The concept of a smart hotel and its impact on guests’ satisfaction, privacy and the perception of the service quality

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Abstract

Smart technology has become very extensive and popular in many areas of our lives in the last few years. Their role is to make life and activities performed by the user easier, faster, better and more interesting. Smart technology has been used for years in areas such as education, industry and transport. The response of the hospitality industry is to implement technology in hotels, usually the more luxurious ones, that improves the operation of employees and is a convenience for hotel guests. The name of this concept is a smart hotel, which is similar to the already existing smart house and smart city concepts.

The purpose of the study was to examine the concept of smart hotel and investigate the impact that smart technology has on guests’ satisfaction, privacy and service quality. The study was conducted using mixed methods research whereby both qualitative and quantitative data were collected in parallel, analyzed individually and then linked with each other. Qualitative data collection constituted of in-dept interviews with hotel employees and hotel guests, and the quantitative part of the study was based on the online survey with hotel guests. The main findings are a proposal definition of a smart hotel, and the belief that smart technology contributes to a better quality of provided services by employees and increases the grade of satisfaction among guests. However, the result also shows that a greater role of hotels is needed in order to reduce the disproportion of equal access to smart technology for all hotel guests.

Keywords: Smart hotel, Smart technology, Internet of Things, Information Communication Technology, Service quality, Guest satisfaction
Declaration

I, Mikolaj Domanski, hereby declares that the content of this study is my own contribution. Interview participants consented to the use of their answers for research purposes, and that any other text taken from other sources were appropriately acknowledged in the text and listed in the reference chapter.
Acknowledgement

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1. Introduction

The introductory chapter presents the background of the research topic, the purpose for which the research is done, the two research questions around which the research is based and delimitations that needed to be implemented during the study.

1.1 Background

In recent years, smart technology has developed significantly and revolutionized many spheres in our daily lives. People can live in smart cities and smart homes, wear smart watches and have smart phones (revfine.com).

The word smart comes originally from the English language and means intelligent, clever, ingenious and slick. Nowadays, the word smart is associated more and more usually in relation to new technologies and devices, called for smart technologies and smart devices. They are linked to each other in a network, they respond to changes in their surroundings and they continuously interact with their users. Smart devices role is to make user activities much easier, faster and better. But the word smart is also used in another field of knowledge. This term is very common in economic learnings, especially in service management. In 1950s was formed S.M.A.R.T (i.e. specific, measurable, agreed, realistic and time bound) model which helped organizations achieve goals on conditions strictly defined to the specific rules described in the model. Later, the word smart related to terms such as organization and its specific situation - an enterprise. As a result, smart organization and intelligent enterprise categories come into sight. These categories are based on knowledge and well-doing on several of organizations’ layers which leads to creation and increasing the value for a client (Jaramen et al., 2016).

The word smart is also appearing in the context of tourism. Smart tourism as Gretzel et al. (2015) describe is a logical transformation from traditional tourism and more newly e-tourism into innovations and the technological adjustment of the hospitality industry established by information communication technology (ICT). According to the Gretzel et al. (2015), the topic of being smart is very common and ongoing, some countries are getting powerful support from the government, and some nations are even under pressure to materialize the idea of smart tourism as soon as possible (Gretzel et al., 2015). Asian countries are most focused on building the technological infrastructure that can assistance smart tourism. In Europe, on the other hand initiative of smart tourism was usually a result of smart city projects. The focus in European countries is more on innovation, competitiveness and creating of smart applications for users that increases tourism experience, through already existing data combined and processed in new ways (Lamsfus et al., 2015).

Many cases in tourism and hospitality industry, indicate that future guideline and competitive benefits of the organization does not really revolve about organization size, but on the
innovativeness of its ICT, backed by highly qualified human resource, in other words those willing to implement and take advantage on the needed technology (Kasim et al., 2013).

Hotels have been always endeavored to give their guests a feeling, warmth and comfort of being at home. One way to accomplish this is to replicate the feeling of being at home. According to Khalid (2016) smart homes are the future and as the author of article states hotels should also follow this path and change their traditional service provide concept into technologically innovative place (Khalid, 2016). Furthermore, hotel guests are now looking for more personalized options so that properties can meet their requirements. The concept of smart hotel with automated checkout services, customized environmental settings within each room, the use of the Internet of Things (IoT), and wireless data linking is the answer to the guests’ expectations (revfine.com).

1.2 Problem statement

Because the concept of smart hotels is relatively new and slowly enters the market, there is also a limited research and knowledge about this phenomenal. The definition of this type of accommodation is largely unknown among tourists, and inconsistent among hospitality employees who base their perception on the position within the company (Leung, 2019).

Through this research, the author would like to fill this existing gap and see if the position and perspective from which stakeholders look at the concept of smart hotels influence their opinions. The author would also like to examine whether a smart hotel generates added value for hotel guests, as many scientists believe, and find out whether smart hotels can turn out to be a success and become a standard in the future when it comes to choosing accommodation type.

1.3 Dissertation aim

Purpose of this mixed methods study is to understand the concept of smart hotels, and examine the approach of managers, receptionists and hotel guests to smart technology in terms of service quality, ethical aspects and guest’s satisfaction. A convergent mixed method will be used, which is a type of design with both qualitative and quantitative data are collected in parallel, analyzed separately and then combined. Qualitative data in this study will consist of interviews with hotel managers, receptionists and hotel guests and quantitative data of online survey with hotel guests. The reason for choosing mixed methods is to develop a complete understanding of a smart hotel concept and to gain broader perspective from involved stakeholders through combining both qualitative and quantitative data.

1.4 Research questions

- How is the concept of smart hotels understandable by hotel employees and guests?
- How do the hotel guests perceive implementation of smart technologies in terms of service quality, ethical aspects and satisfaction?
1.5 Delimitation

Delimitations are needed to do in order to clamp the research area, and thus examine what the author consider is the most appropriate to the study in specified time frame. The starting point of this study was the concept of smart hotel but since technology is an extremely important component of a smart hotel the focus was also there. The study examines two perspectives of the same phenomenal; hotel employees’ perspective who have contact with technology during their daily work and hotel guests’ perspective who are the users of the technology that was designed for their needs. When it comes to the hotel employees’ perspective the study has been delimitated to investigate stakeholders in Stockholm due to the pandemic coronavirus in the world and that the obtained result can be more reliable. Guest perspective on the other hand consists of adults who have been in a 4- or 5-star hotel in the last two years (2018-2020).

1.6 Dissertation outline

This study consists of six main chapters structured in a sequence to make it clear and interesting for the reader. The first chapter, introduction, aims to introduce but also intrigue the reader to the subject of research through background, purpose, and research questions. The second chapter presents the research approach, here are important explanations, arguments for choices, and appropriate definitions of all steps that were necessary to perform for the author of the research. The third chapter is theoretical framework, which includes the topics and theories of previous researchers such as internet of things, responsible innovations and the service quality in hotel industry, that are important and related to this research. Moreover, the author present earlier research on smart hotels, showing what has been determined by scientists so far. All the materials used in introduction, method and theoretical framework chapters have been assigned to the appropriate author, so that the reader can find the right source more easily.

The fourth chapter, which is empirical results, presents collected data. This chapter has been divided into three sub-chapters, one is qualitative answers from interviews with hotel employees, the second is qualitative answers from interviews with hotel guests and the third is the quantitative report of an online survey conducted with hotel guests.

The analysis is the fifth chapter, which includes the analysis of data collected from both hotel employees and hotel guests during interviews, as well as data collected in the online survey. In this chapter, the reader can find analysis of smart technologies’ impact on three key issues in this study, namely quality of provide service, ethical aspects and guest satisfaction. In addition, SWOT analysis of smart technology in hotels is also presented. The sixth chapter, which is the last main chapter, contains the conclusions and the result of the study as well as the idea for further research.
2. Method

This chapter presents in detail the method of research approach chosen by the author. At the beginning, the author presents qualitative and quantitative research methods and compares them, so that the reader can better understand the differences. Then the selected method is presented together with argumentation; mixed methods research which combines both above-mentioned methods. The chapter continues with the description of the data collection method and the detailed procedure of data collection. Thereafter, the author explains data analysis method, which in mixed methods with a convergent design consists of three phases. At the end of chapter ethical issues, reliability and validity are discussed.

2.1 Research approach; qualitative and quantitative research methods

Every researcher aims to collect empirical data systematically and to analyze data patterns in order to better understand and explain the surrounding world. The two most common methods for research and data collection are qualitative and quantitative approach. Data can be divided into two types: soft data (e.g. words, photos, symbols) which is a part of qualitative research method and hard data (e.g. numbers, statistics) which is associated with quantitative research method (Lawrence, 2015, p. 167).

According to Alvehus (2013) the most basic characteristic of qualitative method is that it is interested in sentences, or meanings, rather than statistically verifiable taste bands. At the same time, he points out that qualitative method is searching for connections, and just because it is qualitative does not mean that everything that has to do with quantities is immaterial (Alvehus, 2013, p. 20). Saunders, Lewis and Thornhill (2019) notes that qualitative researcher’s success occurs when his/her role is not only depending on gaining physical access to those who take part in study, but also on building connection and demonstrating sensitivity to achieve psychological access to their data. Since soft data may have various meanings and interpretations, it is in many cases necessary to explore and clarify these with study’s participants (Saunders et al., 2019, p. 179). Eliasson (2013) states that the two most common qualitative methods in the social sciences are observations and interviews. In observations, the observer may be more or less involved. Interviews on the other hand can be to some extent structured, depending on how the interviewer formulates questions (Eliasson, 2013, p. 22).

Quantitative research analyzes relationships between variables, which are measured numerically and examined through various statistical and graphical techniques and methods. Researcher using quantitative method is usually seen as independent from those being studied (Saunders et al., 2019, p. 178). Eliasson (2013) add that quantitative methods include a variety of mathematically advanced approaches to analyzing numbers and data that can be expressed by numbers. Furthermore, the author note that quantitative methods also involve different ways of collecting quantitative data, where survey and interviews are the most common (Eliasson, 2013, p. 28). According to Saunders et al. (2019) the result of quantitative research should be able to generalizability, which mean that findings of a study can be applicable in some extent to other settings. The first step for researcher on this long way to get there is to
ensure that questions are formulated clearly so they are understood in the same way by researcher as by each respondent.

2.1.1 Differences between qualitative and quantitative research

Eliasson (2013) state that the difference between the qualitative and quantitative method is that qualitative methods deal with things that can be described in words, while quantitative methods deal with things that can be described with numbers.

According to Lawrence (2015) differences between qualitative and quantitative method approach are more significant than just two ways of data expression (see table 1). Another difference between qualitative and quantitative research, beside the table is about the research process and assumptions about social life. Quantitative study uses a language of variables and hypotheses with more focus on positivism principles. Researchers target is to precisely measure variables and test hypotheses. In a qualitative study on the other hand, principles from interpretive or critical social science are more common. Researchers aims to contribute detailed examinations of specific cases that arise in the natural sphere of social life. The next difference between these two methods lies in what researchers try to complete in their study. “In all studies, we try to solve a puzzle or answer a question, bet depending on the approach, we do this in different ways” (Lawrence, 2015, p. 168). In a quantitative study, researchers usually try to verify or falsify a relationship between examined variables or hypothesis which they already have in mind. But in many qualitative studies, researchers often create new hypotheses and describe details of the casual mechanism or process for a narrow set of cases. The last difference between qualitative and quantitative studies is that each method has a distinct “logic” and path of conducting research. In qualitative studies, the logic arises from ongoing practice and a nonlinear research path is conducted (back-and-forth and cyclical way to proceed research). In quantitative studies, however logic is accumulated systematically and follows a linear research path (step-by-step through the whole research process) (Lawrence, 2015, pp. 167-170).

