How Artificial Intelligence (AI) Can be Utilized for the Competitive Advantage of an International Luxury Hotel?

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Abstract

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We live in a world where technology drives business in all industries. It is safe to say that almost every industry uses technology in some shape or form. The hospitality industry is no exception. Artificial Intelligence (AI) is a field of computer science, which aims to create intelligent machines with human-like intelligence. The utilization of AI is a highly current topic, which has evoked conversation on international newspapers and the technology has been widely studied globally. Recently, the use of artificial intelligence has attracted interest in the hotel industry.

This research-based thesis aims to discover how the technology of artificial intelligence could be utilized for the competitive advantage of international luxury hotels. The topic is approached from the perspective of how enhancing the hotel guest experience with the utilization of AI can lead to luxury hotels achieving a competitive advantage.

The theoretical framework presents the concept of artificial intelligence, including its subtypes relevant to the research of this thesis. In addition, the advantages, and disadvantages of implementing the technology are discussed. The utilization of AI poses several ethical issues, which are briefly covered in the theoretical framework. Furthermore, the theoretical framework introduces the luxury hotel market. The essential measures required to achieve a competitive advantage and operational efficiency in luxury hotels are presented along with introducing the reader to the luxury hotel customer and their expectations.

The empirical part of this thesis was conducted as a systematic literature review. The method was chosen, as the aim of this thesis was to produce a broad understanding of how the technology of AI is being utilized by international luxury hotels. For the systematic literature review the author reviewed peer reviewed academic research papers published by internationally recognized research databases.

In the discussion the findings of the theoretical framework and the systematic literature review are presented, and the key findings are drawn by analysing the correlation between the two. Lastly, the author's evaluation of the thesis process is described along with the reflection on learning.

Key words
Artificial Intelligence, hotel industry, hospitality, technology, luxury

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1 Introduction

The purpose of this research-based thesis is to find out how international luxury hotels can utilize Artificial Intelligence (AI) for their competitive advantage. The aim of Artificial Intelligence is to build computer systems, with human-like intelligence. As a result, these intelligent machines are then able to perform tasks that would usually be performed by humans. Artificial Intelligence (AI) is a form of computer science, that makes it possible for machines to learn by experience. Once they learn, they're able to perform tasks such as reasoning, decision making, speech recognition and visual perception. (Schroer, 2022.)

Artificial Intelligence is a broad concept and there is no one specific definition for it. The current implementations of Artificial Intelligence in the luxury hotel business and possibilities for future implementations will be discussed further on in this thesis.

Technology is revolutionizing all major industries and the hospitality industry is no exception. As a traditional service field, the hospitality business is known to lag others when it comes to the adaption of technology. The guest experience is fundamentally at the heart of the business and in the digitalized world where guests have higher expectations than ever before, hotels must innovate and adapt technology to keep up with the competition in the field. (Jaiswal 2022.)

Luxury hotels are under constant competition since travellers have more accommodation options than ever to choose from. The modern-day guests give high value for smooth processes and trip customization, which is why hotel managers must challenge themselves to find ways to make these areas their competitive advantages. Analytics and Smart Technology tools can be employed to gain valuable customer insights to learn about the market of operation.

Having studied the topic of AI during her studies the author has become interested in the endless possibilities it could create for the hotel industry. Another factor, that has impacted the decision to further investigate the ways of combining the two fields is the author's personal desire to continue studies in business information technology. Keeping up with hospitality technology trends and finding new ways to deliver outstanding hospitality services is what motivates the author to research this topic.

1.1 Thesis objectives

The objective of this thesis is to research how international luxury hotel chains have utilized Artificial Intelligence in their business operations and how they can benefit from the technology. This thesis also seeks to find answers to the factors limiting international luxury hotel chains from utilizing AI. Further on in the thesis the author will look into the ways in which these hotels could potentially utilize AI in the future.

The author of this thesis has decided to research the topic from an international perspective, since after extensive research it was found that there isn't much data available about the application of Artificial Intelligence in Finnish hospitality companies. Most of the relevant data for this thesis is published from the perspective of international hotel chains. The reason why the author of this thesis has decided to explore the topic from the perspective of international luxury hotels is due to the matter that international luxury hotel chains have an extensive offering of services as well as highly educated professionals in their teams, who research the field of Artificial Intelligence for innovations that could be applied into their hotel operations.

By researching the demand for AI utilization in international luxury hotels and the ways AI utilization has positively impacted the competitive advantage of the international luxury hotels this thesis is able to provide different viewpoints on the topic as well as provide information on the factors limiting AI implementation in the luxury hotel industry. Therefore, this thesis aims to provide valuable insights on the topic of AI implementation in the hotel industry which is to this day a relatively new topic that needs further research.

This thesis aims to answer the following questions:

I. How international luxury hotels have implemented Artificial Intelligence in their operations?

II. What limiting factors do the industry professionals see when it comes to the application of AI?

III. In which ways has the application of Artificial Intelligence positively impacted the competitive advantage and operational efficiency of the international luxury hotels?

IV. Does the segment of the hotel have an impact on the expectations of the guest and to the extent to which processes can utilize AI instead of the traditional host-guest human interaction?

1.2 Scope of the Thesis

The purpose of this research-oriented thesis this is to develop an understanding of how the technology of Artificial Intelligence could be integrated to the business operations of international luxury hotels. The purpose of this study is not to dive deep into the technology of Artificial Intelligence and how to assemble AI technology. This study will focus on the existing AI developments suitable for the utilization of the hotel industry. The topic is approached from the perspective of how international luxury hotels can gain a competitive advantage by enhancing the guest experience with AI enabled technologies. Therefore, only the academic research papers, which contributed to the discussion of how AI can be utilized to enhance the luxury hotel guest experience were included in the literature review. There exist limitations to this study as the amount of internationally recognized research databases investigated for the literature review of this thesis was limited to five: ScienceDirect, Ebsco, SAGE Journals, ProQuest, and Emerald Insight. This limitation was drawn due to the limited timeframe and resources. For the empirical research of this thesis 74 peer reviewed academic research papers were studies.

The research of this thesis will mainly be focusing on the perceptions of the industry experts in the world's leading luxury hotel chains in addition to data gathered from hotel guests' perceptions of AI-enabled hotel solutions.

1.3 Research Methodology

For the research of the theoretical part of this thesis the author studies previously published data sources related to the topics studied in this thesis. In the empirical part of this thesis, the author conducts a systematic literature review to acknowledge various viewpoints in order to form a broad picture of the current state of the utilization of AI in the luxury hotel industry and the challenges related to implementing the technology.

1.4 Key Concepts

Artificial Intelligence (AI) There is no single universally accepted definition for Artificial Intelligence. However, Artificial Intelligence could be described as a field of computer science that aims to create intelligent machines, with a focus on creating intelligent computer programs. Artificial Intelligence integrates computer science with robust datasets to accomplish systems capable of problem-solving. (IBM 2023.)

Artificially Intelligent machines are able to perform human-like tasks, such as reasoning, problem solving and speech recognition.

Explainable Artificial Intelligence To establish the trust of customers, companies must clearly explain how does the AI that their business utilizes actually work. Artificial Intelligence as a concept is still relatively unknown to many. However, as businesses use AI to process data and form conclusions, the customers wish to obtain the security that their personal data is in safe hands. The AI systems utilized must be understood by the ones affected by it. (Grennan, Kremer, Singla & Zipparo 2022.)

In order to explain the process of an AI system reaching a certain decision, the process must first be understood at the organizational level. The reason why it has become harder to understand these processes is because Artificially Intelligent systems have become more complex as technologies develop. It is crucial for the technology team of a business to be informed of the specific steps the AI system performs to produce its results. By providing explanations to these matters, companies bear their responsibilities and also secure that the processes are reliable for future use as well. (Grennan & al. 2022.)

Competitive Advantage A company can obtain competitive advantage by developing its internal resources. An example of a competitive advantage is a highly skilled team of employees. A competitive advantage is something that differentiates the company from the competitors in its field and makes it attractive to its customers. (Peterdy, 2023.)

Big Data as a concept stands for the comprehensive amount of data that companies store. It consists of the structured, semi structured, and unstructured data that companies collect. The mining of big data extracts valuable insights which companies can use to improve their performance. Machine learning (ML) algorithms can be used for big data analytics. (Botelho & Bigelow 2023.)

The Fourth Industrial Revolution refers to the next phase of digitization, which builds on from the inventions of the Third Industrial Revolution. During the Third Industrial Revolution from the 1950s to the beginning of the 2000s, people were introduced to computers, various technological devices such as mobile phones and the Internet as permanent tools to utilize in our daily lives. (McKinsey & Company 2022.)

The technology driven Fourth Industrial Revolution is the next chapter in development and pushes us to discover new ways in which countries can develop and companies can create value for their clients. (World Economic Forum 2023.)

Global Luxury Hotel Market is formed by hotels offering luxurious accommodation and high-quality services. The services offered at luxury hotels are extensive, including high-end spa amenities, room service, personal trainers, and overall top tier hospitality. The luxury hotel market consists of resort & spa hotels, business hotels, suite hotels and airport hotels. Biggest companies in the field include Marriott International Inc, Four Seasons Holdings Inc, Jumeirah International LLC and Shangri-La International. (Wood 2022.)

1.5 Structure of the Thesis

The structure of the thesis is following: In the introductory chapter, the purpose and scope of the thesis are discussed in order to provide the reader with a comprehensive overview. The introductory chapter presents the research questions in addition to explaining the key terminologies relevant to the topic.

Chapter two and three form the theoretical framework of the thesis. Chapter two briefly presents the different types of artificial intelligence relevant to the research of this thesis, the challenges, and opportunities the technology proposes in addition to the ethical challenges the utilization of AI presents. The third chapter presents the global luxury hotel market, discusses how competitive advantage and operational efficiency are achieved in a luxury hotel and reviews the luxury hotel customer and their expectations.

In the fourth chapter the methodology of the thesis is presented along with the recommendations for further research.

The fifth chapter consists of the systematic literature review, which was conducted as the empirical part of the thesis. Chapter five is divided into five sections, which consist of the presentation of the research background followed by the chapters discussing findings related to the four research questions of the thesis.

Lastly, the findings of the research are covered in the discussion chapter of the thesis, where the key findings are presented, and the author reflects on the personal learning along the process.

2 Artificial Intelligence

This chapter focuses on explaining the concept of Artificial Intelligence as the main categories of AI are being discussed. AI is a new technology and there has been much debate around the phenomenon, especially because of the ethical issues it brings. Further on in this chapter, the author will discuss the advantages and disadvantages of AI as well as the ethical matters around the technology.

Artificial Intelligence is a technology, that combines computer science with robust datasets to develop intelligent machines capable of problem-solving (IBM 2023). Machines that utilize AI are therefore capable of certain human-like activities such as making decisions based on data analyses. Many industries have started researching and employing the technology of AI, as it's use has been found to provide benefits to companies. According to Oracle Cloud Infrastructure (2023) companies are making investments in their data science teams to get the full benefit of their AI solutions, since data science employs statistics, computer science and business value to form conclusions of their market of operation.

2.1 Types of Artificial Intelligence

Artificial Intelligence can be divided into Narrow Artificial Intelligence and Artificial General Intelligence. Narrow Artificial Intelligence is also known as Weak AI, and it is designed to perform a specific task in a way that would outperform the humans doing the same task. All the AI technologies that exist in the market today are under the category of Weak AI. The term "Weak AI" is very misleading, since Weak AI can transform industries and automate tasks once performed by humans. This is where the term "human-like" comes from. There is a total of four types of Artificial Intelligence and two of them fall under Narrow Artificial Intelligence. Reactive machines are designed to respond to immediate tasks and requests but do not store memory or learn from past experiences. Limited memory machines are more advanced as they are capable of storing knowledge. What makes limited memory machines special is the fact that they use the knowledge they've stored to learn and train for future tasks that they're challenged with. The capacity of Weak AI is limited, and the machines are ideal for the purpose of automating processes. (Glover, 2022.)

The most commonly known example of a Weak AI technology are the chatbots. Banks, online stores and multiple other businesses have a chatbot on their website, that almost immediately greets the visitor and asks whether there's something they could assist them with. The capacities of a chatbot are limited and they're often able to help customers with the most frequently asked

questions. If the customer tries asking something that does not fall under the reach of the chatbots knowledge, the chatbot usually proceeds to suggest contacting customer service where an actual human will then assist the client.

Weak AI also exists in simple everyday places, where you might've not realised and an example of that are the spam filters used in emails. Artificial Intelligence is utilized to separate the important messages from the ones that belong to the user's spam folder. The browsing feeds we scroll on Instagram and other social media platforms as well as online stores are customized by AI based on our browsing history.

A phenomenon, that has been a hot topic in the recent years are the smart assistants, like Amazon's Alexa, Siri and Google Assistant. These virtual assistants can search for information, put on music, set reminders, and even control the lighting in a person's home. All of this is possible, because of Weak AI. The reason why they're called smart assistants lies under their capability of first collecting information from their user, then learning the preferences of their user and finally they're able to make recommendations based on the knowledge they've gathered on their user. Recommendations could simply be suggesting a similar band, than the ones their user usually listens to. Another hot topic over the recent years has been the self-driving cars. Self-driving cars operate by using Weak AI's neural networks to sense objects that move in the same space as them. They're able to estimate the distance to other cars as well as identify traffic. (Glover, 2022.) Self-driving cars divide opinions, since many are worried about the hazardous situations they may cause.

Alan Turing's Turing Test is a popular way to test the level of intelligence a machine has. In the Turing Test the interrogator aims to recognize whether they are having a conversation between a human or a machine. The test is conducted by asking the same questions from the machine and the human respondent. If the interrogator is able to tell, that they are communicating with a machine, the machine can't be classified as intelligent. (IBM 2023.)

Artificial General Intelligence (AGI), the so-called Strong AI does not yet exist. AGI machines would be able to behave and act in the same way as human do. The level of strength AI has is measured by how near it is to the level of human intelligence. AGI would be capable of learning new skills and be able to solve problems just like humans do. If a machine would be able to generalize knowledge based on their experiences and apply the knowledge to different tasks all while planning ahead on what to do and adapting to changing situations, the machine would be considered to have reached the level of AGI. This has not yet happened and experts in the field have different outlooks on when or whether something like this will be achieved in the future. Many

movies have presented their predictions on what a future with Artificial General Intelligence would look like. (Glover, 2022.)

If an AGI technology would come to existence, it would revolutionize humanity. A computer program that would be able to internalize all available information, could without a doubt come up with solutions to the biggest problems of our century, like how to stop climate change. (Glover, 2022.)

In addition to AGI Strong AI also has another sub-field called Artificial Super Intelligence (ASI). A machine with Artificial General Intelligence would be considered to be as intelligent as a human, but a machine that would be Artificially Super Intelligent would be more intelligent than humans are. Both of these Strong AI sub-fields are still a theory and a machine with AGI or ASI does not yet exist. (IBM 2023.)

2.2 Machine learning

Machine learning is the subgroup of AI, that is most often used in the current technologies powered by Weak AI. It is a technology, that makes it possible for computers to learn without being explicitly programmed. According to a survey conducted by Deloitte in 2020, 67 % of companies were then using machine learning in their business operations and 97 % of companies were planning on adapting the technology in the next year. The technology of machine learning aims to build machines that can imitate intelligent human behaviour. This technology is then utilized to lighten the workload of humans by using machine learning to perform complex tasks by mimicking the way humans solve problems. These machines are able to perceive the visual scenes they operate in, comprehend written text and perform certain tasks that they’re designed to do. (Brown, 2021.)

Mikey Shulman, lecturer at MIT Sloan School of Management compared the traditional way of programming to the process of baking. Everything is based on the specific amounts of defined ingredients and the clearly described steps the baker needs follow in order to achieve the wanted final product. In a similar way the traditional process of programming rests on the detailed instructions the programmer creates for the computer to perform. In the technology of machine learning the approach is for computers to learn to program themselves. Computers learn to program themselves when they’re given data and as they gain experience from solving problems. (Brown, 2021.)

In the very beginning, engineers gather and sort data that they will then give as training data for the machine. The data could for example be text, photos or numbers and it is the information that the

machine learning program will utilize when it's being trained. The program will be the better and more accurate the more data it has for it to process. As an example, if you give the machine bank transactions or sales reports from the previous five years you want to make sure that you give as much data as possible to get the broadest outlook of the development of the figures. After feeding the data a machine learning model is chosen by a programmer. The machine learning model is used to supply the data and then the computer program can begin training itself by finding data patterns and making predictions based on the data. A part of the training data is separated and used later on in the process as evaluation data, to test the accuracy of the machine learning model in the situation where it is presented with new data. (Brown, 2021.)

The purpose for using a machine learning system can vary. A machine learning system can be used to describe, where the system is used to analyse data and explain the course of a situation. A machine learning system can also be used to predict future outcomes, or it can be used for prescriptive purposes where the data analyse can be utilized to create suggestions on how to act in a situation. The full potential of utilizing a machine learning technology can be achieved when there is as much data to analyse as possible. Google Translate serves as an example of machine learning technology, that was possible only because there was such a large scale of data for it to practice on. (Brown, 2021.)

Machine learning models are divided into three categories. Supervised machine learning is currently the most used machine learning type. The supervised machine learning models are trained by the labelling of data sets. Labelling allows the models to learn and makes it possible for it to grow its accuracy rate over a period of time. The algorithm could for example be trained with pictures of parrots and other birds, all labelled and eventually the machine is able to learn the certain features which differentiate parrots from other birds. (Brown, 2021.)

Unsupervised machine learning program uses machine learning algorithms to analyze unlabeled datasets and looks for patterns in them. The algorithms are able to find hidden patterns or data groupings that people wouldn't think of. The capability to look for similarities and differences in information makes this method of machine learning useful for customer segmentation, image and pattern recognition and exploratory data analysis. (IBM 2023.)

Reinforcement machine learning uses a trial-and-error method to train machines by giving the machine feedback and informing the machine after a sequence of making the right decisions. Machine learning models can be trained to learn over time on which actions to take, because it begins to remember the best ways of operating in each situation through the feedback. (IBM 2023.)

The most commonly used machine learning subfields are natural language processing and neural networks. Traditional programming makes use of data and numbers but machines that are capable of natural language processing can understand written text and natural languages spoken by humans. The technology enables language recognition, understanding of different languages and also makes it possible for machines to produce text as well as perform translations between different languages. Chatbots and virtual assistants are prime examples of natural language processing. (Brown, 2021.)

One of the most used machine learning algorithms are neural networks or artificial neural networks (ANNs). Neural networks mimic the way the human brain works as they consist of layers of nods that are connected with each other just like biological neurons in the human brain. The operation of an artificial neural network is based on the nods, which are connected. A nod processes the input it's given and then produces an output that is sent to the next nod. Data is transferred through the nods, where each nod holds a function of its own. Neural networks can be used to identify for example whether a person is smiling in the picture or not. Each nod is assigned to analyse a specific feature of the picture and together they come to a final conclusion (Brown, 2021). Training data is essential to neural networks as it provides the opportunity for the neural networks to learn and become more accurate as time goes on. As neural networks evolve and become accurate, they become valuable tools for humans that significantly improve the efficiency with processes such as sorting and classification of data. (IBM 2023.)

2.3 Deep learning

Neural networks consist of nod layers, which include an input layer, one or several hidden layers and an output layer. After the determination of an input layer, weights are given to determine the emphasis of the given variables because some have a bigger impact on the final output than others. As an example, when a picture of a donkey is analysed, it is more essential to highlight the importance of evaluating the length of its ears than it is to define the texture of its hair. In the process the inputs are multiplied by their weights before summing them up. (IBM 2023.)

A three-layer neural network is an ordinary neural network, whereas a neural network that consists of more than three layers is considered to be a deep neural network. The additional hidden layers help improve the accuracy of the results since a single layered neural network gives just an estimated result. An image recognition system could as an example have a layer that detects the features of a human face like nose, eyebrows and mouth and another layer that examines these features in the picture and makes a conclusion on whether the features are located in a way that

forms a human's face. The layers in a deep neural network each build upon the resolvations of the previous layer to form an optimized outcome. (IBM 2023.)

Deep learning algorithms were created to enhance traditional machine learning by making it more efficient. The training process of the traditional machine learning technologies needs a lot of human effort when it comes to training the software and in deep learning there isn't a similar need for the same extent of the pre-processing of the data done by humans. Both machine learning and deep learning have their own benefits and challenges and are suitable for different processes. (Amazon Web Services 2023.)

Deep learning is currently applied in fields such as health care, customer service and finance. Customer service solutions that employ deep learning take chatbots to the next level by designing them in a way that when they come across unclear issues, they can propose multiple solutions to them based on their previous experiences. Based on the client's responses the chatbot either answers them directly or then guides the client to a human customer service agent. Sophisticated virtual assistants like Amazon's Alexa, IBM Watson and Apple's Siri that employ deep learning and speech recognition bring added value to the user experience and most importantly add convenience to everyday processes. (IBM 2023.)

2.4 The Advantages and Disadvantages of AI

Applying AI technology to business operations has proven out to bring various benefits to companies. However, the utilization of new technologies always comes with challenges and in this section the advantages and disadvantages of implementing AI are being discussed.

