Haaga-Helia
University of Applied Sciences

People's view on technology: should hotels innovate?

Jeroen Westervoort

Bachelor's Thesis
Degree Programme in Hospitality, Tourism and Experience Management
2020

| **Author** | |
| Jeroen Westervoort | |

| **Degree programme** | |
| Hospitality, Tourism and Experience Management | |

| **Report/thesis title** | **Pages: 50** |
| People's view on technology: should hotels innovate? | **Appendices: 7, 21 pages** |

Technology is being developed and advances quickly. Research shows which factors are of influence for people to accept technology, yet does not provide insights in how people actual feel about technology. How do people feel in general about technology, and should hotels anticipate on that by innovating? Derived from this question, research was also done on the level of importance placed on technology, and if there is interest in high-tech hotel experiences. In this context, technology is defined as the industrial use of scientific discovery, with a focus on robots and in-room amenities.

Based on the models on technology acceptance and existing research on technology being applied in hospitality, an online survey was distributed to people with the criteria of them having stayed in a hotel or similar sleep accommodation in the past two years. Analysis of the responses demonstrates a general acceptance of technology, with people liking hotels to innovate more. Additionally, the findings suggest limited interest in staying at high-tech hotels. The results also indicate relationships between age and level of technology usage, and age and the level of importance placed on technology. Surprisingly, there was no relationship between age and the desire to stay in a high-tech hotel.

| **Keywords** |
| Technology, hospitality, acceptance |

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1   Introduction

Do you know anybody who does not use technology? Over the past decades, technology has made its way into society. Where technology used to not have a set place at home or work, now it cannot be imagined without. From the moment the Internet was developed, the technological development only has increased more and more. Mobile phones came on the market, which later became Smartphones. From typewriters, computers and laptops developed, which then also enabled writing emails and enhanced communication. Social Media emerged and is now more important than ever. Music is not being bought anymore but streamed instead. And now, robots are replacing human capital, from factories to hospitality. Kiosks are replaced with self-service kiosks, and artificial intelligence (AI) enables voice-controlled technology, chatbots, computer systems and more.

Hotels are known for being conservative rather than innovative. Where it is of course a risk to make a big investment in technology, doing nothing is not a great option either. Hotels are now busy with offering an app, and several hotels are installing self-service kiosks, often in addition to the traditional Front Desk. Often it does not go much farther than that, except of one hotel that tried in Japan, called Henn-na. The Henn-na hotel is an all-robot staffed hotel, offering a high-tech hotel experience. Unfortunately, human staff was often needed to help out the robots or do their work for them, for the robots lacked in skills or capacity. When the robots needed replacements after a period of usage, it was too expensive to replace them, moreover, humans already did most of their work anyways. This example does show on the other hand that, with future technological enhancements, such a hotel could work.

Since technology has made its way into society thus far, people have begun research on technology acceptance straight from when modern technology was invented. The Technology Acceptance Model (TAM) by Davis (1986), Igbaria's Model (1996) and the Unified Theory of Acceptance and Use of Technology (UTAUT) model by Venkatesh et al., (2003) combine elements like perceived usefulness, perceived ease of use, perceived joyfulness of use, and variables like gender, nationality and age, as determines for technology acceptance. This thesis reports the findings of a questionnaire study to establish whether people accept technology or not. Although technology might be everywhere, not everyone knows exactly how to use it, or perhaps does not want to use it. This is where acceptance comes in. Do people accept technology? Or does a certain part of society not accept it? These are questions that are looked into in this paper. In addition to this, a focus is placed on the hospitality industry, and especially hotels. Depending on

that level of acceptance, this paper looks into whether or not hotels should innovate with technology.

The main research question is: "What is the people's view on technology?", which has a follow-up question: "Should hotels innovate?". As there is a lot of research on models on technology acceptance and with that perceived usefulness on the work floor, there is little on how people in general, in society, accept technology. Therefore, this paper aims to fill that gap, and answer the question on how people see technology today. The 'People' described in the main research question, are people who have stayed at least once in a hotel or similar sleep accommodation in the past two years. These are the people that have been targeted for the data set, and their answers have been used for the results. Additionally, a further look is taken into the differences between different groups of ages. The technology that is discussed is the technology that exists right now.

Using the acceptance models of Davis (1989) and Igbaria (1996), the gap in existing literature will be investigated, which is the actual acceptance of technology by people. As technology keeps on growing and advancing, the topic is current and relevant to all industries. As this paper focuses on hospitality and mainly hotels, it should mainly solve their question to whether or not they should innovate. Furthermore, after reading this paper, you will have gained a deeper understanding in the way people view technology, and how various age categories can differ.

In chapter two of this paper, the Theoretical Framework, you will find an extensive literature review presenting an overview of the existing and used literature for this thesis. Additionally, the literature review covers a section of possible future technological trends, to get the reader to think about what the future might bring, and to define some technological concepts.

Chapter three of this thesis, the Methodology section, describes the methods used for the research that has been conducted. It will elaborate more on the different decisions that have been made concerning research methods and tools, and more importantly why they have been made.

In chapter four you will find the main findings and statistics. In chapter five, Discussion, the findings are interpreted and discussed in further detail.

Please note this paper will make use of the Harvard referencing style.

2   Theoretical Framework

In the theoretical framework you will find a literature review, consisting of four sections; models on technology acceptance, technology in hospitality, hospitability in technology, and current and future technological trends. Combined it makes the theoretical framework that is used to conduct the research for this thesis.

Before diving into the academic literature, two key concepts, technology and acceptance, should be defined clearly, as they will be used widely in this paper. As described by the Cambridge Dictionary (2020), technology is "(the study and knowledge of) the practical, especially industrial, use of scientific discovery".
Acceptance, in general, is described as "an antagonism to the term refusal and means the positive decision to use an innovation" (Simon, 2001).

2.1   Models on Technology Acceptance

This section describes different academic models that have been developed over time to determine one's acceptance towards technology. The aim of this section is to provide several models, and finally to combine different elements of them to as a base for the design of the research instrument used for data collection.

The Technology Acceptance Model (TAM), introduced by Davis (1986), adapted from the Theory of Reasoned Action (Ajzen & Fishbein, 1980), assumes that a person's information systems acceptance is depending and determined by three major variables, these being the perceived usefulness, and the perceived ease of use, which make up for the attitude towards use (Davis, 1986; Taherdoost, 2018). The model, as displayed in figure 2.1, helps to provide an understanding for what is needed to determine one's attitude towards using technology, which according to the model is the perceived usefulness, and the perceived ease of use. When this is measured, a better assumption can be made on the user's attitude.
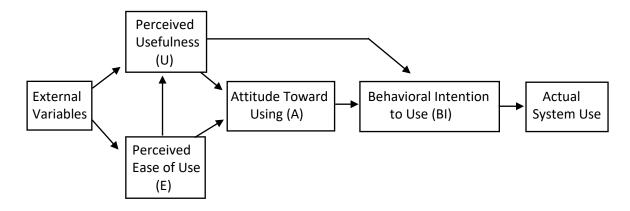
Figure 2. 1: Technology Acceptance Model, adopted from David et al. (1989)

The limitation of the Technology Acceptance Model, however, is that it assumes people plan their behaviour and think rationally. This is not the case with people. People often want things even though they do not need them, however, buy or use them out of irrationality, or for example because it is a popular trend (Islam, et al., 2014). Although the model is not one of the most recent, it is one of the most cited and base of many research papers. As it describes many cognitive factors in order for the acceptance of technology to be there, it can still be applied to today's technology, hence why it is used in this paper.

Another model describing technology acceptance is the model by Igbaria (et al., 1994). In Igbaria's Model (IM), it is explained that both intrinsic and extrinsic motivators have effect on new technology acceptance or rejection (Igbaria, et al., 1994). For intrinsic motivators, perceived fun is posited, whereas for extrinsic motivators perceived usefulness is posited. User acceptance, or actual behaviour, is directly and indirectly affected by perceived usefulness, computer anxiety, computer satisfaction, and perceived fun. In addition, perceived fun and perceived usefulness have both direct and indirect, via satisfaction, influence on adoption. Where perceived usefulness has effects on perceived fun, does computer anxiety negatively affect the two factors perceived fun and perceived usefulness. The model also confirms that satisfaction of computer has a direct influence on usage (Taherdoost, 2018). Great examples of these are people who are not able to comprehend the usage of the computer systems, which directly affects their perceived fun, for it is not fun for them at all to use a computer, for they do not understand how to use it, whilst they do understand the usefulness of it. Hence why for these people it is more difficult to accept this technology. On the other hand, while elderly can see the fun in advanced technology, they might not see the usefulness.
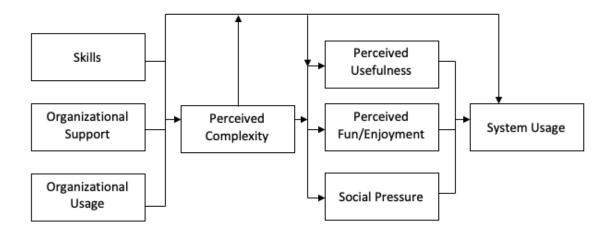
Figure 2. 2: The motivation model of microcomputer usage, adopted from Igbaria et. Al (1996)

The Social Cognitive Theory (SCT) is based on phycological thinking, developed by Albert Bandura (1986). It is based on three main factors which continually interact; personal factors, environmental influences, and behaviour. They can predict both group and individual behaviour, as well as identify methods which can change and modify behaviour (Rana & Dwivedi, 2015). All three factors constantly influence each other and reciprocally determine each other. Behaviour is focused on usage, performance and adoption issues. The personal factor is any personality, cognitive, and demographic aspect that characterises a person. The environmental factor is affected by physical and social factors, physically external to the individual. The model is integrated to evaluate the IT usage, based on factors as self-efficacy, outcome expectations performance, anxiety, and outcome expectations (Taherdoost, 2018)

There are limitations to this theory. Firstly, it does not state if one factor is of bigger influence than the other. Additionally, assumed is that changes in one factor will result in changes in the individual, and this does not need to be true per se. And lastly, the theory references to past behaviour, however, does not focus on emotion or motivation (Lamorte, 2019).

