was answered by 268 individuals. The stored information concerning them was later analyzed using statistical methods. However, in the scope of the present research, and considering the need to understand and deepen the subject within the scope of the case study Evolution Lisboa, an interview divided into 21 questions and its script can be found in appendix 10 - Interview's script. In this investigation, the interview arises to complement the surveys. However, these two methods are distinguished only by the way data is collected, since the interview is the result of a "human interaction and communication", characterized by direct contact between the researcher and the interviewee (Quivy & Campenhoudt, 1998, p. 191). The interview selected to this study is directive or structured. This type of interview is characterized by having the goal to deep and verify the theme in question, as well as the formulation and the order of the questions being predefined. It is considered necessary that in this type of interview the interviewer puts together a list of closed answer questions as well as a set of opened answer questions, which will allow a bigger collection of information. This means that throughout the application of the interview, a real exchange of information is identified, where the interviewee is free to express his/her perceptions, interpretations or experiences on a particular topic to be investigated (Quivy & Campenhoudt, 1998). Therefore, with the use of a directive/structured interview, it is possible to obtain statistically analyzed data which will create relationships with the data

collected by the surveys. A structured interview was conducted with the Evolution Lisboa Hotel's general manager, who shared content about the hotel and its Artificial Intelligence implementations. The main goal of this interview is to study the perception on the adoption of AI and its advantages and disadvantages.

5.1) Data Collection Method

The data collection method can be qualitative or quantitative (Yin, 1981). Quantitative data is used when there are many variables of numerous and possible to quantify. On the other hand, the qualitative data is used when the information to be collected is not easily worked through statistical data, so qualitative data are more recurrent in cases where it prefers a descriptive technique of the results and phenomena of tourist activity (Perez, Borrás, Mesanat & Mira, 2001). Considering the data collection method, in this investigation it will be used the qualitative-intensive and the quantitative-extensive methods. The qualitative-intensive method will be used to conduct structured interview with the Evolution Lisboa Hotel manager to analyze the perceptions of the Artificial Intelligence adoption made by the hotel.

The quantitative-extensive method will be used to conduct surveys to the potential consumers of the hospitality industry that has adopted several AI techniques. The other data collection method used in this investigation it is the survey. This seems to be the most appropriate instrument, due to the research issue and the general and specific objectives defined. According to Bhattacharjee (2012), the survey is a research instrument that encompasses several questions which purpose is to collect answers in a standardized way. The same author also considers that this is the method that best suits when the unit of analysis of the study are people. Kalof, Dan & Dietz (2008) summarize the survey as a sequence of questions that participants, after reading, answer autonomously. With this instrument it is possible to collect quantitative data and analyze it later, with the help of descriptive and inferential statistics (Saunders, Lewis & Thornhill, 2016). The data that the survey allows us to collect is often unobservable, which implies that it was difficult to know the preferences of individuals, their attitudes, beliefs, behaviors or information (Bhattacharjee, 2012). Therefore, it is necessary to define a target population to later select a sample with some members of this population (De Vaus, 2002). It is considered necessary to develop the survey in a way that the respondents can complete it accurately and without assistant. In order to do this, a simple and direct language should be used, as

well as a defined and structured set of questions with logic and easy understanding, avoiding double-meaning questions (Vanderstoep & Johnston, 2009).

The survey was conducted in order to try to understand the perception that consumers, or possible consumers, have about the intervention of Artificial Intelligence in the hospitality industry. The survey was prepared in electronic form using the Google Forms tool being one of the most popular research tools because, in addition to allowing virtually free data collection, it also allows for uncomplex comparisons.

Through these two methods of investigation, it will be possible to analyze the content of the information collected in through the interviews and it will be studied the consumer behavior towards the new AI implementations through the surveys.

5.2.1) Interview Structure

Initially, an introduction is presented to context the study and its main objective, as well as important information. Secondly, it is collected information about the hotel's characteristics and specificities such as the hotel's date of opening, number of bedrooms, common areas and different services provided. It is also asked about the mission, vision and values of the hotel and the hotel awards. In the next stage of the interview, the information collected regards the perception of the hotel on Artificial Intelligence and the relationship between AI and competitive advantage in the hospitality industry. Therefore, it is intended to collect relevant information to achieve the main goal of the investigation – study the Artificial Intelligence as a competitive advantage factor in the hospitality industry. The next set of questions refer to the hotel's implementation of AI trends. In this stage, the goal is to identify which trends have been used in the hotel, what is its main goal, where were they implemented, what are the advantages and disadvantages and what is the guests' and the staff's perception. The last set of questions refer to the Pandemic's impact on the Artificial Intelligence in hotels and the future implementations that will be made in the hotel and its objective.

5.2.2) Questionnaire Structure

The survey comprises a total of 21 closed answer questions, such as: dichotomic, where the respondent chooses between two alternatives presented (yes/no; true/false; agree/disagree); multiple choice, when the participant selects one of the options presented; verification, where the respondents select as many answers as they want; and also the questions that follow the five-point Likert Scale (1-Totally disagree; 2-Disagree;

3-Indifferent/I don't know; 4-Agree; 5- I totally agree). The Likert Scale is a tool used quite often in social sciences and focuses in measuring the attitude of individuals. It is a set of statements in which respondents opt for one of the alternatives according to their degree of agreement/disagreement in relation to the proposed statement/question. The extension of the survey is reflected in the time that the respondents need to complete the survey and it is quite important because it can affect the quantity and quality of the responses obtained (Baxter, Hastings, Law & Glass, 2008). Therefore, in order to make the surveys' filling less complex and as short duration, the participants were asked to dispense approximately 10 minutes of their time.

Prior to the presentation of the questions to which it was intended to be answered, it was written an introduction explaining the purpose of the investigation and ensuring the confidentiality of the information transmitted. In order to answer the objectives of the survey, the questions were divided into four groups, which are: characterization of the relationship with Artificial Intelligence's concept in general and inside the hospitality industry; competitive advantage factors for decision-making; Artificial Intelligence as a competitive advantage factor in hospitality; and demographic characterization.

In the first group of questions - characterization of the relationship with Artificial Intelligence's concept in general and inside the hospitality industry – the main goal is to find out the level of knowledge that participants have with the concept of Artificial Intelligence in general, their perceptions of it within the hotel industry and analyze their opinions on the future of AI.

In the second group - competitive advantage factors for decision-making - it is intended to discover the most important characteristics a hotel should have and the perspectives on the impact of AI in long-term. In this group it is also intended to evaluate the importance of the advantages and disadvantages described and the level of agreement, or disagreement with statements related to the contribution of AI in hotels, the technological advances and its threats and the potential of AI implementations along with human resources. (Campos-Soria, 2005; Botelho, 2010; Baum & Kokkranikalos, 2005; Nyheim et al., 2004; Tsai et al., 2009; Erdem et al., 2009; Cobanoglu et al., 2011; Bremmen, 2019; Hospitality Tech, 2018; He, Wu & Li, 2018; Best Western, 2016; Kuo, 2017; Ianov et al., Ianov & Webster, 2019; Noone & Couter, 2012; Dixon & Kimes, 2012; Larivière et al.,

2017; Security Intelligence, 2017; Fortinet n.d; Towards Data Science, 2019; Tussyadian, 2020).

In the third group of questions - Artificial Intelligence as a competitive advantage factor in hospitality – it is intended to discover if the participants think that AI is an important factor in terms of competitiveness in hotels and if they would choose AI over humans, AI and humans or only humans. (Camisón, 2000; Cobanoglu, Corbachi & Ryan, 2001; Collins & Cobanoglu, 2008, David et al., 1996; Siguaw & Enz, 1999; Van Hoof, Verteeten, & Combrink 1996; German & Muralidharan, 2001; Uriely, 2005).

In fourth group - demographic characterization – the main goal is to obtain the respondent's profile regarding the age, gender, academic qualifications and professional occupation. Therefore, this are sociodemographic questions related to the individual.

5.3) Data Collection and Sample Determination

The interview was conducted on October 29th via Google Forms, and it was submitted by email to the Evolution's general manager, as already referred previously. The survey was disseminated to the participants on June 16th, 2021, by email and social media via link to the form, - the script can be found in appendix 11- and the access ended on 20th July 2021 with a total of 268 responses. Considering the actuality of the theme and considering that the objective of the survey was to obtain the general public's perception of AI in the hotel industry, the snowball method was chosen until a satisfactory sample was obtained. The snowball method is a sampling technique that uses reference networks and is used in qualitative research. It can be applied in researches with difficulty in accessing groups or when dealing with topics that are more private, standing out in researches which opt for non-probability samples in qualitative studies.

5.4) Data Analysis Procedures

The data analysis procedures included the preliminary data analysis, to validate the sample, in order to check if all the survey questions were properly filled out. After data validation, descriptive analysis was used, mainly based on frequencies.

CHAPTER VI: Presentation, analysis and data discussion

6.1) Interview's Results, Analysis and data discussion

The purpose of this chapter focuses on presenting and analyzing the data collected from the interview and discuss the results. In it, it will be related the Artificial Intelligence

trends mentioned in the previous chapters, with its implementation in the hotel chosen as case study. This part of the dissertation aims to describe the advantages, disadvantages, objectives and impact that these trends have on the Evolution Lisboa hotel as well as on the guests and employees.

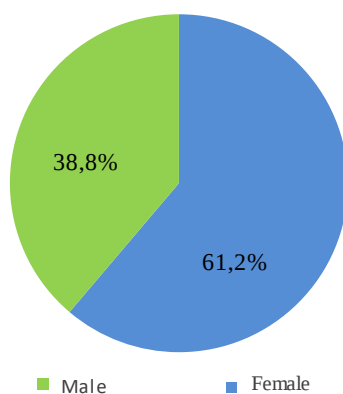
According to the trends presented in the previous chapters, it was possible to identify some trends that are used in the Evolution Lisboa Hotel, according to the interview to the general manager. This hospitality unit uses the facial recognition tool to facilitate the process of identifying employees and to be able to control the time of arriving and leaving. Also, it is used the internet of things, digital kiosks and a software that allows the guests to manage absolutely every service from their cellphone, named SANiA. The digital kiosks and the internet of things have been implemented since the opening of the hotel, which was in 2014, and the facial recognition tool and the software SANiA were implemented in 2021 with the objective of improving the guests' experience. The advantages related to the use and implementation of AI tools in the hotel are autonomy and ease and the disadvantages is the slower post service sale in the first two years. The main motivation which leads people to choose the Evolution hotel, it is the fact that the hotel provides the option that allows the guests to choose to have total autonomy or not during their experience, even though there will always be people that consider the AI tools implementation as a reason for not to choose the hotel. As for the degree of acceptance by the guests regarding AI trends, it is possible to deduce that it is very positive, especially regarding the SANiA software and the self-check-in options. Artificial Intelligence in the Evolution Hotel has some influence in the employees' productivity since it technological support allows for another type of dedication in personal contact and interaction with customers which improves productivity. According to the interview, the general manager of Evolution Lisboa Hotel stated that after the pandemic it was possible to notice a positive impact in the use of AI in hotels since the fear of contacting with people forced and expedited the AI's memory in the services. As for the future projections for the adoption of more AI in the hotel, those are under analysis and depend fundamentally on the social evolution and several options that are being studied now are confidentially of the Evolution Project.