One of the key benefits AI implementation brings is the automatization of simple and time-consuming processes. Employees have more time to concentrate on the more valuable tasks in their area of responsibilities when AI can take care of the repetitive duties like answering the clients most frequently asked questions. This does not only save the time of the customer service employees but also shortens the response time and by doing that increases the customer satisfaction. AI can also bring assistance to tasks like market research and help with making large amounts of data understandable for professionals. (Weitzman, 2023.)

Unlike humans, AI does not get tired. When employees feel tired or their thoughts are somewhere else due to things happening in their personal lives, mistakes happen. AI does not lose focus and can maintain its performance for an endless period of time. For this reason, the utilization of AI can

lead to fewer errors. AI is ideal for repetitive tasks since it can do the tasks for endless hours and also perform them way faster than humans can. (Forbes 2022.)

AI comes in especially handy when dealing with the analysis of large datasets. As an example, if you have a file with 10 000 pages, for a human to go through that file and form an analysis of the key findings it would take at least days if not even more to finish a process like that. For AI, a task like this is a piece of cake. It can perform an analysis of the file in minutes. A sophisticated machine learning algorithm comes in handy, since it can perform an extensive data analysis is a relatively small amount of time. At Q.ai, which is an AI-powered investing app they use AI to look through the historical data of stocks, market performance and volatility data and compare that to other data like interest rates. AI is then able to form an outlook of the patterns and create predictions for future market shifts. (Forbes 2022.)

Businesses can benefit from AI when wanting to better understand customer behaviour. AI can help build customer profiles as well as track and analyse their customers behaviour with machine learning. With the help of customer profiles brands can understand their customer groups and cater to their needs. AI-powered solutions replace the need to manually analyse and sort out through the customer data to form customer profiles. Data can be collected through online forms, browser signatures, cookies and from customers website behaviours. The data gathered can be used to train machine learning algorithms to identify patterns in behaviour and to form customer profiles. (Accubits Technologies 2020.)

Also AI can make mistakes. In the worst-case scenarios implementing AI for the programming and coding of your business operations could lead to disasters that would harm the reputation of the business and cause financial damage especially since programming and coding errors tend to typically be expensive. (Weitzman, 2023.)

AI technologies are powered with information from the past, which means they do not have the same up to date information as humans can have if actively following the news and current happenings in the world. AI does not have the same ability as humans to look at issues from an innovative point of view. It’s ability to predict the future is limited and it cannot think in the same creative way humans can when it comes to taking into account the possibility of special cases and never-before-seen events. (Forbes 2022.)

Cyberattacks are a possibility, when utilizing AI technology. Hackers are finding new ways to access companies’ private information and to attack them with viruses. Cyberattacks result in customers questioning the security policies of a company as well as in financial losses. To help

your company fight off cyberattacks make sure to update the AI systems with recent algorithms. (Weitzman, 2023.)

In-sensitive responses generated by the AI customer service applications are possible. Due to it's limited capabilities AI is not able to sense the emotional state of the person it's having a conversation with in the same way that human customer service representatives can. A customer who is frustrated or sad needs to be treated in a way that makes them feel acknowledged and heard. If the AI chatbot fails to meet the expectations the customer had for the conversation with a company, it could potentially result in the company losing a customer. (Weitzman, 2023.)

It is very likely, that even though AI is designed to just assist humans in repetitive tasks that the utilization of AI will lead to some people losing their jobs. There are numerous ways is which AI can bring benefits to companies without actually taking anyone's job but the truth is that when AI development reaches a point where AI "workers" can be put into practice it will lead to terminations of human employees. This is because AI "workers" will most likely be more cost-effective and cheaper for businesses. AI "workers" will not be able to replace all human employees. As an example an AI robot, that can assemble cars in factories has the potential of replacing the human automotive assembler. (Forbes 2022.) Another example is an AI robot replacing the job of a fast food restaurant worker. There are also positive sides to AI doing the job of a fast food restaurant employee, since their work tasks include tasks that pose danger to the human like working with boiling hot oil. When AI "workers" become reality in industries like the fast food industry that employs many young people and also uneducated people, it is important in the governmental level to make sure new jobs are created and that these people will have the opportunity to educate themselves to other careers.

2.5 Typical Challenges When Implementing AI to Business Operations

The hype about the incredible things AI has accomplished for the big tech companies like Google and Tesla is all over the news and a hot topic for discussions on platforms like Twitter. This has resulted into the increased interest of companies in the technology. It is important to be noted that at the moment most business professionals do not have the detailed knowledge on what it takes to implement AI into their business operations. To begin with, to get the most use out of AI implementation most companies need to undergo a process of organization-wide digital transformation. The biggest challenges companies face have to do with data, the process of identifying data and comprehending in which ways the data can be used to drive decision making and product development. The base for successful AI implementation lies in the fact that

management understands what the technology can and cannot do and based on that creating an efficient data strategy. (Rouhiainen, 2023.)

For most companies the first challenge doesn't necessarily lie in the problems with AI implementation, but rather in challenges with the digital transformation as a whole. Many companies still face challenges with the implementation of digital communication tools, such as applications and other platforms needed for marketing purposes, internal and external communication as well as data handling. (Rouhiainen, 2023.)

According to Deloitte's 5th edition of their State of AI in the Enterprise report conducted in 2022 one of the participating companies found the biggest challenge to be assisting everyone involved into understanding what the problem is that AI will solve. It is important to highlight that people are still at the core of a business' success but by implementing AI technologies it is possible to take the business to the next level with the collaboration of people and machines. It was found out in Deloitte's State of AI in the Enterprise survey (2 620 respondents) conducted in 2022 that 94 % of business leaders believed AI to be critical to success in the next five years. Even though the percentage is high, and the survey found that there has been an increase in AI technology deployment, companies are still finding it challenging to effectively achieve tangible value for their AI investment. (Ammanath, Mittal & Saif 2022, 3-6, 13).

Depending on the situation behind the AI employment, respondents were facing varying challenges. The biggest reported challenges with AI when starting new projects were reported to be the challenges of proving business value (37 %), lack of executive commitment (34 %) and choosing suitable AI technologies (33 %). In both starting and scaling projects the top challenges were stated to be insufficient funding for AI technologies and solutions (30 %), lack of needed technical skills (29 %) and choosing the right AI technologies (29 %). Other major difficulties that the respondents were facing with AI included challenges with managing AI-related risks (50 %), insufficiencies with the maintenance or ongoing support after initial launch (50 %), difficulties with integrating AI into the organization's daily operations and workflows and the difficulties that the respondents were facing when integrating AI technology with other organizational systems (44 %). (Ammanath & al. 2022, 8-9)

The results of the survey conducted by Deloitte in 2022 state the importance of leadership commitment as well as the importance of investing in talent with AI-skills, that is going to train the employees and management, help find the suitable AI technologies that would be beneficial for the company as well as provide solutions for the maintenance of AI technologies and managing AI-related risks. One of the biggest issues often is that the leadership and the employees of a company do not have the needed understanding of the AI technology. If the company does not

have internal workforce with AI-skills it is recommended to hire external professionals from a consulting company. Consulting companies have highly skilled AI-technology specialists who can assist with overcoming the integration difficulties as well as create an efficient AI strategy. As companies aim to achieve tangible value from their AI investments it is important to focus on the maintenance of the systems and algorithms so that they can continue generating value for the business. (Ammanath & al. 2022, 8, 25)

2.6 AI ethics

Ethical principles help people to separate right from wrong. AI ethical guidelines give instructions on how to design AI machines, what type of data to use and describe what kind of outcomes Artificial Intelligent machines should produce. (IBM 2023.) As AI makes decisions based on how its pre-set parameters are set, the output of the algorithm depends entirely on the decisions of its creators. This sets an enormous responsibility on the shoulders of the people creating AI machines. As an example, if a human driver is put to an accident situation where they must choose between driving into a cliff or hitting a pedestrian, they will make this decision based on their own morals and background. An autonomous vehicle on the other hand will base its decision on what the algorithm has been programmed to do in an accident situation. It is challenging to incorporate ethical matters and morals into an algorithm and for that reason AI ethics have become a crucial issue to find solutions to. (Forbes 2022.)

As an AI system gets bigger and grows its capacity of being able to do different things, the probability that it produces unethical outputs grows. There are many systems, that in other ways work really well but the issue is that they create ethical problems. (Miller, 2022.) In the recent years many companies have begun to research the possibilities of automating certain business processes in addition to making data-driven decisions to expand their operations. Unfortunately, there have been cases where companies have unintentionally built AI applications based on biased datasets and therefore have had to suffer from the consequences like bad brand image, legal issues, fines and the loss of clients. It’s typical for new technologies to outpace the creation of governmental regulations that would set restrictions and guidelines on how to practice these technologies. The purpose of these regulations would be to ensure that human rights and civil liberties are not violated. While the wait for unified governmental AI regulations continues, the leading companies in the field have shown interest in shaping the guidelines. (IBM 2023.)

IBM has presented five main ethical concerns, that AI implementation currently poses. The first one is technological singularity, which addresses the issue of Artificial Intelligence possibly surpassing human intelligence in the future. A situation, where an autonomous vehicle would get into a car accident poses the question of who is responsible? The owner of the car, the car owner’s insurance company or the software developer and the vehicle manufacturer? As we understand

the complexity of a situation like that, the question of whether it is ethical to bring autonomous vehicles to the market rises. Is it ethically right to develop fully autonomous vehicles or should there be oions of this technology which would only allow the manufacturing of for example semi-autonomous vehicles? (IBM 2023.)

Another ethical concern surrounds the matter of AI's impact on jobs. IBM's outlook on the issue focuses on the idea, that as some jobs that used to be performed by humans get automated there will be a demand for employees who manage these systems. IBM emphasizes that AI can be used to assist humans in transitioning to these new professions. (IBM 2023.) If an individual has built their career for several years in a non-tech related field like as a car mechanic, they have the opportunity of transitioning to car-related technology profession if they have the willingness to educate themselves further. Technology has merged with many fields and new fields have been created, examples include healthcare technology and legal technology. When some professions die, new ones are born. Technology can be utilized in every industry which creates new professions. (Laukkonen & Von Kügelgen 2020, 11.)

Data privacy, data protection and data security issues regarding the use of AI technologies have created the demand for policymakers to set regulations for the protection of people's personal data. In the United States, where states have their own laws in addition to the federal law policies like the California Consumer Privacy Act (CCPA) have been established. The CCPA regulates businesses to inform consumers when collecting their data. As a result of the legislation companies are now responsible for making sure that they store and use personally identifiable data (PII) in a safe manner. This has evoked the desire to invest in security to avoid the potential hacking and cyberattacks that would be damaging to the reputations of the companies as well as potentially leading to legal challenges and fines. (IBM 2023.)

As code is increasingly being embedded to multiple parts of our lives, it is crucial that human rights and the principles of inclusivity and trustworthiness will be taken into account. Algorithms are implemented in many important processes like deciding whether a person gets a loan, gets a job, gets arrested, gets to travel or is applicable for a scholarship. According to Ericsson, it is still sadly common that people are refused a job due to the colour of their skin, based on the God they believe in, their gender, age, sexual preference or their social status. AI technologies are designed and overseen by people, so to minimize the transfer of human bias to AI technologies we must carefully select our training data, make sure that a diverse workforce covers the range of inputs and that these people cover a fair representation of diversity. (Anneroth, 2021.)

Accountability is the fifth ethical issue presented by IBM. Due to the fact, that proper AI legislation does not yet exist there is no entity that would assure that ethical AI is enforced. The current

ethical frameworks only guide AI technology developers and according to IBM the confusing mixture of distributed responsibility and the disability to predict consequences will not likely be enough to prevent societal harm. (IBM 2023.)

According to a report conducted by Goldman Sachs, rapidly developing generative AI has the potential of replacing a quarter of current jobs in the European and US job markets. They found that conversational Chat GPT and other generative AI technologies can cause a significant leap in productivity by increasing the worlds gross domestic product (GDP) by 7 % in the next ten years if the technology develops as predicted. The downside of this, however, would be the effect on over 300 million full-time jobs. The report predicts, that 45 % of administrative staff and lawyers would be in the risk of losing their jobs to AI. Overall, the automation which AI enables, would have a certain level of effect on two thirds of the global jobs. AI could automate less than half of the work tasks of these employees, enabling them to focus on more effective tasks. Similar predictions have been made in research conducted by Princeton University, University of Pennsylvania, and New York University, which forecasted that AI will have the biggest impact on the jobs of educated people. Goldman Sachs predicts, that in the future AI will be capable of doing tasks such as filling out the tax returns of small businesses, evaluating insurance applications and documenting crime scene investigations. AI wouldn't be able to perform more complicated tasks, such as making legal decisions or assessing the state of the health of a patient. (Pietarinen, 2023.)

The experts in the field of AI have differing opinions on the development of the technology. Recently the Tesla CEO Elon Musk and Apple co-founder Steve Wozniak among over thousand others signed an open letter, which demanded that the development of powerful AI machines would be banned for the next six months. The ban would've paused the creation of any AI systems that could be considered more powerful, than GPT-4. GPT-4 is the latest language processing AI which was developed by the company OpenAI, based in San Francisco. The capability of AI is often correlated to the AI model's size and the amount of specialized computer chips, that are needed to train it. (Kahn, 2023.)

The people, who signed the open letter are concerned that the race for the creation of powerful AI technologies is getting out of hand and they argue that the development of these technologies is happening so rapidly that it can't no longer be predicted or controlled. To specify, they don't want to completely shut down the creation of these technologies but believe that the development of these AI models should be designed more carefully. According to an interview conducted by Reuters, the Microsoft founder Bill Gates doesn't believe, that the ban on creation of powerful AI technologies would resolve the challenges that advanced AI development is currently facing. Gates believes the focus of right now should be on how these technologies can be best utilized. Gates questions how the ban could be put to practice and monitored globally. In the beginning of the

year, Microsoft announced that it'll invest 10 billion USD to OpenAI. Microsoft will also implement Chat GPT's AI in its tools such as Word and Excel. (Kukkonen, 2023.)

3 Luxury Hotel Market and Operations

In the hotel industry luxury services are defined as services that are of high quality and expensive. Luxury hotels offer rare, authentic, and exclusive experiences to customers who have high expectations for their stay at a hotel. In order to keep a position in the luxury segment, the hotel needs to meet the standards of excellence and continue to provide added value to its customers. As there exists a high level of competition within the luxury hotel market, the marketing and management strategies need to focus on efficiency and profitability. (Jaewook, Sung In & Minwoo 2022, 78-95.)

3.1 Obtaining Competitive Advantage in a Luxury Hotel

Investopedia defines the concept of competitive advantage as the factors that enable a company to compete more efficiently than its competitors in the market of operation. A company with a competitive advantage can produce goods or services in a better and cheaper way than its competitors, leading to a better profit margin. A competitive advantage makes company's services more desirable to customers than the services of other providers in the field. (Twin, 2023.)

Figure 1. Michael Porter's Five Forces, which identify the five forces shaping competition across all industries (data adapted from Hospitality Net, 2017)

The process of designing an efficiently operating luxury hotel environment includes careful consideration to creating spaces, that have various revenue generating units. Since the luxury clients expect various amenities, where high-quality services are being offered, the management of luxury hotels must create different operational efficiency strategies compared to the ones of limited-service hotels. To begin with, luxury hotels have special operational characteristics such as higher staff-customer ratios, a wider selection of amenities and services as well as personalized staff-customer interactions. In an article published by Cornell Hospitality Quarterly in 2022 where the efficiency of 37 United States based luxury hotels was examined, it was found that the luxury hotel customers give high value to amenities whereas the customers of the limited-service hotels tend to mainly prioritize suitable room prices. (Jaewook & al. 2022, 78-95.)

The purpose of examining luxury hotels efficiency is to see whether the hotel can gain competitive advantage by generating maximum sales revenue while keeping the operating costs and expenses as low as possible. The aim is to maximise the potential of the hotel property and it's floorplan by creating multiple different revenue-generating units. These units include hotel rooms, restaurants, nightclubs, spas, and meeting spaces among other outlets. Resources are a key factor for building a competitive advantage and in the luxury hotel industry. The additional resources such as spas, sports facilities and food and beverage outlets are what provide additional value as well as differentiate the hotel from its competitors. (Jaewook & al. 2022, 78-95.)

Revenue per Available Room (RevPAR) is one of the most relied on performance indicators in the hotel business. Hotel room sales are the primary source of revenue for hotels of all segments, which is why RevPAR provides insightful numbers of the property-level performance. However, in addition to the RevPAR, sales revenues, costs, and expenses should all be assessed to gain a comprehensive picture of the profitability and efficiency of the hotels business operations. Luxury hotels gain as much as 35 % of their total revenue from non-room outlets. In comparison, the limited-service hotels gain 95 % of their total revenue from room sales. As luxury hotels gain revenue from multiple different sources in addition to room sales, the performance measurements must take into account the contributions of all revenue-generating sales units. (Jaewook & al. 2022, 78-95.)

Another key performance indicator (KPI) for hotels is ADR, which stands for the Average Daily Rate. ADR measures the average revenue that a hotel earns for an occupied room on a given day, it tells the hotel how much revenue is generated per room on average. In an ideal situation ADR is as high as possible. (Hargrave, 2020.) According to an article published by Cornell Hospitality

Quarterly in 2022 the best efficiency strategy for a hotel is to raise their ADR to a higher level than the average price position within the market of its operation, since room-sales make the biggest contribution to their overall revenue. Added value must be offered with a higher quality of service and a diverse selection of amenities in order for customers to be willing to pay the higher room prices. (Jaewook & al. 2022, 78-95.)

Total fixed costs and management systems are crucial factors, that contribute to the negative operational efficiency of luxury hotels. What this indicates is that the total fixed costs and expenses should be lowered for the optimal efficiency performance to be reached. Luxury hotel chains typically have expenses associated with fixed chain management systems and the brands uniforms. Aforementioned use of resources is inefficient, compared to independently operated hotels since the expenses associated with the management systems and maintenance used by brand luxury hotels are highly costly. (Jaewook & al. 2022, 78-95.)

To thrive in the competitive market, luxury hotels must create and market a sales mix, which combines rooms, food and beverage outlets and other leisure amenities (Jaewook & al. 2022, 78-95). A sales mix is the calculation of the proportion of sales each product offered by a business contributes as a percentage of the company's total revenue. In situations where profits aren't on the ideal level, companies can identify the low-selling products, stop selling them and drive focus to increasing the sales of the profitable products and services. (Kenton, 2021.) Since luxury hotel clients have shown interest towards adding value to their hotel visit, the luxury hotel brands should study which service units would their guests find attractive and be willing to spend money on. The suitable service units can be discovered and added to the property based on the hotel guests needs, wants and expectations for their stay. It is relevant for luxury hotels to promote the additional sources of revenue when marketing the hotel to potential guests. (Jaewook & al. 2022, 78-95.)

3.2 Obtaining Operational Efficiency in a Luxury Hotel

TechTarget defines the concept of operational efficiency as the capability of a company to maximise the waste in time, effort and materials while continuing to produce services and products of high quality (Gillis, 2021). For a luxury hotel to be successful in providing guests with exquisite customer experiences it needs to operate efficiently. Hotel's operations consist of various aspects such as housekeeping, maintenance, the functions of the front desk, bookings, and employee management. Hotel operations cover all the daily tasks, which need to be completed to ensure the customer journey from check-in to check out functions smoothly. (AxisRooms, 2022.) When aiming to improve operational efficiency a company focuses on giving less input for the same or enhanced output (Gillis, 2021).

A key pillar of operational efficiency is the communication between guests, hotel employees and managers. Communication leads to effective hotel management as employees and the corporation as a whole benefit from clear policies and orientation processes, that managers put into practice. Employees must know who to contact when they face a problem. In addition to communication, training your employees to ensure they are in the loop of recent updates makes them more satisfied with your hotel as an employer and gives them higher motivation to do their job well. The management of a hotel is responsible for making sure, that staff is well-trained. By having a well-trained staff, you ensure that they have the tools to assist customers and that they are representing your brand in the best possible way. Employees can tackle problems the better and faster the more trained they are. (AxisRooms, 2022.)

Technology is reinventing the way hotel businesses operate. The COVID-19 pandemic has had an impact to the technological advancements across all industries and the hospitality industry is no exception. Mobile room keys, direct booking, self-ordering from room as well as hotel restaurants using QR codes, contactless check-in and check-outs are some of the latest technological innovations in the field. Even though some of these innovations were created out of the demand to obtain maximum overall safety and level of hygiene, these innovations are also creating operational value for hotels since they enable lower operational costs, improve the guest experience, and enhance the overall operational efficiency. In addition to the new innovations, booking engines, website, and search engine optimization (SEO) technology and property management systems (PMS) are driving the operational efficiencies of hotels. (The Hotel Conversation, 2022.)