Table 1: Qualitative research versus Quantitative research

<table>
<thead>
<tr>
<th>Qualitative research</th>
<th>Quantitative research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researchers capture and discover meaning once they become immersed in the data.</td>
<td>Researchers test hypotheses that are stated at the beginning.</td>
</tr>
<tr>
<td>Concepts are in the form of themes, motifs, generalizations and taxonomies.</td>
<td>Concepts are in the form of distinct variables.</td>
</tr>
<tr>
<td>Measures are created in an ad hoc manner and are often specific to the individual setting or researcher.</td>
<td>Measures are systematically created before data collection and are standardized.</td>
</tr>
<tr>
<td>Data are in the form of words and images from documents, observations and transcripts.</td>
<td>Data are in the form of numbers from precise measurement.</td>
</tr>
<tr>
<td>Theory can be casual or noncausal and is often inductive.</td>
<td>Theory is largely casual and is deductive.</td>
</tr>
</tbody>
</table>
Research procedures are particular, and replication is very rare. Procedures are standard and replication is frequent.

Analysis proceeds by extracting themes or generalizations from evidence and organizing data to present a coherent, consistent picture. Analysis proceeds by using statistics, tables or charts and discussing how and what they show relates to hypotheses.

*Source: Lawrence, 2015*

### 2.2 Chosen method; Mixed methods research

According to Eliasson (2013) combining different methods, so that they together cover different angles and provide different kinds of information to the study, is called the mixed methods research approach and often gives a more complete picture than a single method does (Eliasson, 2013, p. 30).

Creswell and Creswell (2018) states that mixed methods research is still to some extent unknown in the social and human sciences as a recognizable research approach. Their definition is that this approach involves collecting both quantitative and qualitative data, combining both hard and soft data, and using specific designs that can contain philosophical assumptions and theoretical frameworks. The main benefit of using mixed method is that the interaction of qualitative and quantitative data produces additional awareness and provide much more information, which would not be able to get access to either by the quantitative or qualitative data alone (Creswell and Creswell, 2018, p. 4).

Similar definition of mixed methods is provided by Saunders et al. (2019). According to the authors, this research connects multiple methods that integrates the use of qualitative and quantitative data collection practices and analytical techniques in the same research project. Furthermore, the authors pointed out two philosophical positions that are usually linked to mixed methods approach. These are: pragmatism and critical realism. Pragmatists insist that there are many ways of understanding the world and that various methods are often suitable during one research study. To choose the appropriate methods for their studies, pragmatists are guided by nature of the research questions, the research context and usually think about research consequences. Critical realism researchers can for example use initially qualitative research methods to examine perceptions and combine this with quantitative analysis of officially published data or other documentary sources (Saunders et al., 2018, p. 181).

Creswell et al. (2018) states that many different terms are used in the scientific world for this approach, for example integrating, synthesis, multimethod or mixed research. However, in this research the word mixed methods will be used, as Creswell et al. (2018) and Bryman (2016) tend to use.

#### 2.2.1 Reasons for choosing mixed methods

The choice of mixed methods as the method of this study was based on several reasons. At a general level, mixed methods approach is chosen because of its strength on illustrating both qualitative and quantitative research and decrease the limitations of both approaches. At a
practical level, mixed method according to Creswell et al. (2018) provides a modern and complex approach to research that engage those who are on the forefront of research subject. From the procedural level, mixed methods approach is a useful strategy to have a more complete understanding of research gaps, problems and questions and also make it possible to compare different perspectives found through quantitative and qualitative data (Creswell et al., 2018, p. 215). Another reason of choosing mixed methods is complementarity factor. This method can allow meanings and finding to be more detailed, clarified, confirmed and connected through two ways of data collection procedure. The last reason is interpretation of data; qualitative method can be used to help to define relationships between variables developed from the quantitative method or vice versa (Saunders et al., 2018, p. 185).

2.2.2 Types of mixed methods design

Creswell et al. (2018) presented three types of mixed methods design. The first and probably the most common mixed method design is convergent. This approach is usually used by researchers who had no contact with mixed methods earlier. This approach consists of a single-phase and in practice means collecting both quantitative and qualitative data, analyzing them separately and comparing the results to see if the findings confirm or disconfirm each other (Creswell et al., 2018, pp. 217-220). This type allows both results to be explained together to bring richer and more broad response to the research questions in contrast to the use of mono method design (Saunders, et al., 2019, p. 184).

The second type of mixed methods is explanatory sequential design. This approach request to individuals with a solid quantitative background or from fields to some extent new to qualitative methods. It includes a two-phase data collection, first the research collects quantitative data (phase 1), analyzes the findings, and then uses the results to plan the second, qualitative phase. The main difference from convergent method is that data collection in this approach takes place in two different periods (Creswell et al., 2018, pp. 221-222).

Exploratory sequential mixed methods design is the last type that Creswell et al. (2018) described. This three-phase design is a approach in which the researcher first begins by investigate with qualitative data and analysis, then creates an element to be tested (e.g. a new survey, a website or add new variables) and tests this element in a quantitative third phase. This design is common in global health research when, for example investigators need to understand a community or population before managing English-language components (Creswell et al., 2018, pp. 224-225).

This study followed the convergent mixed methods design. According to Saunders et al. (2019) it should contribute richer data than a mono method design and be shorter in time aspect, as well as more practical to attempt than a sequential design (Saunders et al., 2019, p. 182).

2.3 Data collection method

As a part of quantitative research, the study contains an online survey with guests that stayed at hotel (4 or 5 stars) no sooner than in 2018. In a survey, interviewer ask questions to the respondents (the survey subjects) under the same conditions as possible. However, before
formulated questions can be published online, it is very important to show them to a test person and ensure that the questions are perceived in the same way by two parties. Surveys can provide answers to questions related to what, where, how and when but it is more difficult to answer questions about why. The purpose of the survey is to get answers from many people to the same questions. As a result, the researcher can not only describe but also compare the answers (Bell, 2014, pp. 26-27).

Qualitative part in this study consists of interviews with hotel managers who to some extent are using smart technology in their hotels and hotel receptionists who deal with technological implementations during their daily work. Interviews are a way to find out how another person thinks and feels about a particular topic, event or phenomenon. Interviewing a person is a way to access into someone’s knowledge, opinions, feelings, experiences and thoughts. Moreover, as a complementary to online survey, some hotel guests were also invited for in-depth interviews to gather more detailed information to the study.

According to Alvehus (2013) there are three types of interviews: structured, semi-structured and unstructured. In this study the semi-structured interviews were applied which are characterized by open questions or broader themes that the conversation centers around. The respondent has significantly greater opportunities to influence the content of the interview at the same time as the interviewer must be more active in listening and in working with follow-up questions (Alvehus, 2013, pp. 82-83).

2.3.1 Sampling methods

“Purposive sampling is a non-probability form of sampling. The researcher does not seek to sample research participants on a random basic. The goal of purposive sampling is to sample cases and participants in a strategic way, so that those sampled are relevant to the research questions that are posed” (Bryman, 2016, p. 408). Purposive sampling is an umbrella term for three sample types: theoretical sampling, generic purposive sampling and snowball sampling. For the qualitative part of the research, snowball sampling have been used which is a technique that requires from researcher to find a small group of people relevant to the study, and later these sampled participants recommend other participants within their network who also have the experience or characteristics relevant to the study (Bryman, 2016, p. 415).

Additionally, a convenience sampling has been used as a sampling method in the quantitative part of the research. This technique is a type of non-probability sampling and is simply available to the researcher by advantage of its accessibility. The convenience sampling involves recruiting participants who are close to hand (Bryman, 2016, p. 187).

2.3.2 Methodological dilemma

Plan A was to conduct 10-15 in-depth interviews as a part of qualitative method with managers of Stockholm hotels and about 100 quantitative surveys with hotel guests, but at the same time as the author began with data collection, the situation on the whole world because of the coronavirus was getting more serious and dangerous. This status had a large negative impact on the country's economy, especially for tourism sector (naturturismforetagen.se, 2020). This pandemic situation also affected the students. To reduce the spread of
coronavirus, the Swedish government recommended for all colleges and universities to introduce distance education from March 18, 2020 (dn.se, 2020).

Unfortunately, face-to-face interviews were no longer possible to do and moreover, even an email interview or telephone interview was repeatedly refused by managers due to the lack of time, the labor force and the general crisis that the hotel industry was in. As a result of this situation the original plan described above had to be modified.

Plan B, which was introduced and implemented in this study, constituted of 5 telephone and e-mail interviews with managers and receptionists, 104 electronic surveys and 5 in-depth interviews with hotel guests.

However, the most important factor for the author in data collection procedure is the content and not numbers, that is why the author aimed to get saturation in data collection. This means that the author stops collecting qualitative data when categories and themes are saturated; collecting fresh data from interviews do not longer gives new facts to the study (Creswell et al., 2018, p. 186).

2.4 Detailed data collection procedure

Data collection procedure started by formulating interview questions, one version to managers and receptionists and another version addressed to hotel guests. Both versions of interview questions and online survey questions can be found in appendix. Interview questions consisted of 8 pre-formulated questions and a few follow-up questions that appeared during each interview. Online survey questions, on the other hand consisted of 10 questions in total, of which 2 were basic questions, 2 were open questions and the rest of them were close-ended questions where respondents needed to answer using the scale. Each version of the form was checked by two test persons so that the questions were clear and understandable for everyone. After some corrections, the questions were ready for publication.

Next step was to contact and find right and willing people to interviews. The author searched for hotel managers and hotel receptionists through Linkedin and contacted them by e-mail and telephone call. In total, empirical data consists of 5 interviews with managers and receptionists. When it comes to the survey, Södertörns University tool Sunset Artologik have been used for creation, publishing and collection of the answers. The survey was published online on 14th of April 2020, and its online address (https://sunet.artologik.net/sh/Survey/4723) was sent by the author in a Facebook post, in private messages on Messenger and on travel group forum. In total, after two weeks, 108 unique answers were collected, of which 104 were fully valid to the study. Parallel to the online survey, 5 in-depth interviews with hotel guests were conducted.

2.5 Data analysis methods

According to Hannam and Knox (2005), content analysis is an empirical technique which includes the calculating, identification of issues and understanding of the content of a text which is expected to be important (Hannam and Knox, 2005). The content can be words, meanings, symbols, pictures, ideas or any communicated information. The text, on the other
hand is anything written, visual or spoken that function as a device for communication (Lawrence, 2015, p. 371). The main belief of this approach is that there is a relationship between the repetitiveness of a specific theme and its importance or dominance above other (Hannam and Knox, 2005). Bell (2014) describes content analysis as systematic and replicable technique to summarize many words in a text into fewer content categories based on clear coding rules. The content analysis can be based on an emerging coding, which means that categories are formulated by researcher going through different empirical sources or it may be a prior coding based on researcher’s previous reading of the theoretical material and formulation of research ideas (Bell, 2014, pp. 145-146).

Data analysis in mixed methods with a convergent design consists of three phases. First phase is to analyze the qualitative database by coding the data and break down the codes into specific themes (content analysis). Second phase is to analyze the quantitative database in items of statistical results (charts and tables). The last phase is directly linked to mixed methods approach and consists of combining the two databases. The merge can be done through several ways but in this research the author will use comparison called side-by-side. Using this technique, the researcher must first report the quantitative statistical results and then discuss the qualitative findings (e.g. themes) that confirm or disconfirm the statistical results. It can be also done in reverse order. However, the most important thing for researcher is to make the comparison within a discussion, showing first one set of findings and then the other one (Creswell et al., 2018, pp. 219-220).

2.6 Ethical consideration

According to Israel and Hay (2006) researchers need to protect their research participants; establish a trust with them; build up the completeness of research; protect against misconduct and mistake that can effect on their personalities or organizations; and confront with new, problematic issues (Israel and Hay, 2006).