6.2) Survey's Results, Analysis and data discussion

The purpose of this chapter focuses on presenting and analyzing the data collected from the surveys and discuss the results. Firstly, a characterization of the sample will be made,

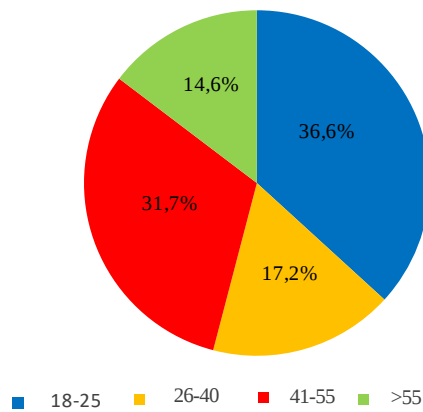
and then an analysis on the four groups of questions in which the surveys were divided: demographic characterization of the sample; characterization of the relationship with Artificial Intelligence's concept in general and inside the hospitality industry; competitive advantage factors for decision-making; and the Artificial Intelligence as a competitive advantage factor in hospitality. The information obtained from the surveys was processed with the help of Microsoft Excel and the data from the response summary provided by the Google Forms tool was also considered. In the analysis it was concluded that there were no invalid answers. Therefore, the total amount of answers collects was used to this investigation. The population of the survey consists of all people who travel and enjoy hospitality worldwide and the sample of this study consists in a total of 268 individuals.

6.2.1) Demographic Characterization of the Sample



Graphic 1 –Gender

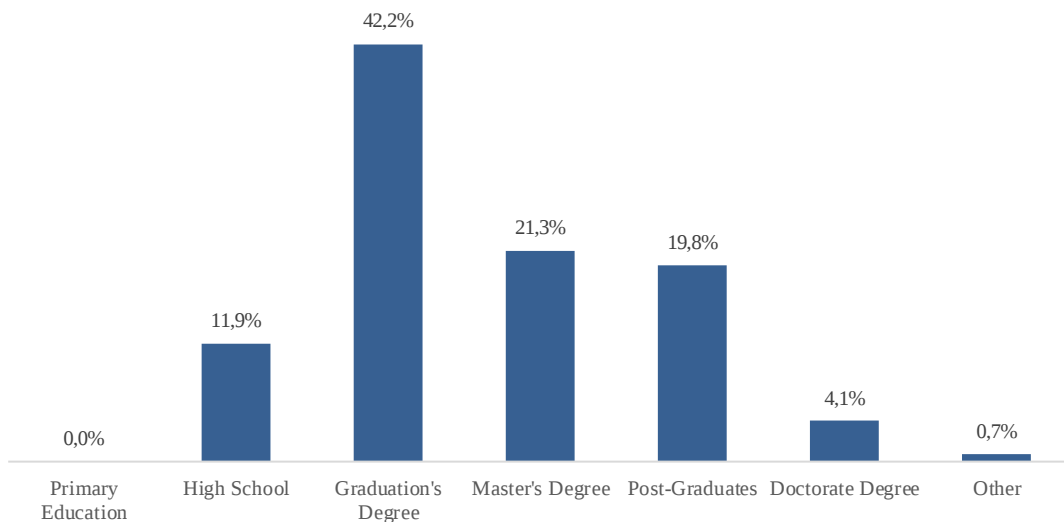
According to the last five questions of the survey, and in order to analyze the demographic characterization of the sample, it has been concluded that the majority of the sample consists on female individuals, representing 62,2% of the sample, whilst the male individuals represent 38,8%, as it can be seen on the previous graphic.



Graphic 2 – Ages

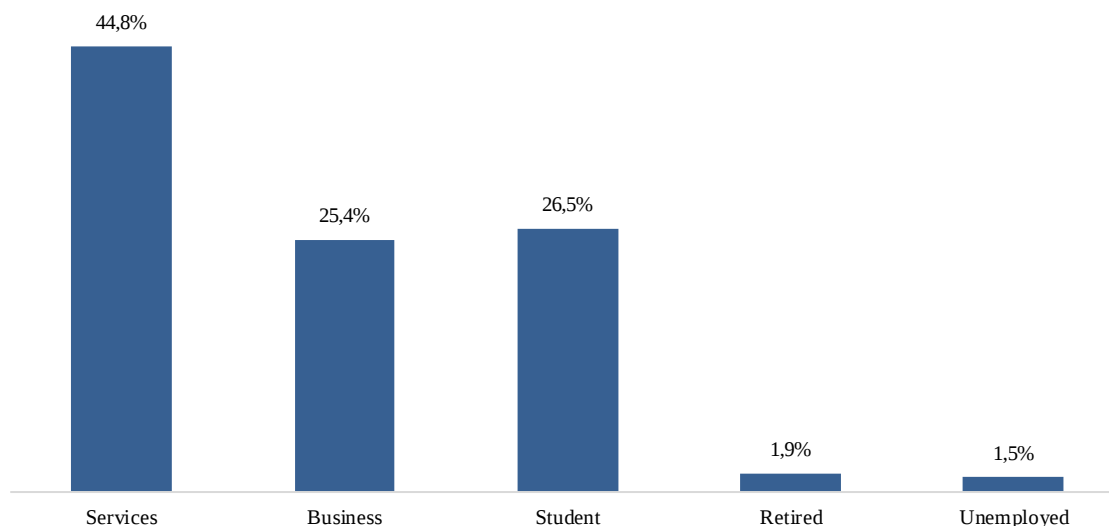
According to the second graphic, most answers were given by younger people with ages between 18 and 25 years old, representing 36,6% of the sample. The age gap that follows consists in people between 41 and 55 years old, representing 31,7% of the sample, 26 and 40 years old with 17,2%, over 55 years old with 14,6%.

The distribution of answers regarding academic qualifications is represented on the graphic below.



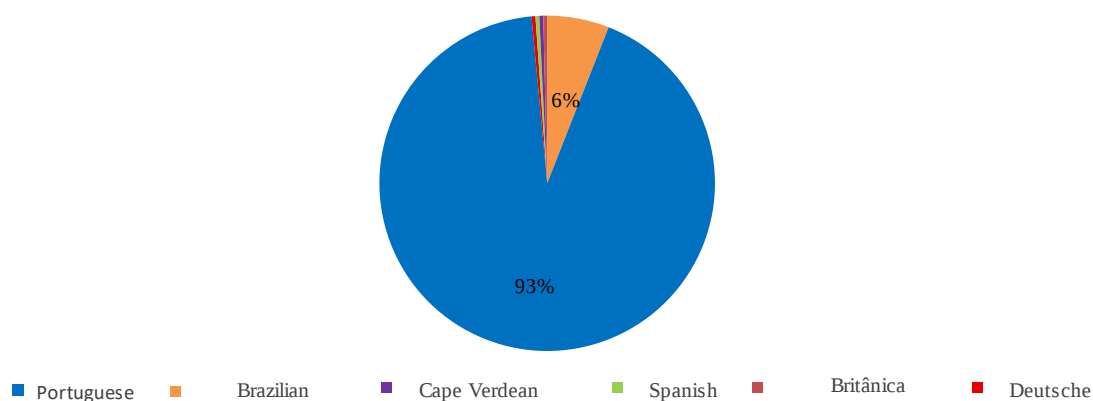
Graphic 3 - Academic Qualifications

It is noticed that almost half of the sample consists on individuals who have a degree (42.2%), followed by those who have a master's degree (21,3%), those who are post-graduates (19,8%), those who have high school qualifications (11,9%) and those who has a doctorate degree (4,1%). Together, these groups represent 99.3% of the total participants.



Graphic 4 - Occupation/ Area of activity

The next question on this group refers to the interviewees' occupation/ area of activity. The service area stands out encompassing about 45% of the sample. The students and business are the ones with highest representation after the first, represented by 26,5% and 25,4%, respectively. Lastly, the retired and unemployed only represent 1,9% and 1,5%, respectively, as it can be seen in the previous graphic.

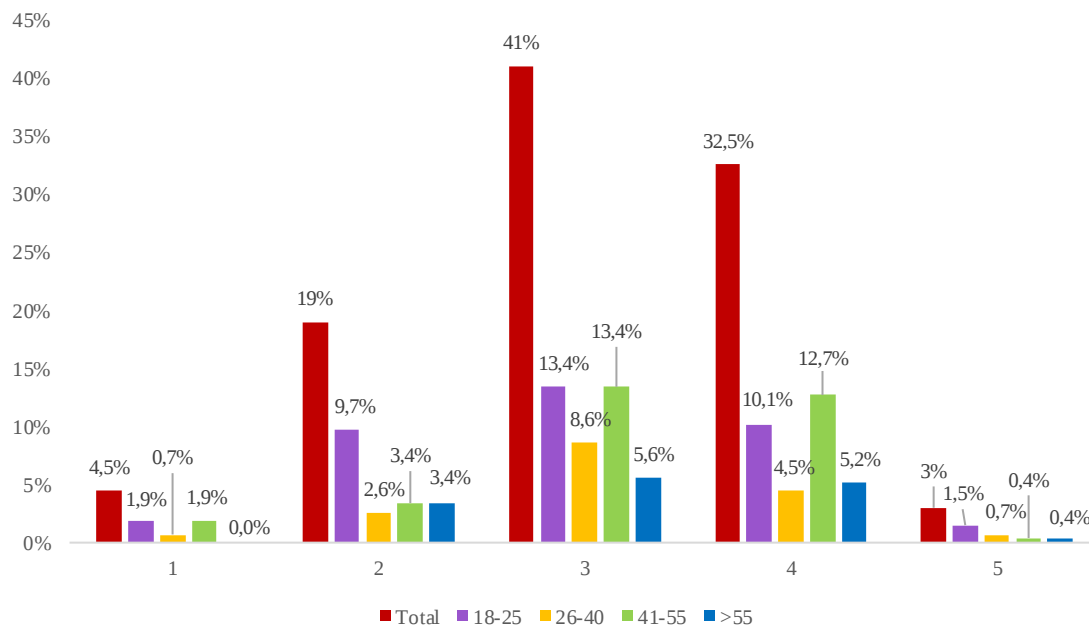


Graphic 5 - Individuals' Nationality

The previous graphic relates to the individual's nationality. This graphic shows that almost 93% of the sample is Portuguese, nearly 6% is Brazilian and the last 1% is either Spanish, Deutsche, British or Cape Verdean.