To improve efficiency, it is crucial to implement an operations management software, where you can control your hotel operations from one platform. The integration of systems enables hotel operations to be simplified and allows your human staff to save time from tasks like scheduling. With the integration of systems tasks take less time and the possibilities of human errors are minimized. (AxisRooms, 2022.) A factor, that hinders operational efficiency is using disparate solutions as it slows down the process of sharing information between departments (Hotelogix, 2023). Smart cloud-based property management systems are stored in the cloud, which means they don’t require servers or hardware. You can log into these systems from any device and get access to your property management software from anywhere in the world, the only thing needed is an internet connection. With a cloud-based property management system everything is managed on the cloud, which means specialized computers or on-site servers are not necessary. With the benefits of less maintenance and more automated processes, your hotel can be managed with less help. Although the adaption of a cloud-based property management system comes with an

inevitable investment, the hardware and labour savings will in the long run make up for implementation expenses. (Cloud-Secure Tech, 2023.)

Automation enables hoteliers to minimize operational expenses, while providing guests with maximum value. The automation of time-consuming processes gives your employees more time to focus on other job tasks and will eventually lead to reduced labour costs. With the help of automation, you can have less employees working as automation will take care of a certain area of tasks that previously needed to be done by human employees. (Campbell, 2022.)

The first area in which automation can help increase the operational efficiency is with Request for Proposal (RFP) management. RFP Software can be integrated with core booking systems to enable real-time booking. With real-time booking already purchased guest rooms and other fixed inventory get automatedly blocked when payment has been made. (Hotel Tech Report, 2022.) This replaces the process of manually tracking and inputting data from one platform to another (Campbell, 2022).

Automated guest messaging is a key operational efficiency driver. As an example of this the AI enabled chatbots can answer guests most frequently asked questions, saving the time and effort for the human staff to repeatedly be answering the same questions. Through automation hotels are also able to send booking confirmations, reservation reminders and deposit details to their guests. Other examples of automated guest messaging would be sending your guests the summary of their receipt after they've completed check-out or sending them hotel loyalty program rewards that they are applicable for. (Campbell, 2022.)

Mobile check-in services are another example of automation, that can help improve hotel's operational efficiency. Hotels worldwide are implementing mobile check-in services. Benefits of automated mobile-friendly guest check-in are factors, such as the lightened workload of front desk staff, improved quick guest experience and the savings hotels can make in labour costs. (Campbell, 2022.)

Smart technology utilization is beneficial when aiming to reduce overconsumption in hotels. Smart technology is defined as a technology capable of self-monitoring, self-analysis and producing reports. Hotels can utilize it to reduce the overconsumption of electricity. This is possible by having the smart technology automate energy use. Examples could be the technology giving a command to turn off heating or cooling in a hotel room when the guest is not present. Not only is technology more eco-friendly, as it reduces the need to print paper and plastic room keys it is making traditional hotel processes more convenient for the guest while enabling the hotel to operate more efficiently. The costs related with the adaption of new technologies, could be seen as investments

since these resources have a high probability of lowering the overall costs in the future once they're integrated to business operations. (The Hotel Conversation, 2022.)

An effective way to research the possibilities of developing hotels business performance is to benchmark against the best performers in the same field. Performance evaluation and benchmarking effective business models provides insights which can be utilized to redesign the luxury hotels to be more customer friendly as well as to gain a competitive advance in the market. To thrive and enhance the financial performance in the competitive luxury hotel market, a hotel must improve their operational efficiency and offer additional profitable services to their guests. Different operating inputs and factors such as flexible pricing, fixed costs and management systems are the components that determine whether a hotel operates efficiently. To reach the maximum potential of efficiency it is important for luxury hotels to aim to increase the average spending of a guest by increasing the length of stay, promoting additional services, diversifying revenue sources, and offering high-quality leisure activity and restaurant deals. (Jaewook & al. 2022, 78-95.)

3.3 Luxury Hotel Departments

Luxury hotels have various operational departments, depending on the size of the hotel as well as the scale of services offered on the property. The successful performance of a hotel requires the collaboration of all the departments, as each of them has an impact on the final guest experience. In smaller hotels certain departments tend to be combined, as there isn't a demand for that many employees for each division. (Indeed, 2023.)

Figure 2. The 12 Key Operational Departments of a hotel (data adapted from Indeed, 2023)

This thesis aims to research how AI can be utilized for the competitive advantage of an international luxury hotel. The topic is viewed from the point of how enhancing the customer experience with the technology of AI will potentially lead to a competitive advantage and increased revenue. For this reason, the author will only be covering the operational functions relevant to the research which include guest services, finance and accounting, management, and the marketing and sales department.

Guest services department includes functions like the reception and room service. Front office typically takes care of guest enquiries, guest check-ins and check-out's as well as bookings. They are the first contact a guest faces when arriving to the hotel, which gives them the important responsibility of giving a welcoming first impression. Front office takes care of answering the questions of potential customers, when they have questions regarding the rooms, prices, and the amenities the hotel has to offer. Receptionist working in the front office also advise the customers who are currently staying on the property. Front office provides guests with their hotel room key, check the IDs of the guests, and provides information about the property, nearby activities and make sure that the guests have a suitable room and everything they need on their stay. In addition, guest services include room service, where guests can order food and beverages to their room as well as additional needed items. (Indeed, 2023.)

Large luxury hotels typically have a separate department for finance and accounting, where they manage cash inflow and outflow. In hotel accounting all the cash flows from different departments are analysed. Accounting and finance department oversee regular invoicing and the accounts receivable. Their duties include keeping a track of the most important financial metrics of the hotel business, which include the occupancy rate, Average Daily Rate (ADR), rooms sold, operating expenses, Revenue per Available Room (RevPAR) and other revenue management related key metrics. Hotel accounting plays an important role in creating forecasts for future demand as they record and monitor cash inflows and outflows. Accounting department track the cash flows, make sure that yearly budgets are maintained, manage the payroll and are responsible for ensuring the hotel is complying with the tax laws of the country. (Lacalle, 2021.) Another typical duty of the accounting department is taking care of outstanding the balances of hotel guests as well as maintaining the unpaid invoices of business partners. Together with the management of the hotel the accounting and finance department creates budgets for the hotel. They send invoices, produce financial reports, as well as handle transactions including guest accounts, supplier payments, taxes and plan the financing of expansions, new innovations, and renovations. (Indeed, 2023.) The asset management of the hotel holds an important role as the representative of the owner, as their job is

to increase the value of the hotel real estate. They evaluate whether new innovations and technologies are worth investing in. (Wehrle, 2023.)

Sales and marketing department is responsible for attracting potential hotel customers and selling the hotels services. They advertise the current offerings of a hotel according to the brands standards. Sales and marketing team is responsible for analysing what do their guests seek for from their hotel experience and making an analysis of how their clients spend money. They create ad campaigns, promotions and oversee monitoring the members loyalty programmes to ensure the hotel acknowledges its guests and creates lasting customer relationships. (Indeed, 2023.) Sales and marketing team also creates customer profiles, which help to identify who are the hotels customers and give insightful information which helps the hotel to cater to its client's needs. Customer profile could include the following information: a single male in his thirties, travels for business, typically stays at an x room with an ocean view, typically orders room service for an x amount per day and uses laundry services.

3.4 The Global Luxury Hotel Market

In 2022 the global luxury hotel market was valued at approximately 104,7 billion USD (IMARC Group, 2023). According to a Global Luxury Hotel Market 2023-2027 report published by Technavio in 2023, the global luxury hotel market is expected to grow by 54,46 billion USD between the years of 2022-2027. The compound annual growth rate (CAGR) is estimated to decline by 4,5% during the time period. (Yahoo Finance, 2023.) CAGR describes the rate at which an investment would have grown in a scenario, where it would've grown at the exact same rate every year and the profits would've been reinvested at the ending of each year. It should be pointed out however, that a performance like this is not very likely and CAGR can only be used as a representational figure that smooths the returns in way that makes them easier to understand. (Investopedia, 2022.)

Due to the extensive selection of options, the luxury hotel market is relatively competitive. Matters influencing the competition in the luxury hotel market include consumer spending habits, demographic trends, and constant changes in the preferences of consumers. According to PR Newswire, the competition in the market between the years of 2022-2027 is expected to be on a moderate level. (PR Newswire, 2023.)

Geographically the global luxury hotel market is divided into North America, Europe, Asia-Pacific, the Middle East & Africa, and South America. North America is expected to accumulate for 32 % of the growth of the global luxury hotel market between the years of 2022-2027. The growth of the

North American luxury hotel market has been increasing recently. Many factors, like the growing baby boomer population have affected this growth. The generation of baby boomers were born between the years of 1946-1964. In North America they've also experienced the growing demand for micro trips, due to working age professionals who are travelling for work. Another factor influencing the growth of the North American market is the fact, that multiple prominent luxury hotel vendors exist in the market. (PR Newswire, 2023.)

The most influential players in the luxury hotel market include brands such as Marriott International, Hilton Worldwide Holdings Inc, Starwood Hotels & Resorts, Four Seasons Holdings, Shangri-La International, The Indian Hotels Company, Hyatt Hotels, Mandarin Oriental International, Jumeirah International LLC, Kerzner International Resorts, Aman Group Sarl, Rosewood Hotel Group, InterContinental Hotels Group Plc and Kempinski Hotels SA. (PR Newswire, 2023.)

In 2022 Luxury Travel Intelligence created an algorithm, that measures the performance and values of luxury hotel brands. With 128 relevant touch points to the luxury hotel industry, each with their own weighted value rating the brands overall performance, the results bring an insight to the brands ability to deliver. The focus was on measuring the brands passion, commitment, ethics and values, quality of management and staff as well as the continuing investment in new properties and the renovations of the existing ones. For the third consecutive year Six Senses, which belongs to the InterContinental Hotels Group held the first position of the comparison. Six Senses offers wellness, uniquely crafted experiences and their hosts are professionals at delivering warm hospitality. They are open about how they practice sustainability and how important it is to them. Other brands, that made it to the top 10 performers included Mandarin Oriental, Rosewood, Aman, One & Only, Auberge and Four Seasons. (Lucas, 2022.)

The growth of disposable income in households and the growth of the luxury hotel market go hand in hand. Rising incomes in households, per capita income, and the significant growth in the rate of employment have affected to the increasing amount of disposable income all over the world. This increase in income gives customers more options and purchasing power, when deciding where to stay during their holidays. The increasing use of online booking platforms is also affecting the growth of the luxury hotel market. Since it is now more convenient than ever for customers to research their accommodation options and book holidays from their mobile devices, the booking process has become effortless and quick. Online booking platforms are constantly finding innovative ways to promote their sites, which has an impact on the customer behaviour by increasing the sales of holidays. (PR Newswire, 2022.)

With the obvious fact, that luxury hotels come in pricier than their upper mid-scale and mid-scale competitors comes the challenge of the high prices affecting the market growth of luxury hotels. The part of society, which has a growing amount of disposable income tends to gravitate towards choosing luxury hotels over the affordable ones. However, a big portion of customers are still choosing traditional hotels over luxurious ones due to the inability to pay the high prices, even if they would prefer to stay at a luxury hotel over a traditional one. (PR Newswire, 2022.) In the current global economy, in which the world has struggled since the COVID-19 pandemic and faced the Russian invasion of Ukraine the global economy is expected to grow at a slower rate. The rising inflation and growing interest rates are making their own contributions to the slower growth. Due to these factors consumers are making more careful decisions when spending their money, which has an impact on the manufacturing sector and brings limitations to the overall market potential. (Industry Research, 2023.)

In the year 2016 the US based Marriott International merged with Starwood Hotels and Resorts and it is now the world's biggest hotel company. They have properties in over 110 countries, with a total of over 5 700 hotels divided into 30 brands. Marriott's yearly revenue is around 19,3 billion USD. Their brand portfolio includes world widely respected luxury brands including The Ritz-Carlton and Westin. (Johnston, 2023.) Marriott International, Hilton Worldwide Holdings, Hyatt Hotels Corporation and Four Seasons Hotels Holdings Inc hold 25 % of the luxury hotel market. The United States luxury hotel market is the biggest one globally, as it holds around 30 % of the market. Europe and China come after the United States, with a combined portion of 35 % of the market. (Luxury Hotel, 2023.)

According to Economy Middle East, the Middle East's hospitality sector is expected to grow in 2023. A key destination in the Middle East & Africa market is Dubai, which has reported growth in holiday home and hotel occupancies as well as progress with construction plans for luxury hospitality developments across the region. In 2022 the Middle East reported the strongest growth of 83 % of international arrivals over pre-pandemic numbers. Growth numbers in Europe were 80 %, Africa and the Americas 65 % each and Asia-Pacific reported a growth number of 23 %. A factor, that impacted such high figures for the Middle East was the FIFA World Cup, which was held in Doha, Qatar. (Bhatia, 2023.)

In the Asia-Pacific hotel market the overall tourist arrivals are expected to reach pre-pandemic levels by the year of 2024. The recovery of the market is being largely driven by the domestic travel demand, especially in the North Asia and Pacific markets. International arrivals are currently still well-below the pre-pandemic numbers. However, there are differences between regions and for example Australia, Singapore, India, and Thailand which all have been quicker to loosen

restrictions for vaccinated travellers are experiencing higher amounts of international visitors. (CBRE Hotels, 2022.) Now as the most advanced economies have elevated household savings, the luxury hotel market in Asia Pacific's key countries continues to experience growth. The luxury hotel market in Asia Pacific is booming, as their Average Daily Rate growth/recovery is outperforming the overall market. Travellers are interested in spending their savings on Asia Pacific's luxury holidays, that would normally be out of reach for the average consumer. Resort destinations, like the Maldives have a remarkable contribution to the success of the luxury segment in Asia Pacific. In the year 2022 the Maldives reported a luxury ADR, that was almost 1.5 % times higher than in 2019 pre-pandemic. (Bangkok Post, 2022.)

The luxury hotel market of Europe is approaching the profit numbers of 2019. The key cities of Europe have been witnessing the return of international demand which has boosted the profit recovery. However, the utility expenses of the luxury segment have rapidly increased as a result of inflation and the Russian invasion of Ukraine. In addition to the inflation of the operational costs, other factors that negatively impact the European luxury hotel segment are the energy costs, current labour market and supply chain disruptions caused by global political unrest. The costs of gas, electricity, energy and water reclamation have tripled Year to Date (YTD) when compared to a year ago. (HotStats Limited, 2022.)

According to an article published by Hospitality Net in 2022, luxury hotels are the first asset class suffering in global crises. The COVID-19 pandemic is a prime example of a global disaster, which once again showed how the luxury demand vanishes at a time of crisis. Another example of a disaster that shaked the industry was the global financial crisis in 2008. The demand for luxury accommodation services decreases on behalf of both leisure and corporate clients during a crisis, since households cut down on additional spendings and companies aim to minimize the travelling needs and costs of their employees. Although the luxury hotel industry quickly suffers from the consequences of global crisis's, it typically also recovers from them way faster in relation to other segments. (HotStats Limited, 2022.)

3.5 The Luxury Hotel Customer And Their Expectations

The upcoming generation of travellers seeks for personalized attention to detail as luxury for them means having unique life experiences. Luxury hospitality experience is created when the hotel and its staff are always willing to go the extra mile for their guests. A luxury hotel pays attention to detail in everything, the interior, the service, the food and the amenities are all top tier. A great amount of the responsibility of creating a luxury hotel experience lies in how the staff treats the hotel guests.

When a guest makes a request, it is important that the host makes them feel heard and most importantly is capable of delivering outstanding service. The hotel is able to stand out from its competitors when requests and all guest-host service interaction is handled with careful attention to detail, and often delivering outcomes that exceed the guest expectations. (EHL Insights, 2016.)

Modern luxury travellers are selective about where they want to stay at and put their money to. The desire to travel more responsibly, acknowledging the environmental matters is on the rise as well as the desire to give back to the destination. What this means is an increased interest towards learning about the local way of living, supporting the local vendors and doing volunteering in developing countries holiday destinations. According to a study conducted by a luxury travel advisor company Virtuoso, 80 % of travellers are willing to spend more money on brands, which offer tailored products to them. Customer data is essential and needed, when wanting to create personalized services for your guests. With the help of the right technology hotels can utilize their data insights to better understand the needs of their clientele. Especially Big Data is useful for providing relevant information for hotel marketing teams to use when creating personalized ads for their most valuable guests. (Sramkova, 2022.)

Social media strongly influences the decision-making process of the modern travellers when they’re choosing a place of accommodation, according to Luxe Digital. In order to leverage the hotels potential, it is essential to have a high-quality digital presence which includes a modern website and carefully considered, elegant posts on social media platforms such as Instagram. Tech-savvy hotel guests who are active on social media often share pictures of their holidays to their followers. Social media platforms offer effective marketing opportunities, which is why hotels are highly recommended to engage with their guests there. (Sramkova, 2022.)

Authentic experiences, which represent the local culture are highly sought for. An increasing portion of customers are willing to pay more for sustainable holidays, as 53 % of the respondents in the query conducted by Virtuoso expressed their interest of doing so. A growing portion of travellers seeks for an authentic connection to the local culture and want to experience the heritage and authentic food of the destination. In addition, there is an increasing amount of eco-conscious luxury travellers who want to travel responsibly. Luxury travellers give high value for hotel brands like the Six Senses, that express understanding of their surroundings as they want to give back to the destination. Luxury customers want to see concrete planet-conscious behaviour from hotels, that shows the knowledge and respect of their surroundings. (Sramkova, 2022.)

When the best players from all sectors work together, luxury guests can enjoy world class experiences meanwhile all the companies gain additional sources of revenue. (EHL Insights, 2016.) It is common for brands to make partnerships with luxury hotels. For a long time, there has

been partnerships between luxury cosmetic brands and hotels, where a hotel only uses the soaps, shampoos and lotions of a certain luxury brand in their rooms, gym, and the spa area. A next step further from this is for example the Missoni suites, that are located at the Byblos Saint-Tropez hotel. Missoni is a widely respected fashion house and they have made a collaboration with the Byblos hotels to design a couple of their suites with Missoni interior. Other examples are the Armani hotels and the Bulgari hotels, which are entirely designed by the designers of the fashion houses. (Chitrakorn, 2022.)

Luxury hotel companies are in the business of making their guests dreams come true. When attracting clients to a luxury hotel it must be noted that a luxury experience isn't complete without the smooth operation of technology. Back in 2012 the Four Seasons spent over 18 million USD on personalizing the web experience for their guests. (EHL Insights, 2016.) As the hotel industry is digitalizing and guests are able to browse through a variety of accommodation options websites, it is important to have a representable brand presence on digital platforms that stands out for the guests. (Fox, 2012.)

Guest expectations are rising faster than ever before. According to Janet Jaiswal the Vice President of Global Marketing at Cloudbeds, hoteliers must rely on connected technology in order to compete in the hotel market today. COVID-19 pandemic changed the buying habits of consumers, who are now more willing to change brands. According to McKinsey & Company, two-thirds of traditional loyalty programs fail to deliver value indicating that point-based loyalty programs should be replaced with ones providing instant gratification such as personalized offers and upgrades. (Jaiswal, 2022.)

As consumers have rising expectations for brands, the process of tracking the guest experience is crucial. Hotels have data on of what customers are doing at the different stages of their journey and insights to their typical requests. The first touchpoint of the guest journey is often in a digital platform. An omnichannel guest experience connects the digital channels like the website and email marketing with the on-property experience. A good guest experience is consistent through all the touchpoints of the journey, the website and the app, the booking experience as well as the on-property experience. In order to track the customer experience and understand the trends, hotels can benefit from implementing a guest experience management program. With an integrated platform that tracks all the steps of the guest journey, a hotel is able to find the opportunities where value can be added or where something may need fixing. Hotel companies, which have made significant investments in their customer experience over the last year are 10 times more resilient and three times more likely to have expanded their clientele in the past six months compared to their competitors who have not made these investments. (Jaiswal, 2022.)