Together, these three models conclude that there are two types of factors affecting a person's view on technology, whether this is acceptance or rejection; outside factors and inside factors. Outside factors can be the perceived usefulness, as confirmed by TAM and IM, as well as other environmental aspects as peer pressure, popular trends, but also outcome (expectations) of the technology. Inside factors are the perceived ease of use and the perceived fun, as confirmed by TAM and IM, but also personality traits, cognitive and demographic aspects, as described by the SCT. Many factors need to be taken into

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consideration, hence why it is so difficult to determine whether or not technology will be accepted. It may be by one, whereas it is not by the other. Cultural backgrounds, age, wealth, personality traits etc. all need to be taken into account. This is confirmed again by Venkatesh et al., (2003), who compared the similarities and differences of many models, as described in previous sections, and created the Unified Theory of Acceptance and Use of Technology (UTAUT). UTAUT identified four factors for the acceptance of IT; effort expectancy, performance expectancy, social influence, and facilitating conditions. Additionally, four moderating variables were discovered; gender, experience, age, and voluntariness of use.
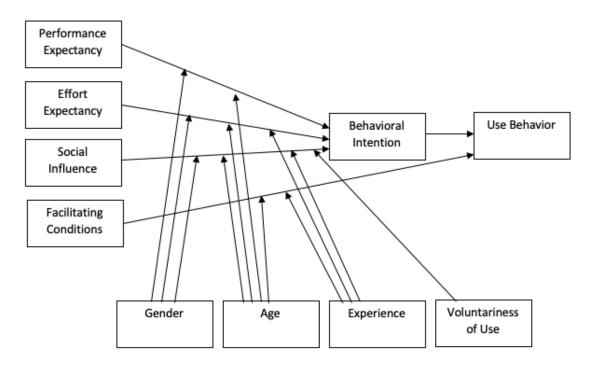
Figure 2. 3: Unified Theory of Acceptance and Use of Technology, adopted from Venkatesh et Al., (2003)

To conclude, these models all have their benefits and their flaws. Highlighted by the one is neglected by the other. Together, they combine psychology, organisational characteristics, internal factors as attitudes, values and intention, external factors as norms and incentives. Often not taken into account are intention, interest, motivation, and impulsive emotions like enthusiasm.

These models have been used as a foundation for the creation of the survey. The survey, which is explained in more detail in chapter 3 Methodology, has investigated people's technology acceptance by measuring certain factors. One of these factors are moderating variables as described by the UTAUT; gender, age, and experience (asked in the form of level of usage and difficulty with technology). Voluntariness of use has not been taken into

account, for the questionnaire has tried to find out if people, voluntarily, want to use technology and technology in hotels. Other factors measured is the level of fun and joyfulness people find in using technology, as described by Igbaria's model. And finally, the factors perceived usefulness and perceived ease of use, as described by the TAM, are being measured. Combined they provide insights in the level of acceptance respondents have.

2.2 Technology in Hospitality

This section explains what role and importance technology can have in hotels, and how it can affect revenue streams in the hotel's future.

Technology is slowly but steadily being applied in the hospitality industry. From using keys in hotels, now most often a key card is used. Where a check-in would take place at the Front Office, in some hotels a self-service kiosk can be found. Slowly but certainly steadily human interaction is replaced at certain points by technology. This Self-Service Technology (SST) is a new service delivery technology delivery method widely used in different fields, including the hospitality industry (Yang, 2018). There are many reasons for organisations to implement SST. The biggest ones are reduced labour costs, increased efficiency, productivity and corporate performance (Kuo, et al., 2016). The time spent on robot labour is less expensive than paying humans (Osawa, et al., 2017).

SST is not the only type of technology implemented in the hospitality industry. Robots are taking over roles which used to be performed by humans. Numbers of robots are developed and there to provide services in different areas, especially in public areas. In a South Korean Airport, a robot has been introduced which helps passengers to find their gate (Lee, 2017). Another example of a machine performing what used to be done by a person is a robot that vacuum cleans. This robot, developed by LG, has cameras, light sensors, and bumper sensors, which moves around and cleans the floor. This airport is not the only one. Schiphol Airport (Amsterdam) has its passenger guidance robot, Spencer, working for KLM. Oakland Airport has its waiter robot, Pepper, and there are many more examples (Read, 2017).

A study by Heo and Hyun (2015) shows that when guests evaluate a hotel, in-room technology amenities are the third most useful amenities, after bathroom facilities and bedding. This shows the level of importance the technology amenities inside the room have on guests' needs and wants during their stay. In the same study, Wi-Fi was of biggest importance. Would this change if other technology amenities would be introduced? Many hotel guests attach value to hotels that offer up-to-date technology amenities, and these technologies have, which is discovered earlier as well, direct influences on the guests' overall satisfaction, purchase behaviour and intentions to repurchase (Chen, 2015). With future amenity enhancements, it might even be so that technology amenities will not be rated third most useful, but first most useful, for, in essence, every hotel offers the same; a bed and overnight place to stay. It is very possible that these advancements in amenities could very well differentiate a hotel in the future from others, making it an order winner instead of an order qualifier, which, like described

by Cobanoglu et al., (2011) could influence the future behaviour of guests, and thus affecting the future bottom line.

The experience is a big part and essential when staying overnight in a hotel. However, from the hotel's point of view, implementing technology should not only affect the experience, but preferably also affect the bottom line. When making advances in technology and subsequent guest-related amenities, it will have the potential to improve not only the guest experience, but it will also increase both guestroom revenues and ancillary room revenues (Bilgihan, et al., 2016). In-room technology amenities are becoming rapidly available and are evolving fast (Bilgihan, et al., 2010). Hotels are trying to differentiate themselves in the competitive marketplace by offering improved technology amenities in guestrooms (Beldona & Cobanoglu, 2007). Hence, if hotels do not follow this trend along, they will be at a disadvantage compared to their competition. In addition, in-room technologies will help hotels to improve the tangible guest experience, for example, with technology guests could be able to change the rooms attributes like colour, sound and smell (Melián-González & Bulchand-Gidumal, 2016). These technology features could positively influence a hotel guest's overall experience and satisfaction level, and will therefore directly influence future behaviour, such as revisit intention (Cobanoglu, et al., 2011). This in turn will affect a hotel's current guest clientele, revenue in the long run and word of mouth and mouse advertising.

According to Bilgihan, et al., (2016) "Innovative technologies will be one of the prime differentiators of hotel companies moving forward through the twenty-first century." They conducted a study on hotel guest preferences of in-room technology amenities. They did research on differences in business and leisure travelers, and found that their attitudes towards the importance of in-room technology amenities are quite similar. However, when categorising respondents of their questionnaire into high, medium and low users of technology, they found a significant difference. High users place a greater importance on in-room entertainment technology compared to medium and low users. In addition, they show that hotel managers and developers must become early adopters of entertainment technology, for they will fall behind if not doing so. Next to providing primary devices, hotels should make a strong effort in supplying their guests with support technologies and services, like high-speed internet access, or installing an alarm clock with high quality speakers and input deivces that allow guests to connect their personal device and play their preferred music (Bilgihan, et al., 2016).

2.3 Hospitability in Technology

This section provides an overview of how hospitability can – or cannot – be found in technology.

In a quantitative research done by Yang (2018), where research was done why people choose to use a self-service kiosk – in this case in a McDonalds restaurant, and how they experience hospitality, it was found that not all interviewees felt that SST provided hospitable moments, rather it contested. The results suggest that young people prefer SST as it gives them a level of empowerment when purchasing fast food. Additionally, some young people stated that they could experience hospitable moments while using a kiosk. It can be questioned if people are interested in general in robot-technology in hotels, for it is argued it will take away the hospitality factor that human staff adds to the experience. However, in Japan a hotel, Henn-na Hotel, already has opened that is run by under 10 human staff members, for the rest it is staffed by robots and technology (Papathanassis, 2017).

There are two main criteria robots must have in the tourism industry. They must offer good service at affordable prices and perform their tasks with minimal failure (Pinillos, et al., 2016). In a service encounter, customers or guests pay more attention to non-verbal behaviour such as facial expressions (Tronvoll, 2007). If hotels want to replace human front desk professionals by robots, whilst still creating the same experience, if not better, it can be said robots need to have not only the same skills, but also similar behaviour. Humans display a lot of non-verbal behaviour; therefore, it is necessary that robots are to be equipped with non-verbal cues as well (Mara & Appel, 2015). Head tilting is considered to be kind, soft and thoughtful (Costa & Bitti, 2000). To increase the human likeness of a service robot, it should show head tilts, since it is a unique characteristic of human beings (Mara & Appel, 2015). An experiment by Murphy et al., (2017) demonstrated head tilts could facilitate the interaction of humans and robots in a service experience. If a robot is more humanlike, chances are bigger of people's acceptance of it. That being said, people's acceptance can turn into negativity if the behaviour and characteristics of it come too close of that of humans (Chung-En, 2018).

