ISCTE ◯ Business School
Instituto Universitário de Lisboa

HOTEL 4.0: TECHNOLOGIES AND ITS RELATION WITH THE PORTUGUESE GUEST

Ana Rita Miranda Fernandes

Dissertation submitted as partial requirement for the conferral of

Master in International Management

Supervisor:

Prof. Doctor Álvaro Augusto da Rosa, Prof. Auxiliary, Associate Researcher, ISCTE Business School, Department of Marketing, Operation and Management

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Acknowledgments

First and foremost, I would like to take a moment to show my appreciation to those who stood beside me throughout this arduous task.

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To my oldest friend, who always challenges me to be my best self.

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I would not have done this without any of you.

Table of Contents

Abbreviations Index

4D – Four dimensions

ADB – Asian Development Bank

AI – Artificial Intelligence

APEC – Asian Pacific Economic Cooperation

API – Application Programming Interface

AR – Augmented Reality

CAGR – Compound Annual Growth Rate

GDP – Gross Domestic Product

GDRC – The Global Development Research Center

Generation Y – those born from mid-1980s to early 1990s

Generation Z – those born from mid-1990s to mid-2000s

GET – Guest Empowerment Technology

HT – Hospitality Technology

ICTs – Information and Communication Technology

ILO – International Labour Organization

INE – Instituto Nacional de Estatística

IT – Information Technology

PC – Personal computer

TV – Television

UNEP – United Nations Environment Program

UNWTO – United Nations World Tourism Organization

UX – User experience

VR – Virtual Reality

WEF – The World Economic Forum

WIFI – Wireless Fidelity

WTO – World Trade Organization

WTTC – World Travel & Tourism Council

Figures Index

Table Index

Sumário

Devido à evolução da tecnologia, esta dissertação visa explorar o impacto que esta tem no setor hoteleiro, principalmente, em Portugal.

Foram identificadas as tecnologias mais importantes para os portugueses assim como as últimas tecnologias na indústria. Adicionalmente, foi investigado se a tecnologia presente nos hotéis portugueses corresponde às necessidades dos portugueses.

Com o objetivo de entender a tarefa em questão, no capítulo 2 - revisão da literatura – estudos referentes à indústria hoteleira e tecnologia, e a relação da tecnologia com a satisfação do cliente foram analisados. Além disso, a indústria portuguesa e o perfil dos hóspedes também foram incluídos.

Um questionário distribuído pela população portuguesa, com o intuito de analisar as expetativas dos portugueses, foi integrado como parte do estudo.

A partir dos resultados obtidos, é possível afirmar que, embora satisfeitos com a tecnologia presente nos hotéis portugueses, os respondentes alterariam alguma tecnologia de modo a obter a melhor experiência. Um forte desejo de experimentar algo novo foi expressado. No entanto, havia serviços em que os métodos tradicionais eram os preferidos, mesmo sendo menos convenientes.

Os portugueses são, geralmente, resistentes à inovação. No entanto, as tecnologias, que eram antes inovadoras, tornam-se comuns ao longo do tempo devido à contante evolução da tecnologia e das expetativas. Assim, com esta dissertação, os hotéis poderão obter informação detalhada da tecnologia que os portugueses realmente desejam.

Palavras-chave: tecnologia, hotelaria, experiência de hóspede, hotéis portugueses, hóspedes portugueses, satisfação.

Classificações JEL:
L8: Estudos da Indústria: Serviços
O3: Inovação • Investigação e Desenvolvimento • Mudança Tecnológica

Summary

Due to the development of technology, this dissertation aims to explore its impact in the hospitality industry, mainly, in Portugal.

The most important technologies for the Portuguese were identified as well as how the latest technologies. It was also investigated if the technology implemented in the Portuguese hotels correspond to the Portuguese needs.

For the sake of understanding the task at hand, on chapter 2 – literature review – studies about the industry and technology as well as its relation with customer satisfaction were analyzed. Furthermore, the Portuguese industry and the guests' profile were also unveiled.

A questionnaire distributed among the Portuguese population was integrated as part of the study in order to analyze the underlying Portuguese expectations and needs.

The results indicated that, although the respondents are pleased with technology present in the Portuguese hotels, they would change some technology to obtain the best guest experience. The respondents expressed a strong desire to experience something new. However, there were services where the traditional methods were preferred, even though they were less convenient.

The Portuguese is, usually, resistant to innovation. However, the constant innovation together with the changing expectations, technologies that were once innovative become common over time. Therefore, with this dissertation, hotels may obtain updated information regarding the technology the Portuguese really wants.

Sumário Executivo

A indústria do turismo, que engloba diversos serviços (alojamento, restauração, recreação e entretenimento, transportes e serviços de viagem), é um dos setores com maior e mais rápido crescimento do mercado (Westcott, 2012) (UNWTO, 2017a). Tal como outras indústrias, passou por uma transformação devido ao desenvolvimento tecnológico. A tecnologia tem vindo a desempenhar um papel crucial não só na transformação da indústria, mas também na difusão do fenómeno do Turismo permitindo que esteja, hoje em dia, presente em todas as partes do mundo (Buhalis et al, 2013).

De acordo com vários estudos, a satisfação do hóspede já não está só relacionada com os serviços oferecidos pelo hotel, pela limpeza e preço, mas também pela tecnologia presente no hotel. Dito isto, se um hotel apresentar o tipo de tecnologias que garantam a satisfação dos hóspedes, logo será, provavelmente, selecionado por novos hóspedes ou repetentes numa futura estadia (Cobanoglu et al, 2011).

A indústria tem-se apercebido do impacto que a tecnologia tem na satisfação do hóspede e, tendo isso em conta, tem centralizado investimento nesse sentido. Serviços como: aplicações para smartphones, informação em tempo real e personalização através de sistemas de IA, realidade aumentada, realidade virtual e robots, já podem ser encontrados em hotéis em várias partes do mundo.

O mesmo acontece no mercado português. Hotéis e restaurantes têm vindo a recorrer à tecnologia para fornecer, aos seus clientes, um serviço eficaz e eficiente. No entanto, várias questões surgem:

- Quais são as tecnologias que podem ter um impacto positivo na experiência de um hóspede português ou, potencialmente, melhorá-la?
- Será que os Hotéis portugueses estão a oferecer a tecnologia adequada para as expectativas e necessidades do hóspede português?

De acordo com o mencionado em cima, esta dissertação visa explorar o impacto da tecnologia no setor hoteleiro, principalmente, em Portugal. Assim como, identificar quais as tecnologias mais importantes para os portugueses e como estes abordam as mais recentes tecnologias presentes na indústria. Adicionalmente, pretende-se averiguar se a tecnologia encontrada nos hotéis portugueses corresponde às necessidades dos portugueses.

O sector tecnológico passa por uma transformação a cada, aproximadamente, 2 anos[1]. Assim, esta dissertação tem uma nova abordagem deste tema, em comparação com estudos realizados ao longo dos anos. No capítulo 2 - revisão da literatura, vários estudos sobre a indústria hoteleira e a sua relação com a tecnologia foram analisados e mencionados. Assim como, a indústria portuguesa e o perfil do hóspede português.

De modo a completar a tarefa em mãos, um questionário foi distribuído pela a população portuguesa, com o intuito de analisar as suas expetativas em relação ao sector hoteleiro em Portugal. A partir dos resultados obtidos, é possível afirmar que, embora satisfeitos com a tecnologia presente nos hotéis portugueses, os respondentes adicionariam ou trocariam alguma tecnologia de modo a obter a melhor experiência. Um forte desejo de experimentar algo novo foi expressado, no entanto, havia serviços em que os métodos tradicionais eram os preferidos mesmo sendo menos convenientes.

Os portugueses são, geralmente, resistentes à inovação, no entanto, isso pode deixar de ser verdade. Uma vez que, as tecnologias, que eram antes diferenciadoras, tornam-se comuns ao longo do tempo devido à contante inovação juntamente com as expectativas dos hóspedes.

A indústria hoteleira portuguesa poderá utilizar os resultados obtidos nesta dissertação para atualizar os seus serviços, nomeadamente, a tecnologia. De tal forma, que a melhor experiência de hóspede seja alcançada, ao fornecer aos portugueses a tecnologia que eles realmente desejam.

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[1] Lei de Moore diz que o número de transistores de chips duplica a cada 18 meses permitindo que haja uma evolução no sector tecnológico

1. Introduction

For the past decades, technology has, rapidly, shaken the world. It has revolutionized industries and changed behaviors to the point where it is no longer feasible to live without it, nowadays. Technology has disrupted old business models and, ultimately, reshaped markets – and the hospitality sector is no different.

The new consumers have different demands and emerging needs. Today's guests are highly educated, users of different platforms/channels, fluent in universal and specific languages, and demand a high level of customization. They wish to take control over their tourist experiences according to their personal preferences. Overall, they have increased value for money and are searching for life experiences.

The industry has been able to grow continuously by recognizing and adapt immediately to these emerging trends. From social and digital media, mobile devices, digital infrastructure, and data integration – these tools have become increasingly crucial to the hospitality industry. Moreover, the development of technology has enabled the incorporation of virtual reality, augmented reality and robots into the sector in order to enhance the guest experience.

As a consequence, hotel guests are demanding the latest technology to be available during their stay. The guest satisfaction, according to several studies, no longer relies solely on the hotel's service, cleanliness, and price, but on its technology as well (Cobanoglu et al, 2011).

The same holds true in the Portuguese market. Hotels and restaurants are using technology to provide an effective and efficient service. However, several questions arise:

- What are the technologies that could impact the traveling experience positively, and, possibly, enhance it?
- Are the Portuguese Hotels providing the adequate technology for the Portuguese expectations and needs?

Scientific studies concerning the use of technology in the hospitality industry, and its correlation with the guest experience, already exist. In spite, it is essential to make an updated analysis of this issue due to the significant changes that occur, especially, in technology which becomes better and less expensive over time[2].

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[2] Moore's Law states that the number of transistors doubles every 18 months allowing for the technological sector to suffer a transformation

On chapter 2, literature review, studies which have explored tourism, travel and hospitality industry, the relation between the industry and technology, customer satisfaction, the profile of tomorrow's guest, and the technological trends of the industry are mentioned and analyzed. Furthermore, a scrutinized scan of the hospitality industry in Portugal and the Portuguese consumer is also included.

Although the topic addressed in this dissertation is not new, since there have been scientific studies approaching this issue over the years, the author considers vital to do an updated analysis.

Thus, this study focuses on 1) identifying what are the most important technologies for the Portuguese to have during their stay; 2) study how the Portuguese address the latest technologies in the hospitality industry; and, finally, 3) if the technology implemented in the Portuguese hotels correspond to the Portuguese expectations and needs.

To find and analyze the data mentioned above, a questionnaire distributed among the Portuguese population will be integrated as part of the study. The quantitative research will, therefore, allow the analysis of the underlying respondents' expectations and needs. Hoteliers can use such information to upgrade their technology in such a way where the guest experience enhancement is possible by providing the consumers with technology that they indeed want.

2. Literature Review

2.1 The Current Tourism, Travel and Hospitality Industry

Recreational and educational travel exists since the beginning of the classical world. There is evidence of journeys taking place, over the years, for the search of amusement, experience and relaxation. In the meantime, Tourism has transformed the global economy and has become the core business and development of specific regions (Gyr, 2010).

"*Tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes*" (UNWTO, 2008).

Tourism industry entails a vast variety of services that interconnect, such as Accommodation, Food and Beverages, Recreation and Entertainment, Transportation, and Travel Services (Westcott, 2012).

For this dissertation, the focus shall be the hospitality industry, which "*is the business of helping people to feel welcome and relaxed and to enjoy themselves*" (Discover Hospitality, 2015). Hospitality is the most significant segment since it offers most of the services available in the industry (Westcott, 2012).

The development that the industry has gone through such development enabled it to be one of the biggest and fastest-growing sectors. In 2016, the number of international tourist arrivals reached a total of 1,235 million worldwide, achieving an increase of 46 million over the previous year. (UNWTO, 2017b). While the hospitality industry, specifically, has generated approximately between 400 and 500 billion U.S. dollars in revenue each year (BLS, s.d.).

Tourism is well-known for driving the economy and creating jobs around the world. Its growth is so significant that it has been faster than the global economy for six consecutive years. In 2016, the sector alone directly contributed 3.1% of the world's GDP and 109 million jobs worldwide. However, tourism has a multiplier effect on other industries, which lead to a contribution, in 2016, of 10.2% of the world's GDP and the creation of 292 million jobs, globally. This is equivalent to 1 in 10 of all jobs. (WTTC, 2017a)

On the other hand, domestic travel generated 72% of the sector's contribution to GDP, thus making a significantly larger contribution than international travel, with foreign visitor spending at 28% (WTTC, 2017a).

Europe, due to its cultural richness, excellent infrastructures, international openness as well as its perceived safety, is the region with the strongest Tourism competitiveness performance. Despite the declining security perceptions resulting from the recent terrorist attacks, the impact on international arrivals was only short-term (WEF, 2017).

France, the United States, Spain and China were the top for international arrivals in 2016. However, over the years, the fastest growing destinations are expected to be China, India, Thailand, and Indonesia. By 2027, China is expected to have overtaken the USA in terms of total Tourism GDP, domestic Tourism spending and investment (WTTC, 2017a).

Tourism is among the most prominent job-creating sectors through the creation of enterprises. It also has a labor-intensive nature and a significant multiplier effect on employment in other sectors. Yet, the industry is characterized by its reputation for poor working conditions due to low wages and low levels of skill requirements, shifts, work intensity, and seasonality (ILO, s.d.). It is quite easy for youth, women and migrant workers to enter the industry's workforce (ILO, 2010). However, the industry has difficulties in attracting talent, mainly, due to the lack of career attractiveness and prospective (WEF, 2017).

Some of the fastest growing Tourism destinations have a sustainability issue. Tourism has opened a path to large numbers of international visitors which may put a destination's sustainability at risk. Pollution (air and noise, solid waste and littering, sewage and aesthetic pollution), depletion of natural resources (water, land and local resources) and physical impacts (alteration of ecosystems, constructions and deforestation) are just a few of the environmental consequences that the Tourism growth has caused (GDRC, s.d.).

Tourism is the fifth largest polluting industry. It generates 5% of global CO_2 emissions, with aviation contributing 40%, cars 32% and accommodation 21% (UNEP & UNWTO, 2007). However, tourism also impacts the environment positively by preserving animal species, establishing protected areas, rehabilitating sites and infrastructures, creation of cleaning programs to guarantee attractiveness, improving sources of resources supply and modernization of environment (Mason, 2003).

2.2 The Future of Tourism, Travel and Hotel Industry

The sector is expected to continue to outperform the global economy and increase its share of global economic activity regarding the total GDP, employment, exports, and investment over the next decade (WTTC, 2017a). According to UNWTO's report, International tourist arrivals worldwide are expected to increase by 3.3% a year reaching 1.8 billion by 2030. Its direct

contribution to GDP is expected to grow at an average of 3.9% over the next ten years. By 2027, Tourism is expected to support more than 380 million jobs globally, which equates to 1 in 9 of all jobs in the world (UNWTO, 2017a).

Emerging and developing regions have begun to explore their potential to attract visitors. These countries will soon have more international arrivals than developed markets (North America, Western Europe, developed areas of Asia and the Pacific) (Horwath HTL, 2015). As new destinations emerge, the exposure to complex geopolitical context is greater (WEF, 2017). Ethnic, cultural and religious differences together with different political agendas across the globe can cause various tensions which can pose a threat to Tourism's growth (Horwath HTL, 2015). Furthermore, travel barriers exist and are hindering growth, job creation, and tolerance between cultures. Though, agreements have been implemented to enable global mobility such as Schengen agreement, US Global Access Program and APEC Business Travel Card, a more flexible model for traveling is needed (WEF, 2017).