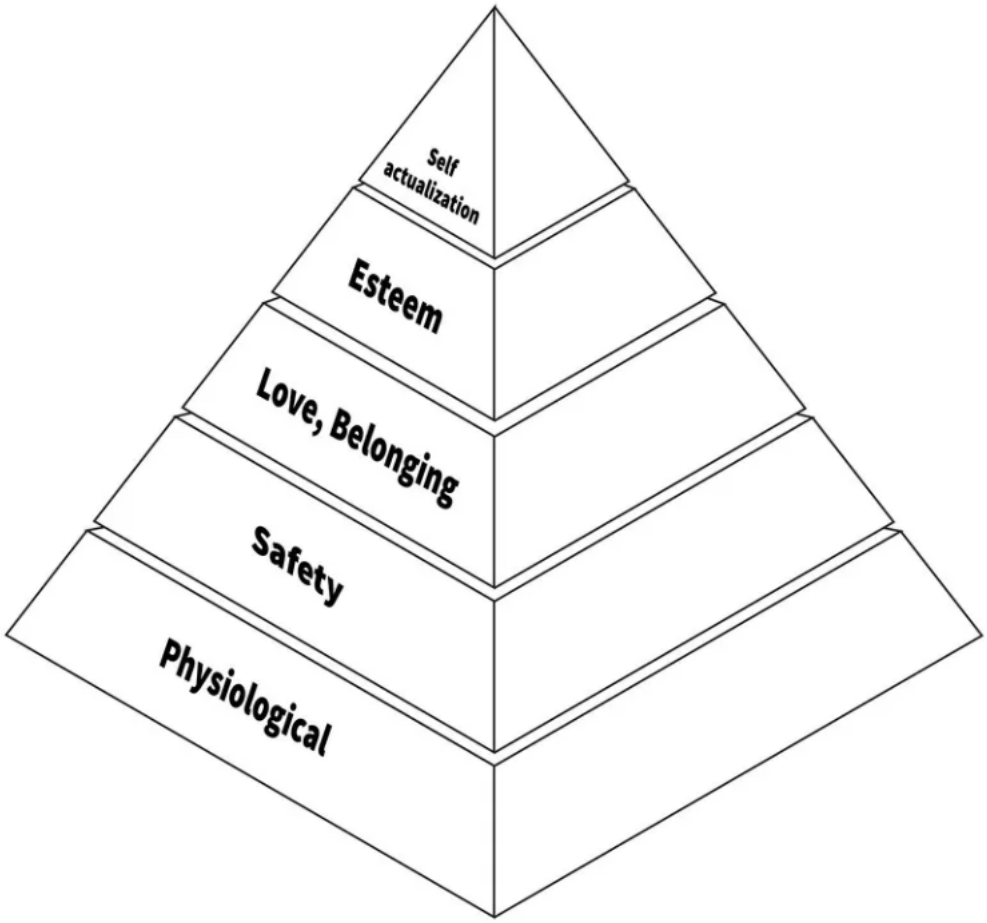

Figure 3. Maslow's hierarchy of needs (adapted from Vector Stock, 2023)

Maslow's hierarchy of needs helps hotel management to understand what guests need, starting all the way down from their basic physiological needs like the need for food, water, and rest to all the way up to self-actualization needs that in practice equals for personal growth and the need to feel fulfilment in one's life. Maslow's hierarchy is based upon the thought, that the human needs come in the mentioned order of the pyramid. If a person doesn't have their physiological needs (food, sleep & shelter) met, they aren't focused on fulfilling the higher needs. After the physiological needs are met humans desire to fulfil their safety needs that consist of security, employment, and financial resources. When safety needs are met a person starts to focus on their sense of belonging, their relationships with family, friends and loved ones. After the first three piles of needs are met, the esteem needs awaken. Esteem needs consist of the desire for achievements, of getting respected by others, independence, and status. When esteem needs are accomplished, the final block is self-actualization. In this phase of one's life they desire feel self-fulfilment, to understand their purpose and reach their full potential in life, seek for personal growth and to have peak experiences. (Hollander, 2022.)

When looking at the Maslow's hierarchy of needs from the perspective of hotel business, we can identify that the basic things guests expect from hotels are shelter, food, water, cleanliness, and security. In addition to these, you fulfil your guests love and belonging needs by making sure to greet them warmly and make them feel like whether there's anything they desire, they are always welcome to ask from the staff. In a luxury hotel these basic aspects of the accommodation are the foundation of the experience. Luxury experience is not possible without these basic aspects being implemented with high quality. In addition to the basics, a luxury hotel experience must offer something extra. The booking process must be smooth, technology aspects like Wi-Fi must function flawlessly and the location of the hotel must be central but in addition the esteem and self-actualization blocks must be ticked off. Esteem needs can be fulfilled by adding a personal touch to the service. Making the guest feel special, recognizing them and their needs when they return to your brands hotel by for example offering welcome drinks and celebrating the milestones of the guest's brand loyalty as a way of thanking them are all great examples of fulfilling a guest's esteem needs. (Hollander, 2022.)

In an article published by EHL Insights, the hotel brands were segmented and put into the same Maslow's hierarchy of needs based on what is their job in the market. Midscale or mass-market brands like Holiday Inn were put into the first box which consists of providers focused on fulfilling the physiological and safety needs of their customers. These brands don't necessarily need to do more. Most customers will only stay at your hotel once and all they might be looking for is for their basic needs to be met. However, this doesn't mean that these brands don't push for more than just covering the basic needs but in most scenarios the outcome of the experience is that just the basic needs were met. When selecting a midscale hotel, the customers aren't signing up for a luxury experience and most often they are aware of that. Luxury brands need to fulfil these basic needs of their guests with high class and then add to the experience. This is done by helping guests meet their esteem needs and helping them feel self-fulfilment and to have peak experiences. The Four Seasons was placed in the block that stands for the esteem needs and Soho House, a brand which offers elite brand memberships to selected individuals was placed in the box of self-actualization. (Yoong, 2023.)

The mass-market also known as midscale brands are selected by the consumer most often when the driver for the selection of accommodation is the price. With upper midscale brands the consumers look at the price/quality ratio, as they want to get a little something more than the average stay. With accessible luxury hotel brands the selection is driven by the quality but the price has an important contribution to the final decision. The consumers, who select to stay with luxury brands base their decision on the quality of the total hotel experience and the price does not drive their decision as their budget is flexible and they seek for peak experiences. (Segura, 2017.)

4 Research Method

The empirical part of this thesis is conducted as a systematic literature review. The research method was selected, as the author aims to provide an extensive picture of the current state of in which international luxury hotels utilize artificial intelligence (AI) in their business operations. In this systematic literature review the author studies peer reviewed articles from five internationally recognized research databases: ScienceDirect, Ebsco, SAGE Journals, ProQuest, and Emerald Insight. The articles researched for this literature review have been published between the years of 2018-2023, to ensure the data is current as the technology of artificial intelligence is developing at a rapid pace. The literature review performed in this thesis is conducted between the months of April and May in the year of 2023. The search terms used to search articles from the research databases are “artificial intelligence hotel” and “artificial intelligence luxury hotel”.

Systematic literature review as a research method aims to summarize the relevant insights found in the previous academic studies performed of a specific topic. It is a way to survey the academic discussion around a specific topic and bring up the interesting findings from the perspective of academic research. Systematic literature review serves as an effective way to test hypotheses, present research findings in a summarized way and to analyse the quality and validity of the selected studies. (Salminen, 2011.)

After performing the search on research databases with the aforementioned search terms, the author of this thesis will study the results and exclude the articles that serve as irrelevant to the research of this thesis. The topic was approached from the perspective of hotels gaining a competitive advantage by enhancing the guest experience. Therefore, only the articles that contributed to the academic research of how AI utilization in hotels enhances the guest experience were included in this literature review. A majority of the articles examined were published on several different research databases and it was therefore ensured that each article was only reviewed once.

A total of 224 peer reviewed research articles published between the years of 2018-2023, written in English were found with the search terms “artificial intelligence hotel”. From these articles only the ones, that discussed the perspective of gaining a competitive advantage by enhancing the hotel guest experience were selected. A total of 74 articles were found to be relevant for the research of this thesis. The 74 articles were selected as they discussed the topics of the four research questions of this thesis.

4.1 Research Questions

The aim of the literature review is to find answers to research questions mentioned below.

This thesis aims to answer the following questions:

I. How international luxury hotels have implemented Artificial Intelligence in their operations?

II. What limiting factors do the industry professionals see when it comes to the application of AI?

III. In which ways has the application of Artificial Intelligence positively impacted the competitive advantage and operational efficiency of the international luxury hotels?

IV. Does the segment of the hotel have an impact on the expectations of the guest and to the extent to which processes can utilize AI instead of the traditional host-guest human interaction?

4.2 Reliability

The empirical part of the thesis was conducted as a systematic literature review. The author studied peer reviewed articles published by five internationally recognized research databases: ScienceDirect, Ebsco, SAGE Journals, ProQuest, and Emerald Insight. The articles included in the systematic literature review were published between the years of 2018-2023, to ensure that only relevant information is included in the thesis as the technology of artificial intelligence develops at a rapid pace.

In the beginning of the research for the literature review, a total of 224 peer reviewed research articles, published between the years of 2018-2023, written in English were found using Haaga-Helia University of Applied Science's online library HH Finna's advanced article search. The advanced search narrows the results down to only consist of the articles that hold relevant content regarding the named search terms, which in the research of this thesis were "artificial intelligence hotel" and "artificial intelligence luxury hotel". These 224 articles were then studied with the aim to find the ones, that discuss the utilization of AI from the perspective of gaining a competitive advantage by enhancing the hotel guest experience and the ones that hold essential insights regarding the four research questions of this thesis.

Therefore, the articles, which discussed the utilization of AI in the hotel industry from various different perspectives irrelevant to the research of this thesis such as of improving marketing,

improving hotel property's security, or performing demand forecasting using AI-enabled technologies were excluded from the literature review. 74 articles were found to have relevant insights regarding the utilization of AI in luxury hotels that are aiming to gain a competitive advantage by enhancing the guest experience and were therefore selected to be included in the literature review.

The selected 74 articles were then studied and all findings regarding each research question were gathered to further identify the patterns and contradictions in the literature. The findings presented in this thesis consist of the patterns and contradictions found in the literature review. In addition, the research gaps were identified in order to perform suggestions on areas requiring further research.

5 Findings

5.1 Research Background

For the empirical research of this thesis, articles within the study context, published between years 2018 - 2023 were analysed. The total number of research articles selected for the literature review of this thesis was 74. A significant growth in the amount of research articles can be detected, since only three articles were published in the year of 2018, in 2019 the number of studies published within the study context was five and in 2020 the amount climbed to 18. In 2021 the number of studies published was 23 and in 2022 the number slightly decreased to 21. Only four articles within the study context have been published in 2023, which can be explained by the fact that this thesis is written between April and May of 2023 and there is over seven months left of the year 2023.

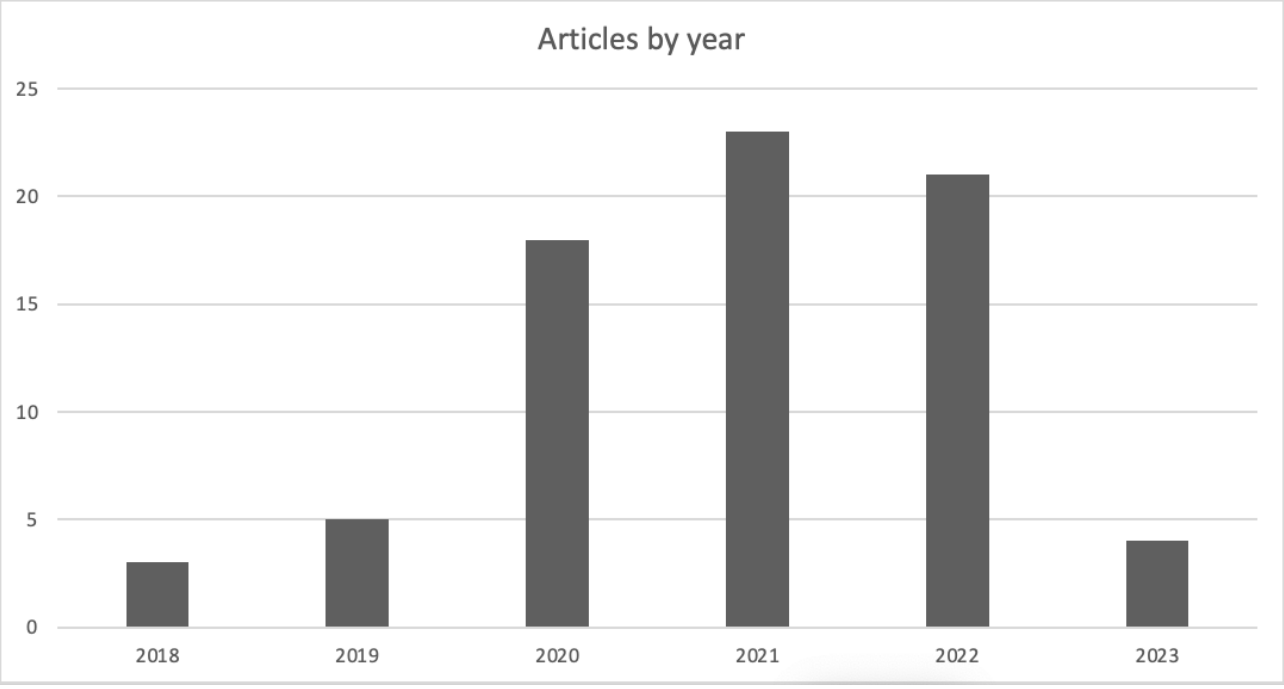

Figure 4. Articles by year

The articles included were published in different tourism, hospitality, service, business, and technology journals. International Journal of Contemporary Hospitality Management and Sustainability (Basel, Switzerland) had both published eight (8) articles within the context. In addition to the aforementioned two, Journal of Service Research (5), Journal of Hospitality Marketing & Management (4) and Worldwide Hospitality and Tourism Themes (4) were the most frequent publishers.

When looking at the countries, where the articles related to the topic have been published, USA (13), China (8), and India (6) had published the most articles. Twenty (20) research articles were conducted by authors from multiple countries, an example could be two authors from USA and two authors from The Netherlands. In four (4) articles the origin of the study was not mentioned.

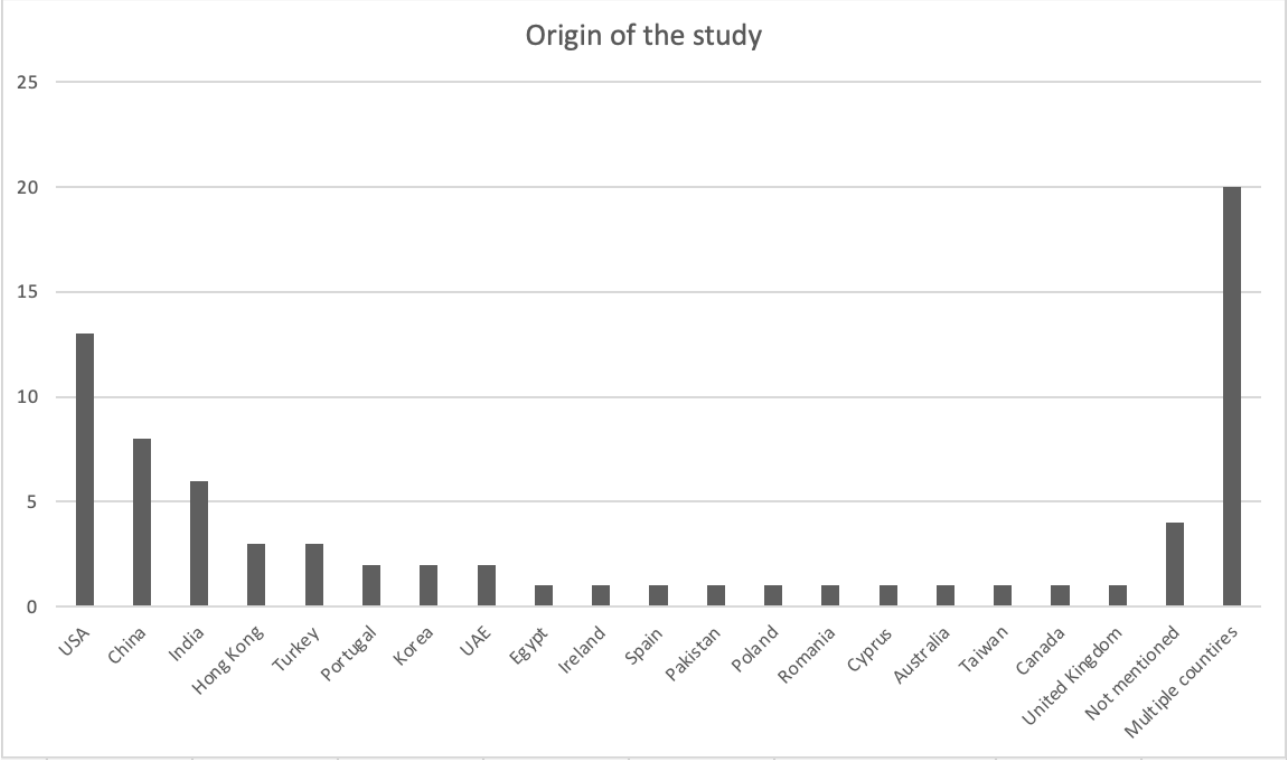

Figure 5. Origin of the study

The majority (50) of the studies were conducted using the quantitative research method. Qualitative research method was used in 20 studies and mixed methodology in four (4) research articles.

The perspectives of the articles can be categorized to the hotel//hospitality customer experience perspective (24), hotel company perspective (22), AI in hospitality industry perspective (14), AI in service industry (8), AI in the field of tourism (5) and one (1) article was written from the perspective of a company from non-hospitality industry related field.

The key approaches for the theoretical frameworks of the studies varied broadly. Customer expectations, satisfaction and loyalty was the approach of 17 studies, making it the most popular approach. Smart technology application to hospitality and service industries as a phenomenon (15), robotics as a phenomenon in hospitality and service (12) and business expansion through obtaining a competitive advantage by utilizing artificial intelligence (9) were among the most popular approaches. In addition, studies focusing on finding the optimal mixture of technology and

human service (7), the approach of COVID-19 recovery of hospitality and tourism companies (4) and studies with the approach of consumer consumption, purchasing patterns and repurchase intentions (2) were included.

The contexts of the articles were divided into 11 categories, with Artificial Intelligence in Hotels as the largest category with 21 articles. After that, Artificial Intelligence in Hospitality (10), Artificial Intelligence in Service (8) and Smart Technologies in Hospitality (7) were the most frequent contexts. Within the contexts of Artificial Intelligence in Luxury Hotels (5) and Smart Technologies in Luxury Hotels (5) were five studies in each.

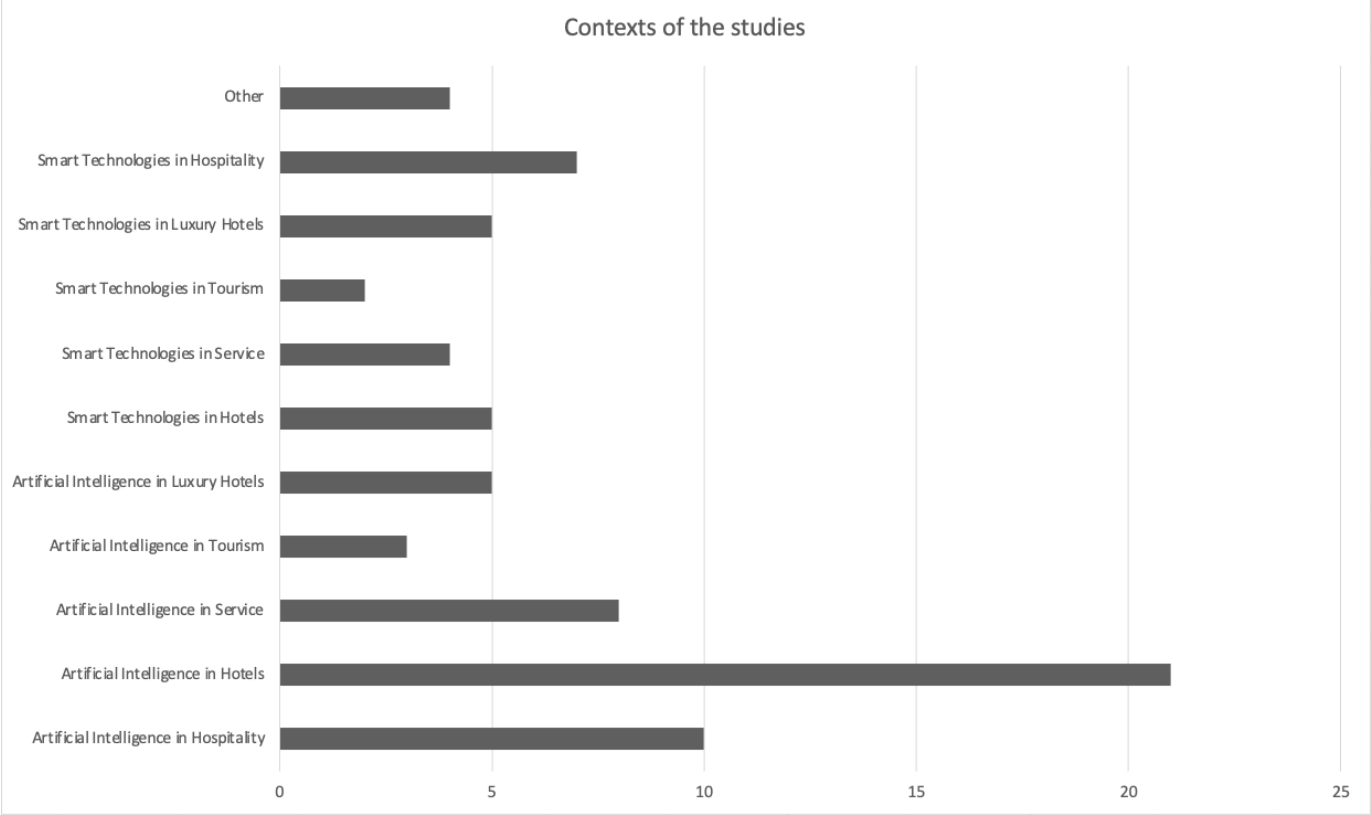

Figure 6. Contexts of the studies

5.2 Current Practices of AI in the Luxury Hotel Industry

The application of AI in hospitality services can be categorized based on the types of artificial intelligence employed. Mechanical AI is used for service standardization. Routine tasks which are simple and repetitive can be performed by mechanical AI enabled technologies. Service robots can be designed with mechanical, thinking and feeling artificial intelligence. Robots with mechanical intelligence have limited capabilities and therefore the service they are able to provide is limited. They can be programmed to answer the most frequently asked questions and tend to have routine answers, which lack personalization. (Belanche, Casalo, Flavian & Schepers 2022) Several studies noted, that the customers of full-service providers such as luxury hotels find mechanical AI to not meet the expectations, they have set for the level of service expected from the luxury hotels. Therefore, mechanical AI was described to be more suitable for the low-cost firms.