Experimental research has been conducted by Chung-En (2018) to investigate people's perception of smiling behaviours with different degrees of head tilt towards robots and humans in a service setting. Next to that, it investigated the difference in response towards the smiles based on the participants gender and age. The research was done by either online questionnaires or street interception. The stimuli used were a photo of a Front Office professional and a photo of a hotel service robot of Henn-Na, the world's first

robot operated hotel in Japan. Pictures were shown with different levels of head-tilts, and a questionnaire using a 7Point Likert scales was used to determine the results. Concluded was that robot staff with different head tilts could be promising. Some customers perceived robots as more reliable than human staff. Additionally, customers perceived the staff's interpersonal warmth – something which is to be believed a human addition to hospitality, and their visiting intention without any difference (Chung-En, 2018). Limitations and reliabilty in this research could be the element of surprise; the participants of this experiment would not have expected a smiling, head-tilting robot, which can affect the results. Additionally, a difference needs to be made with reason of travelling. A leisure traveller might be more appealed by a robot-hotel, where the robot adds to the experience, whereas a business traveller is only in the hotel to spend the night and is not interested in the robot at all; as long as it goes as efficient as possible. Additionally, the research only used pictures and scenarios, together with the hypothesized interaction, reactions could be biased. Nonetheless, it does not take away that the interesting fact of making robots more human-like in both behaviour and appearance can add hospitality to the experience, something that is oftentimes believed to be a human only ability.

On the other hand, whether robots provide the hospitality factor in the experience or not, it could provide a whole different experience in itself, for robots could make a difference on customer satisfaction by creating novel, fun and attractive interactions with customers (Kuo, et al., 2016). Where Mara & Appel (2005) say that it is necessary for robots to be equipped with human-like traits like non-verbal behaviour, Kuo et al., (2016) state robots could enable hotels to provide a whole, different, new experience, by for example creating fun interactions. If, in this experience, robots are not human-like at all, in order to provoke this fun interaction, the two statements of Mara & Appel (2015) and Kuo et al., (2016) can be perceived as being contradictive. Both options could also be applied, where Mara & Appel opt for substituting human to human interaction by robot to human interaction, Kuo et al., (2016) opts for a whole different experience, perhaps for a niche market, where robots do not replace humans, for humans never had a place in such an experience. This, however, turns out to be not completely true. Although the Henn-na hotel was designed to be a robot and technology run hotel, human staff had to intervene or help out more often than expected. Where in the hotel robots were supposed to do certain tasks, humans had to help out or take over, for the robots were not capable enough to carry out the job. The outdated robots, who had been working for several years in the hotel but needed replacement, were replaced by humans again, for they did the job most of the time anyways, and it was too expensive to replace them with new robots (Liao, 2019).

Research done by Mishraa, Goyal and Sharma (2018) on serving robots in restaurants reveals there are still many issues that need further development. They state that

navigation is still a problem. As most robots use the line follower technique – the robot is designed to follow a path already predetermined by the user (Baharuddin, et al., 2005), they are not able to perform intelligent serving as human waiters do. Furthermore, they state that serving is an issue, as the robot itself only can carry the food, not serve it. This does not only disturb the serving process, it affects the experience as well, as guests need to be of constant awareness of what it is they ordered, what it could look like and when the robot would come to bring the order (Mishraa, et al., 2018). Again, the hospitality part will always remain a big point and question, whether or not it is desired. The issues listed before are and will be resolved as technology keeps developing, however, an answer for hospitality is yet to be found. That said, machines are no longer just tools. They have gradually turned into and become social actors or social interactive objects (Gerdes, 2016). Therefore, potential areas where this, interaction between guest and robot instead of guest and staff, can be implemented in departments such as front desk, concierge, housekeeping, meetings and events (Ivanov, et al., 2017). Additionally, when asking the question if the missing hospitality factor will influence the experience, Grönroos and Ravald (2011) state that customers can create value themselves in the self-serving process when interacting with service robots, out of a sense of fun, enjoyment and curiosity.

2.4 Current and Future Technology trends

This section describes technology trends in general, without the specific focus on hotels. Moreover, it takes a brief look in what future technology might bring the hospitality industry and the world. Please note that the amount of technologies being developed and possible arising trends are huge, and thus, as ought by the author, only developments that are applicable to hotels are mentioned.

Before looking into the future, let us briefly touch upon the past. It has only been two decades since the internet has been developed. Websites were created and people could blog. A few years later, the sharing of information, communication, saw an increase in efficiency, as people could email and store data on USB-sticks. Fastforwarding to this decade, phones are not only mobile, they are also smart. People carry their phone, agenda, wallet, and camera in just one device. At the same time, there is an app for everything and Wi-Fi can be found everywhere. This paragraph is mentioned to give the reader an idea of what has been developed over what actually is a really short period of time. Therefore, it is difficult to predict what the future may bring, for it can change all so drastically. Nonetheless, examples are presented on what the trends and predicted future technology are right now.

"Artificial Intelligence (AI) is one of the most transformative tech evolutions of our times" (Marr, 2019). AI applications are often done through providers of as-a-service platforms. This allows companies to simply pay for the algorithms or compute resources, inserting their data, and use them. AI, as defined by the English Oxford Living Dictionary (2020) is "the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages". For hotels, this means full-time customer service availability, with e.g. the improving chatbots. But also at the Front Desk this could mean the solution of language barriers, but also pricing solutions, and overbooking.

Another trend is 5G data networks. The 5th generation of mobile internet connectivity will provide its users fast download and upload speeds, as well as more stable connections. Not only will it be easily applicable to the average mobile phone users, machines, robots and autonomous vehicles will be able to collect and transfer more data than ever, which will lead to advances in the area of the Internet of Things (IOT) and smart machinery (Marr, 2019). Not only IOT will advance, Internet of Skills (IOS) will start to develop. An example of IOS is kinetic movements send to anywhere in the world. A doctor in the United Kingdom could be wearing a glove connected to the internet, with which he could perform a surgery which actually is taking place in South Africa, by a robot, mimmicking

the movements in real time. This is truly where AI, 5G and robotics meet. Although Wi-Fi is widely available around the globe, my experience is that hotels often camp with slow or bad wireless connections. 5G networks could change this, resulting not only in fewer complaints, but also the possiblity of connecting people even more. Epidermal VR, which is tactile virtual reality, aims to put touch within VR's reach. This opens up great possibilities for people communicating on great distances, from helping people with amputations renew their sense of touch, to immersive gaming experiences. Hotels could implement this for example by installing communication rooms, where business travelers who are away from home often could communicate with their families on a more personal way.

Autonomous vehicles will start to emerge even more. Finland has shown that it is absolutely possible to have autonomous cars, as this country already has them in use. Tesla chief Elon Musk expects his company to develop a "truly complete" autonomous vehicle by this year (Musk, 2019). As an extra service, hotels could offer for example shuttles from the hotel to the airport, without having an extra person on the payroll, who can drive around the clock.

Personalized and predictive medicine will be a result of advanced technology. For example, wearable devices such as smartwatches will provide the ability to predict and treat heath issues in people before even experiencing symptoms (Marr, 2019). In addition to these devices giving great precautions, they could instruct others, including hotel staff, what to do in case of a stroke or other medical incidents.

Extended Reality (XR) is a technological development that enables its user to undergo immersive digital experiences. It refers to virtual, augmented, and mixed reality. Virtual Reality (VR) immerses the user into a fully digital, computer-generated world or environment. This is done (now) by using headsets and glasses, which takes you 'out' of the 'real' world. Augmented Reality (AR) however, places digital objects into the real world. This can be done via smartphone screens or displays, like what Snapchat does, and what the game Pokemon Go has done extremely well. Mixed Reality (MR) is an extension of AR. The user interacts with digital objects placed in the real world, usually using an AR headset (Marr, 2019). The future might even bring contact lenses. With these smart lenses, hotels could provide the possibility to change the looks of the room, walls, and even view.

It is unpredictable what the future will bring. 20 years ago the idea of wireles mobile phones was thought of as crazy, whereas now adays thinking of wired phones brings us closer to thinking of crazy. Only few had expected that a mobile phone would take over

not only communication, but also cameras, entertainment, televisions etc. Therefore, it is and will always be hard what it is future technology will be like. However, here are some ideas listed as described by BBC's Science Focus Magazine (2020).

Self healing 'living concrete' is being developed by scientists, consisting of a mixture of sand, gel, and bacteria, which is supposed to be a substitute for concrete. It is environmentally friendlier than concrete, but it is also 'self-healing'. The future building structures should be able to fix cracks themselves, suck up dangerous toxics from the air – which in turn reduces air pollution, and even glow on demand. This way of constructing buildings and future hotels would be of huge impact sustainability speaking. With social corporate responsibility being of big and growing importance, hotels, and other companies, should consider using different materials for their buildings, especially when building new ones, but also when renovating.

Hyperloop trains are being developed and constructed. These trains, which are moved forward in a vacuum tube, propelled by compressed air and induction motors, move people at a speed up to 760mph/1220kmph. This will have a huge impact on the hotel industry, for people will be able to travel home over huge distances in matters of hours, whereas it used to take days, or exhausting plane rides. Chances are that business travelers therefore will not have to stay in a hotel anymore, or for shorter periods, for it is easy to travel back in a short amount of time. On the other side, this way of luxurious travel could also include sleep accomodation as well, like we can see in regular trains nowadays.

Artificial neurons on silicon chips, which mimmick the neurons in a human's nervous system, will have huge impacts on the medical world. There are several examples of chips being placed in the human body, and another example is a smart chip, with which people are able to pay. The future might bring these chips, and possibilities are these chips to be a subsitute for identification, roomkeys, payment and more.