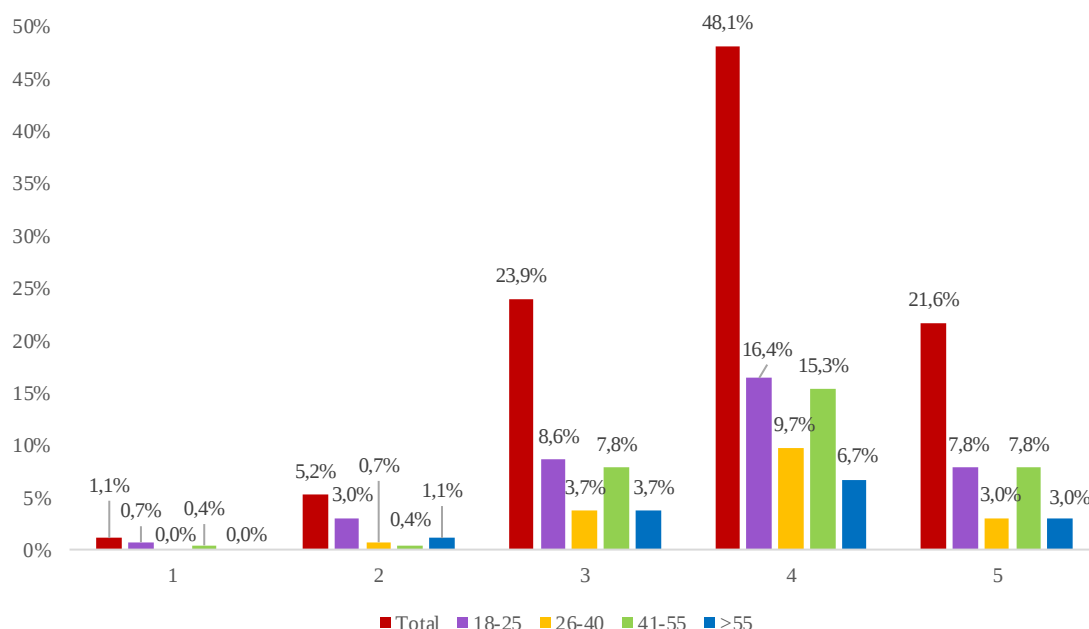
6.2.2) Characterization of the Relationship with Artificial Intelligence's Concept

The next group of questions relates to the characterization of the relationship with Artificial Intelligence's concept in general and inside the hospitality industry. The first question in this group aims to understand what is the level of familiarization that individuals have with the concept of Artificial Intelligence, and it was drawn up according to a 5- Level Likert scale. Category 1 represents a respondent who “knows nothing about AI” and 5 reveals a person who “knows a lot about AI”.



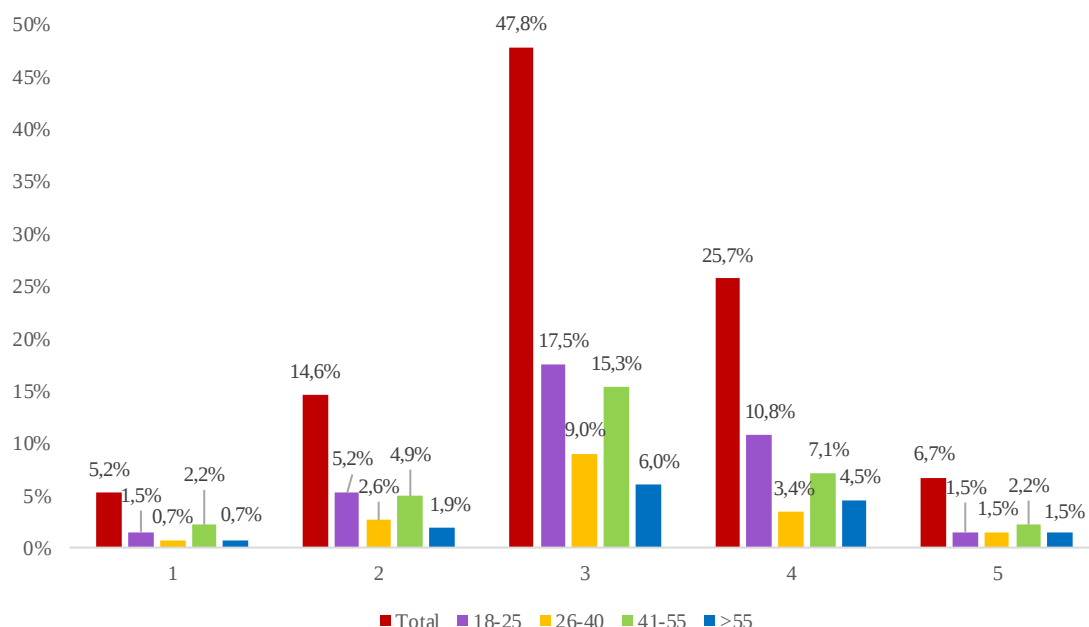
Graphic 6 - Level of familiarization with the concept of AI

According to the previous graphic, only 4.5% of the sample answered that they had no knowledge of AI (level 1) and in the extreme opposite (level 5), 3% enunciated having much knowledge of it. As the graphic shows, 1.5% of people who opted for the level 5 consist in individuals between 18-25, which means the younger people are more familiarized with this concept. Most answers are focused on the intermediate options. That is, about 93% of people opted for alternatives 2, 3 and 4. The highest number of responses relate to the level 3, represented by 41% of the sample, which can be considered as a medium level of knowledge. Following the highest number, 32.5% of people selected number 4, which means that there is a higher knowledge about the topic. Lastly, number 2 represents 19% of the sample, showing a lower understanding about the topic.



Graphic 7 - The impact of AI in society in 20 years

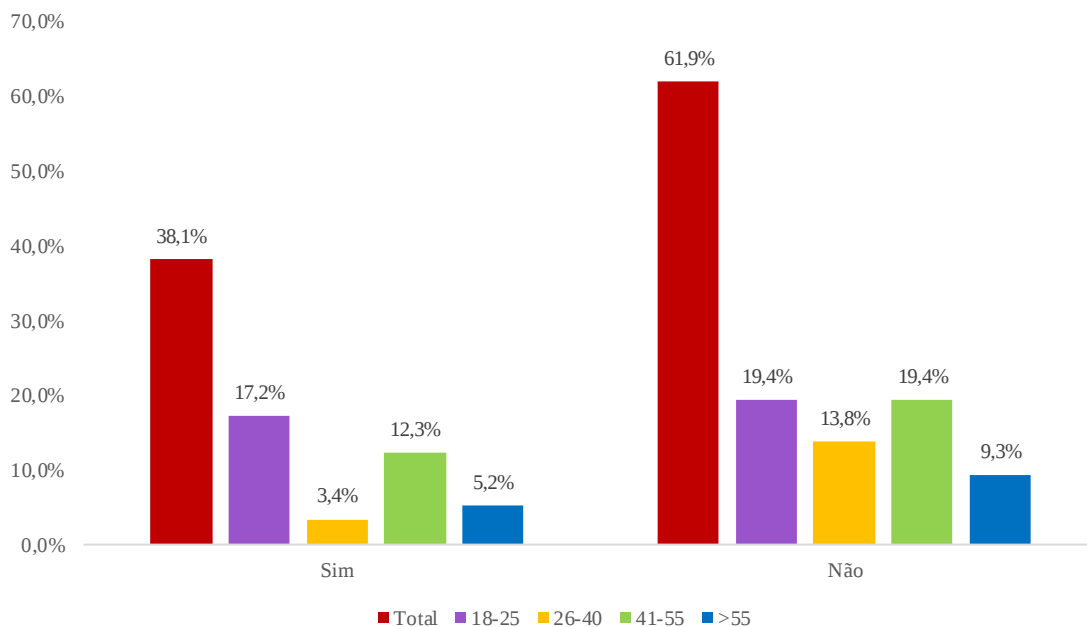
Question 2 aims to capture the individual's opinion regarding the impact of AI in the society in 20 years, considering their age gap. The previous graphic shows that the expectation is positive overall, given that only 6,3% of the sample has a "more negative" or only "negative" (levels 1 and 2) expectation regarding the impact of AI on society within the 20 years. However, this percentage consists mostly in younger people between 18 and 25 years old, representing 3,7% in levels 1 and 2. In addition, about 70% of the sample, has a "more positive" or simply "positive" opinion about this impact (levels 4 and 5). The rest of the percentage (about 24%) is situated in level 3, having no positive or negative expectations on this topic.



Graphic 8 - The perception of the state in which AI is present in the society

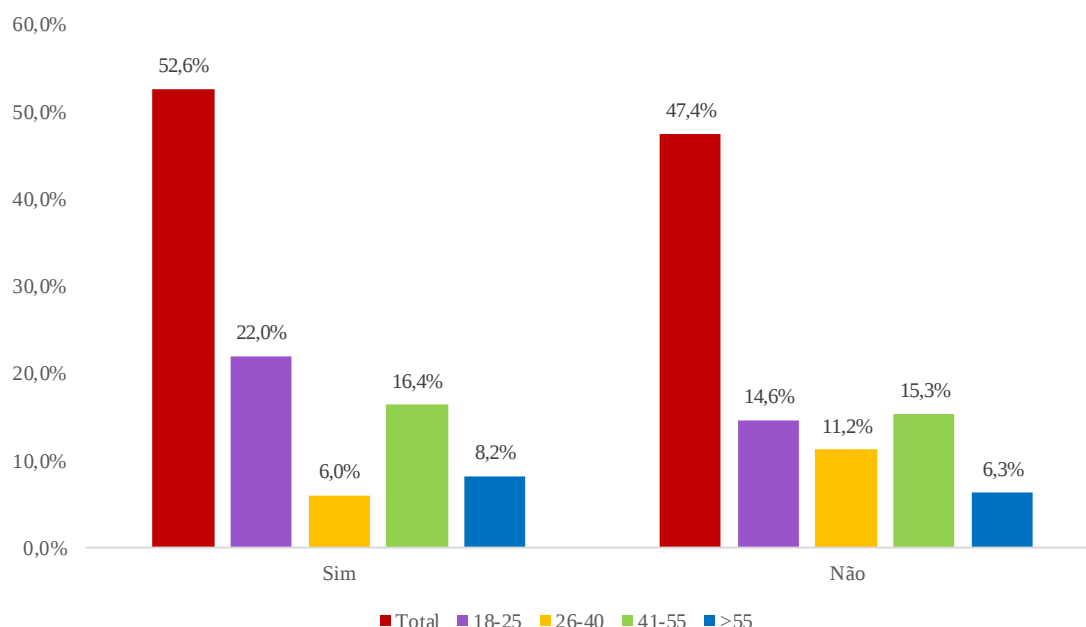
The third question addresses the perception of the state in which AI is present in the society. The first level on Likert Scale represents the appearance of AI in the society and in its extreme, level 5 corresponds to a more developed state of this technology in society.

Almost half of the sample (47,8%) believes AI is in a neutral/medium state. About 32% of the individuals believe that AI is either present in the society today or believe AI has arrived and left its mark on the society (levels 4 and 5). These two levels consist mostly in younger people between 18 to 25 years old, representing 12,3% of the 4th and 5th level. In addition, about 20% of the sample believes we are in the beginning of the influence of AI in our lives (levels 1 and 2 in Likert Scale).