General Data Protection Regulation (GDPR) “protects fundamental rights and freedoms of natural persons and in particular their right to the protection of personal data” (gdpr-info.eu). This research follows the guidelines of the Södertörns University as GDPR requires. Each participant was aware of the study’s purpose, that the participant is voluntary, that his/her answers will only be used for the purpose of the study and that no personal information will be published. The participants of the online survey are anonymous (not identifiable under any circumstances, even for the researcher) and that those have been interviewed are confidential (not possible to identify based on the text, only the author know their identity) (Bell, 2014, p. 64).

2.7 Reliability and validity

According to Bell (2014) reliability is a measure of the extent to which a tool or approach produces the same result on different occasions under otherwise similar circumstances. The author explain that many different factors can influence the answer asking for opinions. The respondent may have recently watched a television program or attended an incident that affected his or her views (Bell, 2014, p. 134). Bryman (2016) defines the term as follows
“Reliability is concerned with the question of whether the results of a study are repeatable” (Bryman, 2016, p. 41). Reliability is especially important in connection with quantitative research. The author points out that the quantitative researcher is probably to be involved with the question of whether a measure is stable or not (Bryman, 2016, p. 41)

Validity on the other hand is a much more complicated term. It is a measure of whether a particular question measures or describes what you want it to measure or describe (Bell, 2014, p. 135). According to Bryman (2016) validity is the most important quality criterion in the research. Validity is concerned with the completeness of the conclusions that are developed from a piece of research (Bryman, 2016, p. 41). Furthermore, validity is linked to data, therefore researchers must be sure if the answers really measure or describe what the respondents are saying and that interpretations are really based on data. The structure of the research information guides the conclusions that can be drawn from them (Bell, 2014, p. 135).

According to Creswell et al. (2018) validity using the convergent approach should be positioned on implementing both quantitative validity and qualitative validity for each data collection (Creswell et al., p. 221). As a part of quantitative validity, the author will establish content validity in the research, which means that the items must measure the content they were expected to measure in the survey (Creswell et al., p. 153). In order to ensure qualitative validity as well, the author will use one of the strategies that Creswell et al. (2018) recommended. This strategy requires to triangulate data sources by exploring evidence from the sources and adopting it to create understandable justification for themes (Creswell et al., 2018, p. 200).
3. Theoretical framework

This chapter provides a literature review on smart hotels and topics that are close to the research area. Previous research demonstrates four different studies about the smart hotel concept conducted in four different countries. Moreover, different definitions and views of other scientists about smart hotels are presented. Thereafter, Internet of Things and Information Communication Technology are described as important parts of smart technology. As a final part of this chapter, theories and explanations about responsible innovations, the service quality and hotel guests’ satisfaction are disposed.

3.1 Previous research

Miočić, Korona and Matešić (2012) examined the tourism demand readiness and willingness to accept technological innovations. The authors collected data through survey method asking 106 hotel guests in the area of the city of Zadar, in Croatia. The research has showed that the majority of responden ts are unsatisfied with the current smart technology implementation and that they are willing to see a higher level and amount of implemented smart technologies in hotel industry. Furthermore, Miočić et al. (2012) identified the main reasons whose are lying behind the implementation of smart technologies in Croatian hotels. Hotels have been stimulated to implement smart technologies because of the growing technology across different spheres of social and economic life. But also, to improve their own facility through differentiation and cost reduction. However, the most important reason was to gain better understanding of the hotel guests’ wishes, and to increase the quality of currently provided services. The authors summarized that the raise in demand for smart technology implementation in hotel industry is just a matter of time and that all types of innovations are required to satisfied technologically ready hotel guests (Miočić et al., 2012).

Similar study to above described case did Neuhofer et al. (2015). The authors purpose was to examine how implementation of smart technologies can help to create personalized experiences in hotel industry. As they mentioned in their text, technology broke through and is present in every industry. Hotel industry must face this challenge and use technology in the best possible way. It’s a very good opportunity to provide better service and differ themselves from competitors. Through case study, Neuhofer et al. (2015) found several implications for ICTs in hotel industry to create consumer experience. One of them is for example Happy Guest Relationship Management (HGRM) platform which provides a centralized solution that bring together all internal and external information exchanges, transports and interactions within the hotel staff and between the hotel and its guests. Users of HGRM platform can easily choose their own desired preferences such as: check-in alternative, extra pillows and towels, car parking, temperature in room. Moreover, the conclusions attained by the authors tells that smart technologies should function as stimulant which can assist in the management of dynamic services. Therefore, technologies will not replace personal human confrontation. Smart technology is a tool to improve human resource by equipping employees and environment with technology to upgrade service and improve customers experience (Neuhofer, 2015).
Jaremen et al. (2016) investigated in their research the concept of smart hotels and identified its attributes. According to the authors the idea of smart hotel can be defined as a practical business model which implements ICT in the hospitality industry to increase efficiency and provide better quality services to its guests. They argue also that in case of hotels, the definition of word smart is more associated with smart technologies than a smart organization. The attributes that they have found are the availability of broadband Internet, the implementation of smart technologies and smart devices, effective policy aimed at the Internet and ICT distribution. Furthermore, the authors identified three main conditions that technologies must meet in order to be implemented for use. Firstly, these technologies must be safe for hotel guests and its staff; secondly, must have correctly functioning communication and finally, must be integrated and suitable to the systems that hotel operate with. Jaremen et al. (2016) did a case study to find out all advantages of ICT application in Puro Hotel located in Wroclaw, Poland. Hotels manager listed many benefits, among others are: automation of the majority of hotel procedures (e.g. check-in, check-out), reduced number of staff, lower operating costs, faster realization time of services, lower risk of making mistakes, higher guest satisfaction, higher efficiency and easier internal communication, upgraded room standard, lower room price as a result from energy savings and employment reduction. The authors claim in their results that the implementation of the idea of smart hotel had a positive impact on the hotel's image and made the organization different from its competitors (Jaremen et al., 2016).

A research done by Leung (2019) aimed to investigate the concept of smart hospitality in Taiwan to set collected data up with the academic world to find potential gaps. In-depth interviews were conducted among others with managers, investors and technology suppliers. It turned out that each stakeholder had a different definition of smart hotel depending on the task and role they had in the organization (e.g. service customization, procedures effectiveness and in-room digitalization). According to the author no one of interviewed stakeholders mentioned the key functions of smart technologies which are interconnectivity and interoperability with business partners’ application (e.g. online travel agencies or food suppliers). Furthermore, Leung (2019) argued that the stakeholders only were aware about financial benefits, but they haven’t mentioned other benefits such as improving of customer satisfaction, increasing guest stay experience and upgrading positively image of organization. Conclusions reached by the author show that the definition of the concept of smart hotels differs between theoretical academic world and hotel industry in practice. Stakeholders perception can’t be limited just to cost saving and employee productivity when it comes to smart technologies. It’s important to understand for hotel industries that the concept of smart hotels is a complex product in which requires many partners cooperating on many levels to achieve final goal (Leung, 2019).

3.2 Smart hotels

Smart hotels or also called by many intelligent hotels does not have one clear definition yet. Prior studies have focused on investigating components of smart cities and implicate them on smart tourism and even on smart hotels (Gretzel et al., 2015; Boes et al., 2016). Other aimed attention at electronic data interchange between internal hotel application systems (Leung et
al., 2013). However, most of the research around smart hotels is related to guest experience of
in-room technology (Miočić et al., 2012; Neuhofer et al., 2015) and organizational
performance (Bin Ayob et al., 2016; Melian-Gonzalez et al., 2016). According to Leung
(2019) the concept of smart hotels can be examined from three different perspectives:
customer-centric (in-hotel and in-room characteristics), employee-centric (increase working
efficiency or reduce workload) and manager-centric (save cost and increase revenue) (Leung,
2019). According to Putnik and Cunha (2005) smart organization is knowledge-driven,
internet-based and dynamically adjusting to new organizational plans and methods.
Furthermore, such organization always create and take advantage of offered opportunities
(Putnik et al., 2005). The definition of smart organizations is to a large extent linked with the
concept of smart hotels which represents a technologically integrated system of hospitality
services arrangement. This system is based on new information communication technologies
driven without or with a little support of human being, reacting to the signals coming from
internal and external environment and satisfactorily adjusting their tasks.

Leonidis et al. (2013) associates the concept of smart hotel directly to intelligent hotel rooms.
According to the authors an intelligent hotel room “provides a ubiquitous attentive
environment that constantly monitors the activity and location of people and objects within it
and uses this information to control technology in anticipation of the guests’ needs” (Leonidis
et al., 2013 p. 242). Examples of its appearances are systems that control lights, noises, air
condition, TV and digital door sign (e.g. do not disturb or clean my room). Moreover,
connected systems know how and when to save energy (sensors recognize when the room is
empty). Guests can also use their devices such as smartphone or tablet to activate and control
some features (e.g. adjust temperature, open door with digital key or turn on a 3D room butler
on the TV who can give practical advices and answer for some questions) (Beckendorff et al.,
2019). Jaramen et al. (2016) presented more detailed examples of ICTs solutions that hotels
use in different places on earth. The guests of The Upper House in Hong Kong get i-Pod
Touch at check-in supplied with games, music and information about the hotel, Novotel
München Messe’s guests are welcomed by both the real and a virtual receptionist and the
hotel is equipped with touchscreens containing information fitted to the guests. Another
example is Blow Up Hall in Poznan, instead for a physical keys or cards, guests are receiving
iPhones to enter their rooms (Jaramen et al., 2016).

3.3 Internet of Things and ICT

Internet of Things (IoT) is a “network of physical objects or “things” embedded with
electronics, software, sensors, and network connectivity, which enables these objects to
collect and exchange data” (Mann, 2015). To simplify, IoT is a process of connecting devices
with an on-off switch to the Internet and to each other to create a big connected network. A
thing, in the Internet of Things can be any electric or electronic device or machine such as
smartphone, coffee maker, television, smartwatch or wearable trackers (Pizam, 2017).

Functioning of IoT technology is completely common in industries as manufacturing,
agriculture, transportation, chemical, energy and healthcare. According to Pizam (2017), there
is also a notable increase in development of IoT devices adapted for individual users. Smart or
self-driven car, smart home, virtual reality and multiplicity of applications for health and well-being are just some examples. However, Pizam (2017) claims that the hospitality and tourism industries work relatively slow in application of IoT technology. Almost every single hotel or attraction have many required systems managed for inventory control, safety and security, energy use, locking systems and tracking customers behavior. Unfortunately, these systems work separately and do not communicate with each other in the same linked network. As a result, they limit themselves and miss opportunities and benefits of IoT technology using (Pizam, 2017).

ICT points out to a huge range of competences used for production, storage, and delivering of data and information as well as in the distribution of knowledge. All of the facts, characteristics and components are data in this case. Information is linked to an arranged, significant, organized and beneficial managing of data. Knowledge associates with profits and perception of a set of information and how that information can be adopted for the best practical implementation (Senn, 1998; in Oyewole et al., 2008).

Information communication technologies (ICTs) had important input on tourism all over the world. The establishment of the Computer Reservation Systems (CRSs) in the 1970s and formation of Global Distribution Systems (GDSs) in the late 1980s. However, the most important founding was Internet, which appeared in the 1990s. The Internet has totally reconstructed and revolutionized all of the functional and tactic processes in the tourism and hospitality industries (Senn, 1998; in Oyewole et al., 2008). ICTs plays a central role in terms of competitiveness and positioning on the market by many different tourism actors such as attractions, hotels and even destination as a whole product (UNWTO, 2001).