Not only on the premises and in the physical world technology is being used. Companies, including hotels, are incorporating AI technology in their search process and chat platforms on their websites to improve and enhance online communication, customer service and customer engagement (Kressmann, 2017). With the upcoming advancements of 5G, AI and Big Data technologies, hotels will be able to target and market to persons and target groups specifically. This is already somewhat happening via cookies, Google ads, Facebook ads, Instagram ads etc. Many hotels and companies have started implementing Artificial Intelligence (AI) technology in their search process and chat platforms on their websites to improve and enhance online communication, customer

service and customer engagement (Kressmann, 2017). Utilising the full potential of AI, hotels can obtain beneficial information on customer purchases, travel choices, journey patterns and itineraries, location preferences, hotel rating inquiries, and payment methods. This knowledge and data can be translated into valuable information, which can be used to develop and improve a hotel guest's experience during their travel, inquiries, stays, and whilst they are enjoying the luxurious hotel amenities (Marutitech, 2020). Hilton has launched its AI based concierge robot, Connie, performing just like a human concierge, answering questions and queries on the spot, giving recommendations and information, and other concierge duties. Crowne Plaza Auckland, like many other hotels, has started experimenting with Amazon's Alexa, a voice commanded AI program, assisting guests in their room. Commands could be 'Alexa, please turn on the light', after which the light is being turned on by the system. However, a conversation can also be held, just like with Apple's Siri. This enables guests to, for example, place an order for room service, just by speaking out loud inside their room. This could not only be beneficial for room service orders, but also for lonely travellers, looking for an (intelligent), perhaps interesting, conversation. AI will also help hotels understand their guest better before their stay, which will enable the company to smoothen the experience and personalise it better. With AI and machine learning, a hotel will be able to help their guests online and fast, but also by offering personalised options and recommendations, by saving their user preferences and page visits, how they make travel bookings, and by collecting meal and drink preferences in advance, and room bookings and reservations (Marutitech, 2020).

Human's physical features become easily readable as a result of advances in 5G technology and biometric technology, which will enable brands to design products and services more personalized than ever. People have been leaving behind an online cookie trail. Physical behaviour is also generating trackable data, which will be captured by the digital ecosystem that monitors our streets (Accenture Interactive, 2020). Examples of governments already executing this physical tracking are India, who is building the largest facial recognition system, and in China, where the authorities are building the most extensive facial recognition database – people have to have a facial scan in order to be able to buy a smartphone. In the United States, the Pentagon has developed technology which is able to identify people from a distance by their heartbeat. If technology like this becomes more easily available, hotels could start implementing enhanced security systems that not only recognises its guests, but also for example criminals or wanted persons. Additionally, it could be a way for a guest to open their room, or to pay for their stay or dinner.

The internet of bodies will be added to the internet of things, "facilitating new business models such as bundling and more effective advertising. It will supercharge businesses to

work in real time, and it will transform industries – for example, annual mobile media revenues are predicted to double in the next ten years to US$420 billion. Brain-computer interfaces and other devices that blur the lines between mind and machine also have extraordinary potential" (Accenture Interactive, 2020).

2.5   Summary

In table 2.1 an overview can be found of the most important literature that has been used in order to design the research instrument. In combination with the other literature, this has formed the theoretical framework for the research instrument. Chapter 2.1 displays models to determine user's attitude towards technology, out of which the TAM, IM, and UTAUT of main influence have been for the methodological design of the research. Chapter 2.2 creates an overview of the technology existing in hospitality, to get the reader and the author on a way of thinking and a general overview of what is there. Chapter 2.3, hospitability in technology, should provide the reader with an idea of how technology can be used for hospitality, and how hospitability can be found back in technology. Chapter 2.4 is designed in such a way to provide the author and reader an idea of what the future might bring, and how hospitality can be involved in this.

Table 2. 1: Overview Literature

Model/Literature	Author(s)
Technology Acceptance Model (TAM)	Davis (1986)
Igbaria's Model (IM)	Igbaria (1996)
Unified Theory of Acceptance and Use of Technology (UTAUT)	Venkatesh et al., (2003)
Business and leisure guests' attitude towards technology	Bilgihan et al., (2016)

3 Methodology

This chapter describes the approach of the thesis, which methods have been used, which choices have been made, and the reasons for these aspects.

3.1 Methodological approach

This thesis focuses on people's view on technology. The main research question is 'What is the people's view on technology?'. Once the research on this question has been analysed and interpreted, a conclusion will be drawn for hotels with the advice on whether they should innovate or not. The approach in this thesis is an inductive approach, therefore, a plan is made for data collection, after which the data is analysed to see if any patterns emerge that suggest relationships between variables (Gray, 2014). The choice for this method is due to the fact that the literature review is a base for this research; part of the questions as presented in the survey have been established based on the existing literature and models.

The approach for the research has consisted of several steps. First, a general overview of the existing academic knowledge was established in chapter 2, the theoretical framework. It was found that there are several models on how to measure a person's acceptance level with regards to technology, however limited research on how people actually perceive technology in general. To investigate this, survey-based research was used, by means of distributing online questionnaires. According to Gray (2014), questionnaires are 'research tools through which people are asked to respond to the same set of questions in a pre-determined order". The questionnaire was solely distributed online, via the questionnaire tool 'Qualtrics'. The questions that were asked in the questionnaire were based on the models as provided in the literature review. For example, the Technology Acceptance Model (TAM), by Davis (1986), suggests that in order to measure the attitude towards using technology is determined by the perceived usefulness and the perceived ease of use, whereas Igbaria (1996) suggests perceived fun/enjoyment is also an element for determination of acceptance. Therefore, the questions have been designed in such a way that analysis and interpretation will be able to indicate these variables as set by these models.

A decision for qualitative research could also have been made, however, then only a limited amount of people would have been asked for their opinion, whereas with a quantitative approach, many people are able to provide their insights. As this paper focuses on the view of 'people' on technology, which generalises to a large group of people, the findings of qualitative research would make a poor representation, for in

qualitative research only a limited amount of people can contribute, whereas with quantitative research many people can be reached and used for the dataset.

3.2   Method of data collection

The data was collected via an online questionnaire. This questionnaire was designed using the survey creation tool 'Qualtrics'. After the questionnaire was designed, it was distributed online by sharing a link to it on social media channels like Facebook, WhatsApp, LinkedIn, and via mail to other students and lecturers of Haaga-Helia University of Applied Sciences. Since the research aimed to investigate a generic view of people in general, there was limited consideration to the collection of respondents. The consideration that was made, was the requirement of respondents having to have stayed in a hotel or any other sleep accommodation in the past two years. This requirement was set, for one of the aims of this thesis is to determine whether hotels should innovate or not, thus a requisite is recollection of an accommodation stay.

In the questionnaire 19 questions were presented. The number of open questions were limited, as they are harder to analyse, for answers can vary greatly. Nonetheless, a few open questions can be found in the questionnaire as they offer potential for richness in responses (Gray, 2014). All others are closed questions. Likert scale questions have been asked to determine the level of agreements from respondents, resulted in ordinal data, which is convenient for it offers the possibility of ranking of values. The rating questions were asked to determine the usage level of technology of respondents. In multiple choice questions different options were given, to which respondents could indicate which of them they used or sounded appealing to them. This was done to provide a certain idea for the respondent and make them think critically. Five questions the respondents had to answer with a 7-point Likert scale, three rating questions, two open questions and six multiple choice questions. The entire questionnaire can be found in appendix 9.1

The goal for the survey was to collect approximately 400 responses to meet the required representative sample and level of confidence. This was calculated by using Raosoft (2020). The calculation used the numbers as displayed in table 2.

Table 3. 1: Sample calculation numbers

Accepted margin of error	5%
Required confidence level	95%
Population size	20.000[1]
Response distribution	50%

[1] Since the survey is accessible to all members of society who stay in a hotel, it was difficult to determine a population size. Therefore, 20.000 has been taken, for the sample size will not be affected much in the calculation if the population size becomes greater than 20.000

The calculation advises the sample size to be 377, and everything above that will raise the percentage of the confidence level. Therefore, the decision was made to try to sample around 400 people. The group that has been targeted to fill in this survey was everyone who have stayed in a hotel or any other sleep accommodation in the past two years.

Demographic questions were also included to gather information about characteristics such as the participants' age, gender, and nationality. These questions were included in order to determine any patterns or relationships between a person's view on technology and their demographic background.

3.3 Method of analysis

The survey was completed by 550 people, out of which 452 completed the questionnaire. The dataset was then filtered down to people who gave their consent for their answers to be used in the data set and who answered 'yes' to the question 'Have you stayed in any type of hotel or sleep accommodation in the past two years?'. This results in a total of 435 questionnaires used for the dataset.

To analyse the data, SPSS and Qualtrics are being used. Where Qualtrics was mainly being used for visualisation of data, STSS was used analyse the data. The statistical methods used to analyse the data are frequency tests, chi-square tests, correlation tests and cronsbach's alpha method.

3.4   Evaluation and justification of methodological choices

Although quantitative methods provide a good general overview of the perception of a big group, they do not provide the in-depth opinions like qualitative methods do. However, since this thesis tries to generate a more generic result, a choice for quantitative research is a better fit. Additionally, when this research was being conducted, the COVID-19 virus was of great influence in the choice of thesis and data collection method. Due to the COVID-19 pandemic, an intelligent lockdown had taken place during the time of conducting research for this thesis, meaning all contact with other people had to go online, which had its impact for both quantitative and qualitative methods.

Even though the questionnaire that was distributed has had many respondents, limitations have been found. A limitation in this research is that the people in the age category 60+ are not as well represented as for example people in the age category of 21-30. This is due to several reasons. First of all, the questionnaire could only have been distributed online, as the COVID-19 virus made it impossible to distribute the questionnaire in public places. This in turn resulted in the questionnaire being distributed via social media channels (Facebook and WhatsApp), LinkedIn and E-mail. This can be seen back when the responses are being divided into demographic groups. The biggest groups are youngsters up until 29 years of age. The questionnaires were distributed by the author, and this is the biggest segment in the author's network. Additionally, since the questionnaire could only have been distributed online, 60+ aged people could not be as well reached as offline. Perhaps this is due to the platform used distributing the questionnaire.