The expectations of the customers of low-cost hospitality service providers differ from the ones of luxury providers. Low-cost customers value efficient service with low prices, whereas the luxury customers have high expectations and expect superior service. Low-cost hotels can utilize any AI type as they are found to increase the efficiency of operations, but luxury hotels benefit from the utilisation of thinking and feeling AI as these technologies are more sophisticated and offer personalization of services in addition to helping the luxury hotels create a relationship with their guest. Robots with a high level of feeling AI technology are found to increase customers positive emotions, which positively relate to spending. (Belanche & al. 2022)

A study, which interviewed five Dubai based luxury hotel asset managers revealed, that AI-powered chatbots and voice recognition technology are currently the most implemented forms of AI technology in hotels. Concierge and delivery robots were described to be popular, since they can be easily implemented to reduce costs and enhance the guest experience. (Chathoth, Daghfous, Dutt, Nam & Sajid 2021)

Chatbots enable instant messaging to guests, as they can respond around the clock. Typically, chatbots are used to communicate with guests on channels such as the hotels website, mobile app, and their social media platforms. (Lehto, Lehto, Mohamed, & Park 2021) Chatbots are pre-programmed to answer the simple questions that customers frequently ask. They have inbuilt programs, which recognize the keywords in a question and then proceed to provide multiple answers to a single question. Chatbots can also be brought to hotel rooms via tablets and hotel brands mobile apps for guests to use on their smartphones. A chatbot can be for example programmed to handle meal and drink orders, customize dishes, or booking a cab. A study, which

interviewed five assistant managers of 5-star hotels in the UAE, including the assistant managers of Atlantis the Palm and the Ritz-Carlton Abu Dhabi and Grand Canal stated that AI-enabled room service is used to order and customize guests' food from the hotel's kitchen and from their partner restaurants. (Ahmed, Al Mamun, Al-shami, & Rashid 2021)

Hilton Worldwide has implemented a concierge robot called Connie, which is capable of greeting hotel customers in different languages, answering customers questions and assisting with the check-in process. Connie resembles IBM's Watson in its functions, and it was created in co-operation with IBM using their Watson AI platform. Connie implements speech recognition, and it can refine its responses based on the customer interactions it has, since it learns from each interaction and continuously improves its answers. (Kunz, Kunz, Paluch & Wirtz 2022) The Mandarin Oriental Hotel in Las Vegas has a service robot called Pepper, that helps customers with directions and their questions about the property (Collins 2020). Hotel Icon in Hong Kong has had trials with two types of AI-powered robots designed by Konica Minolta: a service delivery robot and a cleaning robot. (Çiğdem, Davidavicius, Meidute-Kavaliauskiene, & Yıldız 2021) The Cosmopolitan Las Vegas has a concierge robot called Rose, that is a voice-activated assistant using natural language processing (NLP) AI technology. Rose helps the hotel guests with check-in, answers their questions and if necessary, conveys the challenging queries to the hotel staff. (Lopes, Prentice & Wang 2020) As a result of the needed precautions due to the COVID-19 pandemic, Marriott International, Hyatt and Hilton have adopted robot cleaning systems to minimize interactions between the guests and the hotel employees (Afaq, Dwivedi, Gaur & Singh 2021).

At Novotel Ambassador Seoul Dongdaemun Hotels & Residences an AI-driven robot developed by KT Corporation has been employed. The robot can repair hotel room devices, assist with room service, and can put on the type of music a guest wants to listen to. They have also implemented AI to the check-in and check-out process. Robots are used to recognize the guests face and voice and to assist them with entering their information at the front desk screen during check-in. This is possible with facial recognition technology. The guest is recognized based on the ID photo they have submitted prior to their arrival and the process only takes 1-3 minutes. When the check-in is complete, an automated trolley will transport guests' luggage to their selected room. (Cho, Gupta, Lee, Modgil & Park 2022) Automated check-ins are also implemented by other hotel brands such as Marriott. Marriott International's loyalty program Marriott Bonvoy, which is the largest loyalty program in the hotel industry has a Marriott Bonvoy mobile app that enables automated self-service check-in for their guests without the need for room card or a key. The traditional room key is replaced with an e-key, that guests can use from their personal devices. (Chathoth & al. 2021) In 2018 Marriott International conducted a trial of implementing self-service check-in kiosks into two

of their properties in China. The first step when checking in using a self-service kiosk is for the guest to first scan their ID, then the machine takes a photo of their face, after that the guest signs a service agreement form and finally, they will enter their contact information. The facial recognition software then verifies their personal information as well as their booking information and proceeds to dispensing their room keys. (Bilgihan, Chao, de la Mora Velasco, Huang & Wei 2022)

Hotels in China have been pioneers with testing and employing Self Service Technologies. As an example, facial recognition check-in kiosks have been implemented in estimated 50 hotel properties in Hainan Province, China. Chinese hotels are testing hotel robots and the InterContinental One Thousand Island Lake Resort is an example of a Chinese luxury hotel, that is testing AI-enabled robots. (Hung, Liu, Wang & Wang 2020)

Service robots are implemented in hospitality and tourism fields and the unit sales of service robots have climbed by 15 % from 23,2 million units sold in 2019 to 26,7 million units sold in 2020 (Huang, Li, Wang & Zhang 2023).

Smart home applications have found their ways to luxury hotel rooms in forms of AI-enabled voice assistants. The popularity of the in-room usage of AI-enabled voice assistants is expected to increase from 4.2 billion devices used globally in the year of 2020 to over 27 billion units by 2026. (Cai, Cain & Jeon 2022) Alexa for Hospitality by Amazon was created to combine the original Alexa's functions such as playing music and automated web search with hotel industry specific features including wakeup alarms, control of lighting and the temperature of the hotel room, ordering room service and housekeeping, calling the reception as well as virtual check-out. Alexa for Hospitality is used for example at two Marriott properties in Los Angeles. (Bilgihan & al. 2022) Voice-recognition technology (VRT) works by AI understanding certain speech patterns as a command and then replying to the command appropriately. Voice recognition technology (VRT) is used by various international luxury hotel brands. Accor Hotel's luxury brands including Sofitel, Raffles and Fairmont and Marriott International's Westin, St. Regis, and Autograph Collection are all utilizing VRT's to take their guest experiences to the next level. Google Home, Apple HomePod, and Amazon Echo integrated with Alexa for Hospitality are among the most popular VRT's selected by these luxury hotel brands. The VRT's are used to control the TV, lighting, temperature, and curtains. An aspect, that increases the guest engagement is the personalization VRT's offer by the guests being able to access their personal music and other digital content and to stream the content by pairing their personal devices with the hotel rooms gadgets via Bluetooth. (Bharwani & Mathews 2021) The Wynn Las Vegas has also implemented Alexa for Hospitality in their hotel rooms (Bonn, Li & Ye 2019).

Hotels have been collecting data from their guests for years to manage and improve their relationship with them. Customer relationship management systems (CRM) enable hotels to transform their historical data into valuable knowledge about the behaviour and preferences of their clients, which enables more effective decision making and improved business performance. Big data and predictive data analytics provide the capability for companies to examine and utilize real-time data instead of making decisions based on historical data. Predictive data analytics makes use of technologies such as machine learning to suggest potential outcomes of situations in real time in addition to the likely consequences of each outcome. The usage of big data, data analytics and machine learning can be implemented to recommend targeted services to luxury hotel guests, which personalizes their hotel experience. The amount of available information is constantly increasing in the hotel industry, which is why it is beneficial for hotels to implement big data to engage with their guests and together create value based on customers preferences. Big data and analytics are still fairly new to the hotel industry, but some companies have begun the utilize them to strengthen customer loyalty. (Aluri, McIntyre & Price 2018) CRMs contain such a massive amount of data, that the only way to fully make use of the data is through artificial intelligence applied to software programs or machines. Hotels can then utilize the insights to cocreate enhanced experiences for their customers. (Bowen & Morosan 2018)

Hyatt Hotels uses machine learning (ML) powered tools to analyse the purchasing behaviour of their hotel customers and to improve their in-app and in-hotel experience (Chintalapati 2020). Big data and AI have made the process of collecting and analysing customers reservation data more convenient to guide companies with targeted follow-up marketing (Cheng, Chuang, Huang & Weng 2021). Caesar's Palace in Las Vegas is using AI to mine data from their Total Reward loyalty program, which captures customer data from the booking phase until they check-out. They use the insights derived to provide their guests with customized tailored experiences. InterContinental Hotels & Resorts has a cloud-based technology platform called Concerto which is in linkage to their IHG Rewards Club. They use guest data to improve their guests stay experiences and it has been found that AI-powered predictive analytics play an important role in understanding guest needs. (Bharwani & Mathews 2021)

In the pre-purchase state, hotel brands can use AI to gather data about guests' previous purchases, destination preferences and payment methods. AI can then be utilized to assist the hotel customer with personalized options and suggestions based on previously saved user preferences and page visits, previous room selections and food and beverage choices. (Lopes & al. 2020) In a study, where seven general managers of Indian luxury hotels were interviewed, it was found that the in-stay stage customer service is the most important aspect of the customers hotel experience journey. AI can be used to elevate the customer service through giving

employees insights that help them create innovative experiences for the guests. In the post-stay stage AI-based predictive analytics can be valuable when identifying the guests that have a high churn risk. Customers with a high churn risk have typically had negative experiences during their customer journey and it is beneficial for hotel companies to strive to gain back their loyalty. (Bharwani & Mathews 2021)

5.3 AI Practices Enhancing Hotels Competitive Advantage and Operational Efficiency

Applications of artificial intelligence empower automation of processes that offers hotel companies the opportunity to provide faster, more cost-effective, and personalized services to their guests. (Lehto & al. 2021) The utilization of AI-driven devices is beneficial when striving to clarify customer queries and make personalized recommendations to guests in real-time. By integrating AI to service delivery, hotel companies can improve the way they provide services to their guests compared to the traditional service delivery mechanisms which heavily rely on human employees' capabilities. (Chakraborty, Prabhu, Ramaprasad, Rao & Roy 2020) The opportunities AI enables in terms of improving the level of service personalization is something that has never been possible before (Yi & Wright 2022).

According to a study, which interviewed Dubai-based luxury hotel asset managers AI can lower the operational costs of a hotel by 15 % and increase the revenue by 10 % (Chathoth & al. 2021). Based on the literature reviewed, robots, chatbots, voice assistants, self-check-in and check-outs and analytical AI were found to be the implementations of AI, that have the biggest contributions to the enhancement of the hotels competitive advantage and operational efficiency.

The automation, that AI enables is significantly connected to reduced operational costs, improved operational efficiency, and increased revenue while maintaining to be dedicated to providing hotel guests with unforgettable stay experiences (Cho & al. 2022). One minute of work by a robot is equivalent to a human employees 15 minutes of work. Robots, chatbots, and voice assistants help save costs, since they reduce the number of calls to the concierge by handling customer requests and queries. Hotels can use AI to help meet customer expectations due to its capability to provide 24/7 service and responses. (Chathoth & al. 2021) Chatbots can provide the type of response times, which could be considered almost impossible for humans to mimic (Citak, Owoc & Weichbroth 2021). Furthermore, AI robots speak multiple different languages which can be valuable to reduce the communication difficulties when a guest does not speak the local language or English properly. The number of frustrating service encounters can be minimized, if the host and guest can understand each other and the guest feels comfortable during guest-host interactions. (Huang 2022)

Analytical AI that implements big data and machine learning provides a tool to maximize hotels data assets and deriving valuable insights that can be used to personalize the services provided to guests. With the help of AI hotel companies can predict guests needs and know them better, so that they are equipped to provide them with customized experiences. (Chathoth & al. 2021) The use of machine learning (ML) and data analytics are also found to have a positive linkage to hotel companies' ability to enhance the guest experience (Aluri & al. 2018).

According to a study, where seven general managers of Indian luxury hotels were interviewed the luxury hotel industry gains value by mining data to create personalized guest profiles for each of their guests based on the guests' previous stays and personal preferences. However, the priority number one is to use technology for making sure that the in-stay and in-room hotel experiences are smooth and frictionless. (Bharwani & Mathews 2021) Dorchester Hotels has implemented an AI-based system, which can analyze 7,000 guest reviews in one minute to give the hotel an understanding of what matters most to their customers. If a human employee would've read and analyzed the same number of reviews, it would've taken weeks of time. (Bottrill 2022)

The usage of predictive data analytics with big data to gather real-time insights, instead of historical data is still new to the hotel industry. For years, the competitiveness of a business was based on their capital, location and the qualities of the property, labor, and other tangible resources, but it has recently been discovered that knowledge management is rapidly becoming a valuable source of competitive advantage. Knowledge management helps hospitality organizations to gain a competitive advantage with the help of information technology (IT) tools including decision support systems. By combining various databases hotels can derive essential insights about their customers and utilize them to improve their services, which will help them gain a competitive advantage over their competitors. (Alonso-Gonzalez, Del Ser, Guerra-Montenegro, Lana, Sanchez- Rodriguez & Sanchez-Medina 2021)

A hotel, that has self-service check-in kiosks on their property is able to have a smaller number of receptionists working, since the check-in kiosks help share their workload and the receptionists have more time to focus on other tasks (Ivanov, Slobodskoy, Stoilova & Webster 2020). In addition, long queues often result in guests having to wait in line for a check-in which tends to cause frustration among the guests (Akkaya, Cain, Cebe, Mercan & Uluagac 2021). From the managerial perspective it is essential to see the value that AI integration provides, as it reduces the labor costs and increases the productivity of employees by automating the repetitive tasks which don't require the attention of the human staff. AI is a learning source, that evolves based on the things it learns (Chathoth & al. 2021)

Application of AI in luxury hotels	Types of AI technologies used	Ways in which enhances competitive advantage
Robots (Room service robots, Concierge robots & Cleaning robots)	Computer Vision, Machine Learning (ML), Natural Language Processing (NLP), Reinforcement learning (RL), Speech recognition	-Improved service efficiency -Reduced operating costs -Reduced communication difficulties since robots speak multiple languages
Chatbots	Natural Language Processing (NLP), Natural Language Generation (NLG), Machine Learning (ML)	-Improved service efficiency -Enhanced guest satisfaction -Reduced operating costs -Staff has more time to focus on improving guest experiences
Voice assistants (In-room voice assistants like Alexa for Hospitality, Google Home, Apple HomePod)	Natural Language Processing (NLP), Speech recognition	-Enhanced guest experience -Reduced operating costs -Offers service personalization -Increased revenue from sales gained due to personalized suggestions
Self-check-in and check-out	Facial recognition, Computer Vision	-Enhanced guest experience -Reduced waiting times and queues -Reduced operating costs
Analytical AI (Automated data processing, data analytics and predictive data analytics using big data and ML)	Machine Learning (ML)	-Increased revenue from sales gained due to personalized suggestions -Enhanced guest experience -Reduced operating costs -Helps meet guest expectations -Increased customer knowledge -Helps process and analyze large amounts of data -Enhanced employee productivity -Improved guest loyalty

Figure 7. Key applications of AI in the luxury hotel industry, which have been found to increase the operational efficiency and competitive advantage of the hotels

5.4 Limiting Factors Hindering the Process of Utilizing AI in Business Operations

Privacy concerns, guest resistance towards AI-enabled robots and other AI-enabled technology applications, challenges with building an agile data infrastructure, the lack of understanding of the AI technology, financial risk related to AI implementation and the concern for harming luxury brand's image were found to be the biggest factors hindering the process of utilizing AI in luxury hotels business operations.

From the perspective of the hotel guest, privacy concerns are considered to be the biggest AI-related challenge (Akkaya & al. 2021). Artificial Intelligence adds value to the service delivery by offering personalization of services. To extract value from data sources the utilization of AI requires vast back-end use of big data. (Bharwani & Mathews 2021) The problem with this is that artificial intelligence uses personal data, that consumers do not want to make public (Dinu, Iustin, Lazar & Sorin 2021). As an example, facial recognition technology which is used in the self-service check-in kiosks at hotel lobbies is based on biometric data (Bharwani & Mathews 2021). Biometrics are used to scan a person's physical and biological characteristics in order to identify them. Persons biometrical data is unique and therefore allowing organizations to use one's biometrical data exposes them to privacy issues. According to a study, which was conducted in USA and sampled 579 respondents on their opinions about the use of biometric data-enabled hotel services it was found that the respondents did not have a positive response to the use of biometric data-enabled services in hotels. Especially females and older respondents had a low desire to use such services, when they were given information about the risks and possible negative scenarios such as data breaches. (Lehto & al. 2021)

Although biometric data-enabled hotel services are not provided in all hotels, hotels store various other forms of personal data. As an example, the registration to a mobile app often requires for a person to share their full name, birthday, credit card information and their home address (Han, Hou, Lai & Wu 2021). The critical issue with software-controlled services is their vulnerability. A minor malware attack is able to disrupt the software program and the operations of the service providers like hotels, resulting in a catastrophe. (Bellamkonda, Katkam, Rodriguez & Samala 2022) Marriott had a data breach in 2020, in which more than 5 million guests names, birthdates, phone numbers, and loyalty account numbers were accessed. Such data breaches are connected to the exponential use of advanced forms of automation in service practices, that access and store guests' biometric data. As biometric data is unique, its leakage creates a higher risk compared to personally unidentifiable information such as age, gender, and birthdate. (Lehto & al. 2021) To conclude, it is essential for hotels to balance personalization and privacy by taking a cautious

approach to storing and using guests' personal data, in order to protect their privacy (Bharwani & Mathews 2021)

Various studies stated that hotel guests prefer human service over the service provided by AI-enabled robots. A topic, which caused controversy was the debate on whether an AI-enabled service robot should be anthropomorphic, which equals for human-like or caricatured. It was stated that AI developers should not design and create robots with human-like features, due to the fact that guests may perceive anthropomorphic robots as a threat to their self-identity (Chakraborty & al. 2020) However, it was found that in certain previous studies anthropomorphic robots were found to evoke positive emotions among guests (Badu-Baiden, Choi, Giroux, Kim & Kim 2021). In addition, some studies have found, that anthropomorphism is one of the key factors which shape guest's positive emotions towards using voice-based personal assistants as it evokes enjoyment (Cai & al. 2022). Using a robot may cause anxiety, which discourages guests from using them (Çiğdem & al. 2021). Complaints accumulate in the cases of service failures, when guests have interacted with robots that have failed to understand their voice commands. In those scenarios, it is essential for the human staff to fix the annoyance that robots have caused for guests with genuine compassion. Although the application of robots heavily relies on the idea of reducing the workload of the human staff, in robot service failure cases the human staff's workload increases as they must compensate for the damage caused by robots. (Chan, Kong, Xiao, Zhang & Zhong 2020) Knowledge about service performance standards was described to be essential for the process of designing sophisticated hospitality service robots (Collins 2020). The extent to which service robots can be implemented and brought to luxury hotels is dependent on the hotel guests' willingness to use them (Choi, Choi, Kim & Oh 2020).

It is necessary to note, that guests, especially the ones of luxury hotels seek hedonic benefits when using hospitality services and the delivery of hedonic benefits is heavily relies on guests' interactions with human employees. For that reason, guests may find that AI devices are not capable of delivering the hedonic experiences in an equivalent manner to human staff members. Guests desire social interactions with the human employees of hospitality service providers. (Chi, Chi & Gursoy 2020) When compared to other service environments, such as a fast-food restaurant where it is acceptable to partially replace human staff with self-order kiosks, the same doesn't apply to hotels since their guests expect to interact with human employees for personalization. An authentic smile, eye contact and the feeling of being warmly welcomed were described to be important to hotel guests. Hotel guests prefer to interact with human staff in comparison to using self-service check-in kiosks or robots, since they find a hotel to be a symbol of hospitality that features human interactions (Choi & al. 2020) Therefore, it was found that AI agents are suitable for being used in collaboration with human service agents rather than alone (Cho & al. 2022).