The ICT adoption in hotel industry has been evolved through many different spheres of technological solutions. The most developed and known way is to divide varied ICT activities into two large groups: front office which includes customer relationships, reservations, food & beverage and housekeeping, and back office with human resources, accounting, data mini, revenues and expenses as invisible tasks (Baggio, 2004; in Seric and Gil-Saura, 2012). On the other hand, Ruiz-Molina, Gil-Saura and Moliner-Velázquez (2010) divided the main ICT amenities adopted in hotels into: in-house ICT (i.e. hotel operate system, network connectivity technologies, in-room technologies and business integrated processes) and ICT for external use (i.e. electronic marketing and sales solutions, customer relationships management, ICT solutions associated to guests and communication with suppliers and other stakeholders (Ruiz-Molina et al., 2010). Similar to above named authors argues also Beckendorff et al. (2019). The authors have introduced a list of the most popular lodging ICT activities in the accommodations sector which are divided into four different groups. The first group is front-office applications witch hotels’ operations such as reservation system, check-in/check-out, room status and housekeeping management and in-house guest information functions. The second group is called for back-office applications and include personnel, purchasing module, inventory module and statistics. The next group is defined as guest-related interface applications which consist of call-accounting system, electronic locker system, guest-operated devices (in-room functions and entertainment) and auxiliary guest services. The last group
that include ICT applications is restaurant and banquet management, and involve operations such as menu management systems, sales analysis, menu-item pricing and cost control (Beckendorff et al., 2019, p. 229).

3.4 Responsible innovations

Higher efficiency of guests’ experiences is a result of adoption of ICT in hotel sector (Gretzel, 2011). Furthermore, ICT supports also practice of automation of different hotels’ operations and self-service concept, effecting in reducing of production and distributions costs. ICT is used to varying extent depending on factors such as: hotel category (luxury hotel, B&B, motel, budget hotel etc.), the type of guests (leisure guests, business guests, active, families etc.), the size of the operation, its leaders and owners, and its geographical location (Jaremen, et al., 2016).

The European Commission (1995) described innovation as new or upgraded products or services, new markets, new production methods (containing new ways for supply and distribution) and changes in management (containing organizational changes and adjustment in work terms). In the third edition of the OECD Oslo Manual (2005, p. 46) innovation was defined in a very similar way. It is the implementation of new or significantly improved products (goods or services), or processes, a new marketing practice or a new organizational method in business operation, organization or external relations.

The authors of manual presented four types of innovations:

1. *Product innovations*, a new product or service that is significantly improved regarding its components or destined uses.
2. *Process innovations*, a new or significantly improved methods in production or distribution, including technique, supplies and software changes.
3. *Marketing innovations*, new methods and modifications in any of the marketing mix dimensions which are: design, packaging, arrangement, promotion and price.
4. *Organizational innovations*, new business operations and methods in the organization or in external relations (OECD, 2005).

Innovation is a very important part of tourism and accommodation sector. Innovative tourism products deliver a high amount of added value. Destinations and other involved stakeholders continually try to offer experiences that never have been presented before. It helps providers to achieve a unique advantage to certainly differentiate themselves from others (Gomezelj, 2016). However, the types of innovations in tourism area are a little different from presented earlier. According to Hjalager (2010) there is five different types of innovations:

1. *Product or service innovations*, changes and improvements that can be directly noticed by the tourists and other customers, with “new” meaning and “never-before-seen” feeling; these products and services are beneficial and exclusive for tourists to such an extent that they may decide to buy them only based on their newness.
2. *Process innovations*, typically back-office activities aimed at improving efficiency and productivity; technology financings are the main factors of these innovations.
3. **Managerial innovations**, new techniques of organizing business processes, empowering personal, compensating well-done work with financial or other benefits and improving employees’ satisfaction.

4. **Marketing innovations**, containing new marketing concepts, for example loyalty programs and co-production of brand.

5. **Institutional innovations**, new forms of organizational structure such as clusters, networks and partners.

Technological innovations, according to Minghetti and Buhalis (2010), are becoming more and more important for the management and marketing of tourism organizations, destinations and products. Tourists consumer behavior is also affected by these technologies as they can change his or her whole decision-making process from product search to consumption and memories creating. Although the wide distribution of ICTs and IoT has a huge potential for providing sustainable global and tourism development, disparities and imbalance remains in access, skills, use ability of ICTs, and IoT services (Minghetti and Buhali, 2010). That is why Warschauser (2004) argued that the most important thing about ICT is people’s ability to make use of such devices and manage it in meaningful social practices rather than examining the availability of a computing device or the Internet line (Warschauser, 2004).

Authors of the article postulate the presence of a digital gap between tourism actors and potential customers, which calls digital divide. The definition of digital divide provide by OECD (2001) is “the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access ICTs and to their use of the Internet for a wide variety of activities” (Minghetti and Buhalis, 2010).

Furthermore, having access to technologies innovations, does not automatically mean that tourists will use technology just as it is intended for use. There are also customers who have access to ICTs and the Internet but are not able to use it effectively and efficiently because of a number of different causes, including lack of knowledge, trust, literacy, language barriers, and content availability of credit card and low bandwidth. That is why just offering technological solutions is not enough. As the authors noted, someone should also direct those who have any of the above-mentioned problems so that they are no longer a part of digital divide society (Minghetti and Buhalis, 2010).

There is no difference what type of innovation or in which industry sector it occurs, they should all be the responsible innovations. Gwarda-Gruszczyńska (2016) states that creators under process of developing innovations should be aware about three main aspects concerning responsible innovations. The innovations should be:

1. **Ethically acceptable**, in an European Union (EU) context this refers to a mandatory agreement with main values of the EU code on fundamental rights (e.g. right for privacy) and the safety protection stage set by the EU.

2. **Sustainable** – contributing to the EU’s objective of sustainable development. The EU follows the 1997 UN definition of sustainable development, which include economic, social, and environmental dimensions, in mutual dependence.
3. **Socially desirable** – socially desirable captures the relevant, and more specific normative anchor points such as “Quality of Life”, “Everyone is worth the same”, “Equality among men and women”, and so on. EU tries to promote such product development through the financing of research and development actions (Gwarda-Gruszczynska, 2016).

Close to the term responsible innovation exist the concept of social responsibility, which mean that society has a set of generally accepted relationships, obligations and duties between the major institutions and the citizens. It all constitutes to so-called contract. For example, we as society expect and believe that business will not pollute the air we breathe or the water we drink, will offer fair salary and benefits for employee and will also provide a product or service of good quality at a reasonable price. More and more hospitality organizations respect this and have stated publicly their feeling that it is good and profitable to be a good citizen. Many hotels support local arts, raise funds for charity, only use local and/or organic products and try to put some of their profits into the communities that have made their progress attainable (Woods and King, 2010).

### 3.5 The service quality in hotel industry

General definition of quality according to Injac (1998) is that "*quality is a measurement or indicator of scope, i.e. the term for usability of a product or service for meeting specific needs at a certain place and time, when the product or service is confirmed as goods through the process of exchange*" (Injac, 1998, p. 64). Quality of a product or service can be noticed as its appearance by means of which specific needs of customers are meet and satisfied.

When it comes to the definition of service quality in the hotel industry, quality means achievement of predicted standards and their stable conservation, which is an ongoing process. According to Avelini-Holjevac (2002) high-class hotels deliver the highest standards and highest quality products and services, with the most expanded range of expensive hotel service. Economy and budget class hotels provide products and services of lower quality, with a limited extent of less expensive services (Avelini-Holjevac 2002). The service quality has been progressively classified as a main factor in differentiating service products and creating a competitive position in tourism sector (Prideaux, Moscardo and Laws, 2006).

According to Woods and King (2010) there are three types of quality service improvement in hotel industry:

1. **Continuous improvement**- the ongoing efforts within an organization to meet the needs and expectations of customers by changing the work technique so that products and services are delivered better, faster and at less cost than before.
2. **Incremental improvement**- activities designed to improve or streamline present work processes within a company, department or work area that results in limited but regular benefits in quality, speed and savings. It’s important to think outside the normal mode in this category and make use of technology.

Six Sigma, developed by Motorola Corporation is a practical tool used to focus on the customer. Through systematic method of integrating data collection and guest feedback about quality improvement and problem-solving activities, hotels may create innovative solutions, eliminate errors and significantly improve profitability. The Six Sigma concept rotate around five key aspects:

1. Identifying the core characteristics of the guest experience that are crucial to guests’ perception of quality.
2. Identifying errors in the delivery process that results in guests’ dissatisfaction.
3. Finding the highest capability of the relevant guest service systems to achieve perfection every time.
4. Identifying various in the system in order to find opportunities to eliminate errors and ultimately improve guest satisfaction.
5. Developing a solid operation where ensuring consistent, certain processes to improve the customer experience is the focus of every employee (Woods and King, 2010 pp. 103-104).

### 3.6 Hotel guests’ satisfaction

Hotel guest satisfaction is argued to be a critical factor in hotel operations for guest loyalty and brand association (Torres et al., 2014). Xiang et al. (2015) define guest satisfaction as “the guest’s evaluation of his/her experience through interaction with various service areas”. Increasing guest satisfaction and decreasing guest intention to choose competitive hotels are the most important challenges that hotel management must face with (Prasad et al., 2014).

Earlier research shows that hotel management usually receives guest comments from two types of guests: dissatisfied guests whose expectations were not met so much that they had to express their dissatisfaction, and delighted guests whose expectations were met to a greater extent than they expected. Therefore, opinions of these two extreme groups are just a little percent of the whole hotel guest population. Most of the guests remain neutral when it comes to their views on the functionality, comfort and the quality of the service. That is why hotel management have difficult to develop some action plan and strategy that will improve hotel guest satisfaction among all the guests (Shea and Roberts, 1998).

According to Alrawadieh and Law (2019) guest satisfaction depends of four main determinants. The authors found that the most important factor is room. The room quality in terms of its size, amenities, bathroom, design and cleanliness was the most mentioned aspect by satisfied hotel guests. Second determinants that develop guest satisfaction during the entire stay is service quality. According to the authors, staff’s attitudes and performance was the most frequently mentioned aspects within the dimension of service quality. The role of the hotel employees is dominant in creating guest satisfaction because the communication between hotel employees and guests is to a large extent in the hospitality industry. The last
two determinants that constitute guest satisfaction are hotels' characteristics (location, spa and wellness, lobby bar etc.) and food and beverage (restaurant, prices, menu, selection of drinks etc.) (Alrawadieh and Law, 2019).

In order to improve the satisfaction of hotel guests, Alrawadieh and Law (2019) suggest that hotel managers should focus on two key elements: quality of the rooms and quality of the services. According to them, the first aspect can be easily improved by replacing or remanufacturing existing furniture and adding some new amenities to each hotel room. The second aspect, improving the quality of services, is more difficult to implement and requires more time. However, good recruitment, clear guidelines, and regular training for hotel staff are always a good start.
4. Empirical results

The empirical result chapter presents collected data from the interviews and the online survey. This chapter is divided into three sections to make it clearer for the reader. The first section is qualitative answers from interviews with hotel employees, the second section is qualitative answers from interviews with hotel guests, and the third section is quantitative answers from online survey with hotel guests.

4.1 Qualitative answers from the interviews with hotel employees

Of the five interviews conducted, two were with men and three with women. When it comes to their work position, two interview participants are receptionists and the remaining three are managers. Four interviews were managed by email and one by telephone. The duration of the telephone interview was 32 minutes. Each interview included 9 main questions and some follow-up questions (questions are located in appendix). Due to the wishes of the interview participants, the author of this study will not use the real names of people or hotel names at all, but only numerical names (employee 1, employee 2, and so on.), so that reader better can distinguish individual people and meanings.

All five people connected the term smart hotel in a more or less specific way with technology and digitalization. As an example, employee 1 and 4 provided self-service possibility in the form of check-in and check-out as well as the managing of vending machines and other devices in the hotel. Employee 3 responded from the perspective of the hotel that a smart hotel is one that uses artificial intelligence (AI) for back-office systems, operations and activities but also can track guests' preferences and thereby enable better service. Furthermore, employee 2 and 4 added that smart hotel is something more than just highly advanced technology hotel.