3.5 Validity and Reliability

This research demonstrates face validity (the research instrument appears to measure what it was designed to measure (Grey, 2014)) and external validity (the extent to which it is possible to generalize from the relationships found in the data (Grey, 2014)). The external validity can be seen via the fact that the representative number of samples has been met for the required confidence level. A suggestion for further research in order to prove external validity even more is by organising a similar study and to compare its results. For now, in SPSS the validity has been measured on the most important questions, by means of a correlations test. All questions, except for question 17 (2-tailed = ,216) are valid. The results can be found in appendix 9.6.

Internal reliability has been measured on the same questions as described above. Using SPSS, Cronbach's alpha test has been applied on these questions. The results, which can be found in appendix 9.7, indicate that, with Cronbach's alpha being ,718, concluding this research instrument in reliable. With the alpha coefficient being above ,7, it is deemed acceptable.

3.6   Ethical considerations

In order not to invade privacy, consent was asked in the first question of the questionnaire.

"You acknowledge that your participation in the study is voluntary, you are 18 years of age or have permission of your parents/guardians, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason. By clicking the button below you give consent for your responses to be used for the data collection of the research, which will be published in the format of a Bachelor Thesis. Please be aware that responses are fully anonymous and confidential."

If the consent button was not checked, the questionnaire would be terminated, and thus would not be taken into the data set. Furthermore, in the questionnaire, no personal details were asked in order to maintain full privacy.

4 Findings

This chapter aims to provide a clear overview of the analysis and results of the questionnaire. The main research question to be answered is 'What is the people's view on technology?', followed by 'Should hotels innovate?'.

In order to be able to answer the main research question, a set of sub questions has been developed, which will be answered in this chapter. The analysis aims to answer the following main research questions (MRQ) and sub questions (SQ):

MRQ 1:

How do people see technology?
- SQ 1.1: Do people perceive the use of innovative technology as fun or enjoyment?
- SQ 1.2: Do people perceive the use of new technology as being easy or difficult?
- SQ 1.3: What technology do people use?

MRQ 2:

What is the level of importance people place on technology?
- SQ 2.1: And do people perceive the use of innovative technology in hotels as useful?
- SQ 2.2: And what is the importance people place on technology when applied in hotels?
- SQ 2.3: Should hotels innovate with technology and which features would people like to see?

MRQ 3:

Is there a market for high-tech hotel experiences?

After these general questions have been answered, this chapter aims to present possible underlying relationships between certain variables, in order to obtain a deeper understanding of the results. To investigate this, the following questions have been developed:

Is there a significant relationship between people's age and their level of technology usage, age and their motivation to stay in an all-technology hotel, and amount of technology usage and motivation to stay in an all-technology hotel?

4.1 People's view on technology

Question 8 in the questionnaire, 'Please describe your view on technology in one word.' was an open question to get a general overview of what people think of technology. The answers are displayed in the form of a word cloud, as can be seen in figure 4.1. The word cloud displays 50 words that were answered the most. The bigger the word, the more it was answered. In the word cloud, the word 'useful' is the biggest, for it was answered the most in the questionnaire.

Question 10 asked the respondents their perception of ease of use when trying new technology. Table 4.1 displays the results to this question. With 55,9%, 'moderately easy' was answered most. 3,0% answered 'moderately difficult, and 'extremely difficult' was answered by only 0,5%.

Figure 4. 1: Technology Word Cloud

The perceived enjoyment of technology was asked about in question 12. Table 4.2 displays the result to this question. With 48,0%, 'agree' was the mostly chosen option. 21,1% 'strongly agrees'.

Table 4. 1: Q10: When I try new technology, I find it … to use

Q10: When I try new technology, I find it … to use

		Frequency	Percent	Cumulative Percent
Valid	Extremely easy	31	7,1	7,1
	Moderately easy	243	55,9	63,0
	Slightly easy	69	15,9	78,9
	Neither easy nor difficult	45	10,3	89,2
	Slightly difficult	32	7,4	96,6
	Moderately difficult	13	3,0	99,5
	Extremely difficult	2	,5	100,0
	Total	435	100,0	

Table 4. 2: Q12: I see technology as fun and enjoyful

Q12: I see technology as fun and enjoyful

		Frequency	Percent	Cumulative Percent
Valid	Strongly agree	92	21,1	21,1
	Agree	209	48,0	69,2
	Somewhat agree	97	22,3	91,5
	Neither agree nor disagree	22	5,1	96,6
	Somewhat disagree	11	2,5	99,1
	Disagree	2	,5	99,5
	Strongly disagree	2	,5	100,0
	Total	435	100,0	

In question 13 of the questionnaire people were asked about their possession of technological devices. In figure 4.2 the top 5 devices are being displayed, with a laptop and smartphone being the mostly owned technological devices by 420 out of 435 participants.
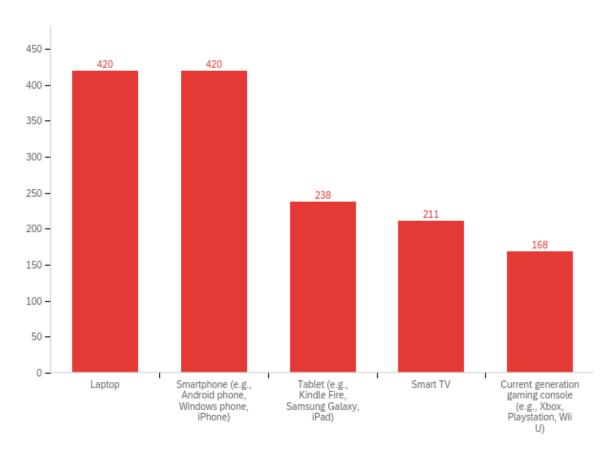
Figure 4. 2: Top 5 technological devices

4.2 Level of importance placed on technology

Question 9 asked the respondents for their level of importance that is placed by them on technology. 43,4% of the respondents rated technology as being 'very important' for them, 31,0% 'moderately important', and 18,6% 'extremely important'. Only 3 respondents (0,7%) rated technology as 'not at all important'.

In appendix 9.2 a cross-tabulation can be found between the age category of respondents and their rating on technology importance. The numbers show that people up until the age of 39 generally place a higher level of importance on technology than those older than that. Chi-square statistics showed this to be statistically significant with P=,002

When looking at what respondents think of innovative technology when applied in hotels (question 16), nearly half of the respondents (48,3%) think of it as 'moderately useful', and almost a fourth of the respondents (24,8%) as 'extremely useful'.
What is the level of importance people place on technology?

4.3   Should hotels innovate with technology and is there a market for high-tech hotel experiences?

To the question if hotels in general are innovative with technology, most respondents (somewhat) agree with this, as can be seen in table 4.3. Although the note must be added that most respondents (38,6%) only 'somewhat agree' with this.

When asked if hotels should innovate more with technology, a large majority agrees. 'Strongly agree' was filled in by 16,3% of the respondents, and 'Agree' was answered by 43,7%. All results can be found in table 4.4.

The all robot-run hotel Henn-na in Japan is real life evidence that such a hotel can exist and has a clientele, thus people are interested in staying in such an accommodation. One of the questions in the questionnaire (20) asked the respondents whether they would like to stay in a hotel run by robots and technology. A mere 5,3% answered 'definitely yes' to this question, with 17,9% answering 'probably yes', and 15,9% was undecisive. 35,6% would probably not want to stay in such a hotel and 25,3% definitely not. In appendix 9.3 a cross-tabulation can be found between the age category of respondents and their answer to question 20. It can be seen that in every age category most respondents choose for 'probably not'. The chi-square statistic showed that this is not statistically significant; the data suggest that the variables are independent of each other and are not associated with each other.

Table 4. 3: Q17: Do you think hotels in general are innovative with technology?

Q17: Do you think hotels in general are innovative with technology?

		Frequency	Percent	Cumulative Percent
Valid	Strongly agree	9	2,1	2,1
	Agree	77	17,7	19,8
	Somewhat agree	168	38,6	58,4
	Neither agree nor disagree	75	17,2	75,6
	Somewhat disagree	75	17,2	92,9
	Disagree	29	6,7	99,5
	Strongly disagree	2	,5	100,0
	Total	435	100,0	

Table 4. 4: Q18: Do you believe hotel should innovate more with technology?

Q18: Do you believe hotels should innovate more with technology?

		Frequency	Percent	Cumulative Percent
Valid	Strongly agree	71	16,3	16,3
	Agree	190	43,7	60,0
	Somewhat agree	107	24,6	84,6
	Neither agree nor disagree	44	10,1	94,7
	Somewhat disagree	15	3,4	98,2
	Disagree	8	1,8	100,0
	Total	435	100,0	

Question 19 in the questionnaire gave the participants of the questionnaire a few examples of technological features and asked them the likelihood of them using the features when staying in a hotel. Figure 4.3 shows the features and the respondents' answers. With 204 picks, self-service check-in is by 46,9% of the respondents answered as 'definitely yes', followed by another 160 respondents answering 'probably yes'.
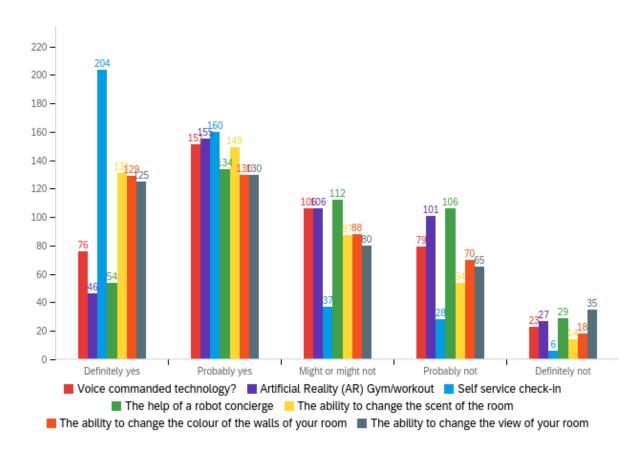
Figure 4. 3: Q19: How likely would you use the following features in a hotel?