Human service staff is required to be available at hotels as they were found to outperform service robots in making guests feel emotionally attached to a hotel brand in addition to creating enjoyable experiences during their stay. (Choi & al. 2020) On that note, hotels can provide self-service options, but guests should have the right not to choose it and opt for human service instead (Hung & al. 2020). According to a study, where seven general managers of Indian luxury hotels were interviewed it was stated that they do not see value in implementing new technology just for the sake of innovation, it must enhance the guest experience. Hotel brands benefit from examining the level of their customer bases AI-adoption readiness and the willingness to use such devices. Significant investments in untested technology are not recommended to be made before that. (Bharwani & Mathews 2021)

One of the key limiting factors hindering the process of AI utilization is that hotel organizations data infrastructure doesn't often allow for systems integration. As an example, the seamless integration of AI-enabled room controls with hotels Property Management System (PMS) often requires changes in the digital and physical infrastructures. Especially in the cases of old hotel buildings the retrofitting needed for the implementation of advanced technologies may turn out to be a challenge. (Bharwani & Mathews 2021). According to a study, where the senior asset managers of Dubai-based luxury hotels were interviewed it was noted that hotel systems are typically highly fragmented. It is common that guest data comes from the PMS, restaurants data comes from the restaurant booking system and Point of Sales (POS) systems and the hotels spa might have its separate booking platform. Therefore, one customer might have several profiles on various different systems, all of them which are disconnected. (Chathoth & al. 2021) It is essential for hotels computer capabilities to be improved to incorporate AI into business operations (Wang 2022). Service organizations are required to have the capability to process and synthesize vast amounts of data in order for them to learn from them with the help of AI (Brock, Bridge, Nambisan & Singh 2020). In a study, where five assistant managers of UAE-based luxury hotels were interviewed on their experiences with AI technology, it was stated that AI infrastructure flexibility needs to be established to facilitate the workflow (Ahmed & al. 2021) In some cases, in order to utilize AI, the organization must first undergo a technological process innovation, which may require changes in equipment (Bharwani & Mathews 2021).

For a hotel organization to gain a competitive advantage from the utilization of AI at the operational level, the technology must first be understood properly. AI provides facilitation to processes, but if implemented without a clear strategy and understanding, it may result in considerable loss of revenue and customers. (Kapoor & Kapoor 2021)

Due to the fact that AI has not yet been widely adopted by hotel organizations, there isn't a guarantee or clear forecasts available for Return on Investment (ROI). Sufficient financial resources are required when aiming to build a secure and robust technical infrastructure to support AI adaption (Bellamkonda & al. 2022). Hotels were found to implement AI-technologies, which competitors had already found to be successful (Ahmed & al.2021).

According to a study, where UAE-based luxury hotel senior asset managers were interviewed, AI adoption was perceived to be risky. (Chathoth & al. 2021) The significant financial investment was described to be a challenge for several hospitality providers (Munjal & Singh 2021). In a study, where seven Indian luxury hotel general managers were interviewed it was stated, that hotel guests tend to expect the latest technological innovations such as AI to be implemented at luxury hotels, but it is crucial to examine whether the investment is financially profitable for the hotel. Investors must consider if the ROI is promising. The interviewed Indian luxury hotel professionals seemed to agree, that a major challenge limiting the adoption of technological innovations was the fact that they are finding the costs of the adoption to be disproportionate to the returns yielded from the innovations. Taking a cautious approach to adapting new technological innovations was described to minimize the risk of exposing a company to financial challenges. According to Indian luxury hotel general managers, their guests are not willing to pay extra for technologically enhanced luxury hotel experience which reinforces the aspect that a considerable ROI must be gained from the technology adaption. (Bharwani & Mathews 2021) Hotel guests expect the use of basic technological solutions, of which they are accustomed to. These include air conditioning, TV, and excellent Wi-Fi signal. (Citak & al. 2021)

The last key factor found to hinder the process of AI implementation was the concern for tarnishing the luxury hotel brand image due to AI-enabled technology caused service failure. For example, in the case of considering the implementation of robots, it is important to strategically evaluate the implementation from the perspective of the desired brand image. (Borghi & Mariani 2021) The risk of performance failure exists, when implementing AI. Failure could be caused by AI-enabled robot, AI-enabled room service technology, AI-enabled self-service check-in kiosk, biased data, or any other form of AI-technology. (Bilgihan & al. 2022) Chatbots as an example are able to provide instant answers to guests' queries, but the answers it provides lack of customization as the answers tend to be standardized. This poses a challenge for the high service standards expected from luxury hotels. The lack of customization can easily lead to frustration, which jeopardizes the customer relationship that luxury hotels do not want to risk. It was stated that guests prefer to interact with hotels human staff and have better experiences when dealing with them compared to robots and chatbots. Repetitive answers have a high chance of not meeting guests expected standards, whereas hotel employees can customize the answers with each guest if necessary. In

addition, human staff has the capability of ensuring guests safety and comfort which can hardly be done by AI. (Bharwani & Mathews 2021)

In the case of branded hotel companies, the IT strategy is in most cases developed by the corporate office of the hotel management company. Coherent IT strategy is then implemented within the properties under maintenance. This equals limitations to the individual properties freedom to implement new technological innovations. (Jones & Wynn 2022)

A study, which researched the readiness of Asian upscale and luxury hotels towards digitalization revealed factors such as corporate policy and legal systems to hinder the process of utilizing technological implementations in business operations (Lam & Law 2019).

Studies found differences among the attitudes of boomers, generation X, millennials, and generation Z towards the acceptance of technology infused hotel services. Millennials and generation Z were perceived to have a readiness to adapt to robots as a part of service delivery. Boomers however were described to be a mixed group in terms of their competence and interest towards using technology in hospitality services. Hospitality service providers were advised to incorporate required assistance for boomers, in order for them to be able to interact with robots and use technological innovations. (Bowen & Morosan 2018) In a study, where seven general managers of Indian luxury hotels were interviewed millennials were described to be tech-savvy in using self-check-in kiosks but the concern for acknowledging boomers' limitations to using such innovations were raised (Bharwani & Mathews 2021). In addition, generation X guests were found to be less interested towards using service robots in hotels when compared to millennials and generation Z guests (Ayyildiz, Baykal & Koc 2022). However, in a study where elderly customers' acceptance and use of hotel service robots was researched it was found that seniors show willingness towards learning new technologies and are able to interact with machines independently (Huang 2022). Boomers are to this day the largest target market of the hospitality industry. They were described to value interpersonal service but show a receptive attitude towards the application of emerging technologies. However, it must be noted, that millennials have become another influential consumer force. In fact, they are expected to form 50 percentage of all the travellers arriving to the U.S. by the year of 2025. As millennials have lived their lives in the digital era, they were described to heavily rely on technology in all aspects of their lives and the same goes for their travel consumption. (Fan & Mattila 2020)

To conclude, large multinational hotels were stated to lead the way with adopting AI-enabled solutions to hotels business operations, as they were described to have the means to invest in the technology (Yi & Wright 2022). In a study, which interviewed 11 Asian upper-upscale and luxury hotel professionals including professionals from the IT and sales departments it was found that

hotels were comfortable as being followers instead of innovators when it comes to the adoption of new technologies (Lam & Law 2019).

Factor hindering the process of AI utilization in luxury hotels business operations	Explanation
Privacy concerns	Privacy concerns are considered to be the biggest AI-related challenge, as the technology utilizes guests' personal information in order to personalize services.
Guest resistance	Luxury hotel guests prefer human service over robots. AI-enabled devices were found to be suitable to be used in collaboration with human service agents. Hotel brands are advised to examine their customer bases AI-adoption readiness before significant investments in the new technologies.
Challenges with building an agile data infrastructure	Hotel systems are typically highly fragmented. The hotel organizations data infrastructure often doesn't allow for systems integration, therefore technological process innovation may require changes in equipment.
Lack of understanding of the AI technology	In order to gain a competitive advantage and extract value from AI-enabled technologies, the technology must first be understood at an organizational level.
Financial risk, since Return on Investment (ROI) is not guaranteed	Hotels have to take a cautious approach to implementing new technological innovations in order to prevent exposing the business to financial risk.
Concern for harming the luxury brand Image	AI implementation must be strategically evaluated from the perspective of the desired brand image. AI technology can only be adapted if it enhances the guest experience and can meet the high standards of luxury hotel guests.

Figure 8. Key challenges luxury hotel organizations face, when considering the implementation of AI technology

5.5 The Impact of Hotel Segment on the Extent of AI Implementation

Within the service industry there exists companies of different service tiers. Low-cost companies have low-price strategies focused on the efficiency and low price, whereas full-service providers aim to provide superior services to their customers. Luxury hotels are full-service providers and therefore their customers select them due to their promise of providing a complete service experience. Luxury service highly emphasizes the importance of their human staffs' skills and their characteristics such as sense of empathy and pleasantness. It must be noted that luxury customers do not accept innovations or practices of which fail to meet the standards of the service providers positioning. Luxury hotel guests appreciate hedonic qualities such as personal attention and genuine empathy from service agents. (Belanche & al. 2022) A company like Ritz-Carlton thrives and competes in the market by engaging with their guests. Their guests expect something some than just a service encounter, they seek for their senses to be stimulated and emotions to be evoked. (Bilgihan & al. 2022) Four Seasons Luxury Hotels and Resorts promises the following: "In all our interactions with our guests, customers, business associates and colleagues, we seek to deal with others as we would have them deal with us". Warmth and competence are highlighted as the key aspects in service encounters. An impersonal technological machine, which can't deliver these key aspects of service in a likely way to humans is not perceived as a potential replacer of humans in full-service encounters, especially not in luxury. (Fan & Mattila 2020) In comparison, it was found that extreme cases allow the full automatization in hostels or limited-service hotels (Ivanov & al. 2020).

Customers of budget, midscale and luxury hotels were found to have different perceptions towards service robots. It was stated that, the more sophisticated the AI device is, the better it is applicable to the use of luxury guests. Therefore, feeling AI-enabled robots are more suitable for the use of luxury hotels compared to mechanical AI-enabled ones, that provide standardized service. (Belanche & al. 2022) Luxury guests prefer human interaction over interaction with AI or robots. In a study, where senior asset managers of Dubai-based luxury hotels were interviewed it was stated that AI-enabled robots were not suitable for luxury hotels to implement and would be suitable for mid-scale or upper scale segments. (Chathoth & al. 2021) The same perspective was backed by 30 Indian luxury hotel general managers as they stated that once luxury guests arrive to the hotel, they prefer to interact with humans rather than robots during their stay (Kapoor & Kapoor 2021). 30 Chinese hotel practioners contributed to the consensus, that its critical to consider the segment of

the hotel, when making decisions about the adoption of new technologies. The believed self-service technologies were best suited for mid-scale and economy hotels such as Hilton Garden Inn and Hyatt Place and expressed that luxury hotels should prioritize the human employee provided service. (Hung & al. 2020) In a study conducted in the USA, which surveyed hotel guests' attitudes towards robot concierges it was found that when guests stay at a luxury hotel they seek for personalized and high-quality services instead of technology-infused services which include self-service kiosks and robot concierges. It was also found that guests of budget hotels were open to using self-service technologies and interacting with a robot concierge. This was because they had not put much effort in to the purchasing decision of opting for an economy or a budget hotel. (Jeong & Shin 2020) A study, which interviewed 16 upscale hotel managers from Hong Kong seemed to agree with the fact that human staff is preferred over service robots, especially in the upscale segment. They agreed that service robots may not fit harmoniously to the service environment of an upscale hotel. They found a service robot to disrupt the luxurious image of a hotel with sophisticated staff who serves their guests. (Choi & al. 2020)

The market position of the hotel was seen as one of the key factors, that impacted the decision of whether to adopt AI technology to hotels business operations or not. It also had a significant impact to the type of AI technology which could be implemented. Luxury hotels were explained to benefit from minimally invasive AI solutions, that set an importance on the guest experience or were created to assist with back-of-house operations. AI practices, which enhance the guest experience by providing additional personalization options or improve hotels internal operations by providing operational cost reduction were seen as suitable AI implementations for the luxury segment. (Chathoth & al. 2021) The analytical subtype of thinking AI is the optimal choice for creating personalized services, especially if a hotel company has a vast amount of customer data. The most value can be extracted from utilization of analytical thinking AI, when a company has clear issues or goals it wants results for, such as in a case where the aim is to predict the type of services that would be desirable for guests. In aforementioned case, it is beneficial to possess large amounts of data about customers preferences, that can be utilized when suggesting different services to different customers. The analytical subtype of thinking AI can be used to find insightful data patterns. (Huang & Rust 2020)

In a study, where Dubai-based senior asset managers of luxury hotels were interviewed, it was stated they felt AI can help hotels to better understand their customers and offer personalization's that are respective of their different expectations. An example of how analytical AI can increase revenue by upselling was presented. If a guest orders a sandwich from room service, analytical AI can recommend suitable drinks that would go together with the sandwich. Analytical AI could also understand that if a guest previously stayed with his friends and they went to a football game, but

now he is on a business trip for two days, so he won't be doing that. Therefore, analytical AI would shape its recommendations based on the previous data but also based on the purpose of the guests stay. Another example would be, when a guest wakes up in the morning and turns on the TV, the AI would know to start the TV with the guests preferred channel. One of the participants explained they had come up with a recommendation AI called the "next best action", which makes recommendations on what the guest could do next. Based on the guests' preferences the suggestions could be a golf event, a nice dinner from a fine dining restaurant or an art exhibition near the hotel. Using analytical AI, the hotel staff can know the customer and be empowered with actionable insights to be able to interact with the customer in a new way and help the luxury brand to build a relationship with them. By doing that, the customer loyalty increases which was stated to be a competitive advantage. (Chathoth & al. 2021) Data mining and the utilization of machine learning were described to be useful in capturing the guests. Hotels can know their guests better with the help of data mining. (Yi & Wright 2022) When a guest arrives to their hotel room at the Ritz-Carlton and their favourite magazines and beverages are there waiting for them, the likelihood of repeat visits increases. Creating something as personalized as that requires the help of technology, that gives employees the insights and tools to provide this level of personalized service. Although it must be noted, that only through human employee's genuine and warm interaction the finest level of hospitality can be provided. (Ford, Golubovskaya, Hancer, Kang, Solnet & Subramony 2019)

Also, in a study where seven general managers of Indian luxury hotels were interviewed, technology was perceived as a game changer of providing superior guest service. Luxury hotels were described to be able to envision the type of customer experience they want to deliver and then look for a suitable technology for providing that. AI-enabled big data mining was seen as a way to customize offers and tailored services. (Bharwani & Mathews 2021)

One of the key areas in which AI could bring value to luxury hotels was stated to be the in-room technology (Chathoth & al. 2021). In a study where Irish hotel professionals were interviewed, they showed critical attitudes towards AI-enabled hotel robots but found AI-enabled in-room technology applications to be a beneficial, especially for the high-end luxury hotels where guests tend to set high standards for the level of service (Yi & Wright 2022). In addition, when looking for suitable AI-enabled in-room voice assistants hotels were advised to opt for the branded voice assistants. There are two reasons behind it. Firstly, if consumers show hesitation towards using voice assistants their anxiety might be eased by using a branded voice assistant in comparison to an off-brand one. This is because consumers tend to have a more positive attitude towards the use of products by well-established brand names. Additionally, luxury hotels may encourage their

customers to make positive revelations about the benefits and soothe their negative attitudes towards using AI-enabled devices and the privacy concerns related to them. (Cai & al. 2022)

With luxury branded hotels, the operators were sometimes found to draw limitations to the use of new technologies. This was due to their concern over the brand image. Operators were described to be against implementing new technologies as they feared their failure may result in a wider negative impact on the global perception of the brand. (Chathoth & al. 2021)

The Dubai-based luxury hotel senior hotel asset managers interviewed did not yet view AI technology adaption as something that they were required to do in order to keep up with their competitors. They perceived AI-enabled technology as an optional advantage that brings benefits but not as something that should be implemented based on the fact that their competitors are using it. One participant compared AI-enabled technology with having a swimming pool or a Michelin star restaurant on their property and expressed that if their competitor has a pool and they don't, money will be lost. Same applies with the Michelin star restaurant. With AI, the case is not yet similar. (Chathoth & al. 2021)

6 Discussion and Conclusions

In this chapter, the key findings of the theoretical framework and literature review are covered and outlined in order to provide the reader with the most important insights discovered during the research of the thesis.

6.1 Key Findings

The utilization of artificial intelligence (AI) is still at an emerging state in the luxury hotel industry (Chathoth & al. 2021). AI applications such as service robots are increasingly being used but were described to be an emerging technology (Huang 2022). In a study, where Dubai-based senior asset managers of luxury hotels were interviewed it was stated that the utilization of AI is not a necessity of now. It was described to be an optional advantage that has been perceived to bring benefits to the luxury hotel companies. (Chathoth & al. 2021)

The most implemented forms of AI-enabled technology in the luxury hotel industry were found to be chatbots and voice recognition technology. Service and delivery robots in addition to in-room technology applications of artificial intelligence enabled voice assistants were by far the most utilized forms of AI, that luxury hotels are currently utilizing on their properties. (Chathoth & al. 2021) Smart voice assistants like Alexa for Hospitality, that use deep learning AI-technology and natural language processing (NLP) were perceived to enhance the in-room guest experience (see 2.3, IBM 2023). In addition, they provided benefits to hotel management through enhancing operational efficiency by saving labor costs and by saving human staffs time giving them the opportunity to focus on other important tasks. (Cai & al. 2022, see 3.2 Campbell 2022) In addition, self-service check-in kiosks and applications of analytical AI-empowered business intelligence tools were found to be increasingly implemented (Citak & al. 2021).

Mechanical AI was found to be suitable for service standardization to assist with repetitive routine tasks, due to its limited capabilities to customize service (Huang & Rust 2020, see 2.4, Weitzman 2023) Mechanical AI was found to be applicable for assisting with cost leadership, therefore making it useful for the low-cost hotels of the economy segment (Cho & al. 2020). Feeling and thinking AI were seen as the most suitable forms of AI for the luxury hotel industry due to their capability to help with the personalization and customization of services, which is essential to meet the increasing demands of the upcoming generation of travellers (see 3.5). Personalization of services is accomplished with AI-enabled solutions, that analyze customer data. In addition, feeling and thinking AI were found to increase guests spending and increase their loyalty towards a brand

through evoking their positive emotions (Belanche & al. 2022). The analytical subtype of thinking AI was found to be especially useful for the luxury hotels aiming to personalize service through better understanding their customer behaviour (see 2.4, Accubits Technologies 2020). Analytical AI can be utilized to find insightful data patterns and therefore luxury hotels can extract the most value from utilizing analytical AI when they possess large amounts of data about customer preferences (see 2.2, Brown 2021). (Huang & Rust 2020) In addition, the utilization of analytical AI was found to increase revenue (Belanche & al. 2022). The use of big data and predictive data analytics, which use machine learning (ML) technology, were described to be new in the hotel industry but it was stated that hospitality service providers are highly suggested to begin implementing this technology in order to engage with their guests and strengthen the customer loyalty (Aluri & al. 2018)

The biggest challenges luxury hotel companies were facing when considering the adoption of AI-enabled technologies into their business operations included: privacy concerns, guest resistance, challenges with building a data infrastructure that allows the implementation of AI technology, the lack of organizational understanding of the AI technology, fear for setting the business up for a financial risk and the concern for harming their luxury brand image. Out of the challenges mentioned privacy concern was found to be the biggest one. (see 2.6, IBM 2023) Artificial intelligence uses data, that guests are not delighted to make public and therefore luxury hotels are faced with the challenge of how to solve the privacy concerns related to the use of AI-enabled services. The concern for tarnished brand image stems from the scare, that implementing AI to hotels business operations could cause mistakes further leading to potential financial damage or the loss of customers (see 2.4, Weitzman 2023)

One of the key challenges was described to be that hotel systems are often fragmented, which poses a challenge for systems integration. It is common, that systems are disconnected and therefore one guest may have several customer profiles within the different systems. (Chathoth & al. 2021) Using disparate solutions hinders operational efficiency as it slows down the process of sharing information between departments. (see 3.2 Hotelogix 2023) As artificial intelligence uses data mining as it's foundation the fragmentation of systems makes the process of data mining significantly challenging.

An essential finding was that the key element of a luxury hotel is perceived to be the genuine hospitality, that human service agents provide. Exceptional service was described to be a competitive advantage for luxury hotel companies. According to the findings, the human staff cannot be replaced by service robots utilizing AI, since luxury guests expect to interact with human staff during their stay at a luxury hotel. Service robots were not found to be able to provide warmth and sincerity in a similar way to humans. In addition, they were found to be incapable of handling

complex service interaction situations due to their incapability to sense human emotions and read the emotional state of the guest (see 2.4, Forbes 2022). Service failures, where AI fails to understand the customer, provides a standardized answer or responds in an in-sensitive way were perceived to be factors that cause frustration in luxury hotel guests and pose a risk for the luxury hotels to lose customers (see 2.4, Weitzman 2023). Therefore, AI-enabled technologies were found to be suitable to use as a supporting backup for the human service agents.

It was discovered that the application of AI-enabled technologies is suggested to be evalued from the perspective of the desired brand image. The attitudes and the potential utilization rate of the technologies should be researched based on the perceptions the hotels clientele towards the use of AI-enabled technologies. This is due to the fact, that guests perceptions of the technology have a huge impact on the success of AI implementation. The Return on Investment (ROI) was described to be a key indicator, which is evalued when considering the implementation of AI.