As mentioned before, Tourism due to its large scale has a massive impact on a region or destination. Tourists' awareness and, therefore, expectations have increased where the sustainability concerns. To mitigate the Tourism's impact, and to guarantee its long-term sustainability factors, such as sustainable design, environmental protection, waste management, sustainable procurement, "Green programs" and renewable energy sources, have to be conceptualized and implemented (Horwath HTL, 2015). The areas which are a matter of concern and need to be addressed are the water usage, waste generation, energy consumption and the deterioration of natural and cultural world heritage sites (WEF, 2017).

Besides the impact that Tourism has on the surrounding environment, tourists are also concerned with the impact that Tourism may have on themselves. Concern about personal health has increased. In the first half of 2014, the download of mobile health apps increased 62%. Consequently, the collaboration between the health and Tourism sector will open up new possibilities in Tourism. Destination SPAS, traditional sports, recreation, all-encompassing life coaching, adjustments according to individual biorhythm, fresh and organic produce are a few of the products that will impact Tourism (Horwath HTL, 2015).

2.2.1 The new consumer

The industry has been able to grow continuously by recognizing and adapt immediately to the emerging trends which transform Tourism in the short, medium or long term. Traveling will

become more common, over the next decades, due to three trends: an expanding global middle class, an aging global population, and improved technology and infrastructure (WEF, 2017).

While traveling has been a luxury for several years, the same cannot be said anymore. With global airline fares decreasing in price, traveling has become more affordable (Wall & Cameron, 2016). Furthermore, the increase in average income has resulted in the growth of middle-class population. The middle class is expected to rise from 1.8 billion in 2009 to 3.2 billion by 2020 and 4.9 billion by 2030. They are using part of their income for education and for learning other languages besides their native one. Their traveling choices are more thoroughly planned with the use of the Internet. All in all, the profile of the middle-class population is characterized by the value for money due to their thorough search for the best bargains and discounts for their travel experiences (Horwath HTL, 2015).

In every region, the global population is aging, and as a result, a significant tourist segment has emerged - *Silver hair tourists* (Horwath HTL, 2015). By 2025, seniors will account for 11% of the world's population (WEF, 2017). Other than the availability of funds, time and health for travel, the older population has a great desire to travel which has resulted from the information available on different media and social media channels. Silver-hair tourists do not seek material goods, but rather life experiences prioritizing tailor-made services and face-to-face interaction (Horwath HTL, 2015).Yet, the generation that has been recognized as the key players in the tourism industry is generation Y (Horwath HTL, 2015).

The Generation Y, better known as Millennials, is expected to represent 50% of all travelers by 2025 becoming the industry's core customer in the next five to ten years (WEF, 2017). On the other hand, Generation Z is believed to be different from generation Y. As a younger generation, they already have higher access to information, a more dynamic lifestyle, and a higher level of education, faster change adopters and spending. In sum, both generations are characterized by the demand of real-time information, being users of different platforms/channels, being users of specific language to connect and demand a high level of personalization (Horwath HTL, 2015).

2.3 The Industry and Technology

Tourism has been going through shifts in customer expectations and new industry trends. The industry has been undergoing a process of diversification to cater to the new and emerging needs of consumers. This diversification has gone hand in hand with the technological advancement.

The way consumers experience, consume and share information has changed drastically. New technologies such as social and digital media, mobile tools and digital infrastructure have increasingly become central to Tourism (WEF, 2017). Technology has been playing a critical role not only by influencing the industry and the tourist experiences as well as by enabling the diffusion of the Tourism phenomenon to every part of the world (Buhalis et al, 2013).

Ultimately, technology has disrupted the old business models and reshaped market, enabling new forms of consumerism and new players into the market. Platforms, such as Airbnb, have become significant players over the past years. In fact, according to Expanded Ramblings website, the projected number of Airbnb users in 2020 is 24 million. The major factors resulting in such a number are the cultural experiences and location. Airbnb guests feel more in touch with the local culture during their stay than in traditional hotels (Glusac, 2016).

Despite concerns about the value of technology and its possible consequences on guest satisfaction, technology, when used adequately, proves to be provider of the necessary tools for better information, improved processed and more effective communication (Buhalis et al, 2013) (Law et al, 2009).

2.3.1 Technology and the experience hierarchy

The development of technology has transformed the conventional experiences into new and emerging types of tourism experiences (Buhalis et al, 2013). In this so-called new tourism experiences, technology may act as a mediator or as the experience itself (McCarth & Wright, 2004). These new experiences, when technologically influenced, are projected to be richer (Gretzel & Tazim, 2009).

Figure 1 - Experience Hierarchy
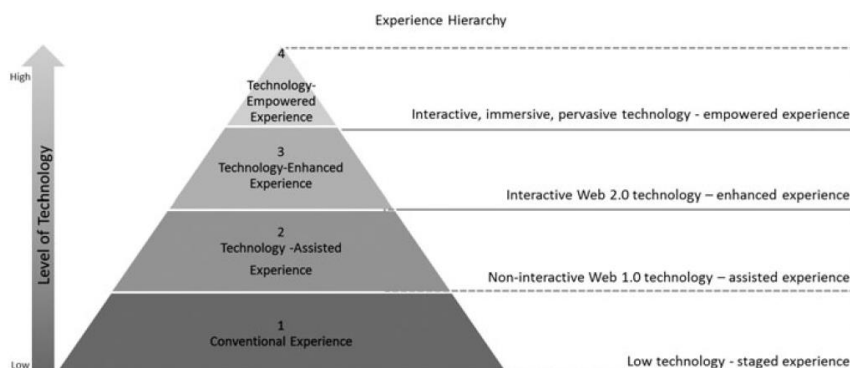
Source: Buhalis et al. 2013. "A Typology of Technological-Enhanced Tourism Experiences".

As it is possible to observe on figure 1, when the adoption of technology is restricted, the guests' involvement in their tourist experience is low. In other words, experiences lacking technology

provide tourists with the most basic value proposition. The first level, observable on figure 1, represents one of the most common types of tourism experiences in today's industry. However, as the level of technology associated with the experience increases, the guests' involvement in the experience is higher. Thus, by making use of all the available different ICTs available, technology becomes crucial in enabling the highest level of value for the consumer (Buhalis et al, 2013).

2.3.1.1 Co-creation and customization

The level of involvement of the consumer is higher than before. The development of ICTs allowed for active participation enabling a dynamic process between the company, the tourist, and other consumers (Prahalad & Ramaswamy, 2004). Technology has become crucial in today's tourist experience allowing for co-creation to take place (Buhalis et al, 2013). Guests have, now, the tools to find, and design the perfect trip according to their preferences (Ráthonyi & Várallyai, 2011). In short, they may "co-create" their trip.

The evolution of the Internet has led to new forms of communication – social media – which allow for the creation and exchange of user-created content (videos and photos) (Kaplan & Haelein, 2010). Consumers use social media to interact with organizations and share their experiences (Tussyadiah & Fesenmaier, 2009).

Consumers can influence the online reputation of global organizations (Inversini et al, 2010). As the process before a stay becomes entirely digital, thorough research for a hotel that best fits the guest's needs is easier than ever. Potential guests, while online, can have access to honest reviews from other guests which help them reach a decision. Thus, the digitalization has allowed for transparent and accessible information while putting the control back into the guests' hands.

Formerly, there was no question that excellent service meant personal interaction with the hotel staff, but guests, nowadays, want to decide when and how they will interact with the staff. Travelers wish to take control over their stay to better customize services according to their tastes. Allowing guests increased control over their stay guarantees higher guest satisfaction scores (Micrometrics, s.d.). Furthermore, by empowering guests with the necessary tools, hotels are enhancing the guest experience while facilitating hotel operations since the staff can be allocated to other tasks, or, even, saving on labor costs (Van Hoof et al, 1996). Such tools have been coined as Guest Empowerment Technology (GET) (Daylighted, 2016).

The term GET has been broadly used to define technologies that allow customers to design a product or service without the direct involvement from the organization responsible for said product or service (Meuter et al, 2000). Over time, examples of this technology have been developed such as ATMs, grocery store self-check-out systems, and vending machines. If a hotel makes use of such technology, it will allow guests to have more control without direct intervention (Erdem et al, 2009). Thus, providing the utmost convenience for both parties.

2.3.2 Guest satisfaction and technology relation

An experience is the knowledge process which is acquired by the exposure to a specific event, and the emotions and sensations triggered by it (Ismail, 2010). Experiences have been characterized as significant human emotions obtained by the consumption of products and services (Holbrook & Hirschman, 1982). In the case of the guest experience, this is shaped by a certain level of exchanges between the tourism system, the employees and the tourist (Larsen, 2007).

The guest satisfaction, according to several studies, is not only related with the guests' experience regarding the hotel's service, cleanliness, and price, but to its technology as well (Cobanoglu et al, 2011). In fact, nearly 70% of U.S. hotel guests said it is "very or extremely important" for hotels to focus on enhancing the guest experience by centering investment in technology (Yasuda, 2017).

Satisfaction determines future behavior. Studies have exposed that service quality has a direct impact on customer satisfaction (Yee et al, 2009). According to the results uncovered by (Skogland & Siguaw, 2004), satisfied guests have the greatest loyalty. Therefore, there is a connection between customer satisfaction and loyalty which is extremely significant for the industry. Furthermore, satisfaction, usually, leads to recommendation to friends or co-workers which may influence them when choosing a hotel for their next stay. All in all, if a hotel manages to deliver the type of technology amenities which may be considered vital to achieve the highest guest satisfaction then the hotel guarantees that it will be, most likely, selected as the top choice – whether by newcomers or returnees (Cobanoglu et al, 2011).

Technology is constantly innovating, and the guests' expectations are closing in. In time, what was once a competitive differentiator will become a mere utility equal to water or electricity. Such is the case of WIFI. While, not long ago, connectivity was slow and unreliable, today, guests expect high-speed WIFI to be available anytime and anywhere (Starfleet Research, 2017).

Therefore, in order to be ahead of the curve, the hospitality industry has to, continuously, look out for the next trends in technology and use the most suitable ones to guarantee guest satisfaction.

2.3.3 Hotel 4.0

The Hospitality industry is coming to realize the importance of acting from the beginning of the tourists' experience (since leaving their home until leaving the hotel) to retain hotel guests (Terry, 2016). Hotel chains no longer restrict themselves to only two phases of the customer journey (see figure 2): booking and experiencing. Despite the industry being often characterized as a late technology adopter (Lubetkin, 2016), hoteliers are exploring the opportunities enabled by the technological advancement in all phases of the consumer journey. Thus, the industry is moving away from its traditional methods which meant focusing on the guests' experience while he or she is physically present on the premises (Roland Berger, 2016).

Figure 2 - Customer Journey

Source: Roland Berger (2016)

The benefits of making use of technologies in tourism are plentiful. Tourism experiences will become more personalized, accessible and ubiquitous. Many well-known brands are leading on the customer experience front and setting the bar quite high for consumers' brand expectations. Hotels and other tourism organizations will find themselves subject to the same expectations (WTTC, 2017a). Those able to make the most of these changing expectations with proactivity are more likely to stay ahead in the race. Subsequently, according to HT's 2016 Lodging Technology Study, 54% of hotels are expected to spend more on technology to meet guest expectations.

A new era for the hospitality industry has emerged. The Hotels that have allowed technology to become central piece in its processes are being called Hotel 4.0. On the next subchapters, it

will be mentioned the technologies that hotels are, currently, investing in or will be integrated in the near future.

2.3.3.1 Mobile ubiquity

Due to poor performance in the mobile and digital sector, 13% of travelers stopped using brand sites and apps (McLandress, s.d.). The Hospitality Industry has been tackling this vacuity by providing guests with a hotel-branded customer mobile app. Accordingly, 84% of hoteliers will have their own app over the next years (HT, 2016a). The app can integrate booking systems, self-check-in and check-out process, room service, and a messaging system. This new technology encompasses all services to provide a seamless guest experience.

With the hotel apps technology, the concierge is only a tap away. Guides with local places of interest, restaurants, tips, and maps accessibility are a few of the features available which can be selected with the guest in mind. Therefore, the information provided is personalized and tailored to the guest (McLandress, s.d.).

A hotel-branded app allows for mobile requests to be placed by using the chat system integrated into the app which makes unnecessary to go or to call the front desk. It is, therefore, more convenient (Marriott Hotel, s.d.). Hotels can leverage on such apps by promoting specific hotel services and special offers to the guest. Thus, enabling a direct line of communication between the hotel and the guest, and if possible creating a much more efficient and convenient booking/reservation system (McLandress, s.d.).

While kiosks[3] and other methods made to avoid going to the front desk have become more common in hotel lobbies, the development of an all-encompassing mobile application has seen a rapid expansion across the hotel industry (Baker, 2014). The app, amongst many things, helps to reduce the waiting time at the front desk by enabling guests to check-in and check-out on their mobiles. Furthermore, some apps, such as Hilton HHonors app, allows guests to book a room, check-in, choose a room from a digital plan, and request additional items before arriving at the hotel (Business Wire, 2017).

With such technology, room keys will also be a thing of the past. Guests, in the Hilton Hotel, for example, can unlock their room door (and other facilities such as the pool) by touching the "Unlock Door" button on the hotel branded mobile app when they are near the door. Since Hilton launched Digital Key, 3 million room keys were downloaded, and more than 13.6 million

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[3] Touchscreen placed at the hotel lobbies that allows guests to a faster self-check-in and check-out process

doors were opened. In July, a door was unlocked with Digital Key every two seconds (Business Wire, 2017).

2.3.3.2 Integrating data

Integrating data is the first step to obtain "Smart Tourism". "Smart Tourism" is the concept used when the interconnection and synchronization of different technologies happen. The line between the physical and digital world becomes blurred since the technologies are connected with physical infrastructures to explore real-time data. This term has already been used to describe homes, factories, among others (Gretzel et al, 2015).

Guests' preferences, habits, decisions – all of this is data. The collection of this data, called Big Data when assimilated properly can help hoteliers gain a deeper insight of the consumers' trends and patterns by analyzing it (Gretzel et al, 2015).

Sorting, analyzing and acting upon data is becoming invaluable for the hospitality industry. However, due to the amount of data from different sources, it proves difficult for hotel chains to manage, interpret and use it successfully. Therefore, artificial intelligence[4] systems are becoming crucial in all sectors. The technology enables companies to have a reliable prediction of future events even with incomplete datasets – Predictive Analytics – and to make smart recommendations (Buhalis & Amaranggana, 2015).

Even before arrival, every piece of information, from destination to room preferences, point to the right direction of how to personalize the guest's experience and hotels. If automatically captured, this data can be used in anticipation of the guests' needs. Based on the obtained insight, the hotel's website or app can provide tailored suggestions, as it is seen on Netflix with the personalized content (altexsoft, 2017). According to Skyscanner, a hotel's software will link with guests' social media profiles. Therefore, hoteliers may act in anticipation by customizing the stay and improve the guest experience by using the information that is disclosed on their profile (Barry, 2017). Modern customer relationship management tools can track guests online in order to build detailed profiles (Webrezpro, 2016).

Furthermore, the emergence of AI technologies, such as Machine Learning and Natural language processing[5], have enabled new ways of communicating called Chatbots. Guests may

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[4] Algorithms that learn from collected data, and either applies what it has learned or scrutinizes the new data, with the aim of discovering untapped information
[5] Processing of human language by a computer program

ask for recommendations, suggestions, and assistance, and receive immediate responses, anytime and anywhere.

Hotels can, now, use guests' location to personalize services or to improve response times. According to HT research, 30% of hotels plan to use location-based technology in 2016. A hotel in Switzerland is already making use of location-based technologies. The hotel has readers installed, which receive information from guests' keycard, and communicates it to the closest employee. The staff is, then, able to offer a more personalized service (Travel Technology & Solutions, 2014).

