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Artificial Intelligence in the Hotel Industry: The Benefits and Effects on Corporations

Carlie Malone

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Artificial Intelligence in the Hotel Industry: The Benefits and Effects on Corporations

Carlie Malone

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ACKNOWLEDGEMENTS

I would first like to thank my advisor, and mentor, Dr. Kelly Way. I truly wouldn't be here without her constant support and patience throughout this process. I am grateful for the way you have listened to me, and even more so, for the way you understand. Words cannot describe how grateful I am as your student, but how you have been the best encourager and role model for a girl like me. Thank you for never giving up on me and my ideas.

I would also like to thank my committee members, Dr. Amanda Terrell, and Dr. Nick Johnston. They have constantly encouraged me to apply myself beyond what I could imagine. They have challenged me to be the best I can be now, but in the future. Their input and insightful feedback has allowed my thesis to reach its full potential.

Lastly and finally, I must acknowledge all my family and friends who were there for me throughout this whole journey. Thank you for seeing my ideas and abilities when I didn't see them myself. Thanks for being part of this journey and constantly being my backbone. God truly has blessed me with the best friends and family, with love and support from you all the encouragement you have given me every day never went unnoticed.

DEDICATION

This thesis is dedicated to my family. Thank you for always being my constant support circle, but also giving me unconditional love whenever. You have truly been my role models and the people I look up to the most. Thank you for showing me all your hard work and dedication in your lives in order for me to succeed and try and match up. I hope I have made you proud and hopefully in the near future continue to make you proud. You all have given me more than I have ever deserved and thank you from the bottom of my heart for everything.

Abstract

This research delves into the benefits and effects of artificial intelligence in the hotel industry. Through a qualitative design, the study shows how the hotel industry since Covid-19 has tried to grow in the technology. The findings were valuable insights from CEO's, CFO's, Executives, Directors, and Managers. Nine hotel and technology executives from around the country participated in interviews covering the basic topics of demographics, AI utilized in/on the hotel property, AI and employee experiences, and guest satisfaction with AI.

The challenges stated by the participants were that AI is still in its early stages and being developed. An additional challenge was trying to incorporate it into already existing hotel systems. Findings indicate that artificial intelligence is poised to play a significant role in the future of hotels. However, the present scenario suggests that its complete impact on both employees and guests is not imminent. Notably, participants expressed the belief that employees should adopt and embrace technology rather than harbor fear regarding potential job implications.

The research underscores the significance of maintaining a human presence among employees and avoiding any modifications to the guest satisfaction experience through automation. The results provide a valuable insight into the executives' intentions and the future trajectory of their hotel, shedding light on the potential benefits that the introduction of artificial intelligence could bring, not only for the executives but also for the guests.

Keywords: Artificial intelligence, hotel technology, guest satisfaction

INTRODUCTION

Background and Need

Robots have begun to give people a broader look at the future of many businesses and industries; including, but not limited to, the hotel industry. Increasingly, the use of AI (artificial intelligence) in the hospitality industry has skyrocketed (Solution Analysis, 2023) the most dramatic use of which has been in the hotel aspect.

PricewaterhouseCoopers, a professional services company, estimates that one-quarter of the hospitality jobs in the USA will be automated by the 2030s (Bowen, 2018, p. 2). No doubt, this statistic (or something close to it) will most likely become a reality. Reinforcing this prediction is the McKinsey Global Institute, which estimates that between 400 million and 800 million of today's jobs will be robotic by the 2030s (Bowen, 2018, p. 2). According to Ivanov and Webster (2017), some reasons why companies have introduced robots into their organizations is to reduce the costs and increase efficiency (Belanche et al., 2021, p. 2). This means that for the future, robots will help with companies' expenses, but will they help with customer satisfaction? This begs to wonder: with the increased application of AI in the hospitality industry, it is vitally important to connect with customers about their needs and preferences but how do we do so at the service level with AI?