“[…] are also aware of the environment, climate and sustainability. Everything to give the guest as practical and optimal experience as possible.”

“Here everything is not about fast service, which it is also, it also about taking time to listen to the guest questions, give recommendation and services that meets the guest need. It’s an experience to stay at a hotel, it’s the getaway, maybe experience first of a new country, things to explore, much more.”

On question about their own opinion about technological solutions and innovations in hotels, the participants' answers were more varied. The majority were positive about it saying that technology can facilitate their daily work so that they can spend more time for other tasks and that modernization of the services simplify the interaction and quality of services between guests and staff. Employee 2 states that it is important for the hotels to be part of the modernization with the technology in order to meet guests' expectations and needs and adds also that digital technologies are to a greater extent demanded by guests. Employee 4, on the other hand believes that increasing of technology will result in missing a lot of the personal services, which is also an important factor of well-working hotel. Interview participants also clarified what kind of smart technologies are used in hotels they work in. Beside self-check-in and self-check-out option which were mentioned by every participant, digital key and smart tv
was the most popular answers. Employee 2 described that their guests can download hotel’s application where they have access to many functions such as check-in and check-out, digital key, payment and even live-chat with staff. Another smartphone application for hotel guests, named by employee 1 includes similar facilities but also allows register membership on loyalty programs and order a taxi from/to the airport. Employee 4 states that they are using a lot of smart tv to entertain but also to inform the guests. They can communicate with guest by writing messages on TV, for example day and time for check-out, breakfast time or information about events. When it comes to entertainment, smart tv offers for the guests a wide database of movies and series and even mini games. Furthermore, employee 4 spoke also about smart technologies created and used for sustainable development.

“We have key holders in the room to get electric only when manually plug in a key, to reduce energy usage. We have water sensors on bathroom sinks so that water flow is only used as much needed, we also using water flow valves to measure and control the water pressure.”

Employee 5, on the other hand explained that they work with different systems and devices connected in the same network, which help them to control hotel, gain better interaction with guests and provide new services that increase the quality and efficiency of their daily work. As an example, employee 5 told about small watches that every employee present on the shift must wear. These watches are like those commonly known smart watches, but they have a different purpose than measuring the pulse or the number of kilometers run. At the reception, restaurant, bar and wellness area there is a panel for controlling these watches. When a problem occurs at the reception or an additional employee is needed, the person presses the button and the closest person receives a notification on the watch that he/she is needed in the given place. In addition, the watches are equipped with a GPS locator, which makes it easier to find an employee.

Another question was what the main reasons are why hotels use or do not use smart technology. Because every participant of the interview, as they mentioned during the conversation, works in a hotel where smart technology is used, participants listed only the reasons why smart technology is used. Employee 1 stated that smart technology is adapted to better and easier perform work activities and to gain profit as it’s cost effective for the hotel. Employee 2 believes that smart technology can be of huge help to both employees and the guests and as a result they are able to deliver the best possible service. Employee 4 contrarily described that they as a hotel chain want to be the first choice of the guests. They continually improve their hotels and services in order to meet customers demand and to give their employees the right equipment to deliver high level services. Employee 3 and 5 ascribe that improving of quality and efficiency are the main reasons why they adapted smart technology. Then, the participants talked about the advantages and disadvantages of using smart technology in their hotels. The vast majority of mentioned things were advantages such as improve services, help staff to grow and get closer to branch future, reduce costs, optimize processes, reduce negative impact on the planet and attract more people to visit and work with them. However, two participants in addition to these advantages, they are also aware of disadvantages and risks arising from the introduction of smart technology.
“The technology has to be maintained and is require a lot of work, resources, engagement from leaders and specialists within the chain and also keep the right competence within the company”.

“We want to provide the best possible service to our guests and where the technology can both help and steal. Of course, it is incredibly helpful when it is something you have become accustomed to using that facilitates both us and guests, which can also become a problem when the technology does not fulfill the function that it should”.

According to all of the participants, technology has a positive effect on them during their daily work. Employee 3 admitted that it makes work much easier, comfortable and faster. It also helps to feel good and safe considering solid and advanced operation systems. Employee 5 believes that it helps to simplify tasks and make them more efficient, but at the same time it brings new challenges to prepare furthermore. Something different noticed employee 2 describing an example of self-check-in.

“It happens that you get comments from guests who mean that it does our job for us. But instead of checking them in to the system, we can put all the focus on providing the best possible service to the guest in addition to the check-in itself”.

The next question concerned how, from the perspective of interview participants smart hotel technologies are perceived by guests. Employee 3 admitted that emerging technologies in their hotel are estimated by the guests and are treated as a big convenience. Employee 5 states that their guests are always very receptive to new technologies that make them enjoy and relax under they stay. Furthermore, she/he noted that the guests require to value their money as part of the luxury package that they expect to receive. Employee 2 answered a little bit differently from others. She/he believes that it is very different from guest to guest.

“Some point out and comment that it lacks certain things, such as speakers in the room or a chromecast to the TV. On the other hand, many of our guests appreciate the app where they can easily check in themselves but know that they can always reach us if they need anything. Then it also varies from what all people themselves are used to”.

According to employee 2, another factor affecting satisfaction or dissatisfaction with smart technology is the nature of guests and their habits.

“Those who themselves use a lot of technology privately miss it when they come to us and discover that it is something we do not have, while others do not at all use such things that they do not even reflect or are aware of it missing”.

Finally, two questions were about the future. When asked if interview participants would like to extend presence of smart technology in the hotel everyone answered affirmative, giving also various examples. Employee 1 would like to extend use of smart TV in guest’s room, employee 2 in the future want to add more in-room technologies, employee 3 would like to
have a system that controls the behavior of the guests, collects statistics and tells the staff what the guest wishes before asking for it. Employee 4 admits that she/he is unable to predict what they will be working on in the future but does not exclude any options. However, she/he believes that this will be development combined with sustainability because these are important values for them. Last but not least employee 5 summed up that there are always many ways to extend the presence of the smart technology in the hotel and that they are focusing right know on delivering an application where the guest can order or control their services inside their rooms.

The last question was about future of smart hotels, will they dominate all over the world? Participants opinions were divided, employee 1 rapidly replied that according to her “if it does not already exist, it will not last too long”. Employee 2 is aware that such hotels are already existing in the world, but at the same time counts on the fact that despite that digitalization is still developing, the hotels will remain personal service. Employee 3 believes that fully digital hotels are just a matter of time but is also convinced that staff will still be needed and will work well together with high advanced technology. Employee 4 answered both yes and no, motivated as follow:

“Some hotels will try to make differentiate to offer latest fully digital service and experience, also there will be hotels that will follow latest innovations and the guest’s needs, so I believe a lot will be changing but I think that we still will have some people that like the ordinary or the personal interact”.

However, employee 5 doesn’t think that smart hotels will be the future of hospitality sector.

“Every hotel or chain has its own concept and personality. There are many hotels that are specialist in continue with more traditional concepts or more person to person services. What we might see in a shorter future is a combination of the modern technologies that keeps the essential traditional services while they make more effective upgrades their systems”.

4.2 Qualitative answers from the interviews with hotel guests

Of all five interviews, three were with female hotel guests and two with male hotel guests. Two of interviews were conducted through face-to-face meetings, one by phone and two by e-mail. The duration of the face-to-face interviews was respectively 38 and 30 minutes. The phone interview had a duration of 18 minutes. There were 10 main questions in total and several follow-up questions to make the hotel guests’ answers more precise. The questions that were asked can be found in appendix at the bottom of the paper. Similar to interviews with hotel employees, the real names of the interview participants will not be given. Instead, the author will use the names guest A, guest B and so on. The table below shows information about the participants' gender, age and occupation.
The first question about how the interview participants understand the concept of smart hotel were responded quite different by each person. Guest A named that she is not so sure about definition but she thinks that smart hotel is a modern hotel with many intelligent functions that are offered for the guests and for the staff to make their stay or work easier, more comfortable and more effective. Furthermore, she believes that it is strong relationship between smart hotel and other smart devices such as Smart TV, which also offers something beyond a usual TV. Guest B associated this term with extra service, preparations for guest arriving and all the in-room experience. According to guest B, all the extra necessities should be covered in the room so that the guest can have more pleasurable stay. Guest C defined smart hotel as a convenient and affordable accommodation located in central areas with limited staff but use a lot of new modern technology. Guest D stated that smart hotel is innovative accommodation alternative that meets the customers’ needs. She also added that such hotel offers and provide better workplace for their employees.

“It is full of the newest technological solutions that support employees work and make your stay more pleasant”.

According to guest E, smart hotels offers new opportunities for the guests. Many guests value time and comfort, technologies that a smart hotel provide will help meet guests’ expectations. Participant E thinks also it’s a good way for organization to different themselves on the market.

“Because technology is present in the lives of each of us, some hotels also want to transfer from ordinary, traditional hotels into more creative, developed and unique hotels. Doing this, they can achieve helpful tools in the hands of employees and a profitable investment for the hotel”.

Second question was touching participants own opinion about technological innovations and solutions provided in hotels. Guest A and guest E besides that they like this idea said also that changes as technological innovations arising are something natural because the whole world is moving on and it cannot be different with accommodation sector.

“It’s important that even hotels follow new trends, add inventions and goes with the time. Everything changes, modernize and updates. Mobile phones, tv, social media, cars etc. seems to work better and better because they are all the time updating and people are finding solutions what to do to make everything work even better”.

Source: Own illustration
Furthermore, guest E adds that there can be no surfeit of all technologies. Managers should only adopt those that are really needed and bring something for guests and staff. Moreover, technologies must be customized for all guests, regardless of the country they came from, age or computer knowledge. Guest C had a mixed feeling. On the one hand, he said that he likes technological innovations and it is always cool to test new facilities in hotels, but on the other hand such added value costs much more than usually hotels in similar locations. According to guest D, smart technology creates higher standards and make the stay more luxury. She argued also that these innovations contribute to reducing the costs of maintaining employees and is important factor if organization wants to be listed high on the market.

Next question was to find out what technologies the interview participants used or were available to use during their last stay in the hotel. All the interview guests named self check-out and keycard to open hotels’ room. Guest A noticed also that these keycards are usually for multiple functions. Besides that they are used it to open room doors, they are also used it to ride the elevator and switch on the electricity in the room. Guest B doesn’t paid attention to it, but she gave a few examples that she remembers: coffee machine, wi-fi, radio in the shower and lamp that changes colors. Guest C, on the other hand used smart TV and both self check-in and self check-out services. According to guest D, the hotel that she stayed at offers a mobile application that the guests can get access to information about the hotel and the area, they can book spa services and pre-order meals at restaurant, control smart TV, set a wake-up call and also to self check-out, everything through the application. Guest E described that at the hotel lobby guests were able to use modern computers for free and that in his room there was a smart TV which had some personalized messages and a lot of useful information. Returning to the keycards, guest E said that those were also used for lockers in the gym and pool which was a huge convenience.

Interview participants identified all the advantages and disadvantages that smart hotel technology can bring. According to guest A less contact with the staff is an advantage because as she said it saves a lot of time and stress. Using technological solutions guests can avoid queues and language barriers. Furthermore, it would be more efficient for the hotel to once invest in technology then to have so many employees. Guest B had a similar opinion about advantages. She believes that it would be a great benefit to the hotel owner and the whole organization to invest in smart technologies and implement them in the hotel. Doing this, hotel can achieve an advantage over the competition, expand the hotel guest segment and equip employees with the best tools for their work. However, guest C was skeptical about positive things with technology within hotels. The only thing that he named and liked was that the smart tv was compatible with his phone and headphones. Guest E, on the other hand stated that it gives him huge freedom and the ability to choose. If he is in a hurry, he likes to use the option of self check-in instead of standing in line and talking to the receptionist. Guest E noticed also that many hotels have a well-equipped conference rooms, as a result meeting are more efficient, professional and interesting for all participants. The last advantage he mentioned was entertainment.