In sum, AI has become extremely important for hotels since it goes through enormous amounts of information while providing personalized responses in record time. Such is impossible to accomplish if hotels continue to rely solely on traditional methods such as human-to-human interaction (Revfine, a).

Although, privacy is a matter of concern, according to Zebra Hospitality Vision's study, 75% of guests are willing to share personal information for customized and prioritized service. Additionally, guests feel less comfortable sharing their location than their personal information – 34% of Millennials are comfortable sharing their current location compared to 13% of 50 to 64-year-old (HT, 2016b).

Data is not only important to achieve the best UX but for processes efficiency as well. With AI systems, hotels can transition from reactive to proactive. AI can aid Revenue Managers by examining cues from market variables and discover patterns, make predictions for guest arrivals and calculate prices as the market changes (Quanovo, 2017).

In spite such advancements, the hotel industry is still in the early stages of applying this technology to guest experience or processes improvement. Most hotels use it for advanced reporting (26%) while only 13% use it for predictive analytics (HT, 2016a).

2.3.3.3 Enabling tech and future-proofing networks

Hoteliers are investing in the guestroom technology giving the guests a unique experience. In fact, according to HT, more than half of hotels (56%) say that guestroom technology upgrades will be a priority this year such as interactive TV, Smart mirrors/digital, room control (heating systems, air conditioning, lighting, music, tv and control the curtains) interface and energy management systems. The study also says that hotels are distancing themselves from providing entertainment technologies as an in-room amenity since they believe that "rather than provide

the technology, the pattern is to enable it." Therefore, room control, for example, would be made with the guests' mobile devices through a hotel-branded app (HT, 2016a).

2.3.3.4 Security

With the increase of mobile devices and social channels, along with refined hacking skills, guest privacy is facing a challenge (Terry, 2016). In fact, hotels identified payment and data security as drivers for investment for the next years since guests' information has become increasingly digitalized. Nearly 70% of the executives in the 2016 HT Lodging Technology study said it would drive spending.

2.3.3.5 Sustainability

As mentioned before, sustainability is a huge issue in the industry. In the hospitality industry, energy is among the top most substantial costs. By using technologies that enable the monitorization of the guest consumption turning into statistics that help optimize settings. For example, hotel chains may adjust the energy consumption if they realize that a guest is no longer in the room or to program water control settings, including an "eco" mode that automatically engages energy-efficient settings, provides operators with savings (Terry, 2016).

Despite the importance of integrating cutting-edge technology being acknowledged, there are challenges obstructing its diffusion, such as the case of guests' privacy and security, cost-benefit analysis and lack of initiative from hoteliers (O'Connor, 2016).

2.3.3.6 Other technologies

2.3.3.6.1 Virtual reality

Virtual reality technology enables consumers, with the use of images, sounds and physical sensations, to feel "*as though they are physically present in a virtual created environment*" (Revfine, b).

Using 360-degree video technology, the hospitality industry is at the early stages of creating virtual travel experiences for users to experience the different aspects of travel before booking. Rather than reading through descriptions, which may not do justice to the experience, it offers customers the opportunity to visualize the experience. Marriott Hotel has launched a "teleporter" placed in public spaces, equipped with a headset, wireless headphone, and 4D sensory, in which people could be transported to a Marriott Hotel in London and Hawaii without having to fly there (Trejos, 2014).

Furthermore, VR technology can be used to virtualize a tour around a specific hotel which is made available on hotel websites for everyone. Guests or potential guests may have a look at the hotel's lobby, restaurant, pool, their hotel room, and other parts of the hotel beforehand such as the case of Shangri-La Hotels (Revfine, c).

Lastly, another emerging use of VR technology has been the creation of virtual reality booking processes (Revfine, c). Navitaire, an Amadeus company, has enabled costumers to visit a destination, search for flights, walk through a plane to select their seat, compare prices of different companies, and pay for their entire trip— all without leaving their place (Amadeus IT Group, 2017).

2.3.3.6.2 Augmented Reality

Augmented reality, unlike virtual reality, enhances the real-world surroundings in real time. In other words, an augmented reality experience is one when the surrounding environment gets altered with the aid of digital graphics when it is viewed through a mobile device. Thus, making the surrounding environment more interactive, and information can be presented when it is most relevant (Revfine, b). One way the hotel industry has used AR is by adding interactive elements in a wall city map. Guests can view information about places of interest and how to get there by pointing their devices to the wall map, such is the case of Hub Hotel in the United Kingdom (HT, 2015).

Pokemon Go was one of the biggest hits of augmented reality which, ultimately, led to an increase of the technology's use (Revfine, d). The hospitality industry is now using the technology to improve the overall experience of staying in a hotel, especially for children. For example, at the Best Western Plus Kelowna Hotel & Suites, guests could experiment QuestUpon – a game that uses Augmented Reality and Mixed Reality to provide guests' a unique experience with a combination of mini-games and trivia using the hotel's environment (QuestUpon, 2016).

2.3.3.6.3 Robots

Robots are no longer a product fabricated by Hollywood movies. Robots are becoming more common, and they will become even more so in the upcoming years.

Rather than a walking and talking auto-bot, robots are, in fact, a digital workforce computer coded software which is programmed to perform repetitive rules-based tasks using cross-functional and cross-application macros (Wright & Witherick, 2016).

Although the usage of robots has been mainly focused on the manufacturing industry, the number of people in hospitality who will be assisted by robots will double by the end of 2017. In fact, it is believed that Hospitality will be the pioneer in human-robot interaction (HT, 2017). Therefore, robots in hotels and restaurants must be user-friendly in all aspects

Robots have been, mostly, used for repetitive and low-level tasks. These tasks by being automatized have become more efficient which result in quicker, higher quality, and lower cost outcomes. Nowadays, with the advancement of AI technologies such as Machine Learning, Natural language processing, and Machine vision (Rouse, 2016), the tasks that robots can complete with and without the human intervention go beyond the routine tasks. One can only imagine what robots can do, over the next years.

RaaS, Robots as a Service, can be used as the concierge for reception desk services such as check-in and check-out process, information about the city's hot spots as well as luggage transportation to the guestroom. Room service can also be done by robots. Food, toiletries, and other special requests can be brought to guestrooms at any time. These requests can be added to the guests' preferences for their next stay.

Hotels are partnering up with technology giants to provide such technology. For example, a partnership between hotel chain Hilton Worldwide and IBM resulted in "Connie" – a concierge robot. Connie assists with guests' requests, personalizes their travel experience and provides them with information that they may require. Connie learns with each interaction with the guests, and, therefore, adapts and improves its recommendations. The hotel can use the information obtained by Connie to improve guests' experiences (Hilton, 2016). Likewise, Cupertino Aloft Hotel has its own robotic "Botlr" that has the task of delivering room service (Price, 2017).

Moreover, kitchen, cleaning, maintenance, entertainment and security and surveillance services are also a few of the areas where the hospitality industry has been testing robots. Another example is the case of Moley, possibly, the first robotic kitchen in the world. Moley has all the necessary tools to replicate recipes with precision through command via touchscreen or remotely via smartphone (Moley, s.d.).

There is a Hotel in Japan that took the term RaaS to a whole new level. Henna-na is the first fully robot-staffed hotel. Right from the moment of arrival, guests can either talk with a humanoid robot who speaks Japanese or a dinosaur who speaks English. Also, there is a robotic arm that lifts guests' items and places them in safes stacked into the wall. Another highlight of

the hotel is that it does not give guestroom keys but, instead, a digital image of the guest's face is registered during check-in. Therefore, the guestroom doors open with facial recognition technology. In the rooms, there is a concierge robot with voice recognition for room control (such as lights) and answers simple questions about the time and weather (The Guardian, 2015).

A curious fact that is important to point out is, while the number of robots being used in the Western world are quite scarce, Japan is highlighting and embracing innovation. Even though, the advancement in technology has, more or less, spread out evenly throughout the world.

According to Sundar Swaminathan, Hotel Solutions Marketing Director for Oracle Hospitality, though guests want technology to be used to enhance their stays, they are not quite ready for robots without a more profound understanding of its capabilities and technology. Lingering concern about robots is present, especially, in the Western world in contrast to the East such as Japan and China. As an example, in Japan, due to the increase of aging population, elder care is in demand, and although, inexpensive caretakers could easily be hired, the cultural preference is for robotic care, rather than human assistance (Nolasia, s.d.).

Another concern that the population has is that the use of robots means that the number of job offers will diminish thus leaving many unemployed. While replacing manual workers with an automaton has been, indeed, beneficial for the industrial companies regarding time and costs, the same cannot be said about the hospitality industry. Since the pillar that hospitality has been built on is the human interaction between staff and guest (HT, 2017). Besides, with the assistance of robots, the staff will be freed up of repetitive and monotonous tasks, so they can spend more time improving the guests' experience.

According to Hospitality Tech, the fear will dissipate, and robots will become part of everyday life as soon as they prove their value by improving the quality of life.

All of the examples referred above can be viewed on 8.1   Appendix I – Images of the technologies used in global Hotels.

2.4 Tourism in Portugal

The Tourism in Portugal has been, mainly, focused on a single product: Sun, Sea and Sand. (Daniel, 2010). However, according to the secretary of state for Tourism Ana Mendes Godinho, "efforts to turn Portugal into a touristic destination of excellence, with unique diversity in what it has to offer" have taken place. Consequently, Portugal has been acknowledged with several awards such as the Best European Destination 2017 by World Travel Tourism. In the main

regions, AM Lisbon, Algarve, and Oporto, Tourism have gained significant weight, over the last year, accomplishing record numbers of tourist arrivals, overnight stays, and receipts (INE, 2017). According to "Inquérito ao Turismo Internacional" realized by INE from the period of July 2015 to June 2016 in Portugal, 37,9% of the tourists were between 35 and 54 years old, and the majority were from France, Spain, and the UK.

Low-cost airline companies have created additional routes which have allowed travelers to explore smaller European cities for a short period. Such is the case of the Autonomous Region of Azores which has witnessed an increase of the number of visitors when comparing to the year before – Terceira Island (+155%) and Ponta Delgada (+77%) (eDreams ODIGEO, 2017). According to the region's government, this boost was enabled due to the investments made towards tourism, and the newly added routes from the United States, United Kingdom, Germany, Spain, and Portugal by low-cost airlines, such as Ryanair[6].

Due to a fast and steady growth, according to the World Economic Forum, Portugal is ranked the 14th most competitive touristic destination, in The Tourism Competitiveness Index, attracting 10,140,199 international tourists in 2017 (WEF, 2017). Although most EU-28 destinations have shown robust growth in the Tourism sector throughout the current year, within the Southern and Mediterranean group, growth was led by Portugal (+13%) (UNWTO, 2017b).

Tourism is a strategic business area in Portugal. In 2015, 13% of the Portuguese companies were from the Tourism sector (53,000 companies). 72% of the Portuguese Tourism companies were from accommodation and restaurant segment. It is also the segment with the most weight according to the business volume and number of employees. On the other hand, the logistics segment is responsible for 41% of the business volume (Banco de Portugal, 2016).

The sector contributed directly to the Portuguese GDP in 6.4%, in 2016. It is forecasted to grow, steadily, until 2027. As a vital element of the direct contribution, visitor exports in Portugal generated EUR15.0bn. In 2017, the country is expected to have attracted 11,596,000 international tourists. By 2027, the international tourist arrivals are expected to reach a total of 14,709,000 while generating revenues of EUR20.3bn (WTTC, 2017b).

Tourism influences the level of quality of life for the inhabitants by creating new jobs. In 2016, 371,500 jobs were generated (8.1% of total employment), and this is forecast to grow by 3.4%

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[6] The Official Azorean Government press releases: Low cost flights and Growth of Tourism throughout the Region

in 2017. By 2027, Tourism will account for 441,000 jobs directly, an increase of 1.4% over the next ten years (WTTC, 2017b).

Regarding the hospitality sector in Portugal, the Algarve region concentrates the most significant number of tourism infrastructures while the Autonomous region of Madeira and Lisbon gather the highest occupancy rate. The local accommodation has verified a remarkable growth, motivated by online research. Tourist apartments represent 10% whereas hotels (8%), rural hotels (4%), tourist villages (3%) and inns (2%) have less weight in representation. The type of hotels that predominate in Portugal is of three and four stars. The Pestana Hotel group chain, Vila Galé Hotels and Accor Hotels form the top 3 hotels with the most accommodation units. The Pestana group leads with 7,076 (14,570 beds) (Antunes & Marrão, 2017).

The use of technologies in the Hospitality industry is also penetrating the Portuguese market. Around the country, the number of hotels and restaurants that use technology to provide an effective and efficient service has increased.

On the last edition of "Boa Cama Boa Mesa" travel book, a rank that distinguished the Portuguese hotels that have been the best at implementing technology in their services was published. Hotels such as Vila Galé and Evolution Lisboa Hotel have its own mobile app that the guests may download for free and use during their stay. The app provides information about the hotel and the city's points of interest. Furthermore, with the app guests can have control over the room's amenities and functionalities. In the Evolution Lisboa Hotel it is possible to self-check-in in a touchscreen (and choose the room) (Brandão, 2016).

2.4.1 The Portuguese tourist profile

According to a study done by Trivago, search engine company for hotels, the Portuguese tourist travels, mostly, across Portugal (Martinho, 2016). The favorite destinations for the Portuguese traveler in 2017 were Oporto, Lisbon, Paris, Ponta Delgada and London. However, this might change in 2018 since the destinations with most bookings are: Funchal, Amsterdam, New York, Lisbon, Paris, and London (eDreams ODIGEO, 2017).

Lisbon is the most searched destination during 8 (out of the 12) months of the year. During the other remaining months (June, July, August, and September) the chosen destination is Albufeira (Southern Portugal) (Martinho, 2016) thus it is possible to conclude that the location favored by the Portuguese guest for relaxation is near the ocean, at least during the summer.

Portugal has seen a boost in mobile device bookings over the last ten years (+229%) (eDreams ODIGEO, 2017). The Portuguese traveler has become more involved in creating their own traveling experience from scratch. The traveler is, then, more informed and technology savvy. With the all needed information in real-time, the traveler has the power at their hands. Moreover, the Portuguese traveler has a preference for price, using low-cost carriers even for long-haul trips (eDreams ODIGEO, 2017). The number of days per stay is, around, 3,5 and the Portuguese traveler spends 99,5€ per night on average (Martinho, 2016).

3. Methodology

3.1 Research Context

As mentioned in the Literature Review, Portugal has become one of the most popular destinations for travel, not only for international travelers as well for domestic.

Although technology has impacted hotels all over the world, this, however, does not mean that the Portuguese hotels are par to hotels' abroad regarding the technology implemented. In fact, as it was seen in chapter 2.1.3, the technology found in the Portuguese is quite limited, especially, when comparing to other countries in, for example, Asia.

The Portuguese guests are transforming their traveling experience by tailoring it to their preferences. This means, as mentioned before, that the presence of technology is mandatory to enhance the guest experience. So, the question arises, what are the technologies that could enhance the traveling experience for the Portuguese population?

Thus, this study focuses on 1) identifying what are the most important technologies for the Portuguese to have during their stay; 2) study how the Portuguese address the latest technologies in the hospitality industry; and, finally, 3) if the technology implemented in the Portuguese hotels correspond to the Portuguese expectations and needs.

3.2 Data Collection Methods

To obtain the most accurate results and data, the chosen method for this research was the quantitative method through the use of one questionnaire among the Portuguese population (view 8.2　　Appendix II – Questionnaire). This choice is justified by the goal of obtaining information from a large sample (about 200 respondents) and by the need to process and analyze the collected data.