According to the literature review USA, UAE and Asian countries were the pioneers of adapting AI in luxury hotel business operations. It was found to be common to apply AI-technologies, that have been successfully implemented by competitors as it is a way to minimize the risks related to the implementation. International luxury hotel brands were described to be the leaders of implementing AI as they hold the financial resources needed to explore the emerging technology.

To conclude, AI was seen to provide several advantages to luxury hotel companies including cost reduction, improved operational efficiency and increase in revenue. From the guest perspective AI-enabled tools were found to enhance the guest experience as hotels were able to know their customers better and therefore could offer more personalized service than ever before. The findings of the research suggest that international luxury hotels are recommended to utilize artificial intelligence enabled technologies when desiring to gain a competitive advantage by enhancing their guest experience.

6.2 Reliability and Validity

The theoretical framework of this thesis was conducted based on a critical review of various reliable data sources. Data sources for the theoretical part of this thesis were selected based on their relevancy prioritizing the newest sources of relevant information. The reputations of the selected publishers were evaluated carefully before deciding on whether the information can be qualified as accurate and included in the thesis. Academic research papers published by scholars of diverse backgrounds and prestigious faculties in addition to the internationally respected

companies within the fields such as technology and consulting were prioritized as the main sources of data when putting together the theoretical framework of the thesis.

The empirical part of the thesis was conducted as a systematic literature review. The author studied peer reviewed articles published by five internationally recognized research databases: ScienceDirect, Ebsco, SAGE Journals, ProQuest, and Emerald Insight. The articles included in the systematic literature review were published between the years of 2018-2023, to ensure that only relevant information is included in the thesis as the technology of artificial intelligence develops at a rapid pace.

6.3 Recommendations for Further Research

The research of this thesis was limited to searching peer reviewed academic research papers from five internationally recognized research databases: ScienceDirect, Ebsco, SAGE Journals, ProQuest, and Emerald Insight. In order to broaden the understanding of the topic further research could expand the research to multiple other research databases. The key search words used for conducting the research were: “artificial intelligence hotel” and “artificial intelligence luxury hotel”. In further research more search terms could be used, as the author noticed that some research papers contributed to the discussion of AI in luxury hotel industry but did not necessarily use the term “luxury” or “hotel” when discussing findings about luxury hotel brands utilizing AI. As an example, the brand name might have been mentioned but the article did not use the term “hotel” in the article and therefore the article did not show in the findings of the search.

The timeframe of the publishing date of the articles was limited to 2018-2023. In further research years before the year 2017 could be included to get an understanding of the historical aspect of the topic.

The number of studies, which conducted interviews with the decision makers of international luxury hotel brands about the topic of AI implementation was very limited. Further research could conduct interviews with several decision makers of international luxury hotel brands. Further research could interview the decision makers on how AI has been implemented in their hotels and how do they perceive the technology.

In addition, the international luxury hotel guests' perceptions on AI-enabled hotel services requires more research. The small number of studies conducted could be explained by the fact that the implementation of AI is still at an emerging state in the hotel industry.

AI-enabled service robots and chatbots were repeatedly discussed in the articles found. Therefore, other forms of AI implementation such as the AI-enabled in-room technology solutions and the implementation of analytical AI could be further discussed in the future.

USA, UAE, and Asian countries such as India, China and Hong Kong had actively contributed to the academic discussion of how international luxury hotels are utilizing AI. The number of studies conducted in Europe was significantly limited, therefore European luxury hotel brands could be contacted for interviews about the topic to get their perceptions of the technology.

6.4 Reflection on Learning

When beginning the thesis process, the author had only participated on one course in which the topic of AI in business was taught. Therefore, the knowledge about AI was severely limited. However, the author found artificial intelligence and its applications to the business world to be extremely fascinating and decided to research the topic in the thesis process.

All in all, the thesis process lasted for over four months in addition to which the author studied the topic for a couple of months before actually staring the thesis process. This was required since the beginning knowledge on the topic was limited. The topic of the thesis combined the two fields in which the author is interested in: hotels and technology and was therefore very interesting to study.

The thesis process has without a doubt been the biggest learning takeaway of the authors bachelor's studies. Collecting data and analysing it was educational and taught to remain critical when conducting research in order to produce content that is reliable and backed by several different sources.

By gaining useful and relevant knowledge on how the technology of artificial intelligence can be used in the luxury hotel industry the author could continue to build up the knowledge and educate herself further to potentially build a career within the field.

References

Accubits Technologies Inc. 2020. AI Powered Customer Profiling to Boost Your Sales & Enhance Customer Experience. URL: https://accubits-tech.medium.com/ai-powered-customer-profiling-to-boost-your-in-store-sales-1946a3ad1dee Accessed: 18 March 2023

Afaq, A., Dwivedi, Y., Gaur, L. & Singh, G. 2021. Role of artificial intelligence and robotics to foster the touchless travel during a pandemic: a review and research agenda. International Journal of Contemporary Hospitality Management. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/IJCHM-11-2020-1246/full/html Accessed: 12 May 2023

Ahmed, E., Al Mamun, A., Al-shami, S. & Rashid, N. 2021. Artificial intelligent towards hotels' competitive advantage. An exploratory study from the UAE. Foresight. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/FS-01-2021-0014/full/html Accessed 12 May 2023

Akkaya, K., Cain, L., Cebe, M., Mercan, S. & Uluagac, S. 2021. Improving the service industry with hyper-connectivity: IoT in hospitality. International Journal of Contemporary Hospitality. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/IJCHM-06-2020-0621/full/html Accessed: 13 May 2023

Alonso-Gonzalez, I., Del Ser, J., Guerra-Montenegro, J., Lana, I., Sanchez- Rodriguez, D. & Sanchez-Medina, J. 2021. Computational Intelligence in the hospitality industry: A systematic literature review and a prospect of challenges. Applied Soft Computing. URL: https://www-sciencedirect-com.ezproxy.haaga-helia.fi/science/article/pii/S1568494621000053?via%3Dihub Accessed: 13 May 2023

Aluri, A., McIntyre, N. & Price, B. 2018. Using Machine Learning To Cocreate Value Through Dynamic Customer Engagement In A Brand Loyalty Program. Journal of Hospitality & Tourism Research. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/1096348017753521 Accessed: 13 May 2023

Amazon Web Services. 2023. What is Deep Learning? URL: https://aws.amazon.com/what-is/deep-learning/ Accessed: 17 March 2023

Ammanath, B., Mittal, N. & Saif, I. 2022. Fueling the AI transformation: Four key actions powering widespread value from AI, right now. Deloitte's State of AI in the Enterprise, 5th Edition report. Deloitte. URL: https://www2.deloitte.com/content/dam/Deloitte/us/Documents/deloitte-analytics/us-ai-institute-state-of-ai-fifth-edition.pdf Accessed: 18 March 2023

Anneroth, M. 2021. AI bias and human rights: Why ethical AI matters. Ericsson. URL: https://www.ericsson.com/en/blog/2021/11/ai-bias-what-is-it Accessed: 20 March 2023

AxisRooms. 2022. How to Improve a Hotel's Operational Efficiency. Hospitality Net. URL: https://www.hospitalitynet.org/news/4109214.html Accessed: 18 April 2023

Ayyildiz, A., Baykal, M. & Koc, E. 2022. Attitudes of hotel customers towards the use of service robots in hospitality service encounters. Technology in Society. URL: https://www-sciencedirect-com.ezproxy.haaga-helia.fi/science/article/pii/S0160791X22001361?via%3Dihub Accessed: 14 May 2023

Badu-Baiden, F., Choi, Y., Giroux, M., Kim, J. & Kim, S. 2021. Preference for robot service or human service in hotels? Impacts of the COVID-19 pandemic. International Journal of Hospitality Management. URL: https://www-sciencedirect-com.ezproxy.haaga-helia.fi/science/article/pii/S0278431920303479?via%3Dihub Accessed: 13 May 2023

Bangkok Post. 2022. Asian hotel market confidence rising. URL: https://www.bangkokpost.com/travel/2407416/asian-hotel-market-confidence-rising Accessed: 7 April 2023

Belanche, D., Casalo, L., Flavian, C. & Schepers, J. 2022. How Smart Should a Service Robot Be? Journal of Service Research. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/10946705221107704 Accessed: 9 May 2023

Bellamkonda, R., Katkam, B., Rodriguez, R. & Samala, N. 2022. Impact of AI and robotics in the tourism sector: a critical insight. Journal of Tourism Futures. URL: https://www.emerald.com/insight/content/doi/10.1108/JTF-07-2019-0065/full/html Accessed: 13 May 2023

Bhatia, N. 2023. Middle East hospitality sector to grow in 2023. Economy Middle East. URL: https://economymiddleeast.com/news/middle-east-hospitality-sector-to-grow-in-2023/ Accessed: 7 April 2023

Bilgihan, A., Chao, Y., de la Mora Velasco, E., Huang, A. & Wei, W. 2022. When artificial intelligence meets the hospitality and tourism industry: an assessment framework to inform theory and management. Journal of Hospitality and Tourism Insights. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/JHTI-01-2021-0021/full/html Accessed: 9 May 2023

Bonn, M., Li, J. & Ye, B. 2019. Hotel employee's artificial intelligence and robotics awareness and its impact on turnover intention: The moderating roles of perceived organizational support and competitive psychological climate. Tourism Management. URL: https://www-sciencedirect-com.ezproxy.haaga-helia.fi/science/article/pii/S0261517719300354?via%3Dihub Accessed: 8 May 2023

Borghi, M. & Mariani, M. 2021. Customers' evaluation of mechanical artificial intelligence in hospitality services: a study using online reviews analytics. International Journal of Contemporary Hospitality Management. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/IJCHM-06-2020-0622/full/html Accessed: 14 May 2023

Botelho, B. & Bigelow, S. 2023. Definition of big data. Tech Target. URL: https://www.techtarget.com/searchdatamanagement/definition/big-data Accessed: 15 May 2023

Bottrill, C. 2022. Human capital futures: an educational perspective. Journal of Tourism Futures. URL: https://www.emerald.com/insight/content/doi/10.1108/JTF-04-2021-0101/full/html Accessed: 12 May 2023

Bowen, J. & Morosan, C. 2018. Beware hospitality industry: the robots are coming. Worldwide Hospitality and Tourism Themes. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/WHATT-07-2018-0045/full/html Accessed: 8 May 2023

Brock, J., Bridge, G., Nambisan, S. & Singh, J. 2020. One-Voice Strategy for Customer Engagement. Journal of Service Research. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/1094670520910267 Accessed: 8 May 2023

Brown, S. 2021. Machine learning, explained. MIT Sloan School of Management. https://mitsloan.mit.edu/ideas-made-to-matter/machine-learning-explained Accessed: 5 March 2023

Cai, R., Cain, L. & Jeon, H. 2022. Customers' perceptions of hotel AI-enabled voice assistants: does brand matter? International Journal of Contemporary Hospitality Management. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/IJCHM-10-2021-1313/full/html Accessed: 12 May 2023

Campbell, Kim. 2022. Hotel Automation: Trends, Tools, and Tips to Know. Cvent. URL: https://www.cvent.com/en/blog/hospitality/hotel-automation Accessed: 18 April 2023

CBRE Hotels. 2022. Asia Pacific Hotels & Hospitality Market Continues to Grow as Travel Demand Returns. Hospitality Net. URL: https://www.hospitalitynet.org/news/4112593.html Accessed: 7 April 2023

Chakraborty, M., Prabhu, N., Ramaprasad, B., Rao, S. & Roy, P. 2020. Customer Acceptance of Use of Artificial Intelligence in Hospitality Services: An Indian Hospitality Sector Perspective. Global Business Review. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/0972150920939753 Accessed: 12 May 2023

Chan, H., Kong, H., Xiao, J., Zhang, X. & Zhong, L. 2020. Construction and empirical research on acceptance model of service robots applied in hotel industry. Industrial Management & Data Systems. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/IMDS-11-2019-0603/full/html Accessed: 13 May 2023

Chathoth, P., Daghfous, A., Dutt, C., Nam, K. & Sajid, K. 2021. The adoption of artificial intelligence and robotics in the hotel industry: prospects and challenges. Electronic Markets. URL: https://www.proquest.com/docview/2591864007?parentSessionId=0DJq0F%2BNDIMFBpy%2FNvTwe676Kugfaq6WKEkOt6Vog60%3D&pq-origsite=primo&accountid=27436 Accessed: 13 May 2023

Cheng, Y., Chuang, S., Huang, M. & Weng, S. 2021. What Triggers Travel Spending? The Impact of Prior Spending on Additional Unplanned Purchases. Journal of Travel Research. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/00472875211030337 Accessed: 12 May 2023

Chi, C., Chi, O. & Gursoy, D. 2020. Tourists' Attitudes toward the Use of Artificially Intelligent (AI) Devices in Tourism Service Delivery: Moderating Role of Service Value Seeking. Journal of Travel Research. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/0047287520971054 Accessed: 12 May 2023

Chintalapati, S. 2020. BankBuddy.ai—Business Expansion and Marketing Dilemma: A Case Study to Discuss the Ansoff Growth Matrix Concepts Combined with Business Expansion Strategies for Expanding into Emerging Markets. Emerging Economies Cases Journal. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/2516604220929994 Accessed: 9 May 2023

Chitrakorn, K. 2022. The next era of brand-hotel partnerships. Vogue Business. URL: https://www.voguebusiness.com/companies/the-next-era-of-brand-hotel-partnerships-fila-byredo-frame-loccitane Accessed: 14 April 2023

Cho, M., Gupta, S., Lee, C., Modgil, S. & Park, Y. 2022. Artificial intelligence enabled robots for stay experience in the hospitality industry in a smart city. Industrial Management & Data Systems. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/IMDS-10-2021-0621/full/html Accessed: 9 May 2023

Choi, M., Choi, Y., Kim, S. & Oh, M. 2020. Service robots in hotels: understanding the service quality perceptions of human-robot interaction. Journal of Hospitality Marketing & Management. URL: https://web-p-ebscohost-com.ezproxy.haaga-helia.fi/ehost/pdfviewer/pdfviewer?vid=0&sid=192ee4cc-5e8d-4985-a54f-6e40787b28b1%40redis Accessed: 12 May 2023

Çiğdem, S., Davidavicius, S., Meidute-Kavaliauskiene, I. & Yıldız, B. 2021. The Effect of Perceptions on Service Robot Usage Intention: A Survey Study in the Service Sector. Sustainability (Basel, Switzerland). URL: https://www.proquest.com/docview/2571538692?pq-origsite=primo Accessed: 12 May 2023

Citak, J., Owoc, M. & Weichbroth, P. 2021. A note on the applications of artificial intelligence in the hospitality industry: preliminary results of a survey. Procedia Computer Science. URL: https://www-sciencedirect-com.ezproxy.haaga-helia.fi/science/article/pii/S1877050921019724?via%3Dihub Accessed: 13 May 2023

Cloud-Secure Tech. 2023. What is a Cloud Based Property Management System? Cloud-Secure Tech. URL: https://www.cloudsecuretech.com/what-is-a-cloud-based-property-management-system/ Accessed: 18 April 2023

Collins, G. 2020. Improving human–robot interactions in hospitality settings. International Hospitality Review. URL: https://www.emerald.com/insight/content/doi/10.1108/IHR-09-2019-0019/full/html Accessed: 13 May 2023

Dinu, V., Iustin, A., Lazar, P. & Sorin, P. 2021. Factors That Influence the Adoption of the Internet of Things in Tourism by Romanian Consumers. Amfiteatru Economic. URL: https://www.proquest.com/docview/2522428415?pq-origsite=primo Accessed: 13 May 2023

EHL Insights. 2016. How luxury hotels cater to the unique customer experience? EHL Insights. URL: https://hospitalityinsights.ehl.edu/luxury-hotels-unique-customer-experience Accessed: 11 April 2023

Fan, A. & Mattila, A. 2020. Touch Versus Tech in Service Encounters. Cornell Hospitality Quarterly. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/1938965520957282 Accessed: 14 May 2023

Fernando, J. 2022. Compound Annual Growth Rate (CAGR) Formula and Calculation. Investopedia. URL: https://www.investopedia.com/terms/c/cagr.asp Accessed: 4 April 2023

Forbes. 2022. The Pros And Cons Of Artificial Intelligence. URL: https://www.forbes.com/sites/qai/2022/12/01/the-pros-and-cons-of-artificial-intelligence/?sh=5b0c7c284703 Accessed: 18 March 2023

Ford, R., Golubovskaya, M., Hancer, M., Kang, H., Solnet, D. & Subramony, M. 2019. Leveraging human touch in service interactions: lessons from hospitality. International Journal of Service Industry Management. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/JOSM-12-2018-0380/full/html Accessed: 15 May 2023

Fox, L. 2012. Four Seasons unveils 18 million USD website as luxury travel grows. PhocusWire. URL: https://www.phocuswire.com/Four-Seasons-unveils-18-million-website-as-luxury-travel-grows Accessed: 14 April 2023

Gillis, A. 2021. Definition of operational efficiency. TechTarget. URL: https://www.techtarget.com/searchbusinessanalytics/definition/operational-efficiency Accessed: 18 April 2023

Glover, E. 2022. Strong AI vs. Weak AI: What's the Difference? Built In. URL: https://builtin.com/artificial-intelligence/strong-ai-weak-ai Accessed: 28 February 2023

Grennan, L., Kremer, A., Singla, A., & Zipparo, P. 2022. Why businesses need explainable AI-and how to deliver it. QuantumBlack AI by McKinsey. URL: https://www.mckinsey.com/capabilities/quantumblack/our-insights/why-businesses-need-explainable-ai-and-how-to-deliver-it Accessed: 22 February 2023

Han, D., Hou, H., Lai, J. & Wu, H. 2021. Modelling Tourists' Acceptance of Hotel Experience-Enhancement Smart Technologies. Sustainability (Basel, Switzerland). URL: https://www.proquest.com/docview/2562193640?pq-origsite=primo Accessed: 13 May 2023

Hargrave, M. 2020. Average Daily Rate (ADR): Definition, Calculation, Examples. Investopedia. URL: https://www.investopedia.com/terms/a/average-daily-rate.asp Accessed: 29 March 2023

Hollander, J. 2022. Using Maslow's Hierarchy to Understand Guest Needs. Hotel Tech Report. URL: https://hoteltechreport.com/news/maslows-hierarchy Accessed: 18 April 2023

Hollander, J. 2023. The Ultimate Guide to Hotel Operations (2023). Hotel Tech Report. URL: https://hoteltechreport.com/news/hotel-operations Accessed: 21 March 2023

Hotel Tech Report. 2022. The 10 Best Hotel RFP & Proposal Management Software Tools. Hotel tech Report. URL: https://hoteltechreport.com/meetings-and-events/hotel-rfp-software Accessed: 18 April 2023

Hotelogix. 2023. How to improve operational efficiency at hotel. Hotelogix. URL: https://www.hotelogix.com/hotel-solutions/how-to-improve-operational-efficiency-at-your-hotel.php Accessed: 18 April 2023

HotStats Limited. 2022. Europe's Luxury Hotels Bounce Back from the Bottom. Hospitality Net. URL: https://www.hospitalitynet.org/news/4110736.html Accessed: 10 April 2023

Huang, D., Li, Z., Wang, X. & Zhang, Z. 2023. Consumer resistance to service robots at the hotel front desk: A mixed-methods research. Tourism Management Perspectives. URL: https://www-sciencedirect-com.ezproxy.haaga-helia.fi/science/article/pii/S2211973623000028?via%3Dihub Accessed: 13 May 2023

Huang, M. & Rust, R. 2020. Engaged to a Robot? The Role of AI in Service. Journal of Service Research. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/1094670520902266 Accessed: 14 May 2023

Huang, T. 2022. What Affects the Acceptance and Use of Hotel Service Robots by Elderly Customers?. Sustainability (Basel, Switzerland). URL: https://www.proquest.com/docview/2748570236?accountid=27436 Accessed: 13 May 2023

Hung, K., Liu, C., Wang, D. & Wang, S. 2020. Determinants of self-service technology adoption and implementation in hotels: the case of China. Journal of Hospitality Marketing & Management. URL: https://web-s-ebscohost-com.ezproxy.haaga-helia.fi/ehost/pdfviewer/pdfviewer?vid=0&sid=fe24a396-4cd7-4370-afa5-2073e680fdfa%40redis Accessed: 12 May 2023

Hussein Al-shami, S., Al Mamun, A., Ahmed, E., Rashid, N. 2022. Artificial intelligent towards hotels' competitive advantage. An exploratory study from the UAE. Foresight, Vol 24 Issue 5. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/FS-01-2021-0014/full/html Accessed: 19 February 2023

IBM. 2023. What are AI ethics? URL: https://www.ibm.com/topics/ai-ethics Accessed: 19 March 2023

IBM. 2023. What are neural networks? URL: https://www.ibm.com/topics/neural-networks Accessed: 17 March 2023

IBM. 2023. What is artificial intelligence? URL: https://www.ibm.com/topics/artificial-intelligence Accessed: 22 February 2023

IBM. 2023. What is deep learning? URL: https://www.ibm.com/topics/deep-learning Accessed: 17 March 2023