“*I don’t have to leave the hotel or even my own hotel room because the current technology allows a lot of entertainment, an example can be hotel application*
with movies on demand, games, food delivery or comfortable bed with remote control”.

From guests’ point of view, the disadvantages of technology in hotels are negligible. Guest B and C couldn't name a single negative thing, while guest A gave an example concerning ecological aspect. According to her, a huge use of power and electricity can negatively harm environmental. Second negative thing that guest A brought up is risk of replacing humans with computers, machines and robots which may happen soon. Guest D mentioned only one disadvantage, namely need of face-to-face contact with the staff. As she explained, personal contact gives her a greater sense of safeness and she cannot imagine contact with a digital device in case of any problems. Guest E raised the issue of functionality.

“Everything is fine when the technology works but what if something goes wrong and some errors occur. It doesn’t matter if some function in smart TV temporarily is not working, but what if the entire hotels’ network goes down in or in some way the data collected by the hotel guests will be stolen or simply lost. That is a serious threat”.

The next topic of conversation were positive and negative incidents involving hotel smart technologies which the interview participants experienced. Guest A told that one negative situation has happened and that was a demagnetized of keycard because she held it too close to the smartphone. Then she went down to the reception and the staff fixed a new keycard. Similar situation named guest C. He just arrived after a long journey, checked-in at the reception, took a lift to his floor but could not open his room, the keycard was not working. As the guest C described, this incident was frustrating because he was very tired and had to bring his luggage to the reception back again just to ask for a new card. According to the guest B and D, they have mostly positive experiences. Self check-out was very quick, without unnecessary conversations and time spending. Guest B also added that the self check-in that she experienced in Japan; Tokyo is on a higher level comparing to the European standards. The guest just go to one of the self check-in machines located in hotels’ lobby, writes his/hers name and address (sometimes reservation number is enough), machine take a photo of the guest and prints out the keycard and a brochure with some hotels’ information. Guest E shared his negative experience from Malta during his stay at some 5-stars hotel in 2019. The first thing he did upon arrival was to take drinks and food out of the mini bar to make some space in the fridge for to put his medicine in. Of course, as he admitted, he did not want to eat or drink anything and on the day of departure he put everything back in the fridge. At the reception during check-out, it turned out that the fridge had motion sensors and all information about what had been removed, was directly sent to the system and added to the guests’ note. The bill was over €50 but after explaining the whole situation the bill was canceled. Guest E admitted that he must remember in the future to inform the reception desk during check-in to avoid similar situations. Interview participant E described also a positive circumstance. One of the hotels he visited had available for the guests the beacon technology, which helped a lot to find the right way.
“[...] the detailed map inside the hotel that show your location and navigate you to places of your choice (restaurant, pool, your room etc.), something like google maps, but from inside the hotel walls. The hotel was huge, so I spend the first two days to learn the exact ways using this application”.

Question number six was intended to examine the stand of hotel guests to smart technology in terms of security and privacy. Guest A answered that in her eyes technology is safe but she is also aware about one aspect that many people are worried about. Namely, giving personal information to a device instead of a real person. As she described, every bank and online shop have many security systems and the chance that the customers will be hacked is much lower than the chance that your wallet or phone will be stolen on the street. Guest B stated that every technology and provided solutions are certainly tested many times before they are put into use. That is why she feels safe, but at the same time she admitted that things, especially those technological can always go wrong. Someone may want to use the technology for the wrong purposes or just even a regular food vending machine or self check-in machine can break. Similar to above opinions answered also guest C and E. Guest C argued that in technological part there is always an element of risk, devices continually collect personal details and preferences that could be leaked and/or used for unwanted purposes by third parties. Guest E believes that every technology can be harmful if users don't use it properly. However, he is convinced that hotels that decide to implement a given solution are fully certain of their functionality and infallibility.

The next question was to find out if there is a connection between smart hotel technologies and provide service. All of the interview participants agreed that technologies allow providing a better service in terms of quality and quickness. According to guest A, hotels that are trying to implement technological solutions, shows that they want to develop, offer new possibilities, improve their standards and reach as many potential guests as possible through new and diverse innovations. Guest B added that smart hotel technologies hugely affect the quality of provide service. She also gave a several examples: guests do not have to stand in queues if they do not want to, they can ask a question and get an answer without leaving the hotel room or order a dish in the application knowing how exactly it looks in reality and see in how many minutes it will be ready. Guest C on the other hand pointed out that the whole process looks different from the staff’s perspective. If the service should really be of better quality and work smoother, the staff must be well prepared and cooperate with technologies which are their tools. According to the guest D, offered services are at a higher level within modern, more developed hotels comparing those with lower standard and more traditional hotels. However, she believes that if face-to-face contact is too much limited it can paradoxically result in worse service providing. Guest E stated that since technology has started to appear to a greater extent, the service has improved significantly. He also added that everything is about the time nowadays. Thanks to various technological solutions can both the guests and the staff be more efficient, do the same things as usual but in the new form and much easier and faster.

The penultimate question was about increasing presence of smart technology in hotels and interview participants opinion on it. Guest A sees no obstacles for hotels to introduce even more technological solutions.
“It doesn’t make any damage, rather the opposite, brings more possibilities and offers new and maybe better solutions”.

She also gave a few examples of what activities and services could be extended. Digital keycard located in smartphone, an hotels’ application that cooperates with local restaurants and attractions through which the guest can book a table or buy a museum ticket to a lower price thanks to collaboration. Guest A also would like to use her smartphone as a remote control to adjust temperature and lights in the room, control smart tv or even to send a command to the coffee machine to prepare a cup of favorite coffee. Guest D would also like to see expanding of technologies available in hotels. She said that it would be greater in the future to have a machine that exactly knows which rooms are missing of products such as towels, soaps, mini bar content and deliver them by itself. Guest C on the other hand, expect to find smart hotel technologies balanced with a level service. According to him, hotels should strive for adapting a useful technology only, devices and tools that reflects our day to day life. Guest C believes also that today's hotels should give up landline telephones, that almost no one uses and equip each hotel rooms with a smartphone or smart TV with a video call function, or simply have an application that every hotel guest will be able to download to a smartphone that allows contact with the reception and has a lot of other functions as well. Guest E stated that he personally would like to see an increasing presence of technology in hotels, but at the same time he is also aware that not every hotel can become a smart hotel because there is a lot of hotel types with various strategies, budgets and goals. Some hotels are small family organizations, others are very old and managed in traditional way who want to preserve their identity, and some cannot afford such changes, even if they would like to. However, guest E believes that in the future the smart hotels will become a kind of standard among other hotels. According to him, it may happen in the same way as it happened with the case of sustainability, it had to take a while before it became "fashionable and popular". Each technology certified hotel would have the same standards for self check-in/check-out, digital key, smart tv and other functions.

The last question was about the future of smart hotels from the perspective of hotel guests. All of the interview participants admitted that smart hotels have a bright future. Guest A motivated her opinion as follow:

“It’s because the world is changing, and technology is taking more place in our lives. If it can make our stay easier and more comfortable, then we should go for it”.

Guest D gave the same arguments for a positive future for smart hotels. According to her, hotels follows the natural changes and development of the whole world. She is also sure that all our lives will very soon be fully automated. Guest B noticed that more technology developed countries have an advantage and it is easier for them to implement a smart hotel into life, smaller and less developed countries need more time and have to introduce changes slowly, but the final result in a few years may be the same. According to guest E, smart hotels will become more popular than traditional hotels just in a few years, but it requires both society and organization awareness and some time.
“However, it takes time, people have to discover them and accept them, and those hotels that avoided technology for a long time have to understand that this way can result in many benefits.”

4.3 Quantitative answers from online survey with hotel guests

The author of this study collected a total of 108 responses, of which 104 were valid and could be used for the study. The survey consisted of 10 questions in total; 2 basic questions, 2 open questions and 6 close-ended questions where respondents used the scale to answer. The survey was completed by 57 women, 46 men and 1 person who marked the alternative "other". The average age of respondents was 30.75 years, the youngest participant was 18 years old and the oldest 65 years old. All the questions with possible choices can be found in appendix.

The first question was an open question, respondents had to write in one or a few words what they associate the concept of smart hotels with. The variety of answers was huge, but each respondents’ answer can be categorized under some of related themes. Some examples of answers:

“Online services, simplicity, modern”

“Effectiveness”

“Sustainable development”

“Modern and fresh hotel”

“Hotels with better and higher level of technology”

Next question that also was the last open question was about the advantages and disadvantages of smart technology in hotels. Respondents were asked to write out positive and negative things that technology brings to them and to the hotel. Advantages that were most frequently mentioned are flexibility, higher guest experience, better and faster service, effectiveness, comfort and more entertainment. On the other hand, the disadvantages that appeared most frequently in the answers are language and knowledge barriers, not suitable for everyone, errors appearing, harmful to ecology, expensive type of accommodation and staff replaced by technology. However, online survey participants wrote positive things more often than negative ones.

The figure below shows the percentage distribution of answers to the question about the extent of smart technology during their last stay in hotel. Exactly half of the respondents (n=52) chose the alternative “To a moderate extent” and 30% (n= 31) marked the answer “To a very low extent”. The other two alternatives "To a large extent" and "Almost nonexistent" got 11% (n= 12) and 9% (n= 9) respectively.
The next question was extensive and touched upon three themes related to smart technology: negative impact on guests’ privacy, improvement of the quality of provide service and increasing of guests’ satisfaction. Respondents had to rate each statement, according to their own experiences and views. Figure 2 presents the diagram with the collected answers.

38 (36.5%) respondents remain neutral on the question of negative interfering in the guests privacy by smart hotel technologies, 34 (32.7%) agree or strongly agree with this statement and 32 (30.8%) on the other hand disagree or strongly disagree that smart hotel technologies can negatively affect guests’ ethical aspects. However, only 2 (1.9%) respondents strongly
disagree and 9 (8.7%) disagree with second statement, which is about quality improving of provide service. 29 (27.9%) hotel guests are neutral in this case, but 33 (31.7%) of all respondents agree and 31 (29.8%) strongly agree that smart technology improves the quality of service perform. The last statement announced that smart technology can increase guest satisfaction. Only 1 (1%) person strongly disagree with this statement, 6 (5.8%) of them disagree and 17 (16.3%) respondents feels neutral about it. While, 37 (35.6%) hotel guests agree and as many as 43 (41.3%) strongly agree that smart hotel technologies can increase guests’ satisfaction.

The last two questions were based on a number on a scale of 0 to 10, where 0 meant not likely at all and 10 meant highly likely. First, respondents had to assess how likely is that they will choose a smart hotel rather than traditional hotel for their next stay. The number 8 (n = 27) on the scale was most frequently marked, and the number 1 (n = 1) was least often marked. The average number of respondents' answers was 6.35 on the first question. The second question addressed to hotel guests was how likely is statement that until 2025 smart hotels will be more popular accommodation alternative than traditional hotels. Answering the same method, the most frequent alternative was number 7, marked by 27 respondents and the least frequent answer was number 0, marked by only 1 respondent. The average number on this question was a little higher, 6.62.
5. Analysis

In this chapter the reader finds analysis of empirical findings from both interviews and online survey conducted with hotel employees and hotel guests. The main research topics which are smart hotel and smart technology were discussed and a SWOT analysis of smart technology in hotels was presented. In addition to this, smart technology impact on guest satisfaction and privacy as well as the quality of provided service were analyzed.

5.1 The concept of a smart hotel

Hotel employees to a great extent identify the smart hotel with the offered technology. Only two interview participants except smart technology mentioned another aspect which can be associated with smart organization where the good of individual units, the whole organization and even the whole planet are the highest priorities. On the other hand, the opinions of hotel guests about smart hotel differed slightly from employees’ perspective. Most of them somehow referred to technology but some of them were not entirely convinced of the correctness of their answers. However, guest C, D and E connect smart hotel with affordable and innovative accommodation with many conveniences for both customers and employees. After analyzing 104 hotel guests’ responses in the online survey to the question of how they can describe a smart hotel in a few words, a several themes (see table 3) were created in which the answers could be entered.