3.2.1　Quantitative Research

3.2.1.1 Questionnaire design

The questionnaire was created after having gathered the appropriate literature and relevant information from previous studies.

The questionnaire starts with a cover letter containing a short explanation of the study, a summary description of the questionnaire, and term of consent where the respondent may agree to participate in the study taking into account that it is voluntary and that their information would be kept confidential.

The questionnaire is divided into three parts. The first part has five questions focused on the respondent's demographic characteristics. Thus, the respondents could be analyzed into different categories: age, gender, the country where they are currently living in, level of education, current employment status, and gross monthly salary.

The second part has eight questions which are focused on the technological trends in Hospitality. On the first question, the respondents are asked to rate the importance of 6 services, to obtain the best guest experience, using a 7-point Likert scale (1= not at all important and 7= extremely important). The services were composed based on the technologies found while gathering information for the literature review. The list contains the following: 1) Services' personalization (the hotel has information about the guests' interests, food restrictions, and allergies); 2) Information about the city, city map, restaurants tips and places to visit; 3) Fast check-in and check-out process; 4) Room service; 5) In-room: Tablet, iPad or Interactive TV; and 6) In-room: room control (heating system, air conditioning, lighting, curtains, music and tv). On the next question, it was asked for the respondents to select (from the following: Front desk, Hotel App, Touchscreen Kiosk, Guest Room iPad or Tablet, Guest Room TV; Guest Room Phone) how they would prefer to obtain the items from the previous question. The next seven questions refer to how likely the respondents would use service robots, if using robots would enhance their experience or if they prefer human concierge instead. On the next question, the respondents have to rate the importance of 9 latest technological amenities using, once again, a seven-point Likert scale, and if they are willing to provide with their information and to obtain them. There is one question that asks if there is any technology (there are options that the respondent can choose from as well as there is an open answer option) that was not referred in this questionnaire that they would like to have in their next hotel stay. The concluding question asks the respondents if technology impacts their decision when choosing a hotel and how much they are willing to pay for it.

On the last part of the questionnaire, the author intends to analyze the respondents' experience in Portuguese hotels, especially, with its technology. This part opens with a question asking where the hotel that they stayed was located. The reason why this hotel was chosen is also asked. In the questionnaire it is also asked about the respondents' opinion regarding the importance and their satisfaction with technologies found in Portuguese hotels and if it impacts their stay positively.

3.2.1.1 Pre-test and field work

A pre-test was executed on the week of 26 to 30 of December, before to the questionnaire's diffusion, with a sample of 11 respondents. The goal was to ascertain the clarity of the questions presented on the questionnaire. Upon suggestions and recommendations made by the respondents, some adjustments were made. Afterwards, a reliability test was done using Cronbach's alpha to make sure that there is internal consistency between the set of items. The result was 0,820 which suggest that the items have high internal consistency. The questionnaire was diffused through social networks and was online for five days. The distribution started in the first week of January of 2018.

4. Questionnaire Results Analysis

As mentioned before, a questionnaire was made to better understand the Portuguese relation with technology in the hospitality industry, mainly, the latest trends. The platform used for such task was Google Forms which was then distributed among the Portuguese population. The goal was to reach 200 respondents over the course of a week. This goal was surpassed, having reached 209 responses in five days.

The analysis of the collected data was done using IBM's SPSS Statistics and Microsoft Excel. Demographic characteristics, the Portuguese preferences and attitude towards technology in hospitality were analyzed.

Before beginning analyzing the responses provided by the questionnaire, a reliability test was, again, done using Cronbach's alpha to make sure that there is internal consistency between the set of items. The result was 0,865 which suggests that the items have high internal consistency.

Table 1 - Reliability statistics - Cronbach's Alpha

RELIABILITY STATISTICS

Cronbach's Alpha	0,865

On following chapters, the main findings of the questionnaire will be exposed and interpreted.

4.1 Sample Characterization

The questionnaire was completed by 209 respondents who were characterized by age groups, as seen in the table below. According to the information displayed in the table, it is possible to conclude that, although, the age distribution was, more or less, even, the majority of the respondents were between 18-24 (29,2%), followed by the 45-54 (23,9%) and 25-34 (22,5%) age groups. There were a few respondents aged between 35-44 (14.8%), and only 9.6% were older than 55 years old.

Table 2 - Sample distribution by age groups

AGE GROUPS	N	%
18-24	61	29,2
25-34	47	22,5
35-44	31	14,8
45-54	50	23,9
55 or older	20	9,6
Total	209	100,0

Regarding the gender of the respondents, they were, mainly, Female (56%) summing up to 117 respondents against the 92 Male respondents.

Figure 3 - Sample distribution by gender
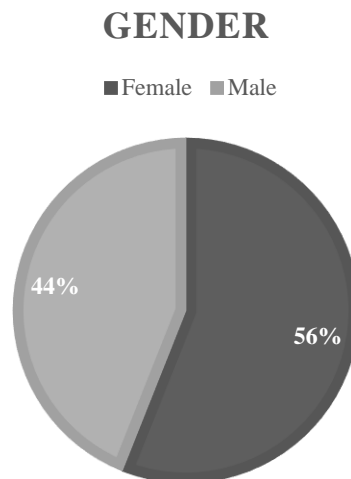
As mentioned before, the chosen sample was within the Portuguese population. This meant that the collection of responses was done from those who currently live in Portugal and abroad. The questionnaire had responses from residents from a total of 13 different countries, including countries from Europe, South America, and Asia. Therefore, in regards to where the respondents live, the vast majority of respondents answered Portugal, representing 91.9% of the sample. The following most representative countries were France, Germany, Qatar, Spain and United Kingdom.

Table 3 - Sample distribution by country

COUNTRY	N	%
Belgium	1	,5
Colombia	1	,5
France	2	1,0
Germany	2	1,0
Ireland	1	,5
Italy	1	,5
Luxembourg	1	,5
Portugal	192	91,9
Qatar	2	1,0
Spain	2	1,0
Sweden	1	,5
Switzerland	1	,5
United Kingdom	2	1,0
Total	**209**	**100,0**

Regarding the education level, the majority had an advanced level of education from Bachelor to Ph.D. (59,8%). The remaining respondents had either first cycle of school or professional/training degrees.

Table 4 - Sample distribution by education level

EDUCATION LEVEL	N	%
Primary	1	,5
Secondary	64	30,6
Professional Degree	19	9,1
Bachelor	81	38,8
Postgraduate	14	6,7
Master	28	13,4
PhD	2	1,0
Total	**209**	**100,0**

By employment status, the majority of respondents were fully employed (66.5%). The second largest occupation was "Student" with 19,6%. There were also respondents who were working

students (2,9%), unemployed (6,7%) or retired (2,9%). The respondents who answered "Other" are working as Freelancers (1,4%).

**Table 5 - Sample distribution by occupation**

OCCUPATION	N	%
Student	41	19,6
Employed	139	66,5
Unemployed	14	6,7
Retired	6	2,9
Working Student	6	2,9
Other	3	1,4
Total	**209**	**100,0**

4.2 Hospitality industry in Portugal

The opening question of the questionnaire was meant to get an understanding of, firstly, the respondents' underlying reasons that impact their decision when choosing the hotel on their last stay. For the most part, the respondents answered that the price was their primary concern when choosing the hotel as well as location. The next most chosen reason was the recommendations which surpassed the online reviews. Lastly, only 5% of the respondents say that technology influences their choice of hotel. Under the "Other" option, many respondents answered that they did not have the possibility to choose since the stay was either work-related or organized by another person.

Figure 4 - Reasons for choosing the last hotel

REASONS FOR CHOOSING LAST HOTEL

- Location
- Price
- Online Reviews
- Recommendations
- Technology
- Other
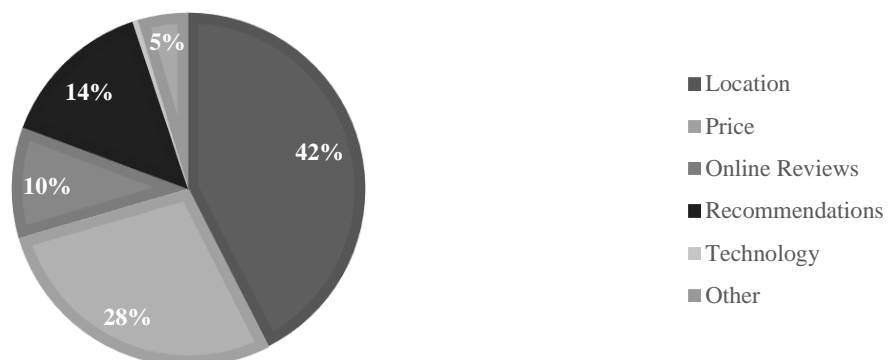
Concerning the guest's experience in a Portuguese Hotel, the next question was meant to understand if the respondents were satisfied with the technology present in the Portuguese hospitality industry. As it is possible to observe on the figure below, 68% of the respondents are pleased with the technology available in Portuguese hotels. There was a percentage of respondents that have never been in a Portuguese hotel.

Figure 5 - Respondents' satisfaction with technology


SATISFACTION WITH THE TECHNOLOGY
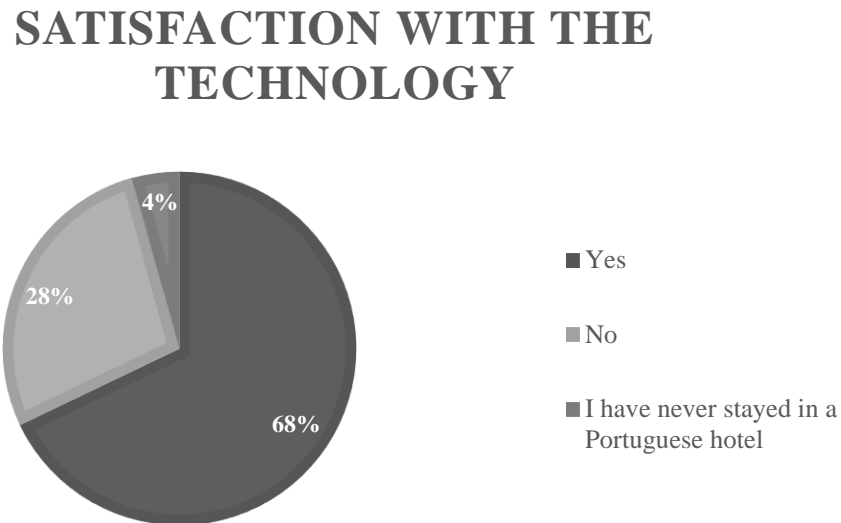
Still concerning the technology available in the Portuguese hospitality industry, it was asked to the respondents if they think that the technologies available in the Portuguese hotels had a positive impact on their experience. The majority of respondents answered that, although the technologies impacted their stay positively, they would add or change some technology to enhance their stay. The missing responses were from those who never stayed in a Portuguese hotel.

Table 6 - Technology's impact on the respondents' stay

DESCRIPTIVE ANALYSIS	N
Yes, but I'd like to add/change some technologies to have a better/different experience	83
Yes, the technologies were enough to provide me a good experience. I wouldn't change or add anything	69
No, the technologies were very outdated	48
Total	200

Finally, the last question from this group asked the respondents what could improve their stay in a Portuguese hotel. Options such as Better Price, Better Booking system, Better Room Service, Better Room Quality, Better WIFI connectivity, and Faster Check-in and Check-out process, were provided in the question. The price leads as the option which the respondents believe needs to be improved in the Portuguese market. Secondly, there is the room quality and, shortly after, there is the WIFI connectivity. On the intermediary level, the respondents answered check-in and check-out process, booking system, and room service. Under the option "Other", the respondents suggested "Technology" and more efficient communication between the hotel and the guest.

Figure 6 - Respondents' view on what needs to be improved in Portuguese hotels


TO BE IMPROVED IN A
PORTUGUESE HOTEL

- Price
- Booking system
- Room Service
- Room Amenities
- WiFi
- Check-in and Check-out process
- Other reasons
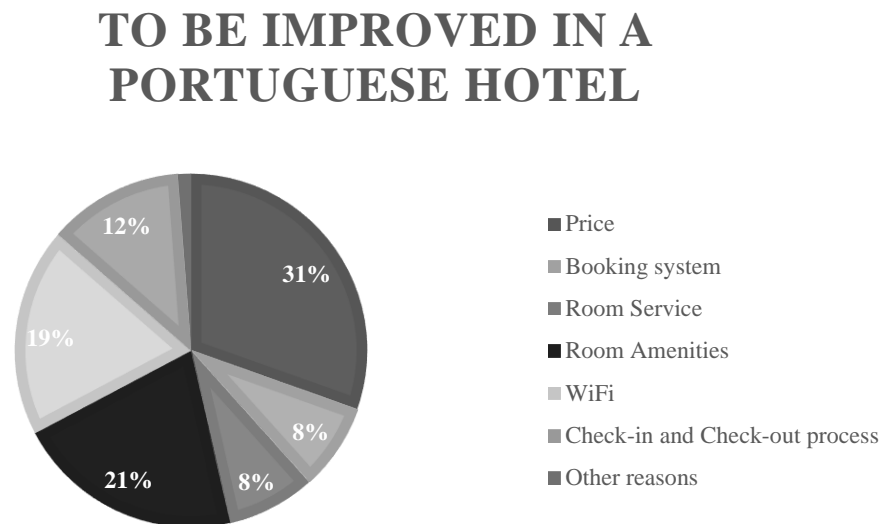
4.3 Technology in Hospitality

4.3.1 Importance of services

On the next group of questions of the questionnaire, the author wanted to grasp which services are essential, for the Portuguese population, when staying in a hotel for them to obtain the best guest experience possible. The options were: (1) efficient check-in and check-out process; (2) real-time and clear information about the hotel services, about the city, city map access, restaurant tips, flight arrivals and departures and driving directions; (3) A-1 room service; (4) in-room entertainment in a format of a tablet, iPad or interactive TV; (5) control over the room's heating system, air conditioning, curtains, music, etc.; (6) Personalized services according to guests' interests, allergies and food restrictions.

With a seven-point Likert scale, from "Not at all important" to "Extremely important" the results were quite positive, as it is possible to observe on the figure below. The most important service for guests is an (1) efficient check-in and check-out process with an average of 5,99. Not too far behind, the guests classified (2) real-time information, (3) room service and (5) room control as "Very important". Still, on the positive side but less than the other options, is the option of (6) personalized services with 5,28. Finally, the option with the lowest score is in-room entertainment which the respondents deem as "Neutral" for their guest experience.

Figure 7 - Hospitality services - level of importance


IMPORTANT SERVICES IN HOTELS
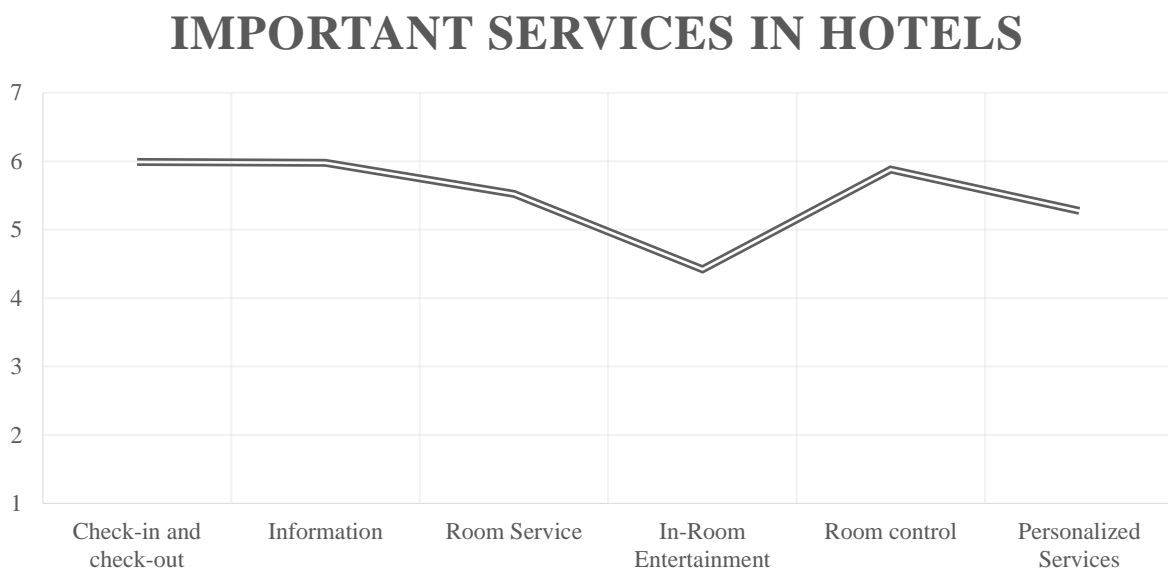
4.3.2 Preferred method to obtain specific services

On the following question, respondents were asked to choose, between the different options, how they would like to obtain the previous services. In other words, the respondents had to select where (or how) they would like to get information, to get the city map, to do the check-in and check-out, to order room service and to control the room.