IBM. 2023. What is machine learning? URL: https://www.ibm.com/topics/machine-learning Accessed 5 March 2023

IBM. 2023. What is strong AI? URL: https://www.ibm.com/topics/strong-ai Accessed: 5 March 2023

IMARC Group. 2023. Luxury Hotel Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028. IMARC Group. URL: https://www.imarcgroup.com/luxury-hotel-market Accessed: 17 April 2023

Indeed. 2023. The 12 Main Hotel Departments and Their Key Responsibilities. URL: https://sg.indeed.com/career-advice/career-development/hotel-departments Accessed: 26 March 2023

Industry Research. 2023. Luxury Hotels Market 2023, As Per The Latest Insights, With a Forecast Research Until 2028. Yahoo Finance. URL: https://finance.yahoo.com/news/luxury-hotels-market-2023-per-085500475.html Accessed: 7 April 2023

Ivanov, S., Slobodskoy, D., Stoilova, E. & Webster, C. 2020. Biosecurity, crisis management, automation technologies and economic performance of travel, tourism and hospitality companies – A conceptual framework. Tourism Economics. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/1354816620946541 Accessed: 13 May 2023

Jaewook, K., Sung In, K. & Minwoo, L. 2022. What to Sell and How to Sell Matters: Focusing on Luxury Hotel Properties' Business Performance and Efficiency. Cornell Hospitality Quarterly Vol.63. Sage Journals. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/epub/10.1177/19389655211020254 Accessed: 26 March 2023

Jaiswal, J. 2022. Guest Expectations Have Evolved Faster Than Ever. Here's How Tech Can Help. Hospitality Net. URL: https://www.hospitalitynet.org/opinion/4109783.html Accessed: 22 February 2023

Jeong, M. & Shin, H. 2020. Guests' perceptions of robot concierge and their adoption intentions. International Journal of Contemporary Hospitality Management. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/IJCHM-09-2019-0798/full/html#sec006 Accessed: 15 May 2023

Johnston, M. 2023. 10 Biggest Hotel Companies and REITs. Investopedia. URL: https://www.investopedia.com/articles/investing/061015/top-5-most-profitable-hotel-companies.asp Accessed: 7 April 2023

Jones, P. & Wynn, M. 2022. IT Strategy in the Hotel Industry in the Digital Era. Sustainability (Basel, Switzerland). URL: https://www.proquest.com/docview/2711516252?pq-origsite=primo Accessed: 14 May 2023

Kahn, J. 2023. Elon Musk and Apple cofounder Steve Wozniak among over 1,100 who sign open latter calling for 6-month ban on creating powerful A.I. Fortune. URL: https://fortune.com/2023/03/29/elon-musk-apple-steve-wozniak-over-1100-sign-open-letter-6-month-ban-creating-powerful-ai/ Accessed: 10 April 2023

Kapoor, K. & Kapoor, R. 2021. The transition from traditional to digital marketing: a study of the evolution of e-marketing in the Indian hotel industry. Worldwide Hospitality and Tourism Themes. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/WHATT-10-2020-0124/full/html Accessed: 13 May 2023

Kenton, W. 2021. Sales Mix: Definition, Uses, and Examples. Investopedia. URL: https://www.investopedia.com/terms/s/sales-mix.asp Accessed: 29 March 2023

Kukkonen, L. 2023. Bill Gates ei pidä tekoälyn kehityksen keskeyttämistä järkevänä. Helsingin Sanomat. URL: https://www.hs.fi/talous/art-2000009500874.html Accessed: 7 April 2023

Kunz, W., Kunz, W., Paluch, S. & Wirtz, J. 2022. The Robot and I: The Rise of Hybrid Service Teams. NIM Marketing Intelligence Review. URL: https://www.proquest.com/docview/2737499617?parentSessionId=QmBMItiyQhxrXUbIlaQMkcMqb4e70r9a1FmeveUcyEs%3D&pq-origsite=primo&accountid=27436 Accessed: 12 May 2023

Lacalle, E. 12 October 2021. How is artificial intelligence changing the hospitality industry? The Mews Blog. URL: https://www.mews.com/en/blog/artificial-intelligence-hospitality-industry Accessed: 22 February 2023

Lacalle, E. 2021. What is hotel accounting and why is it crucial for the hotel industry? Mews. URL: https://www.mews.com/en/blog/hotel-accounting Accessed: 3 April 2023

Lam, C. & Law, R. 2019. Readiness of upscale and luxury-branded hotels for digital transformation. International Journal of Hospitality Management. URL: https://www-sciencedirect-com.ezproxy.haaga-helia.fi/science/article/pii/S0278431918303475?via%3Dihub Accessed: 14 May 2023

Laukkonen, V. & Von Kügelgen, M. 2020. Kaikki koodaa – Päivitä itsesi – Käytännön opas ajankohtaisiin digitaitoihin. Into Kustannus. Helsinki.

Lehto, M., Lehto, X., Mohamed, M. & Park, S. 2021. Traveler Attitudes Toward Biometric Data-Enabled Hotel Services: Can Risk Education Play a Role? Cornell Hospitality Quarterly. URL: https://journals-sagepub-com.ezproxy.haaga-helia.fi/doi/full/10.1177/19389655211063204 Accessed: 11 May 2023

Lopes, S., Prentice, C. & Wang, X. 2020. The impact of artificial intelligence and employee service quality on customer satisfaction and loyalty. Journal of Hospitality Marketing & Management. URL: https://web-p-ebscohost-com.ezproxy.haaga-helia.fi/ehost/pdfviewer/pdfviewer?vid=0&sid=d13faff5-9be6-4c0b-8777-a9565c54f812%40redis Accessed: 12 May 2023

Lucas, J. 2022. LTI announces the World´s Best Luxury Hotel Brands 2022. Hospitality Net. URL: https://www.hospitalitynet.org/news/4113146.html Accessed: 7 April 2023

Luxury Hotel. 2023. Luxury Hotel Industry Statistics I Luxury Hotel Market Share + More. URL: https://luxuryhotel.com/guides/luxury-hotel-statistics/ Accessed: 7 April 2023

McKinsey & Company. 2022. What are Industry 4.0, the Fourth Industrial Revolution, and 4IR? URL: https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-are-industry-4-0-the-fourth-industrial-revolution-and-4ir Accessed: 20 February 2023

Miller, K. 2022. The 2022 AI Index: AI's Ethical Growing pains. Stanford Institute for Human-Centered Artificial Intelligence HAI. URL: https://hai.stanford.edu/news/2022-ai-index-ais-ethical-growing-pains Accessed: 19 March 2023

Munjal, S. & Singh, A. 2021. How is the hospitality and tourism industry in India responding to the dynamic digital era? Worldwide Hospitality and Tourism Themes. URL: https://www-emerald-com.ezproxy.haaga-helia.fi/insight/content/doi/10.1108/WHATT-09-2020-0118/full/html Accessed: 13 May 2023

Nam, K., Dutt, C., Chathoth, P., Daghfous, A., Khan, M.S. 2021. The adoption of artificial intelligence and robotics in the hotel industry: prospects and challenges. Electronic markets, Vol 31 Issue 3. URL: https://www.proquest.com/docview/2591864007?parentSessionId=%2Bu7a18DynTdFVcQ%2BdxTASUWgTe8dHygt3Fm5J5VeQ7M%3D&pq-origsite=primo&accountid=27436 Accessed: 19 February 2023

OCI. 2023. What Is AI? Learn About Artificial Intelligence. URL: https://www.oracle.com/artificial-intelligence/what-is-ai/ Accessed: 28 February 2023

Peterdy, K. 2023. What is Competitive Advantage? CFI. URL: https://corporatefinanceinstitute.com/resources/management/competitive-advantage/ Accessed: 22 February 2023

Pietarinen, H. 2023. Raportti: Chat GPT ja muut tekoälyt voivat korvata neljänneksen nykyisestä työstä. Helsingin Sanomat. URL: https://www.hs.fi/talous/art-2000009485920.html Accessed: 7 April 2023

PR Newswire. 2023. Luxury hotel market size to grow by USD 54.46 billion from 2022 to 2027: A descriptive analysis of customer landscape, vendor assessment, and market dynamics – Technavio. Yahoo Finance. URL: https://finance.yahoo.com/news/luxury-hotel-market-size-grow-123000098.html Accessed: 7 April 2023

Qualtrics. 2023. Secondary research: Definition, methods, & examples. URL: https://www.qualtrics.com/uk/experience-management/research/secondary-research/?rid=ip&prevsite=en&newsite=uk&geo=FI&geomatch=uk Accessed: 21 February 2023

Rauch, R. 2017. Competitive Advantage 2018 – The World Has Changed. Hospitality Net. URL: https://www.hospitalitynet.org/opinion/4084890.html Accessed: 17 April 2023

Rouhiainen, L. 2023. 7 Challenges With Artificial Intelligence. Lasse Rouhiainen. URL: https://lasserouhiainen.com/7-challenges-with-artificial-intelligence/ Accessed: 18 March 2023

Salminen, A. 2011. Mikä kirjallisuuskatsaus? Opetusjulkaisuja 62, Julkisjohtaminen 4. Vaasan Yliopisto. URL: https://www.uwasa.fi/materiaali/pdf/isbn_978-952-476-349-3.pdf Accessed: 16 April 2023

Schroer, A. 2022. What Is Artificial Intelligence? Built In. URL: https://builtin.com/artificial-intelligence Accessed: 22 February 2023

Segura, A. 2017. Maslow, evolution and Luxury Fashion. The Fashion Retailer. URL: https://fashionretail.blog/2017/05/22/the-pyramid-of-fashion-social-approach/ Accessed: 21 April 2023

Sramkova, A. 2022. What are Guests Looking for in a Luxury Hotel Today? Aiello. URL: https://aiello.ai/guests-luxury-hotel-personalization/ Accessed: 14 April 2023

The Hotel Conversation. 2022. How technology is changing the hotel industry – BMT. The Hotel Conversation. URL: https://www.thehotelconversation.com.au/news/2022/03/09/how-technology-changing-hotel-industry-bmt/1646780786 Accessed: 17 April 2023

Twin, A. 2023. Competitive Advantage Definition with Types and Examples. Investopedia. URL: https://www.investopedia.com/terms/c/competitive_advantage.asp Accessed: 17 April 2023

Vector Stock. Maslow pyramid with five levels hierarchy of needs vector image. Vector Stock. URL: https://www.vectorstock.com/royalty-free-vector/maslow-pyramid-with-five-levels-hierarchy-of-needs-vector-21448301 Accessed: 18 April 2023

Wang, N. 2022. Application of DASH client optimization and artificial intelligence in the management and operation of big data tourism hotels. Alexandria Engineering Journal. URL: https://www-sciencedirect-com.ezproxy.haaga-helia.fi/science/article/pii/S1110016821003227?via%3Dihub Accessed: 13 May 2023

Wehrle, H. Understanding the role of a Hotel Asset Manager. EHL Insights. URL: https://hospitalityinsights.ehl.edu/hotel-asset-management-the-whys-and-wherefores Accessed: 3 April 2023

Weitzman, T. 2023. Understanding The Benefits And Risks Of Using AI In Business. Forbes. URL: https://www.forbes.com/sites/forbesbusinesscouncil/2023/03/01/understanding-the-benefits-and-risks-of-using-ai-in-business/?sh=6d90ce606bba Accessed: 18 March 2023

Wood, L. 2022. Global Luxury Hotel Market to 2027 – by Hotel Type and Region – ResearchAndMarkets.com. Business Wire. URL:

https://www.businesswire.com/news/home/20220325005387/en/Global-Luxury-Hotel-Market-to-2027---by-Hotel-Type-and-Region---ResearchAndMarkets.com Accessed: 22 February 2023

World Economic Forum. 2023. Fourth Industrial Revolution. URL: https://www.weforum.org/focus/fourth-industrial-revolution Accessed: 22 February 2023

Yi, T. & Wright, A. 2022. Exploring “Smart and Green” Concepts: A New Synergy for Irish Hospitality. Tourism and Hospitality. URL: https://www.proquest.com/docview/2655576819?pq-origsite=primo Accessed: 12 May 2023

Yoong, K. 2022. Concept Design: Crafting distinctive hotels through storytelling. EHL Insights. URL: https://hospitalityinsights.ehl.edu/crafting-distinctive-hotels-through-storytelling Accessed: 21 April 2023

Appendices

Appendix 1. Sample of the study

Authors	Year	Journal	Origin of the study
Afaq, A., Dwivedi, Y., Gaur, L. & Singh, G.	2021.	International Journal of Contemporary Hospitality Management.	Fiji, India & UK.
Ahmed, E., Al Mamun, A., Al-shami, S. & Rashid, N.	2021.	Foresight.	UAE.
Akkaya, K., Cain, L., Cebe, M., Mercan, S. & Uluagac, S.	2021.	International Journal of Contemporary Hospitality.	USA.
Akram, S., Gehlot, A., Narayan, R., Priyadarshi, N., Singh, R. & Twala, B.	2022.	Sustainability (Basel, Switzerland).	India, Mexico & South Africa.
Alonso-Gonzalez, I., Del Ser, J., Guerra-Montenegro, J., Lana, I., Sanchez- Rodriguez, D. & Sanchez-Medina, J.	2021.	Applied Soft Computing.	Spain.
Aluri, A., McIntyre, N. & Price, B.	2018.	Journal of Hospitality & Tourism Research.	USA.
Asghar, Z., Haider, S., Khaliq, A., Nisar, Q. & Waqas, A.	2022.	Technology in Society.	Pakistan.
Assaf, A. & Scuderi, R.	2020.	Tourism Economics.	USA & Italy.
Ayyildiz, A., Baykal, M. & Koc, E.	2022.	Technology in Society.	Turkey.
Badu-Baiden, F., Choi, Y., Giroux, M., Kim, J. & Kim, S.	2021.	International Journal of Hospitality Management.	Hong Kong & New Zealand.
Bai, B., Li, M., Qiu, H., Yin, D. & Zhou, L.	2023.	Journal of Hospitality and Tourism Management.	USA & China.

Belanche, D., Casalo, L., Flavian, C. & Schepers, J. 2022. Journal of Service Research. The Netherlands/Spain.

Bellamkonda, R., Katkam, B., Rodriguez, R. & Samala, N. 2022. Journal of Tourism Futures. India.

Bharwani, S. & Mathews, D. 2021. Worldwide Hospitality and Tourism Themes. India.

Bilgihan, A., Chao, Y., de la Mora Velasco, E., Huang, A. & Wei, W. 2022. Journal of Hospitality and Tourism Insights. USA.

Bilgihan, A., Kandampully, J. & Li, D. 2022. The Service Industries Journal. USA.

Bonn, M., Li, J. & Ye, B. 2019. Tourism Management. China.

Borghi, M. & Mariani, M. 2021. International Journal of Contemporary Hospitality Management. Not mentioned.

Bottrill, C. 2022. Journal of Tourism Futures. Canada.

Bowen, J. & Morosan, C. 2018. Worldwide Hospitality and Tourism Themes. USA.

Boz, H. & Koc, E. 2021. Total Quality Management & Business Excellence. Turkey.

Brock, J., Bridge, G., Nambisan, S. & Singh, J. 2020. Journal of Service Research. USA.

Cai, R., Cain, L. & Jeon, H. 2022. International Journal of Contemporary Hospitality Management. USA.

Chakraborty, M., Prabhu, N., Ramaprasad, B., Rao, S. & Roy, P. 2020. Global Business Review. India.

Chan, H., Kong, H., Xiao, J., Zhang, X. & Zhong, L. 2020. Industrial Management & Data Systems. Australia & China.

Chang, Y., Hlee, S., Koo, C., Park, H. & Park, J. 2022. Information Technology & People. China, Japan & Korea.

Chathoth, P., Daghfous, A., Dutt, C., Nam, K. & Sajid, K. 2021. Electronic Markets. UAE.

Cheng, Y., Chuang, S., Huang, M. & Weng, S. 2021. Journal of Travel Research. China.

Chi, C., Chi, O. & Gursoy, D. 2020. Journal of Travel Research. USA.

Chintalapati, S. 2020. Emerging Economies Cases Journal. India.

Cho, M., Gupta, S., Lee, C., Modgil, S. & Park, Y. 2022. Industrial Management & Data Systems. France, India & Korea.

Choi, M., Choi, Y., Kim, S. & Oh, M. 2020. Journal of Hospitality Marketing & Management. Hong Kong.

Chun, L., Md Sazzad, H. & Wong, E. 2023. Sustainability (Basel, Switzerland). Not mentioned.

Chung, N., Kim, T. & Um, T. 2020. Sustainability (Basel, Switzerland). Korea.

Çiğdem, S., Davidavicius, S., Meidute-Kavaliauskiene, I. & Yıldız, B. 2021. Sustainability (Basel, Switzerland). Turkey.

Citak, J., Owoc, M. & Weichbroth, P. 2021. Procedia Computer Science. Poland.

Collins, G. 2020. International Hospitality Review. USA.

Cuesta-Valiño, P., Gutiérrez-Rodríguez, P., Kazakov, S. & Rua, O. 2023. Humanities & Social Sciences Communications. Spain & Portugal.

Dinu, V., Iustin, A., Lazar, P. & Sorin, P. 2021. Amfiteatru Economic. Romania.

Elkhwesky, E. & Elkhwesky, Z. 2022. International Journal of Contemporary Hospitality Management. Egypt.

Esmaeilzadeh, H. & Vaezi, R. 2022. Journal of Service Research. USA.

Fan, A. & Mattila, A. 2020. Cornell Hospitality Quarterly. USA.

Flavian, C., Casalo, L. & Wang, D. 2021. International Journal of Contemporary Hospitality Management. Hong Kong & Spain.

Ford, R., Golubovskaya, M., Hancer, M., Kang, H., Solnet, D. & Subramony, M. 2019. International Journal of Service Industry Management. Australia & USA.

Giousmpasoglou, C., Marinakou, E. & Zopiatis, A. 2021. International Journal of Contemporary Hospitality Management. Cyprus & UK.

Gu, T., Liao, Z., Li, W., Ren, C. & Yin, L. 2022. Wireless Communications & Mobile Computing. Not mentioned.

Han, D., Hou, H., Lai, J. & Wu, H. 2021. Sustainability (Basel, Switzerland). Hong Kong.

He, Z., Hillebrand, B., Jang, J., Keiningham, T., Suess, C. & Wu, L. 2019. Journal of Service Management. The Netherlands & USA.

Hong-bumm, K. & Xie, M. 2022. Sustainability (Basel, Switzerland). Korea.

Huang, D., Li, Z., Wang, X. & Zhang, Z. 2023. Tourism Management Perspectives. China.

Huang, M. & Rust, R. 2018. Journal of Service Research. USA & Taiwan.

Huang, M. & Rust, R. 2020. Journal of Service Research. USA & Taiwan.

Huang, T.2022. Sustainability (Basel, Switzerland). China.

Hung, K., Liu, C., Wang, D. & Wang, S. 2020. Journal of Hospitality Marketing & Management. China.

Ivanov, S. & Webster, C. 2019. Tourism Economics. USA & Bulgaria.

Ivanov, S., Slobodskoy, D., Stoilova, E. & Webster, C. 2020. Tourism Economics. Bulgaria, Czech Republic & USA.

Jeong, M. & Shin, H. 2020. International Journal of Contemporary Hospitality Management. USA.

Jiang, Y. & Wen, J. 2020. International Journal of Contemporary Hospitality Management. Australia & China.

Jones, P. & Wynn, M. 2022. Sustainability (Basel, Switzerland). UK.

Kapoor, K. & Kapoor, R. 2021. Worldwide Hospitality and Tourism Themes. India.

Kunz, W., Kunz, W., Paluch, S. & Wirtz, J. 2022. NIM Marketing Intelligence Review. Not mentioned.

Lam, C. & Law, R. 2019. International Journal of Hospitality Management. Hong Kong.

Lehto, M., Lehto, X., Mohamed, M. & Park, S. 2021. Cornell Hospitality Quarterly. USA.

Leung, R. 2021. Tourism Review (Association internationale d'experts scientifiques du tourisme). Taiwan.

Lopes, S., Prentice, C. & Wang, X. 2020. Journal of Hospitality Marketing & Management. Portugal.

Lopes, S., Prentice, C. & Wang, X. 2020. Journal of Hospitality Marketing & Management. Portugal.

Ma, C., Shi, Y., Zhang, R. & Wang, L. 2022. Journal of Service Theory and Practice. China.

Malik, A. & Nguyen, T. 2021. International Marketing Review. Australia & Vietnam.

Munjal, S. & Singh, A. 2021. Worldwide Hospitality and Tourism Themes. India.

Nguyen, M. & Prentice, C. 2020. Journal of Retailing and Consumer Services. Australia.

Njoku, E. & Ruel, H. 2021. Journal of Tourism Futures. The Netherlands & UK.

Parvez, M. 2021. Journal of Tourism Futures. Cyprus.

Wang, N. 2022. Alexandria Engineering Journal. China.

Yi, T. & Wright, A. 2022. Tourism and Hospitality. Ireland.