Table 3: Allocation of hotel guests’ responses regarding the concept of a smart hotel into specific themes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Number of answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>47</td>
</tr>
<tr>
<td>ICT/IoT</td>
<td>17</td>
</tr>
<tr>
<td>Organization</td>
<td>11</td>
</tr>
<tr>
<td>Digitalization</td>
<td>10</td>
</tr>
<tr>
<td>AI/robots</td>
<td>9</td>
</tr>
<tr>
<td>Other, not suitable</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Own illustration

This table confirms that technology is the most associated topic with smart hotel, both among interviewed employees and guests. The second most frequently linked topic to respondents’ answers was information communication technology and internet of things theme, which wasn’t directly named by employees and guests during the in-depth interviews. Organization was the third theme developed from the examination of survey responses. 11 people associated a smart hotel with sustainable development, intelligent organization, collaboration with local suppliers which exactly falls into this specific theme of organization. This theme
also occurred during interviews with employees as it was mentioned earlier. Other themes that was created are digitalization which was named by 10 respondents, and artificial intelligence together with robots which 9 respondents wrote about in relation to smart hotel. 10 answers couldn’t be placed into these specific themes because they were incomprehensible, improper or unfinished. Empirical findings go hand in hand with theoretical perspective. Some researchers characterize smart hotels with advanced technology, others with intelligent management and still others with comfort, convenience and guest satisfaction. Although the smart hotel does not have a clear definition, according to Putnik (2005) it is important for organizations wanting to become smart to always develop and take advantage of offered opportunities, just like technology in this case (Putnik et al., 2005).

5.2 The presence of smart technology in hotels

According to Leung (2019) smart hotels technologies can be divided into three different groups: customer-centric (in-hotel and in-room characteristics), employee-centric (increase working efficiency or reduce workload) and manager-centric (save cost and increase revenue) (Leung, 2019). After all interviews conducted with hotel managers, hotel employees and hotel guests about the presence of technology in hotels where they work or visit, the author of this research collected data that can be entered in these three groups. The vast majority of mentioned technological arrangements, innovations or devices are part of the group customer-centric. A few examples that were mentioned earlier are digital key, smart tv, coffee maker, self check-in and self check-out. Technologies that are designed to improve the daily work of employees and increase their efficiency are the second group, employee-centric. According to interview participants answers online payment, smart watches, self check-in, mini bar sensors are some examples of devices and services that make employees work more efficient. To the last group, manager-centric, not many of the answers received can be classified as devices aimed at saving cost and increase revenue, however solutions such as hotel’s application and internet of things, namely all devices and services in the same network contributes to smaller expenses and higher revenues. It is noteworthy that one solution may also appear in two or all three groups. Such an example can be self check-in function, which is designed as a convenience for hotel guests (customer-centric group), but it also helps employees become more efficient (employee-centric group) and at the same time allows hotel manager to reduce costs (manager-centric group).

5.2.1 SWOT analysis of smart technology in hotels

After examining all the advantages and disadvantages of the technology present in hotels, which were described by interviewees and respondents of the study, the author chose the most often recurring and implemented them in the appropriate category of SWOT analysis.
Table 4: SWOT analysis

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Greater flexibility</td>
<td>- Not adapted to all guest types</td>
<td>- Popularization of smart technology</td>
<td>- Hacker attacks</td>
</tr>
<tr>
<td>- Higher guest experience</td>
<td>- Knowledge and language barriers among guests</td>
<td>- Freedom of choice for guests</td>
<td>- Risk of obtaining personal data</td>
</tr>
<tr>
<td>- Better quality of service</td>
<td>- Harmful to ecology</td>
<td>- Limited only to those technologies that are really needed and requested</td>
<td>- People will not want to pay extra for technology</td>
</tr>
<tr>
<td>- Faster service</td>
<td>- Lack of personal contact</td>
<td>- Differentiation from competitors</td>
<td>- Staff replaced by technology</td>
</tr>
<tr>
<td>- More entertainment offered</td>
<td>- Expensive type of accommodation</td>
<td>- New guest segments</td>
<td></td>
</tr>
<tr>
<td>- Better employee efficiency</td>
<td>- Errors appearing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Own illustration

Many scientists have been examined smart technology in terms of its benefits, which seems to be very similar to those gathered in this study. Jaremen (2016) and Leung (2019) also gained some of the above-named strengths in their studies. However, there is still lack of research presenting the disadvantages and weaknesses of smart technology. The most significant ones are not adapted to all guest types which also can be linked with knowledge and language barriers. If a hotel wants to become smart, then its services must be offered to the widest possible group of people. Hence, the instructions must be clear and available in many languages, and the font size also adapted for the elderly people. Another weakness of smart technology is negative affect on environment. The more technology and electrical devices connected; the more energy is consumed. To stop unnecessary and excessive energy consumption, according to interview participants many hotels have key holders in each hotel room to get electric only when the guest manually plugs in a key card. The last of the most significant disadvantages is the appearance of errors. Unfortunately, there is no cure for it, as my interviewees said, it is so called the malignancy of inanimate things and the only thing hotels can do to face these errors is regular servicing of devices, having a repair team and the possibility of switching to manual functioning until the error is repaired.

Moreover, SWOT analysis involves also opportunities and threats, which in the case of smart technology is not missing. An opportunity that scientists most certainly wrote about and my interviewees talked about is a chance for differentiation from competitors. At the moment, when this concept is not so well known and popular among people, the chance for organization to choose a unique path is great, and hence at the very beginning such a hotel can attract to itself offering the same product, but in a completely new, different form. Another, worth mention opportunity is guests’ freedom of choice. As my respondents and earlier researchers noticed, the smart hotel is not only about technology but also about smart management. With that in mind, hotels should offer the option, not impose one way or the other. An example is self check-in, guests should be able to choose the alternative that suits
best their currently needs, namely traditional face-to-face check-in in hotel reception, digitally check-in using hotel application or with the help of self check-in machine located in the hotel lobby. One of the interviewed hotel guests said that the lack of contact with the reception during arrival is a huge plus, because she/he is tired after flight and want to go to her/his room as soon as possible, while another hotel guest from the same age category said the she/he missed human contact when she/he had to use the self check-in machine. It shows that each guest is different and offering one solution only will not satisfy all types of guests.

Last but not least, the threats caused by smart technology. The most serious threats, after hearing all the opinions, seems to be a hacker attack and stealing the personal data of hotel guests. Breaking into hotels’ servers would have some serious consequences, however, as my interview participants assured, nothing like this happened and should not happened because they have very good security systems. Hotel guests, on the other hand, are more likely to worry about their personal data, valuable items and online content. Beside the hacker attacks that mainly hit the hotel owner and their employees, some hotel guests are skeptical about solutions such as the digital key that is on your phone because they think it is easy to hack and use such a key against them. The last threat mentioned many times by respondents is about replacing people by robots. Many people believe that smart technology contributes to replacing human resources by intelligent robots and machines, but this is a wrong statement. According to Neuhofer (2015), smart technologies function as stimulant to assist for employees during their work. It is a possibility to upgrade and equip employees and environment with smart technology in order to improve service and achieve higher guest experience.

5.3 Smart hotel technologies versus ethical aspects

Hotel guests with whom in-depth interviews were conducted feel safe regarding smart technologies and their impact on guests’ ethical spheres. Despite this, they understand that others may have some concerns such as personal data leakage, hacking a digital key or using a credit card for bad purposes. Their perspective goes hand in hand with survey result. As it was mentioned earlier, 38 (36.5%) respondents remained neutral on the question of negative affect of smart technology on guests’ ethical aspects. At the same time, many survey respondents complained about smart technology due to the fact that in many cases the solutions offered are not suitable for everyone. According to empirical findings, guests who use the self check-in machine for the first time almost always need an assistant, because information on how to operate the machine is negligible and the languages available are only English and German. In addition, there are no available adaptations for the disabled people such as a lowered screen for people on a wheelchair, the option to choose a larger font for the elderly and the visually impaired, or the possibility of hearing text for the blind people. It all fits into the concept of digital divide society described by Minghetti and Buhalis (2010). Just as the authors said, it is not enough to just put some innovative solution and count that it will fix everything. Hotel trying to adapt smart technologies, besides the machines itself, also need to prepare the right ground in the form of trained employees, clear instructions, needed facilities and additional functions so that no one is left out.
5.4 Smart hotel technologies versus quality of provide service

Both employees and hotel guests who were interview participants talked about the quality of provide service with the use of smart technology in superlatives. From the employees' perspective, smart technology enables them to be more efficient, because, as they said, instead of standing at the reception desk all the time, they can also take care of other duties. Thanks to advanced computer systems, employees have a lower risk of making mistakes and their work becomes faster and easier. All these back-office functions that are not visible to hotel guests transform into better quality of the service aimed at guests. According to employees, it seems that the guests do not notice it, however, the interviews with hotel guests show something else. All interview participants admitted that the presence of smart technologies has a positive effect on the quality of provide service. As one of the interview participants said, both employees and guests have the same roles to fulfill as in the past with this change that now there is also a third "person" in the form of smart technology, which is a tool for improving everyday life in many different spheres.

Very interesting results showed online survey on the question about the quality of provide service. It turns out that as many as 64 (61.5%) respondents strongly agreed or agreed with the statement that smart technology increases the quality of services. 29 (27.9%) hotel guests were neutral and only 11 (10.6%) people strongly disagreed or disagreed that smart technology improves the quality of hotel services.

Woods and King presented (2010) three possible types of quality service improvement for hotels. Continuous improvement, incremental improvement and breakthrough improvement. After reading about these three types and interviewing the hotel managers and receptionists, it became clear that the two types of quality service improvement that best suits hotels that want to or already rely on technology is continuous improvement and incremental improvement. Continuous improvement, which is customer oriented, requires continuously improvement so that customer expectations and needs are met. Organizations can do that by changing the work technique, as a result products and services should be delivered better, faster and at less cost than before. The incremental improvement aims to create a better workplace for employees. This improvement is characterized by activities developed to improve and streamline daily work and processes within an organization. By providing better working conditions and tools to employees, the organization will gain benefits in form of better quality of services, efficiency and, in a broader perspective, higher revenues.

5.5 Smart hotel technologies versus guests’ satisfaction

All of in-depth interviewed hotel guests perceived smart technologies as a convenience and added value, which also results in better experience and higher guest satisfaction. Interviewees mentioned the following aspects of smart technology that determine the degree of guest satisfaction: quickness and quality of provide services, guest independency, hotels’ facilities, compatibility with guests’ preferences and devices, in-room comfort and entertainment. On the other hand, employees that have been interviewed are not fully in agreement on this. Of course, most of them believes that smart technology contributes to greater satisfaction among guests, but there are some employees that remain neutral on this.
According to them, people have enough technology at home and when they arrive to the hotel, they would like to avoid any technology and be able to relax. Another argument they gave was the guest's inability to operate a self check-in machine or smart TV, usually caused by a lack of knowledge, not knowing the language or simply giving up after the first unsuccessful attempt. Thus, that the satisfaction of the guests will be low, the opinions passed on will be negative, which may finally result in negative image of the hotel.

However, the data collected from the online survey shows that hotel guests strongly believe that smart technology contributes to higher satisfaction with their stay. 80 (76,9%) respondents agreed or strongly agreed, 17 (16,3%) remained neutral and only 7 (6,8%) respondents disagreed or strongly disagreed that smart technology can increase their level of satisfaction.