As it is possible to observe in Figure 8, the majority of respondents (56,9%) would like to use digital options such as the Hotel App, Touchscreen, Guestroom Tablet/iPad or TV remote control. However, 40,7% the respondents point out the Front Desk as the preferred place to obtain information about the hotel services, about the city, restaurant tips, flight arrivals and departures and driving directions. Therefore, the option of going to the Front Desk to obtain services has a much more significant result when comparing to the digital options. When observing the figure 8, it is possible to see that this situation is quite common – where the

traditional methods are preferred over the new and digital ones – except when the respondents want to obtain the city map. In this case, the respondents answered that they would prefer to obtain the map on their smartphone app.

Figure 8 - Hospitality services - method to obtain them

METHOD TO OBTAIN SERVICES

Front Desk　Hotel App　Touch Screen at lobby　Tablet or iPad　TV remote control　Telephone
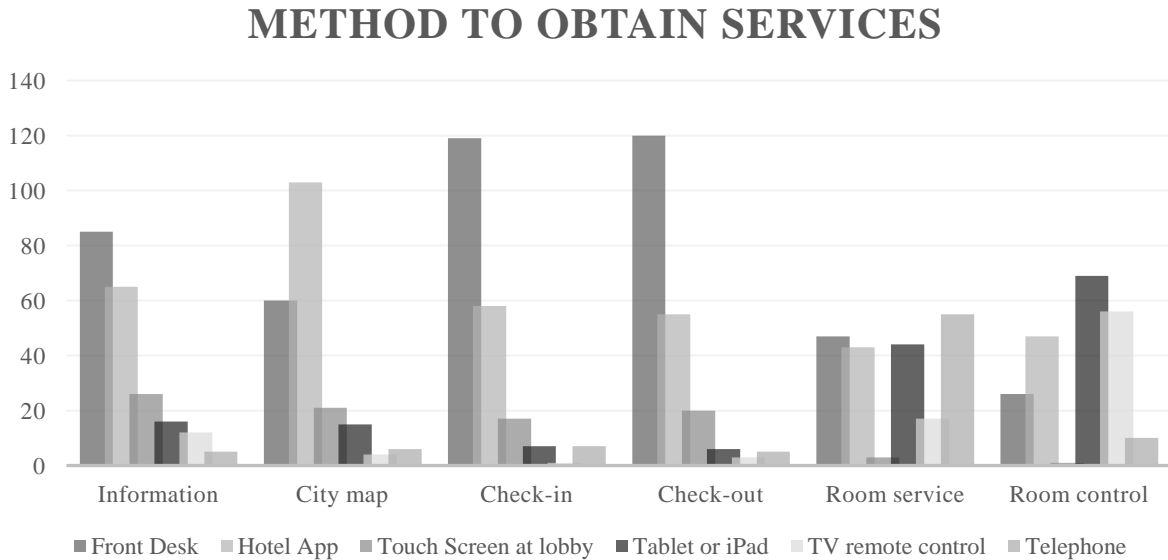
4.3.3   Robots

Moving on to the next group of question, the topic of Service Robots was approached. The questions were divided between the different types of Service Robots that already exist in the hospitality industry.

The first set of questions concerned Connie which, as mentioned in the Literature Review, is the concierge robot placed in the Hilton Hotel. Connie assists with guests' requests, personalizes their travel experience and provides them with information that they may require. Thus, the respondents had to answer, with a seven-point Likert scale from "Strongly Disagree" to "Strongly Agree", if they would request Connie's services – (1) information about the hotel, (2) information about the city and (3) recommendations. The responses averaged between 3,7 and 3,9 which means that the respondents are "Undecided" if they would request for Connie's services.

Figure 9 - Robots - Likelihood to request for Connie's services


CONNIE
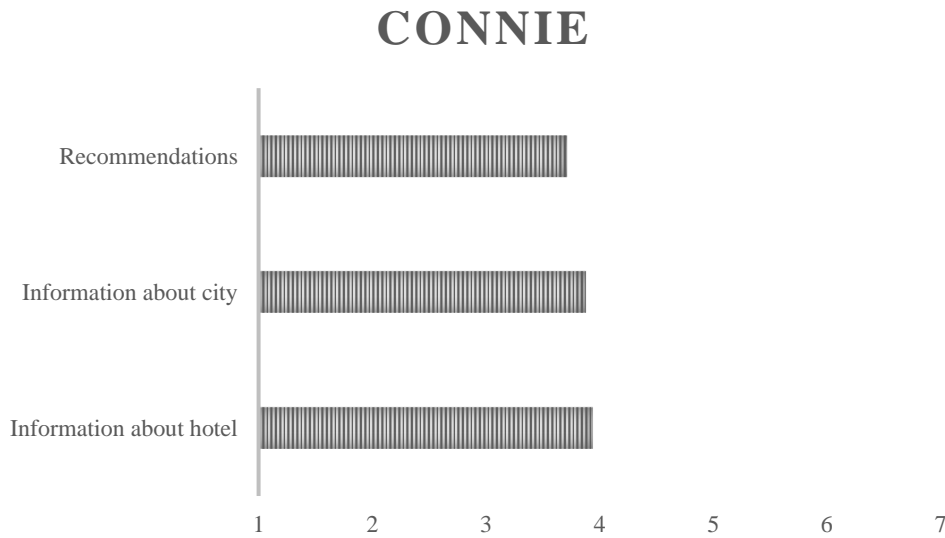
Two other Service Robots were covered in this questionnaire. In this case, Botlr, the Butler Robot that delivers amenities to guest rooms, and Moley, the kitchen robot. It was again asked the respondents to rate if they would like to receive Room Service from Botlr and meals prepared by Moley. In the case of Boltr, the responses were more favorable than those of Connie and Moley. However, the respondents were still "Undecided" (average = 4,34) on whether they would like use Boltr's services. While, in the case of Moley, the respondents "More or less Disagree" with the likelihood of wanting their meals prepared by Moley.

Figure 10 - Robots - likelihood to use Boltr and Moley's services

LIKELIHOOD TO USE
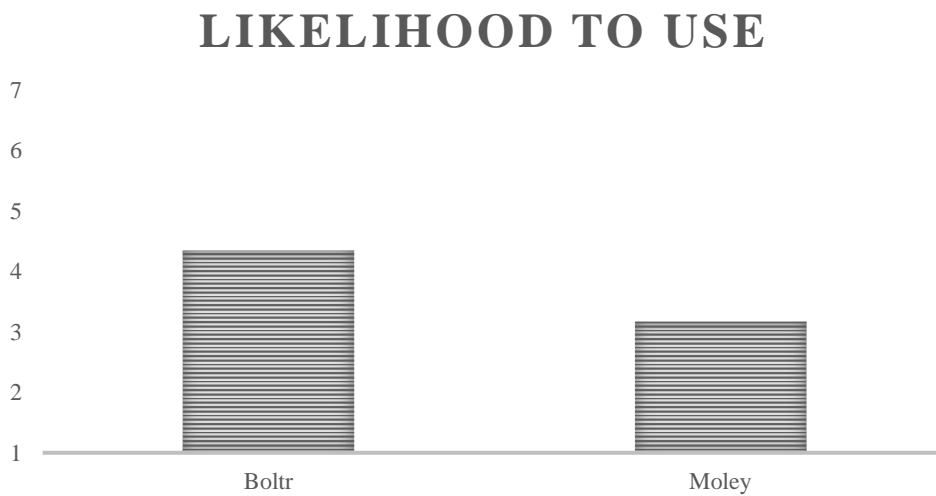
With the aid of images from Henn-na Hotel's Front Desk, the last set of questions was meant to infer the Portuguese guests' relation with Front Desk robots – if the respondents would use them and, if so, in which form. As it is possible to observe in the figure below, more than half of the sample would not use the Front Desk robots. Instead, they would prefer a human concierge (76%). Although there is such significant result for the human concierge, it is highly interesting to see that there are some respondents who would consider the experience of using robot concierge over a human one and over the touchscreen or app option.

Figure 11 - Robots - Guests' relation with front desk robots

FRONT DESK ROBOTS
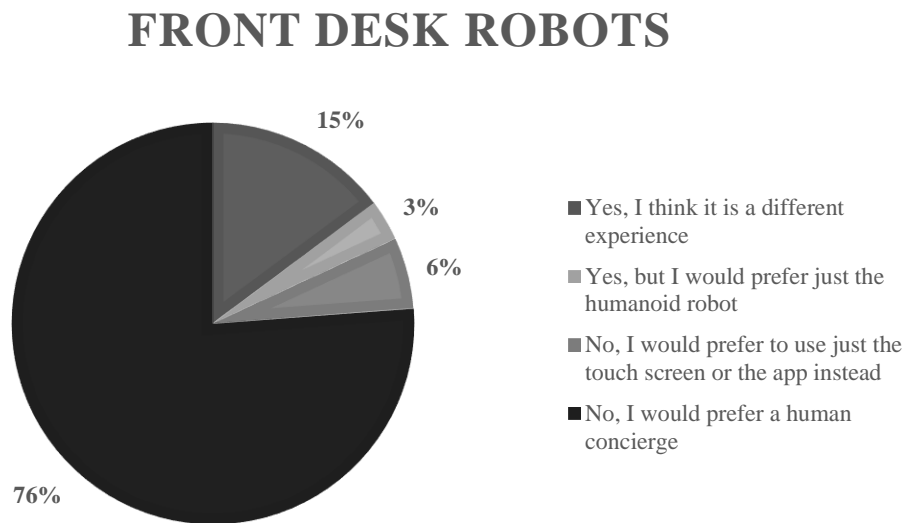
The premise that the respondents prefer a human concierge over a robot is supported by the results of the next question where the respondents had to rate, from 1 to 7, the level of agreement of the following sentence: "When it comes to my best guest experience, I prefer human contact over robots". The respondents, with an average of 6,05, agreed with the sentence.

4.3.4 Importance of the latest technologies

On the next set of questions, the relation between the respondents and the technologies present in the hospitality industry, which were mentioned previously in the questionnaire, was put to the test. Accordingly, it was asked of the respondents to rate the importance of 7 technologies (WIFI, Self-Check-in and Check-out, Hotel App, Interactive TV, In-Room Tablet or iPad, Data Collection for Services and Robots) that could potentially enhance their guest experience on their next hotel stay.

Unsurprisingly, fast connectivity is highly important, with an average of 6,40, for the Portuguese guests. Self check-in and check-out and Hotel App are perceived as "Moderately Important" as well as Interactive TV. However, it is important to highlight that, on the previous questions, In-Room Entertainment, such as Interactive TV and Tablet or iPad, had the lowest score of importance for the respondents. Furthermore, respondents answered that they are "Neutral" on whether the collection of information for personalized services would enhance their guest experience. On the other hand, Robots is the least important technological amenity to have available in a future hotel stay for the respondents.

Figure 12 - Importance of latest technologies
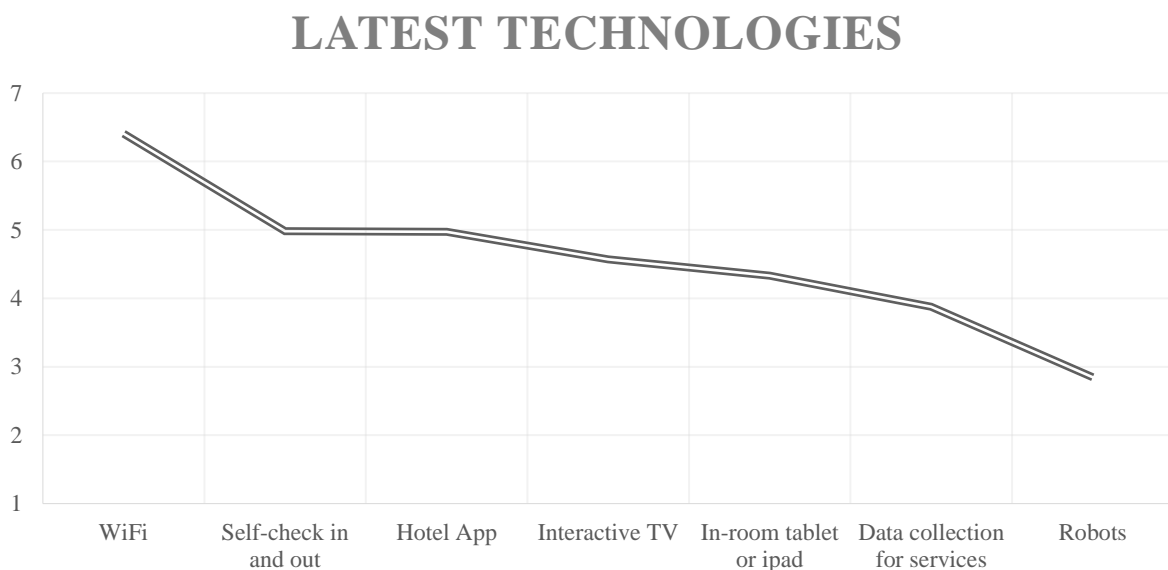
LATEST TECHNOLOGIES

It was also asked for the respondents to name any technology, that was not mentioned in the questionnaire, that they would like to have in their next hotel stay. The results may be observed in the figure below. Almost half of the respondents answered that they would like to have Virtual Reality in their next hotel stay. A respondent added that he/she would like to have a robot who would carry luggage to the guestrooms.

Figure 13 - Other technology amenities

OTHER TECHNOLOGIES
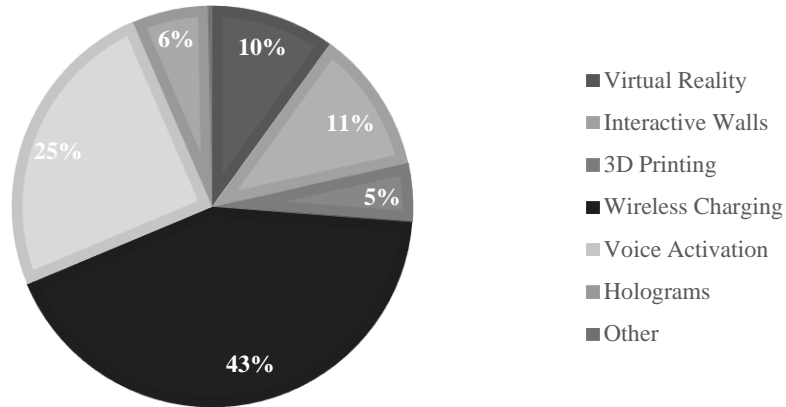
As mentioned before, the Portuguese population is "Neutral" when it comes to the importance of having data collection technology during their stay to have personalized services. This collides with the first set of questions when the respondents had to rate the importance of having personalized services since, at the time, the respondents answered with an average of 5,28. In order to extricate more information about the respondents view of personalized data, two sentences were asked to be rated: "I'm willing that my information (interests, allergies and food restrictions) be collected in order to have personalized services" and "I'm willing to provide my location during my stay in order to obtain real-time information and recommendations". As it is possible to observe in Figure 14, the results were positive (5,18 and 4,49). Therefore, the respondents "More or less Agree" that their information and location be collected to obtain personalized services.