Graphic 9 - The awareness of the use of AI in the hospitality industry

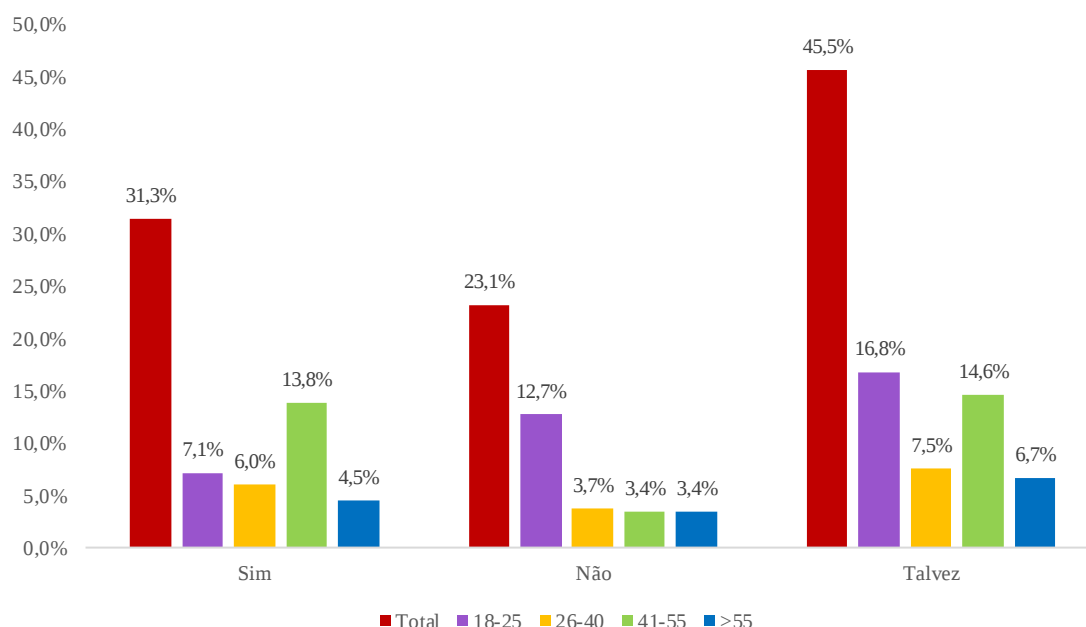
The fourth question aims to determine if the individuals are aware of the use of AI in the hospitality industry. As the previous graphic shows, more than half of the people (61,9%) stated that they are not aware of the use of AI in hospitality. This percentage consists mostly in adults between 18-25 years old and 41-55 years old, represented equally by 19,4%. However, 38,1% claimed to be aware of it, represented mostly by younger adults between 18 to 25 years old (17,2%). This data collection shows that people may not understand AI's use or its role inside the hospitality industry even if they are familiarized with the concept.



Graphic 10 - The awareness of hotels around the world which use AI tools

The next question refers to the awareness of hotels around the world which use Artificial Intelligence tools such as robots, chatbots, internet of things, etc.

As the previous graphic shows, a little more than half of the people (52,6%) claim to be aware of the existence of these hotels and it is mostly younger adults, between 18 to 25 years old, who fill this percentage (22%). On the other hand, 47,4% claimed not knowing about the existence of these type of hotels around the world. In addition, this percentage consists mostly in adults between 41 and 55 years old, which means younger people tend to have more knowledge about AI around the world than older ones.

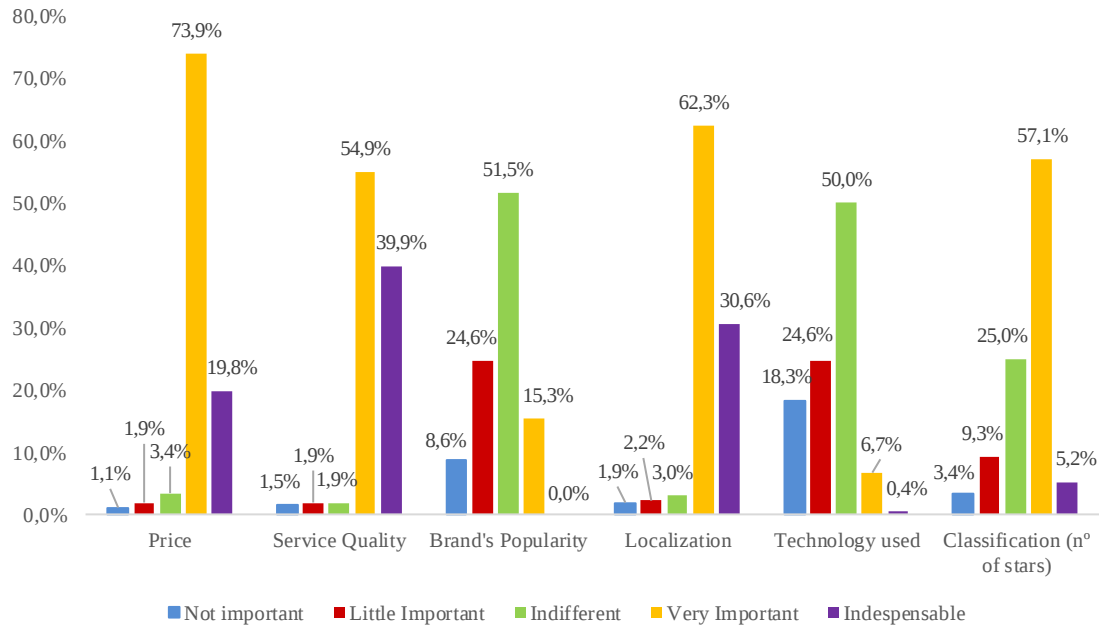


Graphic 11 - Would the Portuguese hospitality industry be able to adopt this type of AI?

In the following question, represented in the previous graphic, it is asked if the interviewees believe that the Portuguese hospitality industry would be able to adopt the type of Artificial Intelligence mentioned in the question above, in a near future. Most answers were “maybe”, representing 45,5% of the sample mostly by people between 18 and 25 years old. About 31% of the sample opted for the answer “yes”. Most individuals who have a positive expectation about AI in the Portuguese hospitality in a near future are adults between 41 to 55 years old (13,8%). On the other hand, the answer “no” was chosen by about 23% of the sample, consisting mostly in young adults between 18 and 25 years old (12,7%). These results show that younger people have a less positive expectation about AI in the Portuguese hospitality unlike older adults.

6.2.3) Competitive Advantage Factors for Decision-Making

The second group of questions relate to the competitive advantage factors for decision-making. In it, it is intended to discover the most important characteristics a hotel should have and the perspectives on the impact of AI in long-term. In this group it is also intended to evaluate the importance of the advantages and disadvantages described.

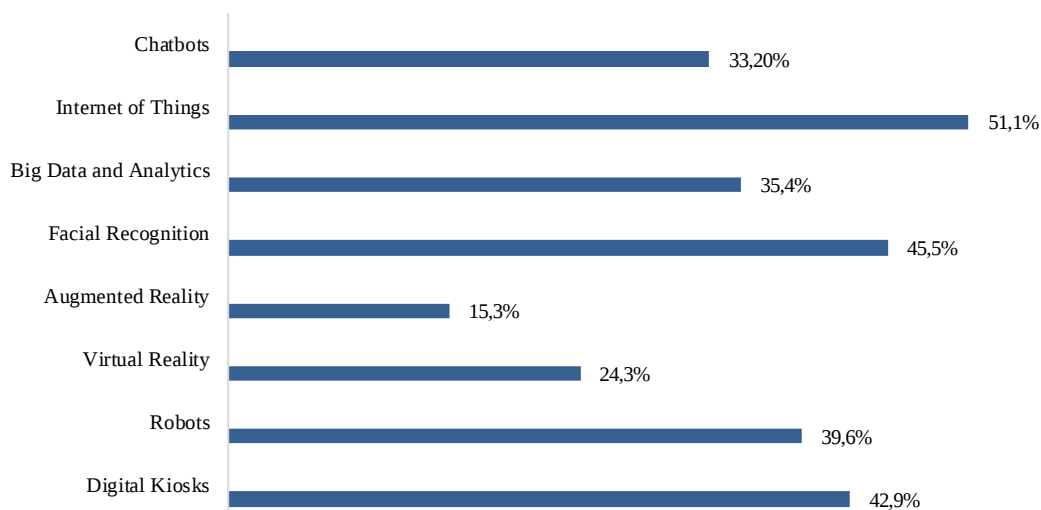


Graphic 12 – Evaluation of the most important features when choosing a hotel

In the first question of this group, it is intended to discover what are the most important features for the individuals, when choosing a hotel. This question was drawn up according to a 5- Level Likert scale which goes from “not important at all”, (representing level 1) to “indispensable” (representing level 5).

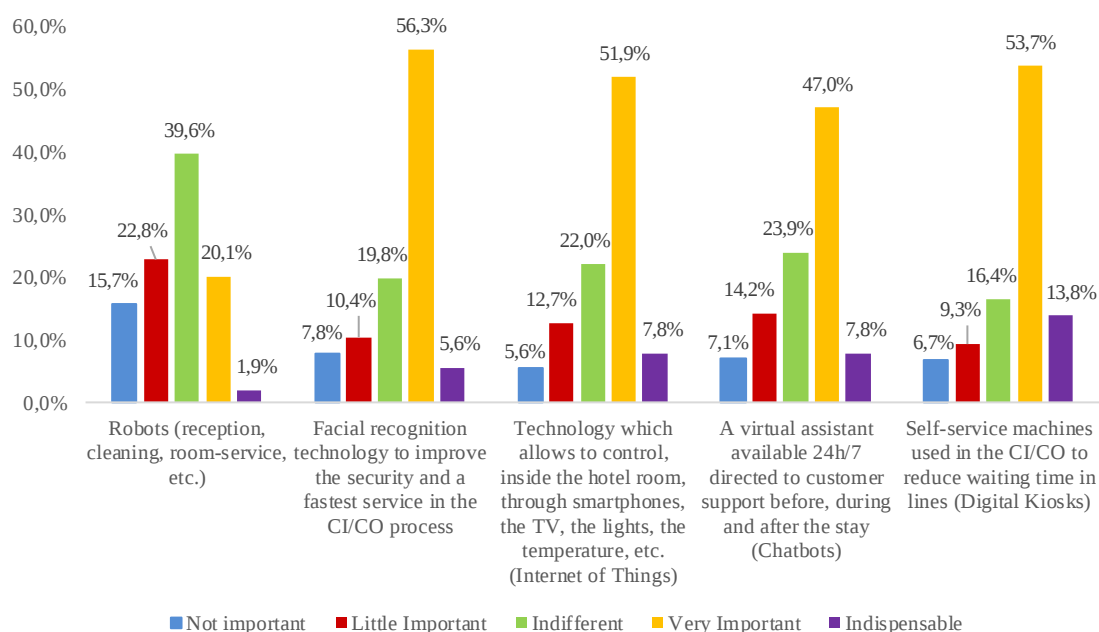
The previous graphic shows that in the first category (Price), most individuals choose the option “very important” (73,9%), being the category with the highest percentage. Regarding to the service quality offered in a hotel, 55,9% of the sample believes it is considered “very important” and almost 40% considers it “indispensable”. The brand popularity is considered “indifferent” by 51,5% of people and “not very important by almost 25%. Regarding the location of the hotel, 62,3% of the individuals choose the category “very important” and 30,6% “indispensable”. The technology used by the hotel/implementation of AI is considered “indifferent” by 50% of people and it was only considered “very important” or “indispensable by 6,7% and 0,4%, respectively. Lastly, the hotel’s category/ number of stars is considered “very important” by 57,1% of people.