The growth in the hospitality industry over the years had steadily increased prior to the COVID 19 pandemic and is showing rapid growth again after the pandemic (Solution Analysis, 2023). In fact, the leisure and hospitality industry made up 40% of all job losses at the height of the pandemic (Soto, 2022). While there has been an incline in sales in the hospitality industry, there has been a shortage of employees. The guests are returning but not the workers. In an

industry that struggled to retain workers prior to the pandemic, the service workforce pool not returning after the pandemic has created a huge obstacle for the industry.

The hospitality industry had been exploring and promoting AI to the industry prior to the pandemic at many national and international association tradeshow and conventions. However, the idea of AI in the industry has been met with much apprehension and skepticism. When employees did not return to their jobs and the workforce pool lacked after the pandemic, industry leaders, owners, managers, and academics alike agreed the industry needed a solution and AI was that resolution.

Problem Statement

As a result of the shortage of service workers (since the COVID 19 pandemic) the hotel industry has turned to solutions including AI (robotics) to fill those service positions.

Purpose Statement

This study will investigate the current applications of Artificial Intelligence in the hotel industry as well as the possible benefits, challenges, or impacts on hotel companies.

Research Questions

The following research questions guided the information gathered and the analysis completed for this honor's thesis:

- How is AI being used in the hospitality industry today and what positive and negative impacts are companies experiencing?
- How are companies engaging and educating their customers on the AI used on their properties?

- What steps are hotels taking to ensure a smooth transition to AI with employees?

Having artificial intelligence may provide success in different ways, but it can also bring a set of issues that need to be resolved. One issue (that technology still faces today) is that robots cannot work without having someone identified to monitor and repair it when it malfunctions. Another issue is that of communicating with the robot. Gupta (2018) discussed possible challenges posed by communication differences:

“There are a growing number of international travelers from Asia and Southeast Asia. Many hospitality workers in Europe speak multiple languages, but this often does not include Mandarin or other languages used in Asia. In the USA, most hospitality workers are not bilingual, and if they are, it is commonly English and Spanish. This creates communication challenges as guests from the east interact with service providers from the West.” (Bowden and Morosan, 2018, p. 1)

When guests have questions or concerns, will the robots understand all languages and have the ability in the technology system to resolve their issues?

And lastly, the issue of employment or unemployment is a concern in the workforce. It is speculated that the use of robots will create an increase in unemployment rates. Hotels find robots to be a comfort in the future for a lacking workforce, since they will be more efficient, require fewer financial resources, and will work overtime. Hotels find this to be an improved way for them to run their businesses, reduce expenses, satisfy their customers and be more profitable. The following sections of the paper will explore the impacts of using artificial intelligence in the hotel industry and the benefits and effects on properties.

LITERATURE REVIEW

The Hospitality industry is changing at a rapid pace. One of the biggest changes involves the use of newer technologies such as artificial intelligence (AI) and robots. The following review of existing literature explores the research conducted to date on the benefits and effects of this technology and the growth that it has had post Covid-19 in the hospitality/hotel industry.

Artificial Intelligence in the Hospitality Industry

AI is a new technology creating buzz around the world. Professor Nilsson (2010) who served on editorial boards for Artificial Intelligence and the Journal of Artificial Intelligence Research talks about this in a paper called "The Quest for Artificial Intelligence " saying that AI studies are focused on creating intelligent machines. More specifically, Gillham et.al (2018) says that "AI is a collective term for computer systems that can sense their environment, think, and in some cases learn, and take action in response to what they're sensing and their objectives." Different forms of AI will include digital assistants, deep question and answering, machine vision and this is only a little of what is to come (Gillham et. al, 2018, pg. 9).