It seems that these two extremely different opinions still reflect in what Shea and Roberts (1998) talked about years ago. According to their theory, it is difficult for hotel management to measure the genuine level of satisfaction of hotel guests, because most often the satisfaction or dissatisfaction is left by the guests whose expectations have crossed the boldest limits and are extremely satisfied, and those whose expectations are completely unmeted and therefore not satisfied at all. Thus, there remains the largest group of hotel guests with the level of satisfaction which cannot be determined. In case of this study, some employees took examples of dissatisfied group, interviewed guests were voices of satisfied group what cannot be followed in order to generalize answers. However, the result from the online survey indicates the clear tendency to generalize that smart technology can improve guest satisfaction.

5.6 Smart hotel and its future

Generally, employees believe that the concept of smart hotels is interesting, needed and should continue to develop. It makes their work easier and faster and offers guests new experiences. However, it is hard for them to judge what it will look like in the future, most believe that the technology will be introduced gradually, and the personnel service will always be present. Of course, there will also be a group of these hotels that encourage their guests with impersonal service and the latest technologies, and there will also be a group called traditional or in a few years old-fashioned, which offers its guests personal service without technological functions. Although, according to employees, the surest scenario for the future is a traditional hotel with a large presence of technology that improves the functioning of the hotel and enables new possibilities addressed to the guests.

All interviewed hotel guests are convinced that smart hotels have a bright future ahead. The main reasons for this are that technology is constantly evolving and people are always looking for new experiences and sensations. Some of them, however, are concerned that the presence of smart technology will spread to such an extent that employees will be redundant, and guests will only be able to interact with machines. Such a scenario, however, is doubtful because, as the employees said, personal service is indispensable in hotels, it has always been, is and will be. Furthermore, as it was mentioned earlier, Neuhofer (2015) points out that smart technologies are to assist for employees during their work, not to take over.
Pizam (2017) argued that hotel industry is not using the potential of IoT technology sufficiently. After interviewing the employees, it seems that this has changed a bit. Large, chain hotels that could have invested in such technologies understood the value and importance of IoT. Nowadays, they use it to control energy use through for example key holder plug in for electricity or touch sensors for water. Another example of IoT existing in some other hotel is smart watches which are connected to the same network and help to locate employees faster and to summon them via notification. Unfortunately, none of the hotels where my interviewees work uses systems to track guests’ preferences. One of them, however, mentioned that they are working on the developing of an application to track the preferences of guests, but the works are at an early stage. In conclusion, hotels have noticed opportunities and advantages of implementing IoT into their operation systems, but to get more benefits, more action is needed.
6. Conclusions and further research

This chapter presents final conclusions and answers the research questions formulated at the beginning of the paper. Besides this, the idea of further research was presented. The research was aimed at examining what the concept of smart hotel is and what knowledge do hotel employees and hotel guests have about it. In addition, the author of this study wanted to investigate how smart technology provided by hotels affects the quality of service, ethical aspects and degree of satisfaction from the guest perspective.

6.1 Definition of smart hotel from the employees’ and guests’ perspectives

The literature review, even though it deepened the knowledge in this regard, does not give a clear answer to the question of what a smart hotel is. Some of earlier researchers associate this term with smart organization and management, other with intelligent back-office systems and in-rooms facilities and the rest of them with technology and guest experience. According to Gretzel (2015), there is no exact definition of this concept. However, the author of this study will present his version of the definition of a smart hotel.

In the online survey, on question about what a smart hotel is, the respondents provided various answers, everything from a modern hotel, through sustainable development, to technology and digitalization. All these answers have been sorted and included in the appropriate themes which have been created based on the content of these answers. The five main themes are: Technology, ICT/IoT, Organization, Digitalization, AI/robots. However, the theme that has clearly been more popular than others is technology, with which almost half of the respondents associated the concept of smart hotels.

While the survey was being published, the author started doing in-depth interviews with hotel managers and receptionists. During the interviews, technology was mentioned most often among all terms related to smart hotels. Some of the employees, apart from technology, also talked about smart management with a focus on the environment, and the fact that a smart hotel is a product that must be offered to the guests in its entirety; competent service, high-quality service and new things to explore. In order to gain a wider perspective of hotel guests than just the survey results, in-depth interviews were also conducted. Despite the fact that the guests were not able to explain this concept using professional phrases, as the employees did, 4 out of 5 guests spoke very similar to them. Like most employees, hotel guests also identify the concept of smart hotels with technology.

Summarizing, the concept of smart hotel is a hotel that provide better workplace for their employees, higher quality of services and aim to achieve higher guest satisfaction. The link of these three aspects is technology, which, together with smart management and human resources, is the way to success. A smart hotel is also an ability to properly balance between technology and human resources. Paradoxically, making a hotel fully self-service, without any employee, will not result in smart hotel. Maybe the technology is the most important and most often mentioned aspect when it comes to smart hotels, but as it was mentioned before, smart management and employees are also a part of this concept.
6.2 Hotel guests’ perception on smart technology in terms of service quality, ethical aspects and satisfaction

The author of this study decided to examine three important factors of smart technology functioning in hotels that are significant for the organization and its customers. These are service quality, ethical aspects and guest satisfaction. Furthermore, the author aimed to identify the impact of smart technology on these three aspects from a guest perspective.

According to Injac (1998) quality is a measurement term for usability of a product or service for meeting customers’ specific needs and expectations. In order to achieve higher service quality, hotel industry continuously provide newer solutions and strategies. One of them is smart technology that aims to improve operation of the hotel and meet the expectations of guests. It must be admitted that in this case, the vast majority of the hotel guests, whether in interviews or online survey, had an opinion that smart technology contributes to the improvement of the quality of services. According to some of them, employees work faster and thus have more time for each guest. On the other hand, for those who do not like to talk or do not have time, self check-in machines are a great convenience, which also improve the service quality. Of course, there were some few opinions that smart technology unfortunately breaks down or is difficult to use and thus reduces the quality of services. An important thing was told by an interviewed employee; hotel guests are not even aware of some of the smart technology features that employees use in back-office activities. Not everything is visible to guests, and it is thanks to these systems and devices that hotel can offer a high-level service. Summarizing the quality of service aspect, hotel guests perceive the smart technology offered by hotels as a positive thing on the way to quality improvement, in other words smart technology improves the quality of provide service.

The second important aspect to investigate was ethical issues, namely how smart technology affects the privacy and security of guests and whether it is equally accessible to each guest. When it comes to privacy and security from the guests’ point of view, the collected materials show that they feel safe. However, interviews with them also show that they are aware of the possible dangers that may result from the wrong use of technology or falling into the wrong hands. The result of the online survey is not completely clear. The responses of the respondents were divided into three groups: those who believe that technology negatively affects ethical aspects, those who are neutral about it and those who do not believe that technology has a negative impact on ethical aspects. This result shows that there is something wrong and something must be done. The problem does not seem to be security and privacy, which is well guarded by hotels, but like many hotel guests believes, it is about equality, accessibility and functionality. Many hotel guests complained that the touch screen was placed too high and not adjustable, small choice of languages, the instructions were complicated and there was no built-in speech function. Unfortunately, it seems that some hotels have forgotten and missed to include all social groups. Since the smart technologies offered by the hotel, such as a self check-in machine, are not adapted to all guests’ type, a phenomenon called digital dived society arises. If hotels decide to adapt such innovations, they must be tailored to the needs of everyone so that no one is excluded. Because one
excluded guest is also one dissatisfied guest, and a dissatisfied guest is a guarantee of bad hotel image advertising in his surroundings.

Thus, it is time for the third factor that smart technology affects, namely guests’ satisfaction. According to Xiang et al. (2015) guest satisfaction can be defined as collected experiences during guests’ stay resulting in a positive or negative evaluation. High guest satisfaction is the goal to which the hotels are aimed, because it allows them to achieve a positive image, brand recognition and loyalty among their satisfied guests. As collected data shows, smart technology is a very good way to improve guest satisfaction. Every in-depth interviewed hotel guest and 76.9% respondents of online survey agreed that smart technology can increase guest satisfaction. However, it should be remembered, as it was mentioned earlier, that smart technology is only a tool that, if used well, in combination with other factors such as smart management, trained employees and the desire to develop will bring many benefits to the organization.

6.3 Further research

It would be interesting to deepen this topic using the participant observation method, which was not possible this time due to the pandemic. Then it would be possible to examine this area from the practical side; how smart technology is used by employees during their workday, how hotel guests communicate with smart devices and see how the hotel collects people’s opinions and feedback. Another idea for further investigation is to make a comparison. Be as a hotel guest and spend one night in a traditional hotel and the second night in a smart hotel to see with own eyes whether and what the differences are between these two.
References


Appendix

1) Interview questions for hotel employees

The purpose of this study is to examine the concept of smart hotels. The study follows GDPR regulations which means that your identity is completely anonymous, and your answers will only be used in study purpose.

1. What comes first to your mind when you hear the term smart hotel?
2. What position do you have for technological innovations and solutions in hotels? (follow-up question: How important are they?)
3. What kind of smart technologies (e.g. devices, back-office, front-office, in-room, service etc.) does the hotel you work in has?
4. What are the main reasons why you implement/do not implement smart technology in the hotel?
5. What advantages and disadvantages does it bring to your hotel?
6. How does it affect employees? (follow-up question: Is technology as a tool for them to support their daily work or does it replace them to some extent?)
7. How do the hotel’s guests speak about the technological aspects/innovations? (follow-up question: Is this a convenience and added value for them or more like unwanted change?)
8. Do you plan to extend presence of smart technology in the hotel? (follow-up question: What activities, services would it be? (e.g. self-check-in, digital key, in-room features)
9. Do you think that fully digital and smart hotels is just a matter of time all over the world? Why/why not?

2) Interview questions for hotel guests

The purpose of this study is to examine the concept of smart hotels. The study follows GDPR regulations which means that your identity is completely anonymous, and your answers will only be used in study purpose.

1. How could you define the concept of a smart hotel?
2. What opinion do you have about technological innovations and solutions in hotels? (follow-up question: How important are they?)
3. What kind of smart technologies (e.g. devices, back-office, front-office, in-room, service etc.) does the hotel you recently visited had?
4. What advantages and disadvantages does it bring to you as a hotel guest?
5. Have you experienced any positive or negative situations using smart hotel technologies?
6. Do you think that smart hotel technologies are completely safe or can they be harmful to some extent?
7. How does the smart hotel technologies affect quality of provided service?
8. Are smart hotel technologies a convenience for you or more like unwanted change?
9. Would you like to see extending presence of smart technology in hotels? (follow-up question: What activities, services would it be?
10. What future do the smart hotels have in your opinion?

3) **Online survey questions for hotel guests**

*This questionnaire is a part of the master’s dissertation that I am writing right now. The topic is about smart hotels and I would be very grateful if you would like to complete the survey. This survey follow GDPR rules and your answers will be completely anonymous.*

- How old are you?
- What is your gender? Female / Male / Other
- What word/s comes first to your mind when you hear the term smart hotel?
- What are the advantages and disadvantages of smart technology in hotels from your experience (e.g. self-check-in, self-service machines, digital key, voice control etc.)?
- How large was the presence of smart technology in hotel that you recently visited? *Almost nonexistent / To a very low extent / To a moderate extent / To a large extent*
- Smart hotel technologies can negatively affect ethical aspects such as guest’s privacy and safety: *Strongly agree / Agree / Neutral / Disagree / Strongly disagree*
- Smart hotel technologies can improve the quality of provided service: *Strongly agree / Agree / Neutral / Disagree / Strongly disagree*
- Smart hotel technologies can increase guest’s satisfaction *Strongly agree / Agree / Neutral / Disagree / Strongly disagree*
- How likely is that you choose a smart hotel rather than traditional hotel for your next stay? *Not likely at all 0 – 10 Highly likely*
- How likely is that until 2025 smart hotels will be more popular accommodation alternative than traditional hotels? *Not likely at all 0 – 10 Highly likely*