Furthermore, a Pearson correlation analysis was made to these two questions to evaluate the linear correlation between them. The result produced was 0,592 which means that there is a positive correlation between the variables.

Figure 14 - Respondents willingness to provide data

WILLINGNESS TO PROVIDE DATA

I'm willing that my information (interests, allergies and food restrictions) be collected in order to have personalized services

I'm willing to provide my location during my stay in order to obtain real-time information and recommendations

1   2   3   4   5   6   7
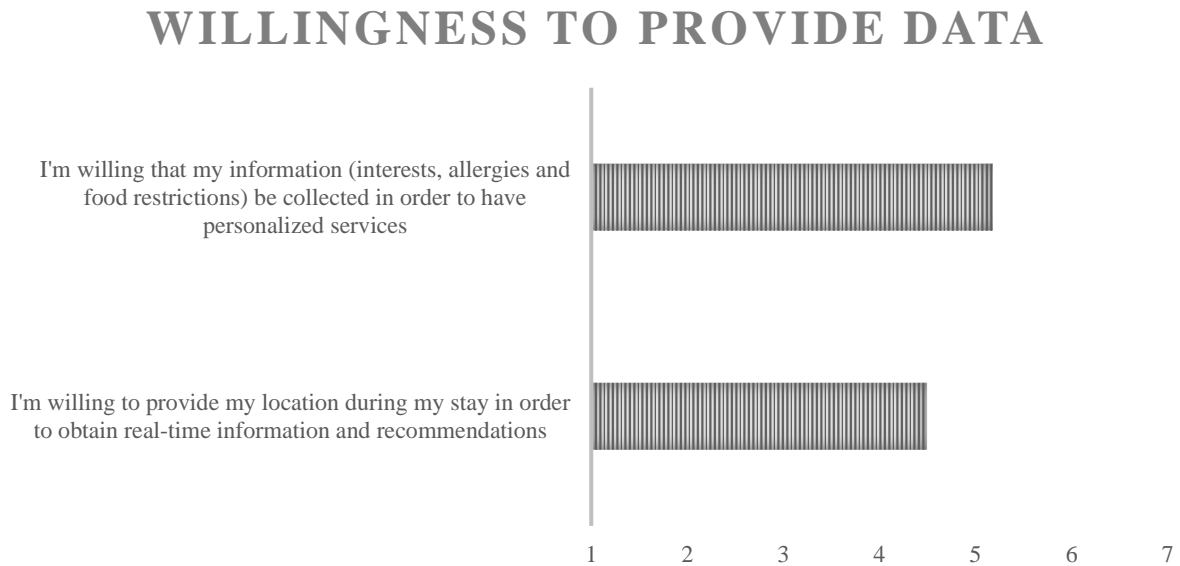
4.3.5 Hotel selection

In regards to whether technology impacts the respondents' decision when choosing a hotel, the respondents answered that they are "Undecided" as observable on the table below.

Table 7 - Impact of technology on respondents' decision

DESCRIPTIVE ANALYSIS	N	MEAN
Does technology impact your decision when choosing a hotel?	209	3,81

The respondents were also asked how much they would be willing to pay to stay in a hotel with the latest technological amenities. The majority of respondents (48,3%) answered between the price range of 61-80 and 81-100.

36

Table 8 - Price average respondents are willing to pay

PRICE	N	%
<40	25	12,0
41-60	39	18,7
61-80	45	21,5
81-100	56	26,8
101-120	21	10,0
121-140	10	4,8
>140	13	6,2
Total	209	100,0

5. Conclusions

The technology advancement has influenced industries, hospitality included. The old business models have been disrupted and, nowadays, hotels, around the world, rely on technology in order to enhance the guest experience.

With the aid of the studies mentioned the literature review, which complements this study with scrutinized information about the topic of technology in hospitality, it is possible to conclude that technology influences positively a guests' stay.

Therefore, the present study has focused on identifying the most important features for the Portuguese population to have during their stay; study how the Portuguese address the latest technologies in the hospitality industry; and, finally, if the technology implemented in the Portuguese hotels correspond to the Portuguese expectations and needs. It aims to contribute with further knowledge about the Portuguese guest so that Portuguese hotels may use such information to enhance the guest experience. Accordingly, a questionnaire was made and analyzed to understand the needs of the targeted population.

The questionnaire was completed by 209 respondents who were characterized by five age groups from 18 to 55 or older. The majority of respondents were young adults aged between 18-24 (29,2%). Regarding gender, the respondents were, mainly, Female (56%). The questionnaire had responses from residents from a total of 13 different countries. Nevertheless, Portugal represented 91.9% of the sample. Furthermore, the majority had an advanced level of education from Bachelor to Ph.D. and were fully employed.

In terms of achieving the first goal of this study –identifying the crucial features for the Portuguese guests to have during their stay – the opening question of the questionnaire was meant to get an understanding of, firstly, the respondents' underlying reasons that impact their decision when choosing the hotel on their last stay. The respondents answered that the price was their main concern when choosing the hotel. This premise is in line with the Portuguese traveler profile who, as mentioned before, is characterized by value for money.

Concerning the guest's experience in a Portuguese Hotel, it was asked to the respondents if they were satisfied with the technology present in the Portuguese hotels. 41,5% of the respondents were pleased with the technology available in Portuguese hotels, although, they would add or change some technology in order to have a better/different experience.

Furthermore, the respondents had to answer what could improve their stay in a Portuguese hotel. The price lead as the option that the respondents believe needs to be improved in the Portuguese market. The premise that Portuguese guest is highly conscious about price is reconfirmed.

It was asked of the respondents to rate which services are the most important when staying in a hotel for the respondents to obtain the best guest experience possible. The respondents had several services which they had to rate from "Not at all important" to "Extremely important". The respondents deemed most of the services mentioned as "Moderately important" to "Extremely important". The most important to the respondents is to have an efficient check-in and check-out process. The option with the lowest score is in-room entertainment which the respondents deem as "Neutral" for their guest experience. This observation goes hand in hand with ADB's report which stated that hoteliers and guests value in-room entertainment services differently and that, although guests view the in-room TV experience as important, it is not important enough to impact their decision when it comes to choosing the hotel (Guest Contributor, 2016). Furthermore, as mentioned in the literature review, hotels are distancing themselves from providing Tablet or iPads as an in-room amenity since they believe that "rather than provide the technology, the pattern is to enable it" such is the case for room control (heating systems, air conditioning, lighting, music, tv and control the curtains) interface and energy management systems (HT, 2016a).

The respondents also had to select where (or how) they would like to get information, to get the city map, to do the check-in and check-out, to order room service and to control the room. Although the majority of respondents (56,9%) would like to use digital options such as the Hotel App, Touchscreen, Guestroom Tablet/iPad or TV remote control, 40,7% the respondents point out the Front Desk as the preferred place to obtain information about the hotel services, about the city, restaurant tips, flight arrivals and departures and driving directions. Therefore, even though, the results showed that the respondents have a strong desire to experience something new, there are services that the respondents prefer to use the traditional methods over the new and digital ones. As an example, the second most voted option to require room service is through the Front Desk, right after the guest room telephone, which is impractical.

The next set of questions concerned the use of service robots in the hospitality industry. The respondents had to rate, with a seven-point Likert scale, from "Strongly Disagree" to "Strongly Agree" if they would use Connie, the concierge robot; Botlr, the Butler Robot; and Moley, the kitchen robot. The respondents were "Undecided" if they would request for Connie's services

as well as Boltr's services. While, in the case of Moley, the respondents "More or less Disagree" with the likelihood of wanting their meals prepared by Moley. Additionally, the respondents had to answer if they would use Front Desk robots. More than half of the sample would not use the Front Desk robots. Instead, they would prefer a human concierge (76%). Therefore, per the results, the respondents prefer a human concierge over a robot to obtain the best guest experience. This aversion to robots may have two reasons: firstly, how the Hollywood's movies depicted robots as destroyers of the world, and secondly, that robots are taking away jobs.

The respondents had to rate the importance of 7 technologies aforementioned in the questionnaire (WIFI, Self-Check-in and Check-out, Hotel App, Interactive TV, In-Room Tablet or iPad, Data Collection for Services and Robots). Expectedly, fast connectivity is highly important for the Portuguese guests. Self-check-in and check-out and Hotel App are perceived as "Moderately Important". On the other hand, Robots is the least important technological amenity to have available in a future hotel stay for the respondents. It was also asked for the respondents to name any technology that was not mentioned in the questionnaire. Almost half of the respondents answered that they would like to have Virtual Reality in their next hotel stay.

Regarding personalized services, the responses were more complex. Although, the Portuguese are "Neutral" when it comes to the importance of having data collection technology during their stay to have personalized services, they rated the importance of having personalized services as "Very important". It is an example of how the respondents have bias responses due to different interpretations. So, to extricate more information about the respondents view of personalized data, two sentences were asked to be rated: "I'm willing that my information (interests, allergies and food restrictions) be collected in order to have personalized services" and "I'm willing to provide my location during my stay in order to obtain real-time information and recommendations". The respondents "More or less Agree" that their information and location be collected in order to obtain personalized services. However, this might no longer be an option for guests since, as mentioned in the Literature Review, hotels' software will link up to guests' social media profiles such as Facebook. More than half of the Portuguese population has a Facebook account (Rosa, 2015).

Lastly, it was asked of the respondents whether technology impacts the respondents' decision when choosing a hotel, the respondents answered that they are "Undecided". Furthermore, when the respondents were asked how much they would be willing to pay to stay in a hotel with the latest technological amenities, the majority of respondents (48,3%) answered between the

price range of 61-80 and 81-100. However, when confronting this result with the last poll of made by Trivago, it is possible to conclude that it is lower than the actual price average in a Portuguese hotel (95€ in 2016) (Gordo, 2016).

To wrap up, it is possible to conclude that these results are congruent with Hofstede's insight about the Portuguese population. Particularly, the fact that the Portuguese population maintains firm beliefs and behavior and are intolerant to the untraditional. So, innovation may be resisted[7]. Some of the technologies mentioned above are quite uncommon in the Portuguese households and, even, hotels. Therefore, guests may be hesitant at this point. However, due to the rapid technology advancement together with guests' expectations, technology amenities, that were once a differentiator in the hospitality industry, have become commonplace over time. Such is the case of WIFI. In other words, the industry has to, continuously, look out for the next trends in technology and use the most suitable ones while attending to the guest's needs. Since guest satisfaction, as mentioned before, is related to not only the hotel's service, cleanliness, and price, but to its technology as well.

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[7] https://www.hofstede-insights.com/country-comparison/portugal/

6. Limitations and Future Research

The present study had several limitations that will be mentioned in this chapter as well as suggestions for future researchers of this topic.

As mentioned before, the impact of technology in the hospitality industry has been studied for several years. However, it is still quite scare, especially, concerning the Portuguese market. Therefore, there were quite some limitations on gathering information about the Portuguese hospitality industry and guest.

Moreover, this study lacks concrete information about what is going on, currently, with technology in the Portuguese hotels and what are the views of the guest's needs. This could have been overcome with an in-depth interview with a hotel manager or someone from the tourism area.

Regarding the questionnaire, it cannot be considered as a representative one since it was not done using a random sample. Furthermore, the questionnaire only grasps the surface of the issue. With further investigation, there is no way to tell how much could be unraveled. Nevertheless, hotels can get cues of what the Portuguese guests are looking for by using the findings of this study.

Although, the topic addressed in this dissertation is not new, it is important to do an updated analysis, due to the significant changes that occur, especially, in technology that becomes better and less expensive over time. With this study, upgraded information about what is trending in the hospitality industry, and knowledge about what are the technologies that a Portuguese guest deems necessary when staying in a Hotel, were added. This study may provide hotels with the necessary tools to ensure the best guest experience possible. If hoteliers guarantee the technology which may be considered vital for the highest guest satisfaction, then it will, most likely, attract newcomers or returnees leading to a potential increase in revenues (Cobanoglu et al, 2011).

It could add value to this study to investigate and compare the Portuguese guest and technology present in hotels with another country such as Japan, for example. The case of Japan would be highly interesting since it is so advance in the field of robotics and digitalization.

7. Bibliography

altexsoft. (2017, October 9). *Data Science and AI in the Travel Industry: 9 Real-Life Use Cases*. Retrieved November 28, 2017, from https://www.altexsoft.com/blog/datascience/data-science-and-ai-in-the-travel-industry-9-real-life-use-cases/

Amadeus IT Group. (2017, April 25). *The world's first Virtual Reality travel search and booking experience*. Retrieved November 27, 2017, from Youtube: https://www.youtube.com/watch?v=Ax0BmO3DrTc

Antunes, M. E., & Marrão, J. (2017). *Atlas da Hotelaria 2017*. Deloitte .

Baker, M. (2014, January 13). *Hotels expand mobile check-in options*. Retrieved November 23, 2017, from Business Traveler News: http://www.businesstravelnews.com/Hotel-News/Hotels-Expand-Mobile-Check-In-Options?ida=Hotel%20Chains&a=mgmt

Banco de Portugal. (2016). *Análise do setor do turismo 2011-2016*. Retrieved November 14, 2017, from https://www.bportugal.pt/sites/default/files/anexos/documentos-relacionados/nie_estudo_17_2014.pdf

Barry, M. B. (2017, September 7). *Travel Trend 2017: Hyper Personalization in the travel industry*. Retrieved November 23, 2017, from Linkedin: https://www.linkedin.com/pulse/travel-trend-2017-hyper-personalization-industry-mariam-banwo-barry/

BLS. (n.d.). *Industries at a Glance: Leisure and Hospitality*. Retrieved November 13, 2017, from Bureau of Labor Statistics: https://www.bls.gov/iag/tgs/iag70.htm

Brandão, F. (2016, April 9). *A tecnologia ao serviço do turismo*. Retrieved November 16, 2017, from Expresso http://expresso.sapo.pt/sociedade/2016-04-09-A-tecnologia-ao-servico-do-turismo

Buhalis, D., & Amaranggana, A. (2015). Smart Tourism Destinations Enhancing Tourism Experience through Personalisation of Services. In T. I., & I. A., *Information and Communication Technologies in Tourism* (pp. 377-389). Springer, Cham.

Buhalis, D., Neuhofer, B., & Ladkin, A. (2013, July 12). A Typology of Technological-Enhaced Tourism Experiences. (L. John Wiley & Sons, Ed.) *International Journal of Tourism Research, 16*, 340–350. doi:10.1002/jtr.1958

Business Wire. (2017, August 10). *More Than Half the Hilton Portfolio to Be Digital Key Enabled by End of Year*. Retrieved November 23, 2017, from Business Wire: http://www.businesswire.com/news/home/20170810005845/en/Hilton-Portfolio-Digital-Key-Enabled-Year

Cobanoglu, C., Berezina, K., Kasavana, M. L., & Erdem, M. (2011, October 14). The Impact of Technology Amenities on Hotel Guest Overall Satisfaction. *Journal of Quality Assurance in Hospitality & Tourism, 12*(4), 272-288.