This means that the price of the hotel and its location are considered the most important features when choosing a hotel, and the least important is the technology used/the implementation of AI. According to this result, it appears to be in agreement with the authors (Tsai et al, 2009; Botelho, 2010).



Graphic 13 - Hospitality AI Tools

The next question in this group intended to capture the individuals' knowledge regarding Artificial Intelligence tools they identified or claimed to know. By observing graphic 13, the most known tools are the internet of things, representing 51% of the sample and the facial recognition with 46%. The following most known trends are the digital kiosks, representing 43% of the sample, the robots with 40% and the big data and analytics with 35%. The least known tools the individuals seem to know are the chatbots only representing 32% of the sample and the augmented reality with 15,3%.



Graphic 14 - Evaluation of the most important implementation of the following AI trends in hospitality

The next question refers to the importance individuals give to the implementation of different AI trends in hospitality, such as: Robots, Facial Recognition, the Internet of Things, Chatbots and Digital Kiosks. This question was drawn up according to a 5- Level Likert scale which goes from “not important at all”, (representing level 1) to “indispensable” (representing level 5).

As the previous graphic shows, the most important AI trend to the individuals is the Facial Recognition technology with 56,3% in “very important” level. This means that individuals tend to prioritize the improvement of security and a fastest service in the CI/CO process by using this type of technology in their stay. Following the highest number, 53,7% of people considered Digital Kiosks as a “very important” trend, which means that people also prioritize the self-service option to improve the convenience and to reduce waiting times in the arrival and departure process. The Internet of Things is represented by 51,9% and this data collection shows that people are increasingly choosing self-service smart rooms composed by this technology which allows the guests to experience a comfortable and customized stay. Regarding the next percentage, the Chatbots represent 47% of the sample and it shows that this tool is having a big impact on the customer’s experience due to the importance of the customer support in the guests’ stay. Lastly, the Robots were considered “indifferent” by 39,6% of the individuals and “not important at all” by almost 16%. This means that people are not ready and do not consider this tool important in the hospitality world today.

The next question aims to discover to what extent the individuals agree with the statements presented below. This question was drawn up according to a 5- Level Likert scale which goes from “Totally disagree”, (representing level 1) to “Completely agree” (representing level 5).



Graphic 15 - Indicate to what extent you agree with the following statements

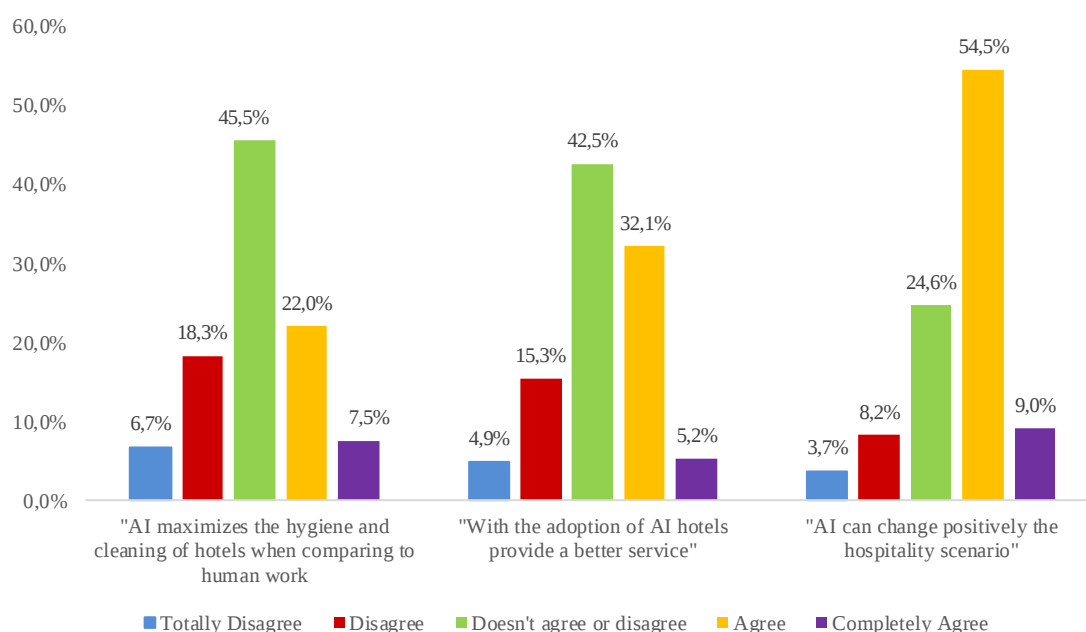
As the previous graphic shows, a big percentage of the total inquired (66,8%) agrees or completely agrees that the AI contributes to increased productivity in hotels. Only 4,5% of the individuals totally disagreed with the statement and 22% did not agree or disagree with it.

The second category on the graphic refers to a possible symbiosis between humans and machines in the future work context. The individuals are generally optimistic. About 76% of them agree or totally agree with the possibility of this harmony at work. Only 1,9% of the respondents totally disagree and 9% do not agree with the statement.

The third category shows that most people (about 62%) agree or totally agree with AI being a threat to the human employment. The graphic also shows that almost 20% of the individuals have no opinion or are indifferent regarding the statement presented. Only 4,5% of people are optimistic to the point of saying that they totally disagree with the statement and not feel threatened by the implementation of AI and the future of human

employment. In addition, 13,4% of the individuals choose the option “disagree”, meaning that they are positive and confident that AI is not a threat to the human employment.

About 81% of the sample agrees or totally agrees that AI helps decrease waiting time in services. Almost 12% of individuals have no opinion or do not agree or disagree with the statement and only about 7% choose to disagree or totally disagree with it.



Graphic 16 - Indicate to what extent you agree with the following statements II

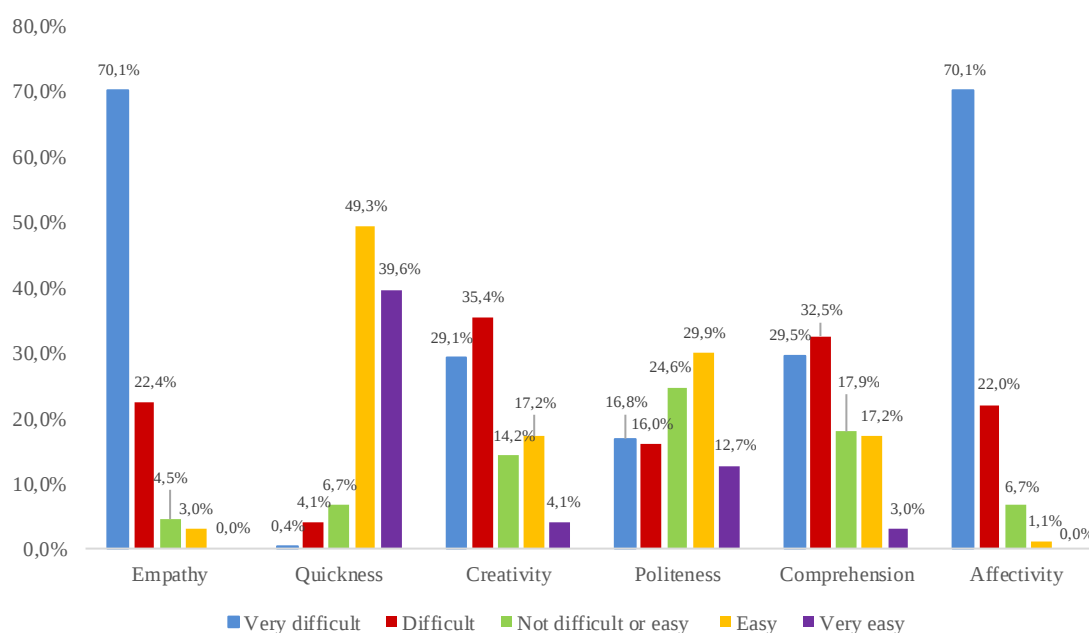
Regarding the fifth category, most people (45,5%) do not have an opinion or consider indifferent if the AI maximizes the hygiene and cleaning of hotels when comparing to the human work. On the other hand, almost 30% of people agree or totally agree with the statement and 25% of the sample disagrees or totally disagrees.

In the sixth category, most answers are also focused on level 3, representing almost 43%, which means that the individuals do not have an opinion or consider indifferent that with the adoption of AI the hotels offer a better service. About 37% of people totally agree or agree with the statement (levels 4 and 5) and about 20% totally disagrees or disagrees with it.

In the sixth category, it is possible to see that most people (about 55%) agree with the possibility of AI changing positively the hospitality industry scenario. Also, almost 25% of the individuals do not have an opinion or consider indifferent the statement and 12% disagreed or completely disagreed with it.

In conclusion, it is possible to see that most individuals recognize that AI contributes positively to work productivity, that AI helps decreasing waiting time in services and that AI can change positively the hospitality scenario. In addition, most people agreed that it is possible to exist a symbiosis between humans and machines in the future work context even though only some individuals agreed that AI is a threat to human employment.