4.4   Relationship between age and technology

In appendix 9.4 a cross-tabulation can be found between the respondents' age category and their technology usage. Where people of younger age categories use technology a lot, people of older age categories use technology less. The chi-square statistics have shown that there is a statistically significant relationship between the two variables, as P=,00

Additionally, there is also a statistically significant relationship (P=,00) between technology usage (question 11) and the motivation to stay in an all-robot/high technology hotel (question 20), as can be seen in the cross-tabulation in appendix 9.5

5 Discussion

This chapter discusses the interpretation of the findings, its implications, and its limitations. Additionally, recommendations for future research are also provided.

5.1 People's view on technology

When looking at which word people have answered in the questionnaire when was asked on their view on technology, as can be seen in the word cloud in figure 4.1.the biggest word was useful. Helpful, important, future, interesting, and convenient are other emerging themes found. This implies that there is a generic positive view on technology in general.

According to the models of Davis (1986), and Igberia (1996) technology is accepted if there is a perceived usefulness, a perceived ease of use and a perceived fun or enjoyment when using technology. The findings suggest that the majority of the respondents find new technology easy or somewhat easy to use, and at the same time, a majority finds it fun to use or gets enjoyment from it. The results in the word cloud have suggested that the word that is mentioned most to describe the respondents view on technology is 'useful'. In addition, when asking for the level of importance placed on technology by the respondents, with a majority, 43,4% finds it very important. This together indicated that, generally, the respondent of the questionnaire has accepted technology, finds technology important, enjoys using technology and finds it (somewhat) easy to use new technology.

Although people accept technology, in the feedback section of the questionnaire, several people indicated they prefer the human interaction over technology. This is one of the comments left behind in the open feedback question from the survey: "*As a customer, I value a lot a personal touch from the hotel. As a Marriot Bonvoy gold member, I value a lot a personal greeting with my name and some upgrades. Use of technology of course would make these things easier enable so much more. Being noticed is one of the most important things in my opinion.*"
This quote, which is one out of many others, suggest a hotel should take their guests' aspects into consideration, like their target market, reason for people staying there, brand values etc. When in a hotel it is all about meeting expectations – or like many say, exceeding them – a hotel should be very much aware of what it is the guest is expecting. If this is a high human-touch experience, it would not make sense for a hotel to replace the front desk with self-service check-in.

5.2 Level of importance placed on technology

In general, the respondents place a high level of importance on hotels. This is shown by the answers of question 9 in the questionnaire, with almost half of the respondents answering the question with 'very important'. Additionally, there is a statistically significant relationship between the age of the respondent and their level of importance placed on technology. According to the chi-square test, this is not by accident, thus, in the questionnaire, people who are younger would generally choose for a higher level of importance and vice versa. This indicates that there is a relationship between these variables, however from the questionnaire it cannot be said that one is a direct cause of the other. In order to determine that, further research should be conducted to confirm this relationship (e.g. via a t-test), and then what the cause is of this relationship.

5.3 Should hotels innovate with technology and is there a market for high-tech hotel experiences?

The findings show that the respondents in general believe advanced technology in hotels is useful. Moreover, they do agree to a certain extent that hotels are innovative with technology. That being said, a large majority believes that hotels do however need to innovate more. When asked what technological features a hotel should have, respondents differed a lot within their responses, however several answers came back multiple times. Many people wrote down self-check-in, but also smart home technologies for in the room, voice-commanded technology, keys replaced by mobile phones or fingerprints, but also decent Wi-Fi was mentioned several times. The complete list with answers can provided upon request. Additionally, figure 4.3 shows that self-service check-in is a feature a majority of the respondents would like to use or at least try. This indicates that people do not necessarily expect hotels to go crazy when is asked for more innovation. Simple things, like the ones mentioned, will already meet the current needs of a hotel's guest. Figure 4.2 shows which technological devices are owned the most by as per the participants of the questionnaire. This gives an indication of which technological devices are used by the average respondent in their lives and are known by people. If this is the trend of technology right now, hotels can start by implementing these basic features, for they have also become the norm in people's daily lives at home.

To the question to whether there is a market for all-robot-run hotels or very high-tech hotel experiences, a clear answer cannot be stated. On the one hand, Henn-na, the world's first all-robot and technology run hotel, located in Japan, proves there is such a market, for they have been operating several years now with success. On the other hand, when looking at the results of the questionnaire, many people indicate to like the human touch in a hotel experience. Moreover, from question 20 in the questionnaire it can be seen that the majority would probably not or definitely not like to stay in a robot-run hotel like Henn-na. This finding collaborates with the real-life events of the robots in Henn-na, where many of the robot staff have been replaced back by human staff again. What is even more interesting is that there is no statistically significant relationship between the age of respondents and their motivation to stay in such a hotel. This is interesting, for there is a significant relationship between people's age and their level of importance placed on technology, as described in chapter 4.4. Further research should be conducted on these kinds of experiences and what it is that it makes a person to want to stay in such a hotel, for if it is not related to their age.

5.4 Relationship age and technology

In general, people of old age have more difficulties with computers, tablets, mobile phones etc. than teenagers. It is therefore also widely assumed that younger people use technology more intensely than older people. In the findings of the questionnaire there is a statistically significant relationship between the age category of the respondents and their level of usage of technology, as can be seen in appendix 9.4. The reason for this is that most likely people of younger ages use technology more than people of older generations, for the younger generation grew up with technology.

Although there is not a relationship between age and the respondent's motivation to stay in a robot hotel, there is a statistically significant relationship between the amount of technology that is used on a daily base and the respondent's motivation to stay in a robot hotel, as can be seen in appendix 9.5. When looking at the cross-tabulation, it can be seen that no matter the level of usage of technology, the mostly answered options were the ones that indicate that the respondent will (probably) not like to stay in a robot hotel, whereas one could expect that a person who uses technology a great deal in their daily lives perhaps would be more tempted to stay in such a hotel than a person who uses technology only a limited amount per day. This arises the questions for why it is that only few would like to stay in these types of hotels. Is it because of the limited human touch that is expected in hospitality, or something completely different? This is where further research could be done.

5.5 Main Research Questions and Sub Questions answered

In general, respondents see technology as useful, helpful and important (MRQ 1), the majority finds it fun to use or gets enjoyment out of it (SQ 1.1), finds it to a certain extent relatively easy to use new technology (SQ 1.2), and usually owns and uses typical devices like laptops and smartphones (SQ 1.3). More than half of the responses place at least the level of very important, or even extremely important, on technology (MRQ 2), with only very few people placing no importance on technology. In hotels, innovative technology is seen as useful by a large majority of the respondents (SQ 1.1). People think advanced or innovative technology in hotels is useful (SQ 2.2), and most respondents (somewhat) agree that hotels are innovative already with technology, however, the majority believes hotels should innovate more, with the main features that would be liked to be seen being self-service check-in, voice controlled technology and smart home technology (SQ 2.3). Generally, there is no interest in a high-touch hotel experience, no matter the age of the respondent (MRQ 3).

5.6 Limitations and recommendations for further research

Limitations are found within the demographic groups. First of all, some age categories (21-29 and 31-39) are better represented than others (50-59 and 60+). Furthermore, the demographic groups have only been divided in these groups solely based on age, whereas possible divisions could be e.g. income or education. Moreover, because of this lack within the demographic groups, diversity between people cannot be measured. Most respondents are from the author's close network, or students from Haaga-Helia University of Applied Sciences, as these are the people amongst who the questionnaire has been distributed. Another limitation is one within the questionnaire. Questionnaires can be interpreted differently from the way the author intended the questions to the way they are interpreted amongst the respondents.

Another limitation is the missing factor of social pressure, as described by different models on technology acceptance, which has not been included in this paper. Further research could build upon this existing research by also including social pressure, and perhaps voluntariness of use, which then will enable the application of findings to technology in the work environment as well.

There are a few aspects that need further research. To start, as described in chapter 4.2, people of younger age categories tend to place a higher importance on technology. The findings of the questionnaire however do not indicate why it is there is a relationship between these variables. Therefore, further research should be conducted on what it is that makes these variables having a relationship. The second finding in need of further research is the finding that there is no relationship between age and the desire to stay in a high-tech hotel, even though people of younger ages to find technology important. One could think that, as a younger person places a higher importance on technology, they would have a higher desire to stay in such a hotel, so if this is not the case, why is that? The same applies to the third finding in need of further research; what is the reason for the relationship between the level of usage in technology and the (limited) desire to stay in a high-tech hotel?

5.7   Evaluation of the thesis process and one's own learning

As this section describes the author's process and learning, it will be written in his own perspective, in an informal way.

I have found the writing of this thesis to be a fun, yet challenging process, especially in this time where the world was placed in a pandemic grip. Although there were time limitations, I have managed to conduct research and write this thesis in a timely manner, meeting every deadline. When evaluating this thesis process myself, I am proud of what has been delivered, and what I have learned.

My learnings are mostly within conducting the quantitative research and the analysis of it. Since I do not have much trouble with academic writing and conducting literature research, the overall writing of this thesis was not challenging. When it comes to the creation, distribution, and analysis of the questionnaire, it gets more difficult, as it is something I have not done before at this level. I have found it to be interesting, and have learned a lot on how to work with raw data and programs like SPSS.

I believe I have worked well together with my thesis advisor, dr. Pasi Tuominen, as well, and I think I have implemented the feedback to the best I could.