Daniel, A. C. (2010). Caracterização do Sector Turístico em Portugal. *Tékhne - Revista de Estudos Politécnicos, 8*(14), 255-276. Retrieved October 30, 2017, from http://www.scielo.mec.pt/scielo.php?script=sci_arttext&pid=S1645-99112010000200016&lng=pt&tlng=es

Daylighted. (2016). *The 2016 challenge: empower your guests*. Retrieved November 23, 2017, from Daylighted: https://www.daylighted.com/blog/the-2016-challenge-empower-your-guests/

Discover Hospitality. (2015). *What is hospitality?* Retrieved January 24, 2018, from Discover Hospitality: http://discoverhospitality.com.au/what-is-hospitality/

eDreams ODIGEO. (2017). *European Traveller Insights 2017 Report*. Retrieved January 4, 2018, from https://www.edreamsodigeo.com/wp-content/uploads/sites/19/2017/12/eDreams_ODIGEO_EuropeanTravellerInsightsRepo rt2017_UK.pdf

Erdem, M., Schrier, T., & Brewer, P. (2009). Guestroom Technologies: Guest Empowerment Technologies. *The Bottomline: The Journal of Hospitality Financial and Technology Professionals, 24*(3), 17-19.

GDRC. (n.d.). *Environmental Impacts of Tourism: Tourism's three main impact areas*. Retrieved from http://www.gdrc.org/uem/eco-tour/envi/one.html

Glusac, E. (2016, July 20). *Hotels vs. Airbnb: Let the Battle Begin*. Retrieved December 7, 2017, from The New York Times: https://www.nytimes.com/2016/07/24/travel/airbnb-hotels.html

Gordo, A. (2016, December 28). *O preço dos hotéis em Portugal bateu recordes em 2016*. Retrieved January 9, 2018, from NiT: https://nit.pt/out-of-town/turismos-rurais-e-hoteis/preco-hoteis-portugal-subiu

Gretzel, U., & Tazim, J. (2009). Conceptualizing the creative tourist class: technology, mobility and tourism experiences. *Tourism Analysis, 14*(4), 471-481.

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: foundations and developments. *Institute of Information Management, 25*(3), 179–188. doi:10.1007/s12525-015-0196-8

Guest Contributor. (2016, October 18). *In-room entertainment: what hoteliers and guests want*. Retrieved November 17, 2017 from EHotelier: https://ehotelier.com/insights/2016/10/18/room-entertainment-hoteliers-guests-want/

Gyr, U. (2010, March 12). *The History of Tourism: Structures on the Path to Modernity*. doi:0159-20100921246

Hilton. (2016, March 9). *Hilton and IBM pilot "Connie" the world's first watson-enabled hotel concierge*. Retrieved November 29, 2017, from Newsroom Hilton: http://newsroom.hilton.com/index.cfm/news/hilton-and-ibm-pilot-connie-the-worlds-first-watsonenabled-hotel-concierge

Holbrook, M. B., & Hirschman, E. C. (1982). The Experiential Aspects of Consumption: Consumer Fantasies, Feelings, and Fun. *Journal of Consumer Research, 9*(2), 132-140.

Horwath HTL. (2015, December 15). *Tourism Megatrends*. Retrieved November 7, 2017, from Horwath HTL: http://horwathhtl.com/files/2015/12/Tourism-Mega-Trends1.pdf

HT. (2015, December 14). *How Hotels Are Using Beacons and Augmented Reality*. Retrieved November 27, 2017, from Hospitality Technology: https://hospitalitytech.com/how-hotels-are-using-beacons-and-augmented-reality

HT. (2016a)**. *2016 Lodging Technology Study*.**

HT. (2016b). ***Zebra Technologies: 75% of Guests Are Willing to Share Personal Information in Exchange for Tailored Promotions, Coupons, Priority Service or Loyalty Points*.** Retrieved November 26, 2017, from Hospitality Technology: https://hospitalitytech.com/zebra-technologies-75-guests-are-willing-share-personal-information-exchange-tailored-promotions

HT. (2017, April 4)**. *Robots in Hospitality: Five trends on the horizon*.** Retrieved November 28, 2017, from Hospitality Tech: https://hospitalitytech.com/robots-hospitality-five-trends-horizon

ILO. (2010)**. *Developments and challenges in the Hospitality and Tourism sector*.** Geneva: International Labour Office. Retrieved October 27, 2017, from http://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/meetingdocument/wcms_162202.pdf

ILO. (n.d.). ***Hotels, catering and tourism sector*.** Retrieved October 27, 2017, from International Labor Organization: http://www.ilo.org/global/industries-and-sectors/hotels-catering-tourism/lang--en/index.htm

INE (2015). ***Inquérito ao Turismo Internacional*.** Lisbon.

INE. (2017). ***Estatísticas do Turismo 2016*.** Lisbon.

Inversini, A., Cantoni, L., & Buhalis, D. (2010, August 1). Destinations' information competitors and Web reputation. ***Information technology & tourism*,** *11*(3), 221-234.

Ismail, A. (2010). ***Investigating British customers' experience to maximize brand loyalty within the context of tourism in Egypt: Netnography & structural modelling approach*.** London: Brunel Business School.

Kaplan, A. M., & Haelein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. ***Kelley School of Business*,** *53*, 59-68.

Larsen, S. (2007). Aspects of a Psychology of the Tourist Experience. ***Scandinavian Journal of Hospitality and Tourism*,** *7*(1), 7-18. doi:10.1080/15022250701226014

Law, R., Leung, R., & Buhalis, D. (2009, July 1). Information Technology Applications in Hospitality and Tourism: A Review of Publications from 2005 to 2007**. *Journal of Travel & Tourism Marketing*,** *26*(5), 599-623.

Lubetkin, M. (2016, September 2016). ***Tourism and The Internet of Things—IoT*.** Retrieved January 28, 2018, from Linkedin: https://www.linkedin.com/pulse/tourism-internet-things-iot-meni-lubetkin

Marriott Hotel. (n.d.). ***Marriott Mobile App*.** Retrieved November 23, 2017, from Marriott: http://mobileapp.marriott.com/

Martinho, V. (2016, March 30). ***Como é o turista português? Confirme se se encaixa no perfil*.** Retrieved January 4, 2018, from Notícias ao Minuto: https://www.noticiasaominuto.com/lifestyle/563340/como-e-o-turista-portugues-confirme-se-se-encaixa-no-perfil

Mason, P. (2003). ***Tourism Impacts, Planning and Management*.** Oxford: Butterworth-Heinemann.

McCarth, J., & Wright, P. (2004, September). *Technology as Experience*. Cambridge, Massachusetts: The MIT Press. doi:10.1145/1015530.1015549

McLandress, K. (n.d.). *How Hotels with mobile apps are winning over guests*. Retrieved November 11, 2017, from Appsbuilder: http://blog.apps-builder.com/hotels-with-mobile-apps/

Meuter, M., Ostrom, A., Roundtree, R., & Bitner, M. (2000). Self-service technologies: Understanding customer satisfaction with technology based services encounters. *Journal of Marketing*, *64*(3), 50-64.

Micrometrics. (n.d.). *How to Increase Guest Satisfaction Scores through Technology*. Retrieved December 6, 2017, from https://www.micrometrics.com/how-to-increase-guest-satisfaction-scores-through-technology/

Moley. (n.d.). Retrieved November 29, 2017, from http://www.moley.com/

Nolasia. (n.d.). *Eastern World versus Western World Perceived Values Placed on Robot*. Retrieved November 29, 2017, from https://nolasia.net/eastern-world-versus-western-world-perceived-values-placed-on-robot/

O'Connor, P. (2016, December 15). The Future of the Hotel Industry in 2020: A session with Peter O'Connor. (Triptease, Interviewer) Retrieved November 16, 2017, from https://www.triptease.com/blog/future-hotel-industry-2020-session-peter-oconnor/

Prahalad, C., & Ramaswamy, V. (2004, December 14). Co-Creation Experiences: The Next Practice in Value Creation. *Journal of Interactive Marketing*, *18*(3), 5-14.

Price, E. (2017, February 27). *You Rang? I Called Hotel Room Service—And Got A Robot*. Retrieved November 29, 2017, from Fast Company: https://www.fastcompany.com/3068401/you-rang-i-called-hotel-room-service-and-got-a-robot

Quanovo. (2017). *Machine Learning Technologies for the Hospitality Industry*. Retrieved November 27, 2017, from http://www.quanovo.com/whitepapers/machine-learning-technologies-for-the-hospitality-industry.pdf

QuestUpon. (2016, May 17). *Augmented Reality Quest at the Best Western Kelowna - Shaw TV coverage*. Retrieved November 27, 2017, from Youtube: https://www.youtube.com/watch?v=u6pA4sVVJV0

Ráthonyi, G., & Várallyai, L. (2011). Web 2.0 and Tourism. *HAICTA*, (pp. 27-39).

Revfine. (a). *How to use Artificial Intelligence in the Hospitality Industry*. Retrieved November 28, 2017, from Revfine: https://www.revfine.com/artificial-intelligence-hospitality-industry/

Revfine. (b). *3 Digital Trends That Will Take the Travel Industry By Storm in 2018*. Retrieved November 27, 2017, from Revfine: https://www.revfine.com/digital-trends-travel-industry/

Revfine. (c). *How Virtual Reality (VR) can Enrich the Hospitality Industry*. Retrieved November 27, 2017, from Revfine: https://www.revfine.com/virtual-reality-hospitality-industry/

Revfine. (d). *How Augmented Reality is Transforming the Hospitality Industry*. Retrieved November 27, 2017, from Revfine: https://www.revfine.com/augmented-reality-hospitality-industry/

Roland Berger. (2016). *Hotel Industry 4.0 - Leveraging digitization to attract guests and improve efficiency*. Wien: Roland Berger GMBH.

Rosa, I. (2015, October 2). *4,7 milhões de Portugueses tem conta no Facebook*. Retrieved January 11, 2018, from Observador: http://observador.pt/2015/10/02/47-milhoes-de-portugueses-tem-conta-no-facebook/

Rouse, M. (2016, December). *AI (Artificial Intelligence)*. Retrieved November 29, 2017, from SearchCIO: http://searchcio.techtarget.com/definition/AI

Skogland, I., & Siguaw, J. A. (2004). Understanding Switchers and Stayers in the Lodging Industry. *Center for Hospitality Research Publications, 4*(1), 5-29. Retrieved January 28, 2018, from http://scholarship.sha.cornell.edu/chrpubs/189/

Starfleet Research. (2017). *The 2017 Smart Decision Guide to Hotel Guest Experience Management*. Starfleet Media.

Terry, L. (2016, April 11). *6 Mega-Trends in Hotel Technology*. Retrieved November 14, 2017, from Hospitality Technology: https://hospitalitytech.com/6-mega-trends-hotel-technology

The Guardian. (2015, July 16). *Japan's robot hotel: a dinosaur at reception, a machine for room service*. Retrieved from https://www.theguardian.com/world/2015/jul/16/japans-robot-hotel-a-dinosaur-at-reception-a-machine-for-room-service

Travel Technology & Solutions. (2014, December 4). *The Future of Travel – Hyper-Personalization*. Retrieved November 23, 2017, from TTS: http://www.tts.com/blog/the-future-of-travel-hyper-personalization/

Trejos, N. (2014, September 22**). Marriott 'teleports' guests to Hawaii, London**. Retrieved November 27, 2017, from USA Today: https://www.usatoday.com/story/dispatches/2014/09/22/marriott-hotels-virtual-travel-transporter/15904019/

Tussyadiah, I. P., & Fesenmaier, D. R. (2009, January 1). Mediating tourist experiences: Access to places via shared videos. *Annals of Tourism Research, 36*(1), 24-40.

UNEP, & UNWTO. (2007). *Climate Change and Tourism: Responding to Global Challenges*. Retrieved November 3, 2017, from http://sdt.unwto.org/content/faq-climate-change-and-tourism

UNWTO. (2008). *Understanding tourism: Basic glossary*. Retrieved January 24, 2018, from UNWTO: http://media.unwto.org/en/content/understanding-tourism-basic-glossary

UNWTO. (2017a). *Tourism Highlights*.

UNWTO. (2017b). *Sustained growth in international tourism despite challenges*. Retrieved from UNWTO: http://www2.unwto.org/press-release/2017-01-17/sustained-growth-international-tourism-despite-challenges

Van Hoof, H., Verteeten, M., & Combrink, T. (1996). Information technology revisited: international lodging-industry technology needs and perceptions: a comparative study. *Cornell Hotel & Restaurant Administration Quarterly, 36*(5), 86-91.

Wall, R., & Cameron, D. (2016, May 29). Airline executives gather at IATA convention and look for answers. *The Wall Street Journal*. Retrieved November 16, 2017, from https://www.wsj.com/articles/airline-executives-gather-at-iata-convention-and-look-for-answers-1464427803

Webrezpro. (2016, March 3). *Getting to Know Your Guests: How to Gather Guest Data*. Retrieved November 24, 2017, from Webrezpro: http://www.webrezpro.com/getting-to-know-your-guests-how-to-gather-guest-data/

WEF. (2017). *The Travel & Tourism Competitiveness Report 2017*. Geneva.

Westcott, M. (2012). *Introduction to Tourism and Hospitality in BC*. Columbia: British Columbia. Retrieved December 7, 2017, from https://opentextbc.ca/introtourism/

Wright, D., & Witherick, D. (2016). *The robots are here: Meet your digital workforce*. London, UK: Deloitte LLP.

WTTC. (2017a). *Global economic impact & issues 2017*.

WTTC. (2017b). *Economic Impact 2017 Portugal*.

Yasuda, G. (2017, February 1). *New Report from Oracle Hospitality: Creating the Coveted Hotel Guest Experience*. Retrieved November 29, 2017, from Oracle Hospitality: https://blogs.oracle.com/hospitality/oracle-hospitality-hotel-guest-experience-research-report

Yee, R., Leung, A., & Cheng, E. (2009). An empirical study of employee loyalty, service quality and firm performance. *Int. J. Production Economics, 124*(1), 109-120. doi:10.1016/j.ijpe.2009.10.015

8. Appendices

8.1 Appendix I – Images of the technologies used in global Hotels

<u>**Figure 15 - Marriot Hotel App**</u>
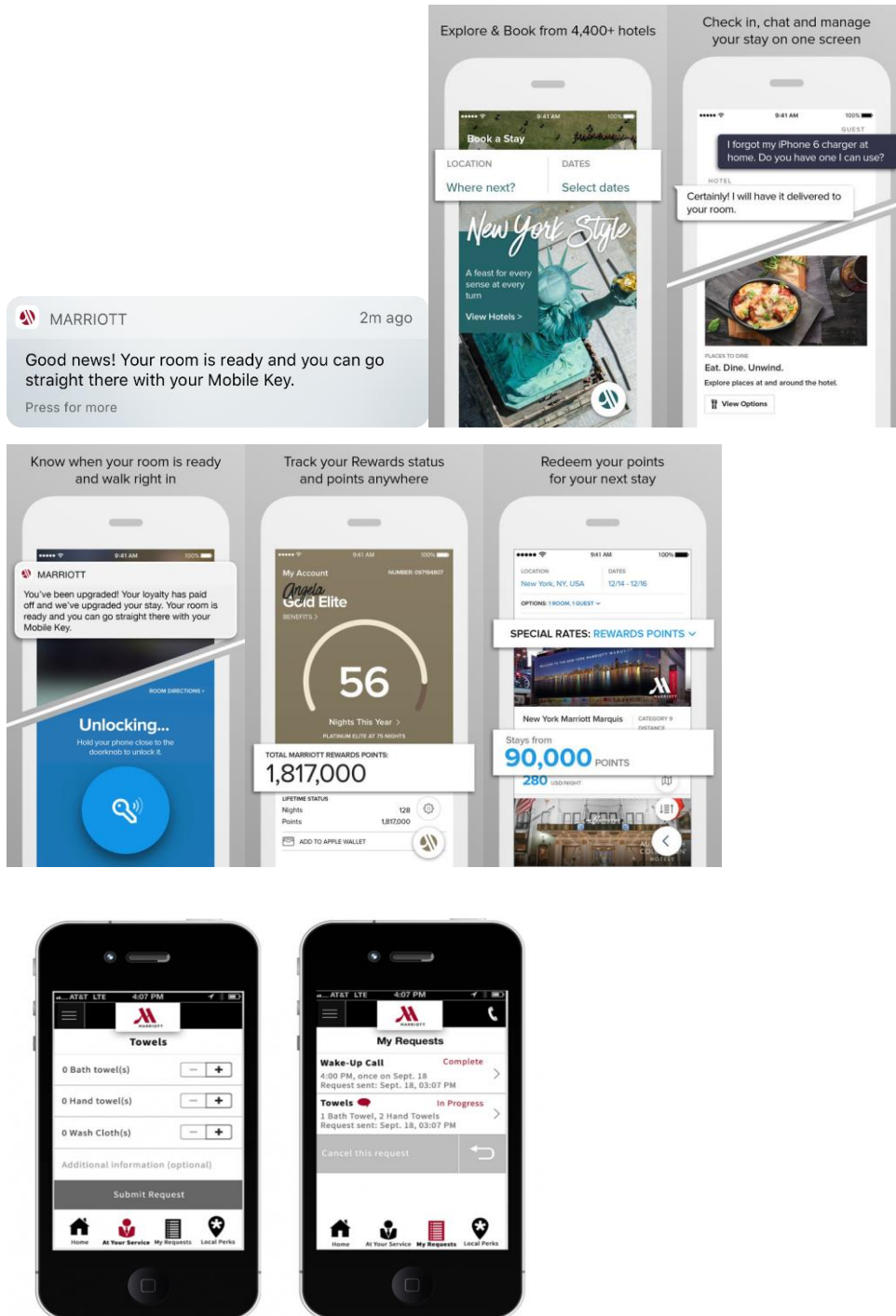
Source: iTunes