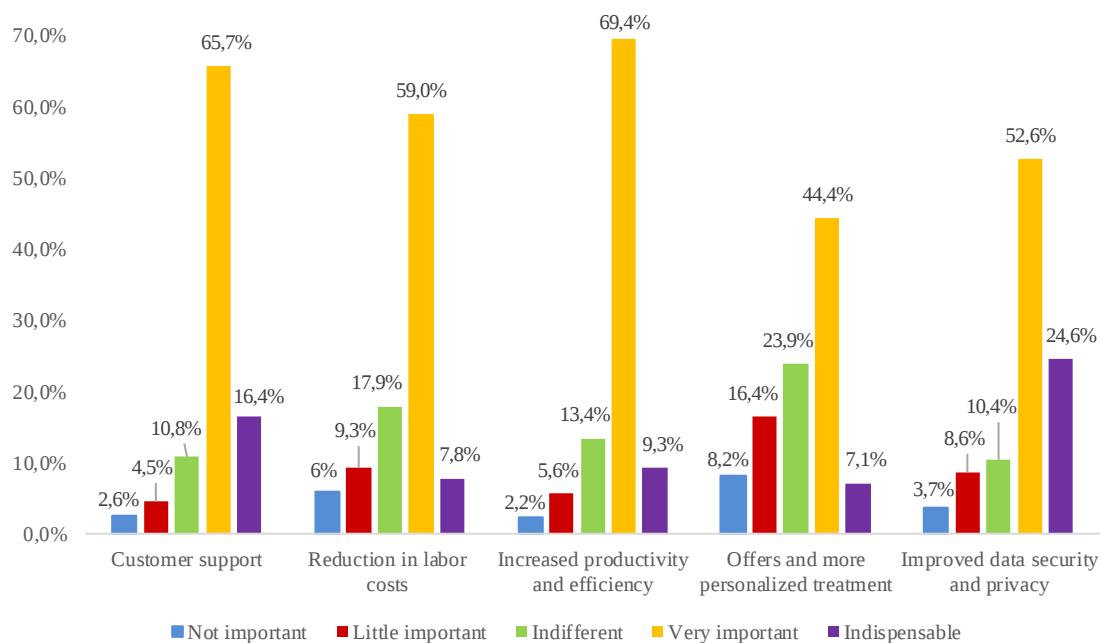
Question 11 relates to the difficulty level that individuals assign to different attributes when replicated on machines. This question was drawn up according to a 5- Level Likert scale which goes from “Very difficult”, (representing level 1) to “Very easy” (representing level 5).



Graphic 17 - Assessment of the difficulty level of attributes that are more difficult to replicate on machines

As the graphic 17 shows, the empathy and the affectivity are the most chosen attribute (70,1%) as “very difficult” to replicate in machines. About 46% and 33% of the sample considered creativity and comprehension as a “difficult” attribute to replicate in machines, respectively. On the other hand, the category “quickness” was considered “easy” to replicate by almost 50% of people and “very easy” by 40% of people. In addition, “politeness” was considered mostly as “easy” by 29,9% of the sample.

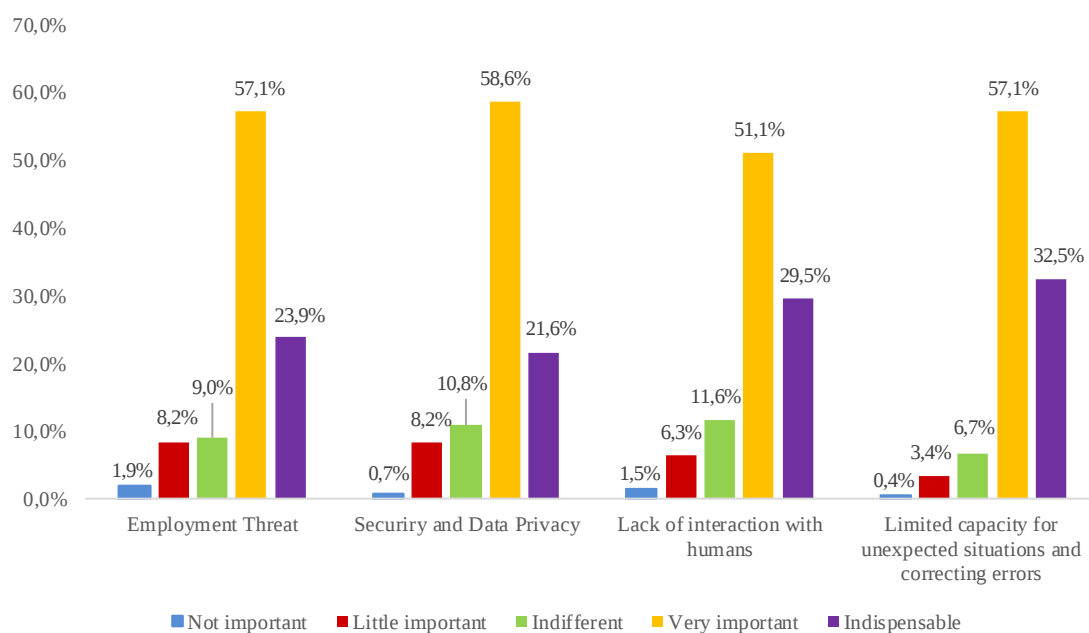
Question 12 relates to the importance of the advantages the individuals think may be associated with the adoption of AI by the hotels. This question was drawn up according to a 5- Level Likert scale which goes from “not important at all”, (representing level 1) to “indispensable” (representing level 5).



Graphic 18 - Indicate how important are the advantages that may be associated with the adoption of artificial intelligence by hotels

The previous graphic shows that the most important advantage, considered as “very important” is the increased productivity and efficiency (69,4%) followed by the 24/7 customer support (65,7%). In addition, the reduction in labor costs and the improved data security and privacy is also considered “very important” by 59% and 52,6% of the sample. Lastly, the less chosen option as “very important” was the offers and more personalized treatment representing 44,4% of the individuals. Also, the graphic shows that the improved security and data privacy has the highest percentage in “indispensable”, meaning that almost 25% of people consider that this is the most important advantage in the adoption of AI tools in hospitality.

The next question aims to discover the importance of the disadvantages the individuals think may be associated with the adoption of AI by the hotels. This question was drawn up according to a 5- Level Likert scale which goes from “not important at all”, (representing level 1) to “indispensable” (representing level 5).



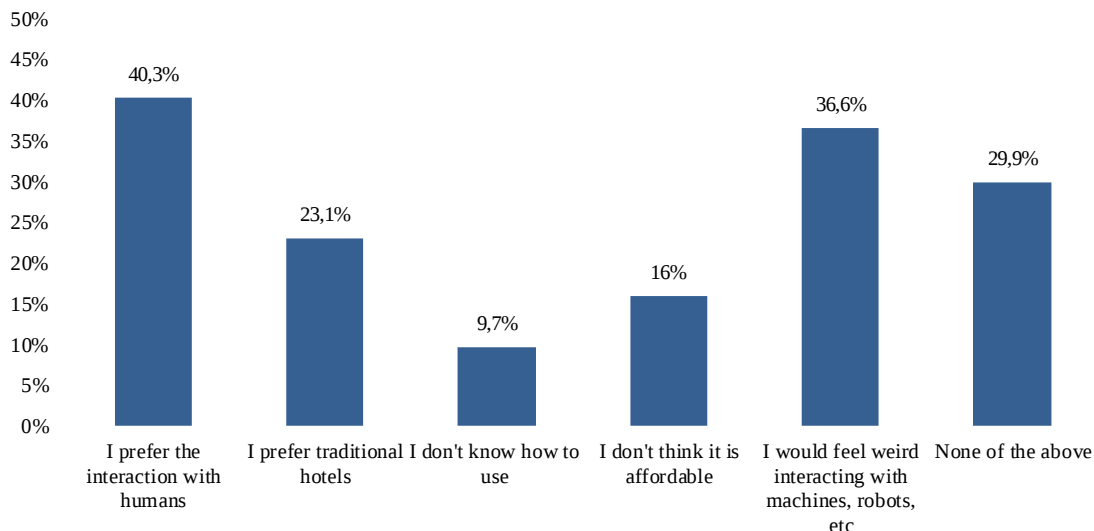
Graphic 19 - Indicate how important are the disadvantages that may be associated with the adoption of artificial intelligence by hotels

The previous graphic shows that the most voted categories of “very important” are the security and data privacy, threat to employability and the limited capacity for unexpected situations or correcting errors with 58, 6% and 57,1% of the sample in the last two. The last category relates to the lack of interaction with humans and although it has the lowest number representing “very important” still counts with about 51% of the individuals. This graphic shows that these disadvantages are much more voted for “indispensable” in all categories as the graphic presented before with the advantages. In the threat to employability, almost 24% of people voted for “indispensable”, in the security and data privacy, 21,6%, in the lack of interaction with humans, 29,5% and in the limited capacity for unexpected situations or correcting errors, almost 33%.

6.2.4) Artificial Intelligence as a Competitive Advantage Factor in Hospitality

The next group of questions relates to the Artificial Intelligence as a competitive advantage factor in hospitality and the first question in this group aims to find out the

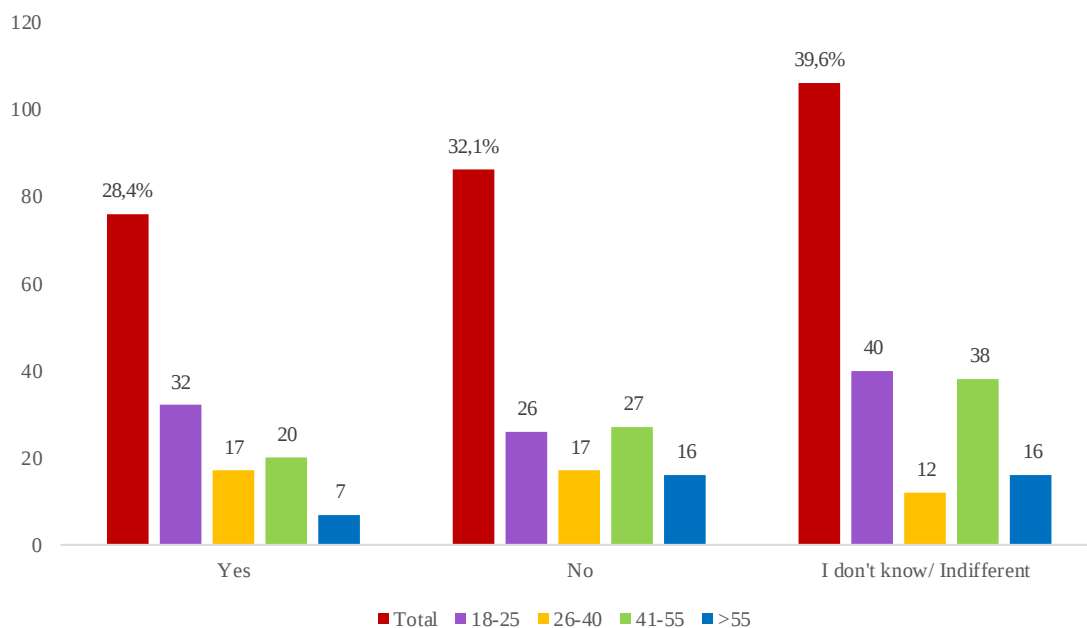
reason/reasons to not to stay in a hotel which uses Artificial Intelligence tools. It was described five different reasons plus the option “none of the above”, which means that the individual has another reason to not to stay in this type of hotels or does not have any.



Graphic 20 - Reasons to not stay in a hotel

The previous graphic shows that most people (about 40%) answered that they preferred the interaction with humans. Following the highest number, about 37% of people choose the option “I would feel weird interacting with machines, robots, etc.”, about 30% has different reason/reasons to not to stay in this type of hotels or does not have any. Lastly, the lowest percentages were in the answers “I prefer traditional hotels” representing about 23% of the sample, “I don’t think it is affordable” with 16% and “I don’t know how to use it” with only 10%.