6 Conclusion

"Innovative technologies will be one of the prime differentiators of hotel companies moving forward through the twenty-first century" (Bilgihan, et al., 2016). The respondants of the questionnaire generally accept technology and find it useful. At the same time, they also believe hotels should innovate more. Whilst innovation is requested, it does not need to be difficult straight away. 'Simple' things, like decent Wi-Fi, self-service check-in, voice commanded technology, and an I-Pad in the room already can do the trick for now. By installing the technology people can find in there homes as well, hotels will meet the current needs of guests. As the opening quote of this paragraphe suggests, hotels will on the other side need to use these innovative technologies in order to differentiate themselves, and perhaps even to gain market share and stay competitive.

Additionally, a difference can be found within the view on technology between different age categories. A different level of importance is placed by younger people (a higher importance) than older people (a lower importance). That being said, all age categories are equally not interested in staying in a high-tech hotel experience.

7 Acknowledgements

I would like to thank my thesis advisor, dr. Pasi Tuominen, for guiding me in this process and giving feedback during. I would like to thank Haaga-Helia University of Applied Sciences and Breda University of Applied Sciences for their available resources that I could use.

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9 Appendices

9.1 Thesis Survey Questions

Thesis survey

Survey Flow

Standard: Consent (1 Question)
Standard: Introduction (1 Question)
Block: Segment Questions (3 Questions)
Standard: Hotel stay behaviour (2 Questions)
Standard: Technology General Questions (8 Questions)
Standard: Technology and Hotels Questions (6 Questions)
Standard: Word of appreciation and feedback opportunity (1 Question)

Page Break ————————————————————————

Q1

Welcome to the research study!

I am interested in understanding people's view on technology. You will be presented with information relevant to technology and the hotel business and asked to answer some questions about it. Please be assured that your responses will be kept completely confidential.

Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. If you would like to contact the Principal Investigator in the study to discuss this research, please e-mail Jeroen Westervoort, via jeroen.westervoort@myy.haaga-helia.fi.

By clicking the button below, you acknowledge that your participation in the study is voluntary, you are 18 years of age or have permission of your parents/guardians, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason. By clicking the button below you give consent for your responses to be used for the data collection of the research, which will be published in the format of a Bachelor Thesis. Please be aware that responses are fully anonymous and confidential.

◯   I consent, begin the study (1)

◯   I do not consent, I do not wish to participate (2)

End of Block: Consent

Start of Block: Introduction

Q2 This survey will ask you on your opinion on technology in general and applied in hotels. You do not need to have specific knowledge on technology.
This survey will help me gain insight in people's view on technology, which I will use to write my Bachelor Thesis.

The survey will approximately take 10 minutes of your time. I am very thankful for your participation and cooperation!

X→

Q3 What is your nationality? If you do not affiliate with this nationality, please select your permanent country of residence.

▼ Netherlands (122) ... Zimbabwe (195)

Q4 What is your sex?

○　　　　Male (1)

○　　　　Female (2)

○　　　　Other (3)

Q5 Which category includes your age?

- ○   17 or younger   (1)

- ○   18-20   (2)

- ○   21-29   (3)

- ○   30-39   (4)

- ○   40-49   (5)

- ○   50-59   (6)

- ○   60 or older   (7)

Q6 Have you stayed in any type of hotel or sleep accommodation in the past two years?

- ○   Yes   (1)

- ○   No   (2)

Skip To: End of Survey If Have you stayed in any type of hotel or sleep accommodation in the past two years? = No

Q7 When travelling, I usually stay at a(n):

- ○   (Air)BnB   (1)

- ○   Apartment Hotel   (2)

- ○   Hostel   (3)

- ○   Hotel   (4)

- ○   Motel   (5)

- ○   Other   (6) _____

Q8 Please describe your view of technology in one word.

○   1 (1) _____

Q9 For me, technology is

○   Extremely important (1)

○   Very important (2)

○   Moderately important (3)

○   Slightly important (4)

○   Not at all important (5)

Q10 When I try new technology, I find it ... to use

○   Extremely easy (1)

○   Moderately easy (2)

○   Slightly easy (3)

○   Neither easy nor difficult (4)

○   Slightly difficult (5)

○   Moderately difficult (6)

○   Extremely difficult (7)

Q11 In my daily life, I use technology

- ○   A great deal (1)
- ○   A lot (2)
- ○   A moderate amount (3)
- ○   A little (4)
- ○   None at all (5)

Q12 I see technology as fun and enjoyful

- ○   Strongly agree (1)
- ○   Agree (2)
- ○   Somewhat agree (3)
- ○   Neither agree nor disagree (4)
- ○   Somewhat disagree (5)
- ○   Disagree (6)
- ○   Strongly disagree (7)

Q13 What electronic devices do you own? Multiple answers allowed.

☐ Smartwatch (1)

☐ VR/AR (2)

☐ Laptop (3)

☐ Voice commanded technology (4)

☐ Desktop computer (5)

☐ Tablet (e.g., Kindle Fire, Samsung Galaxy, iPad) (6)

☐ Smartphone (e.g., Android phone, Windows phone, iPhone) (7)

☐ Phablet (8)

☐ E-book reader (e.g., Nook, Kindle) (9)

☐ Portable media player (e.g., iPod) (10)

☐ GPS (e.g., TomTom) (11)

☐ Smart TV (12)

☐ Flat screen HD TV (13)

☐ Current generation gaming console (e.g., Xbox, Playstation, Wii U) (14)

☐ Older gaming console (15)

☐ Current generation portable gaming device (e.g., Sony PS Vita, Nintendo 3DS) (16)

☐ Older portable gaming device (17)

☐ Streaming media device (e.g., Roku, Apple TV) (18)

☐ Other: (21) _____

Q14 8. What wearable smart technology sounds appealing to you? Multiple answers allowed.

☐ Clothing (e.g., running shoes, shirts, pants) (1)

☐ Watches/jewelry (2)

☐ Eyewear (e.g., glasses, contacts) (3)

☐ I would not want wearable smart technology (4)

☐ Other (feel free to get creative!) (5)

_____

Q15 How much technology would you like to see in this world?

0 = no technology at all

50 = current situation

100 = everything is technology

	0 10 20 30 40 50 60 70 80 90 100
Level of technology ()	

End of Block: Technology General Questions

Start of Block: Technology and Hotels Questions

Q16 I think innovative/advanced technology in hotels is

○   extremely useful (1)

○   Moderately useful (2)

○   Slightly useful (3)

○   Neither useful nor useless (4)

○   Slightly useless (5)

○   Moderately useless (6)

○   Extremely useless (7)

Q17 Do you think hotels in general are innovative with technology?

○   Strongly agree (1)

○   Agree (2)

○   Somewhat agree (3)

○   Neither agree nor disagree (4)

○   Somewhat disagree (5)

○   Disagree (6)

○   Strongly disagree (7)

Q18 Do you believe hotels should innovate more with technology?

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q19 How likely would you use the following features in a hotel?

	Definitely yes (1)	Probably yes (2)	Might or might not (3)	Probably not (4)	Definitely not (5)
Voice commanded technology? (1)	○	○	○	○	○
Artificial Reality (AR) Gym/workout (2)	○	○	○	○	○
Self service check-in (3)	○	○	○	○	○
The help of a robot concierge (4)	○	○	○	○	○
The ability to change the scent of the room (5)	○	○	○	○	○
The ability to change the colour of the walls of your room (6)	○	○	○	○	○
The ability to change the view of your room (7)	○	○	○	○	○

Q20 Would you like to stay in a hotel run by robots and technology only?

○ definitely yes (1)

○ Probably yes (2)

○ Might or might not (3)

○ Probably not (4)

○ Definitely not (5)

Q21 What technology would you like to see in hotels? Please be thoughtful, this information will be very valuable!

_____

Q22 Thank you for filling in this questionnaire. You have helped me a lot in my research for my Bachelor Thesis.

If you have any feedback or comments, please leave them here.

_____

9.2 Cross-tabulation age-technology importance

Age category * Level of importance Technology Crosstabulation[2]

			Level of importance Technology				Total
			Extremely important	Very important	Moderately important	Slightly important	
Age category	20 or younger	Count	8	33	18	3	62
		Expected Count	11,5	26,9	19,2	4,3	62,0
		% within Age category	12,9%	53,2%	29,0%	4,8%	100,0%
	21-29	Count	47	98	52	12	209
		Expected Count	38,9	90,8	64,9	14,4	209,0
		% within Age category	22,5%	46,9%	24,9%	5,7%	100,0%
	30-39	Count	15	29	23	2	69
		Expected Count	12,8	30,0	21,4	4,8	69,0
		% within Age category	21,7%	42,0%	33,3%	2,9%	100,0%
	40-49	Count	7	12	14	5	38
		Expected Count	7,1	16,5	11,8	2,6	38,0
		% within Age category	18,4%	31,6%	36,8%	13,2%	100%
	50 or older	Count	4	17	28	8	57
		Expected Count	10,6	24,8	17,7	3,9	57,0
		% within Age category	7,0%	29,8%	49,1%	14,0%	100,0%
Total		Count	81	189	135	30	435
		Expected Count	81,0	189,0	135,0	30,0	435,0
		% within Age category	18,6%	43,4%	31,0%	6,9%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	30,809[a]	12	,002
Likelihood Ratio	30,775	12	,002
Linear-by-Linear Association	15,238	1	,000
N of Valid Cases	435		

a. 4 cells (20,0%) have expected count less than 5. The minimum expected count is 2,62.

[2] Please note that the value 'Not at all important' has been merged with 'slightly important' to benefit the chi-square measurability.