Figure 16 - Hilton Hotel App
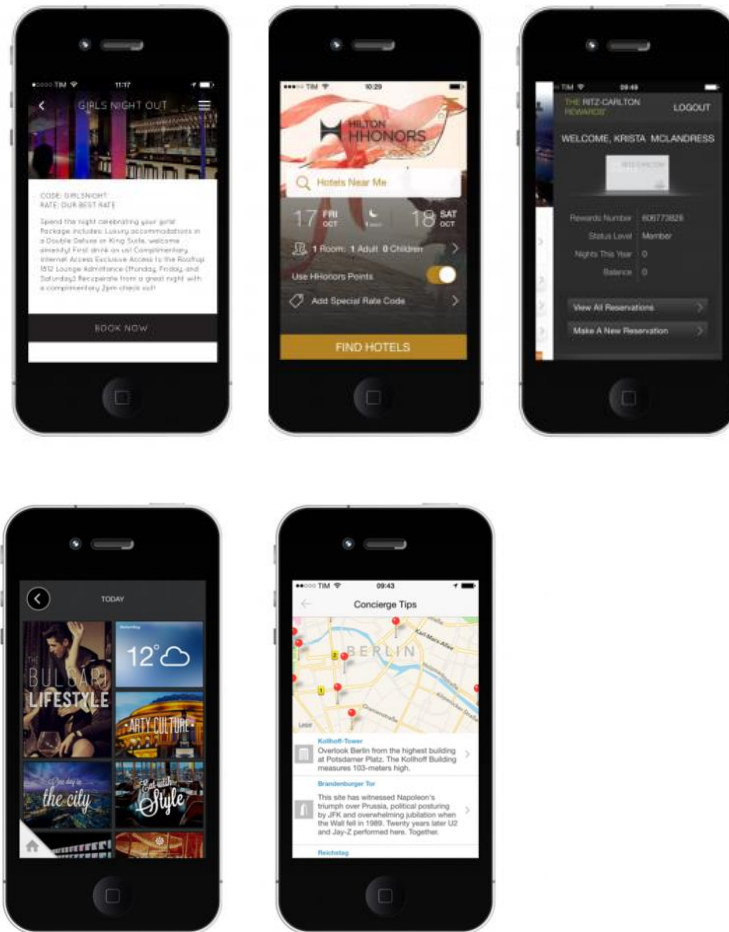
Source: iTunes

Figure 17 - Marriot Hotel VR experience

Source: https://www.americaninno.com/

Figure 18 - Shangri-La VR 360º

Source: hotel's website

Figure 19 - Amadeus Navitaire VR booking system

Source: https://www.digitalnewsasia.com/business/amadeus%E2%80%99-navitaire-unveils-virtual-reality-travel-search-and-booking-experience

Figure 20 - Hub Premium Inn AR map

Source: https://www.tnooz.com/article/budget-hotel-brand-with-heavy-technology-mix-unveiled-looks-for-hipsters-and-savvy-business-folk/

Figure 21 - QuestUpon AR app
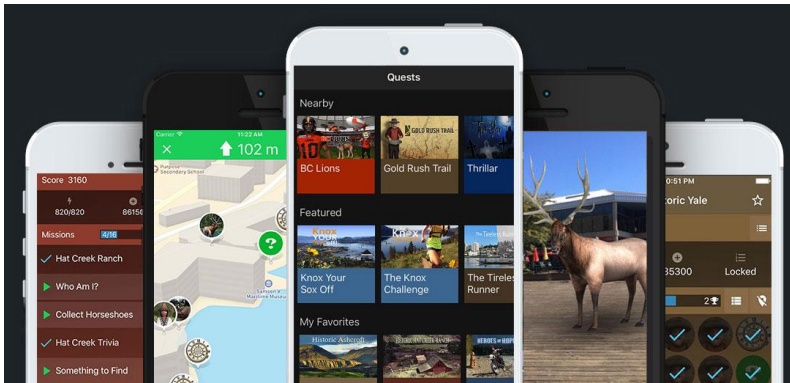
Source: Company's website

Figure 22 - Connie - The concierge robot

Source: http://newsroom.hilton.com/index.cfm/news/hilton-and-ibm-pilot-connie-the-worlds-first-watsonenabled-hotel-concierge

Figure 23 - Boltr - The robot that brings amenities to the guests' room

Source: https://www.fastcompany.com/ https://www.fastcompany.com/3068401/you-rang-i-called-hotel-room-service-and-got-a-robot
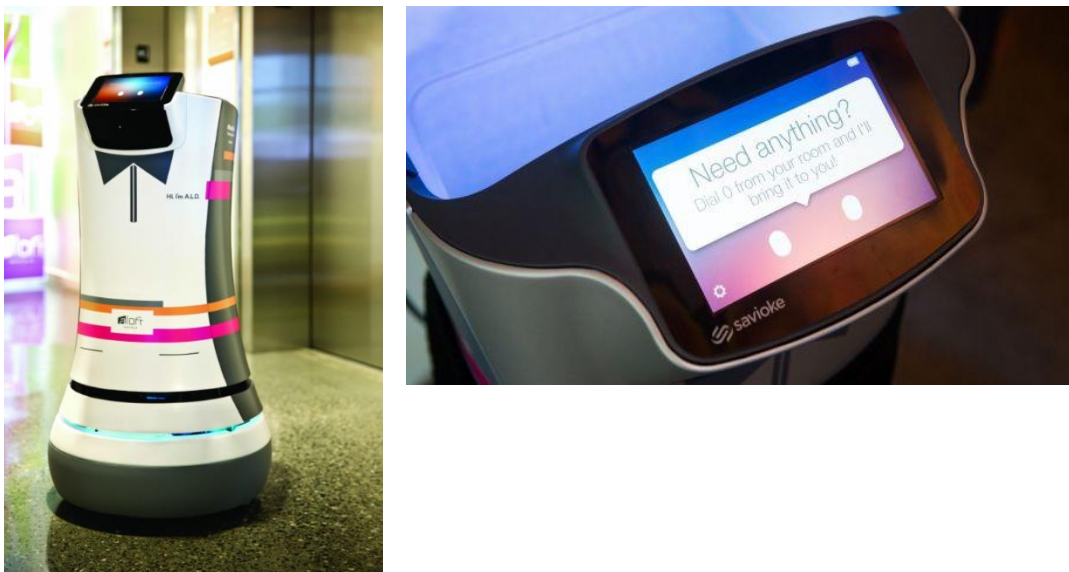
Figure 24 - Moley – the kitchen robot

Source: Company's website

Figure 25 - Front desk at Henn-na Hotel, Japan

Source: https://www.theguardian.com/world/2015/jul/16/japans-robot-hotel-a-dinosaur-at-reception-a-machine-for-room-service

8.2 Appendix II – Questionnaire

Hotel of the Future

Hello,
My name is Rita Fernandes and I am a Master student in International Management at ISCTE Business
School (Lisbon, Portugal), working under the supervision of Professor Álvaro Rosa. For my thesis, I am
researching how technology influences the hospitality industry and, especially, how guests interact with it.

Summary description of the survey
This survey will take approximately ten minutes to complete and consists primarily of questions about the
technologies present in the hospitality industry and your expectations about the service. Some basic
questions related to your demographic characteristics are also included.

Voluntariness and confidentiality
Participation in this study is voluntary. All data will be kept strictly confidential. Your answers will not be
disclosed.

*Required

Consent to Participate

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.
- I agree to participate. (Take the survey now.)
- I do not wish to participate. (Please close your web browser.)

Part I - Demographic Questions

1. **Age:** *

_____

2. **Gender:**
   Mark only one oval.

   ( ) Female

   ( ) Male

   ( ) Prefer not to answer

3. Which country do you reside? *

_____

4. Level of Education: *
Mark only one oval.

- ◯ Primary School
- ◯ Secondary School
- ◯ Professional Degree
- ◯ Bachelor's Degree
- ◯ Postgraduate Degree
- ◯ Master's Degree
- ◯ Doctorate Degree

5. Occupation: *
Mark only one oval.

- ◯ Student
- ◯ Employed
- ◯ Unemployed
- ◯ Retired
- ◯ Other: _____

6. Gross monthly salary (in €): *
Mark only one oval.

- ◯ <600
- ◯ 600-799
- ◯ 800-999
- ◯ 1.000-1.499
- ◯ 1.500-1.999
- ◯ 2.000-2.499
- ◯ >2.500
- ◯ No income

Part II - Experience in Portuguese Hotels

7. Where was the last hotel where you stayed? *
Mark only one oval.

- ◯ Portugal
- ◯ Europe
- ◯ North America
- ◯ South America
- ◯ Australia
- ◯ Africa
- ◯ Antarctica

8. **Why did you choose this hotel? (Choose as many as you like)** *

Tick all that apply.

- [ ] Location
- [ ] Price
- [ ] Online Reviews
- [ ] Recommendations
- [ ] Technological Amenities
- [ ] Other: _____

9. **Are you satisfied with the technology found in the Portuguese hotels?** *

Mark only one oval.

- ( ) Yes
- ( ) No
- ( ) I have never stayed in a Portuguese hotel

10. **Do you think that the technologies available in the Portuguese hotels had a positive impact on your experience?**

Mark only one oval.

- ( ) Yes, the technologies were enough to provide me a good experience. I wouldn't change or add anything
- ( ) No, the technologies were very outdated
- ( ) Yes, but I'd like to add/change some technologies to have a better/different experience

11. **What do you think could improve your experience during your stay in a Portuguese hotel?**

Tick all that apply.

- [ ] Better price
- [ ] Better booking system
- [ ] Better room service
- [ ] Better room quality
- [ ] Better WIFI connection
- [ ] Faster check-in and check-out process
- [ ] Other: _____

Part III - Technological trends in Hospitality

12. **Please rate the importance of the following according to a scale from 1 – "Not at All Important" to 7 – "Extremely Important" for you to have the best guest experience** *

    Mark only one oval per row.

	1	2	3	4	5	6	7
1. Hyper-personalization: the hotel has guests' information concerning interests, food restrictions, allergies, etc.	◯	◯	◯	◯	◯	◯	◯
2. Information about the city, city map access, restaurant tips, flight arrivals and departures and driving directions	◯	◯	◯	◯	◯	◯	◯
3. Check-in and check-out process	◯	◯	◯	◯	◯	◯	◯
4. Room service	◯	◯	◯	◯	◯	◯	◯
5. In-room: Tablet or iPad or TV with games	◯	◯	◯	◯	◯	◯	◯
6. In-room: Room control (heating systems, air conditioning, lighting, music, tv and control the curtains)	◯	◯	◯	◯	◯	◯	◯

13. **Please select your preferred way of obtaining the following services** *

    Mark only one oval per row.

	Concierge at the Front Desk	Hotel App on your mobile	Touch Screen Kiosk at the hotel lobby	Guest Room Tablet or iPad	Guest Room TV (remote control)	Guest Room Phone
Information about the city: restaurant tips, places to visit, etc	◯	◯	◯	◯	◯	◯
City map	◯	◯	◯	◯	◯	◯
Check-in process	◯	◯	◯	◯	◯	◯
Check-out process	◯	◯	◯	◯	◯	◯
Room service	◯	◯	◯	◯	◯	◯
Room controls	◯	◯	◯	◯	◯	◯

The robot concierge - Connie

14. I would ask Connie for information about the hotel *
Mark only one oval.

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

15. I would ask Connie for information about the city *
Mark only one oval.

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

16. I would ask Connie for recommendations *
Mark only one oval.

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

Room Service - Botlr (ALOF Hotel) the Butler Robot that delivers amenities to guest rooms

17. **I would use Botlr for Room Service** *
    Mark only one oval.

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

Kitchen - Moley the Robot

18. **I would like my meals to be prepared by Moley** *
    Mark only one oval.

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

Front Desk: Henn-na Hotel (in Japan)

19. **Concerning the Front Desk services, would you like to be assisted by robots?** *
    Mark only one oval.

    ◯ Yes, I think it is a different experience

    ◯ Yes, but I would prefer just the humanoid robot

    ◯ No, I would prefer to use just the touch screen instead

    ◯ No, I would prefer a human concierge

20. **When it comes to my best guest experience, I prefer human contact over robots** *
    Mark only one oval.

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

21. **Please rate the importance of the following technologies according to your preference. Being 1 – "Not at All Important" to 7 – "Extremely Important"** *
    Mark only one oval per row.

	1	2	3	4	5	6	7
WIFI (High Speed Internet)	◯	◯	◯	◯	◯	◯	◯
Hotel App	◯	◯	◯	◯	◯	◯	◯
Tablet or iPad in the guest room	◯	◯	◯	◯	◯	◯	◯
Interactive TV in the guest room	◯	◯	◯	◯	◯	◯	◯
Self-Check-in and Check-out	◯	◯	◯	◯	◯	◯	◯
Service Robots	◯	◯	◯	◯	◯	◯	◯
Data collection for location-based services and hyper-personalization	◯	◯	◯	◯	◯	◯	◯

22. **I am willing to have my information collected in order to have hyper-personalization** *
    Mark only one oval.

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

23. **I am willing to provide my location during my stay in order to have real-time information** *
Mark only one oval.

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

24. **Which technology would you like to have available in your next hotel stay that was not mentioned in this survey?** *
Tick all that apply.

- ☐ Virtual Reality
- ☐ Interactive Walls
- ☐ 3D Printing
- ☐ Wireless Charging
- ☐ Voice Activation
- ☐ Holograms
- ☐ Other: _____

25. **Does technology impact your decision when choosing a hotel?** *
Mark only one oval.

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

26. **How much are you willing to pay to stay in a hotel with the latest technologies? (per night)** *
Mark only one oval.

- ◯ <40€
- ◯ 41€-60€
- ◯ 61-80€
- ◯ 81-100€
- ◯ 101-120€
- ◯ 121-140€
- ◯ >140€

Thank you!
The questionnaire is now complete. I would like to ask for your e-mail, should I have further questions. Your assistance is kindly appreciated.