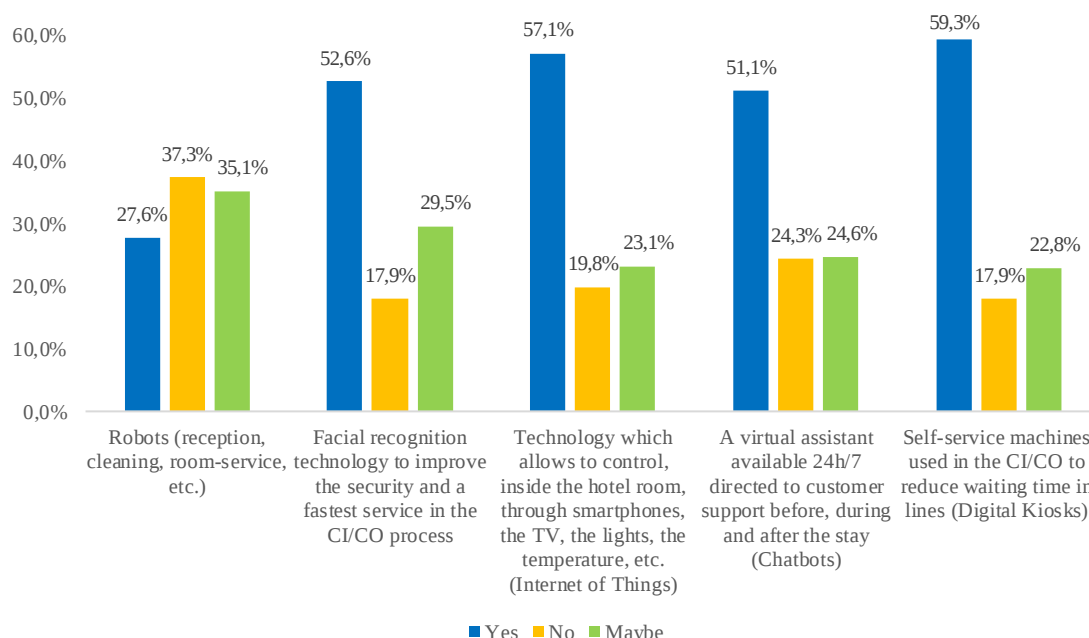
The next question in this group aims to find out if the COVID-19 Pandemic changed the individual's perspective positively, considering that AI reduces the interaction between humans.



Graphic 21 - The Pandemic and the AI perception

As the previous graphic shows, most people (almost 40%) answered that they did not know/indifferent. About 32% of individuals said that it did not change their perspective and about 28% answered that it changed their perspective.

Question 16 aims to find out if the individuals would choose a hotel which uses AI tools instead of one that only uses human resources. In it is asked to imagine the scenario of choosing the hotel unit where the guest will stay. All available options have the same price, the same location, are all part of the same brand of hotels and all provide excellent service.



Graphic 22 - Would you choose a hotel that uses any of these AI technologies, instead of one that only uses human resources?

The previous graphic shows that in the first category (Robots), most people (about 37%) said “no”, meaning they would not stay in a hotel if it had robots there. Also, 25,1% answered “maybe” and almost 28% said “yes”. Regarding the facial recognition technology, more than half of the sample (almost 53%) answered “yes”. In the next category (Internet of Things) about 57% of people answered “yes”, being the highest percentage on this graphic, which means that people would stay in a hotel which uses IOT. Regarding the chatbots, a little more than half of the sample (about 51%) answered “yes” and about 49% choose between “no” and “maybe”. Lastly, in the digital kiosks category, most people about 59% choose the answer “yes” which matches the opinion in the question about the importance of implementing different AI trends, where the highest percentage (about 13%) choose it as an “indispensable” implementation. According to this result, it appears to be in agreement with the authors (Erdem et al., 2009; Cobanoglu et al., 2011) and (Makarem, Mudambi & Podoshen, 2009; Ostrowski, 2010; Lui & Piccoli, 2010; Shaw, 2004).

CHAPTER VII: Conclusion

7.1) Main findings of the study

This chapter aims to present a synthesis of the work developed, bringing up the main research question, the general and specific objectives and mentioning the main findings of the investigation.

As mentioned throughout the dissertation, the main objective of this master's dissertation was to study the Artificial Intelligence as a competitive advantage factor in the hospitality industry. Regarding the first specific objective of the investigation, a literature review was conducted in order to summarize a large number of scientific document that would enable a broad knowledge on this topic. In it, it is possible to understand the concept of Artificial Intelligence, competitiveness and competitive advantage in the hospitality industry. Through this review, Artificial Intelligence is defined by McKinsey & Company as the ability of a machine to perform cognitive functions associated with human minds such as the perception, reasoning, learning and problems solving (Chui and Malhotra, 2018). However, after the analysis of the answers obtained from the surveys it can be concluded that most people are not very familiarized with this concept but have a positive expectation about its growth and impact in the society in 20 years.

When looking at the second specific objective, it corresponds to the third chapter of the investigation and relates to the study of the main AI trends and its adoption in hospitality by exposing its impact, advantages, disadvantages in the industry. Through the rest of the survey, it was also possible to deduce that most individuals recognize that the increase of productivity and efficiency, the customer service available 24/7 and the decrease of waiting time in services are considered advantages in the implementation of AI in hotels. In addition, and as for the possibility of replicating human attributes in machines, the participants agreed that empathy, creativity, comprehension and affectivity are the most complex to imitate. Furthermore, individuals believe that it is possible to exist a symbiosis between humans and machines in the future work context and that AI can positively change the hospitality industry scenario.

Regarding the final specific objective of this investigation, an interview to the Evolution hotel's general manager was conducted to study the impact of using AI. Through the results of the interview, it was possible to deduce that Artificial Intelligence is already implemented in the hotel unit with the goal to ease and improve the guest experience. The

hotel at the moment is already using some AI tools such as the facial recognition technology to a better control of the arriving and leaving time of the employees, the digital kiosks to fasten the check-in/out process, the internet of things to make the experience more comfortable and smarter, and the SANiA app which allows the guests to manage everything from their cellphone. Regarding the factors that AI tools bring to the hotel, in terms of the competitive advantage, it is possible to state that the Evolution can distinguish itself from others through the speed, autonomy, adapted language and ease that provides to the guest experience.

All things considered; the conditions are gathered to answer the research question: “Is the Artificial Intelligence a competitive advantage factor in hospitality?”. Through the surveys conducted it was possible to conclude that the most important features in the decision-making process in hospitality are the price, the location and the quality of the service offered. The implementation of AI is considered the least important feature in a hotel. In conclusion, nowadays Artificial Intelligence does not play a relevant role in influencing the customer’s purchase decision making in the hospitality industry, and therefore can’t be considered as a competitive advantage factor. However, and to a certain level, people are willing to experience some of the AI tools in the hospitality industry, such as Facial Recognition, Internet of Things, Chatbots and Digital Kiosks as long as there is always a symbiosis between humans and machines. AI in the hospitality industry should be used to replace tasks and not jobs because people are not ready yet to interact only with machines.

7.2) Limitations and future research

Throughout the research some limitations were found both in the literature review and in the surveys. Regarding the literature review, the main limitation relates to the lack of studies and scientific articles that relate Artificial Intelligence in the hospitality industry with competitive advantage. Most of the available literature about the theme is mainly related artificial intelligence in general and robots. Also, when studying the tourism prospects and trends, it was possible to realize that there is also few information in the literature review. Most articles or books focus on mostly on technologies advances and do not cover other themes besides that. The limitation found in the surveys relates to the lack of representativeness in the sample collected since most of the individuals who participated in the surveys are female elements with ages between 18 and 25 years old. This does not allow rigorous general statements to be made about the population.

The research on the application of AI in the hospitality industry is still limited which can provide opportunities for future research. Some topics for future research are:

- The attitude of different types of tourists such as business, holiday, family, health, cultural, religious, etc. towards the implementation of AI tools in hotels.
- The attitude of guests towards the implementation of AI in hotels with different categories such as luxury, economy, etc.
- The attitude of different generations such as baby boomer, generation X, millennials and generation Z towards the implementation of AI in hotels.
- The type of robots (housekeeping, concierge, reception, room-service) are more appropriate for different types of hotels and hotel operations.
- The need vs the attractiveness for implementation of AI tools
- The employment threat considering the implementation of AI in hospitality industry

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Appendices

Appendix 1- KAYAK Travel Awards 2020



Source: Evolution Lisboa Hotel website

Appendix 2 - KAYAK Travel Awards 2019



Source: Evolution Lisboa Hotel website

Appendix 3 - Certificate of Excellence by TripAdvisor 2018



Source: Facebook Evolution Lisboa Hotel

Appendix 4 - Xénios Awards 2018



Source: Ambitur – Tourism Information

Appendix 5 - Revelation of the Year by Boa Cama Boa Mesa 2016



Source: Evolution Lisboa Hotel website

Appendix 6 - Recommended Accommodation by Boa Cama Boa Mesa 2016



Source: Facebook Evolution Lisboa Hotel

Appendix 7 - Guest Review Award by Booking 2016



Source: Facebook Evolution Lisboa Hotel

Appendix 8 - AHRESP Award for Best Concept/Brand 2016



Source: Facebook Evolution Lisboa Hotel

Appendix 9 - SIL Awards for Best Real Estate Development in Tourism 2016



Source: Facebook Evolution Lisboa Hotel

Appendix 10- Interview's Script

Entrevista Evolution Lisboa Hotel

O meu nome é Rita Correia e esta entrevista insere-se no âmbito da dissertação final do Mestrado em Gestão Hoteleira da Escola Superior de Hotelaria e Turismo do Estoril sobre a temática da inteligência artificial em hotelaria. Esta investigação foca-se na contextualização do tema da Inteligência Artificial, na importância que esta tem para a indústria hoteleira e em como pode ser considerada um fator determinante da competitividade em hotelaria.

Desta forma, esta entrevista em formato digital tem como principal objetivo estudar a perceção do Evolution Lisboa Hotel sobre a adoção da inteligência artificial e as suas vantagens e desvantagens. Para além disso, pretende-se recolher informações acerca do hotel para uma melhor contextualização do tema da Inteligência Artificial em hotelaria.

Agradeço a sua atenção e colaboração.

1.

Nome do entrevistado *

A sua resposta

2.

Posição que ocupa no hotel *

A sua resposta

3.

Data de abertura do hotel *

Data

dd/mm/aaa:

4.

Número de quartos *

A sua resposta

5.

Tipo de serviços oferecidos (Spa, Restaurante, Lounge, Bar, Ginásio, Piscina, etc.) *

A sua resposta

6.

Missão do hotel *

A sua resposta

7.

Valores do hotel *

A sua resposta

8.

Visão do hotel *

A sua resposta

9.

Prémios ganhos pelo hotel e respetiva data *

A sua resposta

10.

Qual a sua percepção do uso da inteligência artificial (IA) por parte dos hotéis? *

A sua resposta

11.