9.3 Cross-tabulation age category and robothotel

Age category * Robothotel Crosstabulation

			Robothotel					Total:
			definitely yes	Probably yes	Might or might not	Probably not	Definitely not	
Age category	20 or younger	Count	1	8	13	25	15	62
		Expected Count	3,3	11,1	9,8	22,1	15,7	62,0
		% within Age category	1,6%	12,9%	21,0%	40,3%	24,2%	100,0%
	21-29	Count	13	38	37	74	47	209
		Expected Count	11,1	37,5	33,2	74,5	52,9	209,0
		% within Age category	6,2%	18,2%	17,7%	35,4%	22,5%	100,0%
	30-39	Count	6	16	10	24	13	69
		Expected Count	3,6	12,4	10,9	24,6	17,4	69,0
		% within Age category	8,7%	23,2%	14,5%	34,8%	18,8%	100,0%
	40-49	Count	2	8	2	10	16	38
		Expected Count	2,0	6,8	6,0	13,5	9,6	38,0
		% within Age category	5,3%	21,1%	5,3%	26,3%	42,1%	100,0%
	50 or older	Count	1	8	7	22	19	57
		Expected Count	3,0	10,2	9,0	20,3	14,4	57,0
		% within Age category	1,8%	14,0%	12,3%	38,6%	33,3%	100,0%
Total		Count	23	78	69	155	110	435
		Expected Count	23,0	78,0	69,0	155,0	110,0	435,0
		% within Age category	5,3%	17,9%	15,9%	35,6%	25,3%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21,109a	16	,174
Likelihood Ratio	22,190	16	,137
Linear-by-Linear Association	1,767	1	,184
N of Valid Cases	435		

a. 4 cells (16,0%) have expected count less than 5. The minimum expected count is 2,01.

9.4 Cross-tabulation age category and level of technology usage

Age category * Level of Technology Usage Crosstabulation

| | | | Usage of Technology amount | | | | |
			A great deal	A lot	A moderate amount	A little	Total
Age category	20 or younger	Count	26	30	6	0	62
		Expected Count	23,9	26,5	10,5	1,0	62,0
		% within Age category	41,9%	48,4%	9,7%	0,0%	100,0%
	21-29	Count	87	97	24	1	209
		Expected Count	80,7	89,4	35,6	3,4	209,0
		% within Age category	41,6%	46,4%	11,5%	0,5%	100,0%
	30-39	Count	28	29	12	0	69
		Expected Count	26,6	29,5	11,7	1,1	69,0
		% within Age category	40,6%	42,0%	17,4%	0,0%	100,0%
	40-49	Count	14	13	9	2	38
		Expected Count	14,7	16,2	6,5	,6	38,0
		% within Age category	36,8%	34,2%	23,7%	5,3%	100,0%
	50 or older	Count	13	17	23	4	57
		Expected Count	22,0	24,4	9,7	,9	57,0
		% within Age category	22,8%	29,8%	40,4%	7,0%	100,0%
Total		Count	168	186	74	7	435
		Expected Count	168,0	186,0	74,0	7,0	435,0
		% within Age category	38,6%	42,8%	17,0%	1,6%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	50,705a	12	,000
Likelihood Ratio	44,038	12	,000
Linear-by-Linear Association	27,691	1	,000
N of Valid Cases	435		

a. 5 cells (25,0%) have expected count less than 5. The minimum expected count is ,61.

9.5 Cross-tabulation level of technology and robothotel

Level of Technology Usage * Robothotel Crosstabulation

			Robothotel					
			definitely yes	Probably yes	Might or might not	Probably not	Definitely not	Total
Usage of Technology amount	A great deal	Count	17	42	28	55	26	168
		Expected Count	8,9	30,1	26,6	59,9	42,5	168,0
		% within Usage of Technology amount	10,1%	25,0%	16,7%	32,7%	15,5%	100,0%
	A lot	Count	4	29	31	69	53	186
		Expected Count	9,8	33,4	29,5	66,3	47,0	186,0
		% within Usage of Technology amount	2,2%	15,6%	16,7%	37,1%	28,5%	100,0%
	A moderate amount	Count	1	7	10	28	28	74
		Expected Count	3,9	13,3	11,7	26,4	18,7	74,0
		% within Usage of Technology amount	1,4%	9,5%	13,5%	37,8%	37,8%	100,0%
	A little	Count	1	0	0	3	3	7
		Expected Count	,4	1,3	1,1	2,5	1,8	7,0
		% within Usage of Technology amount	14,3%	0,0%	0,0%	42,9%	42,9%	100,0%
Total		Count	23	78	69	155	110	435
		Expected Count	23,0	78,0	69,0	155,0	110,0	435,0
		% within Usage of Technology amount	5,3%	17,9%	15,9%	35,6%	25,3%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	38,424a	12	,000
Likelihood Ratio	41,191	12	,000
Linear-by-Linear Association	29,741	1	,000
N of Valid Cases	435		

a. 6 cells (30,0%) have expected count less than 5. The minimum expected count is ,37.

9.6 Validity Test: Correlations

Correlations

		Level of importance Technology	Ease of Use of Technology	Usage of Technology amount	echnology as fun and enjoyful
Level of importance Technology	Pearson Correlation	1	,360**	,494**	,487**
	Sig. (2-tailed)		,000	,000	,000
	N	435	435	435	435
Ease of Use of Technology	Pearson Correlation	,360**	1	,445**	,464**
	Sig. (2-tailed)	,000		,000	,000
	N	435	435	435	435
Usage of Technology amount	Pearson Correlation	,494**	,445**	1	,523**
	Sig. (2-tailed)	,000	,000		,000
	N	435	435	435	435
echnology as fun and enjoyful	Pearson Correlation	,487**	,464**	,523**	1
	Sig. (2-tailed)	,000	,000	,000	
	N	435	435	435	435
Level of Technology rating 1-100	Pearson Correlation	-,391**	-,301**	-,247**	-,410**
	Sig. (2-tailed)	,000	,000	,000	,000
	N	435	435	435	435
Usefulness adv. Technology in Hotels	Pearson Correlation	,424**	,172**	,259**	,352**
	Sig. (2-tailed)	,000	,000	,000	,000
	N	435	435	435	435
Hotels innovative w/ technology	Pearson Correlation	,049	-,077	-,067	,045
	Sig. (2-tailed)	,309	,110	,163	,348
	N	435	435	435	435
Innovate more in hotels	Pearson Correlation	,490**	,273**	,290**	,425**
	Sig. (2-tailed)	,000	,000	,000	,000
	N	435	435	435	435
Robothotel	Pearson Correlation	,241**	,183**	,262**	,235**

		Level of Technology rating 1-100	Usefulness adv. Technology in Hotels	Hotels innovative w/ technology	Innovate more in hotels
	Sig. (2-tailed)	,000	,000	,000	,000
	N	435	435	435	435

Correlations

		Level of Technology rating 1-100	Usefulness adv. Technology in Hotels	Hotels innovative w/ technology	Innovate more in hotels
Level of importance Technology	Pearson Correlation	-,391**	,424**	,049	,490**
	Sig. (2-tailed)	,000	,000	,309	,000
	N	435	435	435	435
Ease of Use of Technology	Pearson Correlation	-,301**	,172**	-,077	,273**
	Sig. (2-tailed)	,000	,000	,110	,000
	N	435	435	435	435
Usage of Technology amount	Pearson Correlation	-,247**	,259**	-,067	,290**
	Sig. (2-tailed)	,000	,000	,163	,000
	N	435	435	435	435
echnology as fun and enjoyful	Pearson Correlation	-,410**	,352**	,045	,425**
	Sig. (2-tailed)	,000	,000	,348	,000
	N	435	435	435	435
Level of Technology rating 1-100	Pearson Correlation	1	-,347**	-,020	-,425**
	Sig. (2-tailed)		,000	,680	,000
	N	435	435	435	435
Usefulness adv. Technology in Hotels	Pearson Correlation	-,347**	1	,197**	,534**
	Sig. (2-tailed)	,000		,000	,000
	N	435	435	435	435
Hotels innovative w/ technology	Pearson Correlation	-,020	,197**	1	,000
	Sig. (2-tailed)	,680	,000		,999
	N	435	435	435	435
Innovate more in hotels	Pearson Correlation	-,425**	,534**	,000	1
	Sig. (2-tailed)	,000	,000	,999	
	N	435	435	435	435
Robothotel	Pearson Correlation	-,342**	,237**	,059	,246**
	Sig. (2-tailed)	,000	,000	,216	,000

	N	435	435	435	435

Correlations

		Robothotel
Level of importance Technology	Pearson Correlation	,241**
	Sig. (2-tailed)	,000
	N	435
Ease of Use of Technology	Pearson Correlation	,183**
	Sig. (2-tailed)	,000
	N	435
Usage of Technology amount	Pearson Correlation	,262**
	Sig. (2-tailed)	,000
	N	435
echnology as fun and enjoyful	Pearson Correlation	,235**
	Sig. (2-tailed)	,000
	N	435
Level of Technology rating 1-100	Pearson Correlation	-,342**
	Sig. (2-tailed)	,000
	N	435
Usefulness adv. Technology in Hotels	Pearson Correlation	,237**
	Sig. (2-tailed)	,000
	N	435
Hotels innovative w/ technology	Pearson Correlation	,059
	Sig. (2-tailed)	,216
	N	435
Innovate more in hotels	Pearson Correlation	,246**
	Sig. (2-tailed)	,000
	N	435
Robothotel	Pearson Correlation	1
	Sig. (2-tailed)	
	N	435

**. Correlation is significant at the 0.01 level (2-tailed).

9.7   Reliability Test: Cronbach's Alpha

Case Processing Summary

		N	%
Cases	Valid	435	100,0
	Excludeda	0	,0
	Total	435	100,0

a. Listwise deletion based on all variables in
the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,718	8