Na sua opinião, quais os fatores que a inteligência artificial pode trazer em termos de vantagens competitivas na hotelaria? *

A sua resposta

12.

Das seguintes tendências de inteligência artificial em hotelaria, quais as que podem ser encontradas no Evolution? E em que departamentos? Chatbots, Internet das coisas, Big data and analytics, Reconhecimento facial, Realidade aumentada, Realidade virtual, Robots, Digital kiosks, Outras : Quais: *

A sua resposta

13.

Quando é foram implementadas estas ferramentas de IA no hotel? *

A sua resposta

14.

Com que objetivo foram implementadas as ferramentas de IA, no hotel? *

A sua resposta

15.

Pode referir algumas as vantagens e desvantagens associadas à implementação e uso de ferramentas de IA no hotel? *

A sua resposta

16.

Qual a principal motivação que leva os clientes a escolherem este hotel? *

A sua resposta

17.

Qual o grau de aceitação por parte dos hóspedes relativamente às tecnologias de IA implementadas. *

A sua resposta

18.

Na sua opinião, pensa que as tecnologias de IA, poderão ser uma das razões para determinados segmentos de clientes não escolherem este hotel? Se sim, como os identificaria? *

A sua resposta

19.

E por parte dos colaboradores? Pensa que este tipo de IA implementado tem influência na empregabilidade e/ou na produtividade? De que forma? *

A sua resposta

20.

Na sua opinião, a pandemia pode ter um impacto positivo no uso de inteligência artificial nos hotéis? *

A sua resposta

21.

Quais são as projeções futuras para a adoção de mais IA no hotel? Com que objetivo? *

A sua resposta

Appendix 12 - Survey's Script

A inteligência artificial é um fator de competitividade em hotelaria?

Este inquérito está inserido no âmbito da dissertação final do Mestrado em Gestão Hoteleira da Escola Superior de Hotelaria e Turismo do Estoril sobre a temática da inteligência artificial em hotelaria.

Esta investigação foca-se na contextualização do tema da inteligência artificial, na importância que esta tem para a indústria hoteleira e em como pode ser considerada um fator determinante da competitividade em hotelaria.

A Inteligência Artificial pode ser definida como a capacidade de uma máquina para reproduzir competências semelhantes às humanas como é o caso do raciocínio, a aprendizagem, o planeamento e a criatividade.

Com este inquérito pretende-se recolher informação sobre o nível de conhecimento e perceção da inteligência artificial e a opinião sobre a implementação desta tecnologia por parte dos hotéis.

Agradeço a sua participação nesta investigação. O preenchimento do questionário não demorará mais do que 10 minutos, sendo constituído por diversas secções.

O presente questionário respeita totalmente a liberdade de escolha de cada participante. Este é anónimo, não sendo recolhidos qualquer tipo de dados identificativos. É cumprido o estipulado no Regulamento Geral de Proteção de Dados (RGPD), estando assegurada a segurança, proteção, anonimato e confidencialidade de todos os dados facultados pelos participantes.

Caso tenha alguma dúvida, poderá entrar em contacto comigo através do email: 12018@eshte.pt

Agradeço a sua atenção e colaboração.

***Obrigatório**

1.

Indique o seu grau de familiarização com o conceito de inteligência artificial (IA).

*

	1	2	3	4	5	
Não sei nada sobre o tema	☐	☐	☐	☐	☐	Sei muito de IA

2.

Avalie a sua expectativa relativamente ao impacto da IA na sociedade, daqui a 20 anos. *

	1	2	3	4	5	
Expectativa muito negativa	☐	☐	☐	☐	☐	Expectativa muito positiva

3.

Na sua opinião, acha que a IA já está muito ou pouco presente na sociedade? *

	1	2	3	4	5	
Pouco presente	☐	☐	☐	☐	☐	Muito presente

4.

Está a par do uso da Inteligência Artificial no setor hoteleiro? *

- ☐ Sim
- ☐ Não

5.

Está ciente de que já existem hotéis no mundo que usam apenas inteligência artificial (robots, chatbots, internet das coisas, etc) ? *

- ☐ Sim
- ☐ Não

6. Acredita que a hotelaria em Portugal seria capaz de adotar todo este tipo de inteligência artificial num futuro próximo? *

- ☐ Sim
- ☐ Não
- ☐ Talvez

7. Avalie, de acordo com as suas preferências, as características mais importantes na escolha de um hotel. *

	Nada importante	Pouco importante	Indiferente	Muito importante	Imprescindível
Preço	☐	☐	☐	☐	☐
Qualidade do serviço oferecido	☐	☐	☐	☐	☐
Popularidade da marca	☐	☐	☐	☐	☐
Localização	☐	☐	☐	☐	☐
Tecnologia utilizada/ Implementação de Inteligência Artificial	☐	☐	☐	☐	☐
Classificação (número de estrelas)	☐	☐	☐	☐	☐

8. Indique quais as ferramentas de IA que conhece em hotelaria *

- ☐ Chatbots
- ☐ A internet das coisas
- ☒ Big Data and Analytics
- ☐ Reconhecimento Facial
- ☐ Realidade Aumentada
- ☐ Realidade Virtual
- ☐ Robots
- ☐ Digital Kiosks

9. Até que ponto consideraria importante a implementação das seguintes tendências de IA na hotelaria? *

	Nada importante	Pouco importante	Indiferente	Muito importante	Imprescindível
Robots (de receção, de limpeza, de room-service, etc.)	☐	☐	☐	☐	☐
Tecnologia de reconhecimento facial para melhoria da segurança e de forma a facilitar o processo de check-in	☐	☐	☐	☐	☐
Tecnologia que permite controlar dentro do quarto de hotel, através de smartphones, a televisão, as luzes, a temperatura, etc (Internet das coisas)?	☐	☐	☐	☐	☐

Um/uma assistente virtual disponível 24h por dia, direcionado/a para apoio ao cliente antes, durante e após a estadia (Chatbots)	☐	☐	☐	☐	☐
Máquinas de self-service para check-in/check-out, para reduzir o tempo em filas de espera	☐	☐	☐	☐	☐

10.

Indique em que medida concorda com as afirmações abaixo apresentadas. *

	Discordo totalmente	Discordo	Nem concordo nem discordo	Concordo	Concordo completamente
"O uso da IA contribui para o aumento a produtividade nos hotéis."	☐	☐	☐	☐	☐
"No contexto laboral futuro é possível haver uma simbiose entre os humanos e as máquinas."	☐	☐	☐	☐	☐
"A IA é uma ameaça à empregabilidade humana."	☐	☐	☐	☐	☐
"A IA ajuda a diminuir os tempos de espera nos serviços."	☐	☐	☐	☐	☐

"A IA maximiza a higiene e limpeza dos hotéis comparativamente com o trabalho humano."	☐	☐	☐	☐	☐
"Com a adoção da IA os hotéis prestam um melhor serviço."	☐	☐	☐	☐	☐
"A IA pode mudar o cenário da hotelaria positivamente."	☐	☐	☐	☐	☐

11.

Avalie o nível de dificuldade dos atributos que pensa serem mais difíceis de replicar nas máquinas *

	Muito difícil	Difícil	Nem difícil nem fácil	Fácil	Muito fácil
Empatia	☐	☐	☐	☐	☐
Rapidez	☐	☐	☐	☐	☐
Criatividade	☐	☐	☐	☐	☐
Educação	☐	☐	☐	☐	☐
Compreensão	☐	☐	☐	☐	☐
Afetividade	☐	☐	☐	☐	☐

12.

Qual o grau de importância das vantagens que possam estar associadas à adoção de inteligência artificial por parte dos hotéis? *

	Nada importante	Pouco importante	Indiferente	Muito importante	Imprescindível
Atendimento/apoio ao cliente 24h por dia	☐	☐	☐	☐	☐
Redução dos custos com mão-de-obra	☐	☐	☐	☐	☐
Aumento da produtividade e eficiência	☐	☐	☐	☐	☐
Ofertas e tratamento mais personalizado	☐	☐	☐	☐	☐
Melhoria da segurança e privacidade dos dados	☐	☐	☐	☐	☐

13.

Qual o grau de importância das desvantagens que possam estar associadas à adoção de inteligência artificial por parte dos hotéis? *

	Nada importante	Pouco importante	Indiferente	Muito importante	Imprescindível
Ameaça à empregabilidade	☐	☐	☐	☐	☐
Segurança e privacidade dos dados	☐	☐	☐	☐	☐
Falta de interação com humanos	☐	☐	☐	☐	☐
Capacidade limitada para situações inesperadas ou corrigir erros	☐	☐	☐	☐	☐

14.

Qual ou quais seriam as razões para não ficar num hotel que usa tecnologias de Inteligência Artificial? *

- ☐ Prefiro apenas a interação com humanos
- ☐ Prefiro os hotéis tradicionais
- ☐ Não sei como usar
- ☐ Não acho que seja acessível em termos de preço
- ☐ Sentir-me-ia estranho ao interagir com máquinas, robots, etc.
- ☐ Nenhuma das anteriores

15.

Tendo em conta que a IA reduz a interação entre humanos, a pandemia devido à COVID-19 mudou a sua perceção positivamente sobre a IA em hotelaria? *

- ☐ Sim
- ☐ Não
- ☐ Não sei/Indiferente

16.

Imagine o cenário de estar a escolher a unidade hoteleira onde vai ficar. Todas as opções disponíveis, têm o mesmo preço, a mesma localização, fazem todos parte da mesma marca de hotéis e prestam todos um excelente serviço. Escolheria um hotel que usa alguma destas tecnologias de IA, em vez de um que somente usa os recursos humanos? *

	Sim	Não	Talvez
Robots (de receção, de limpeza, de room-service, etc.)	☐	☐	☐
Tecnologia de reconhecimento facial para melhoria da segurança e de forma a facilitar o processo de check-in	☐	☐	☐

Tecnologia que permite controlar dentro do quarto de hotel, através de smartphones, a televisão, as luzes, a temperatura, etc (Internet das coisas)?	☐	☐	☐
Um/uma assistente virtual disponível 24h por dia, direcionado/a para apoio ao cliente antes, durante e após a estadia (Chatbots)	☐	☐	☐
Máquinas de self-service para check-in/check-out, para reduzir o tempo em filas de espera	☐	☐	☐

17.

Faixa Etária *

- ☐ < 18
- ☐ 18-25
- ☐ 26-40
- ☐ 41-55
- ☐ > 55

18.

Género *

- ☐ Feminino
- ☐ Masculino

19.

Habilitações académicas *

- ☐ Ensino Primário
- ☐ Ensino Secundário
- ☐ Licenciatura
- ☐ Pós-Graduação
- ☐ Mestrado
- ☐ Doutoramento
- ☐ Outra

20.

Ocupação *

- ☐ Negócios
- ☐ Serviços
- ☐ Estudante
- ☐ Reformado
- ☐ Desempregado

21.

Nacionalidade *

A sua resposta