The beginning of AI and robots being a benefit for hospitality companies began with Covid-19 as less human contact was sought to avoid the spread of the disease. "COVID-19 had changed the operation of the hospitality sector. Many hotels and restaurants were struggling to survive. The tourism industry had a 50% drop in hotel revenue, a 70% drop for tour operators, and a 90% drop for airlines" (Mukherjee et al., 2021, p. 2). The ability for these companies to survive the new norm during the pandemic became critical. Covid-19 was a reason for the world to allow and present the AI technology. They had to carefully balance the future costs and benefits of their services while making sure customer satisfaction was intact. "COVID-19 has

demanded a solution to deal with the uncertainty in the hospitality industry by using automation and robotics as technological innovation.” (Mukherjee et. al, 2021).

The various fields of hospitality, including hotels, restaurants, bars, travel, and tourism, are providing a testing ground for the use of AI and service robots as the technology grows. Everything from digital agents, baggage handling, food delivery or room service, and maintenance and cleaning. It is important for companies to dig deep into the knowledge and research on AI and robots in the hospitality industry to understand the future use of this technology and the benefits and effects on the companies (Yassin et al., 2022).

Artificial Intelligence in the Hotel Industry

Hotels have taken advantage of this technology and are including AI in several aspects of the business. In Epiknetworks and Makadia (2018), they have implemented the latest AI technology from the back-office operations to having direct customer interactions. Hotels have started to become aware of the benefits of such technology, which means that hotels would start adopting the changes needed to make the major renovations to make their hotel a “smart” hotel (Nam et al., 2021). This is smart business for the future of hotels in the industry. Belanche et al. (2021) reported robots will be in the frontline services of hotels into the foreseeable future. Examples include waiter robots and robotic concierges, which have been the easiest ways for companies to incorporate them into hotels and restaurants. It has been reported from (Francis, 2021; Zhou, 2019) that AI enhanced hotel operations, allowing guests to be innovated by the technology and have a memorable experience. AI has improved expectations for guests as it brings accurate responses and fast.

AI is a complex technology that will allow multiple working generations to be equal as it should be easy and efficient to operate and learn to control and respond to the technology. AI

will also allow the guests to be in full contact with the hotel staff throughout their entire stay before and after. For hotels, the effects of Covid-19 was a driver to bring in the technology and test out the success for future visits. Hotels are using more contactless services, reducing the human-to-human interaction, which will help reduce the spread of the virus (Lafranca and Li, 2020). Covid-19 helped promote AI.

By 2030, it is expected that AI would be the most popular market product for companies in the hospitality industry (Bowen, 2018). In addition, CEOs and executives want to better market and improve hotel services. After the pandemic, the best way that companies could compete was to make changes to their staff and services. Looking forward, hotels will use AI to personalize the guest experience, by allowing AI to make the experience based on the guest's personality or behavior.

Next for predictive maintenance, AI can help reduce the number of equipment failures and down time. And chatbots, which help with 24/7 customer care whenever there is a need for assistance. Peter (2023) in his article states what roles hotels have started using AI and the improvements they have seen. Hilton, Marriott, and InterContinental Hotels are 3 top ranked hotels that have started to change their hotels into more "Smart" hotels. An example is Hilton where they have integrated AI-powered virtual concierges (Peter, 2023).

Relay Robotics is also a company that specializes in AI technology and is known to have robotics already in play at these hotels. The reason for the Relay Robots, as they call them, is that these hotels have been having issues with staff shortages, so these robots bring relief and are able to become integrated as part of the team. Relay Robots help relieve employees from doing repetitive tasks, but also when the guest gets a robot to bring them something in the hotel lobby,

it makes for a wonderful and memorable experience. These are just some of the reasons that hotels have started to use AI technology.

Tailos Robotics has created AI-assisted automated commercial cleaning solutions. In a recent article they talk about Rosie, their robotic vacuum which has successfully cleaned up over 10 million square feet of hotel and other property space around the world. This robot has improved the cleaning of hotels and changed the expectations for the future of hotels. Founder and CEO, Micah Green talks about how “Today marks an extraordinary milestone for Tailos, as we announce that our robotic vacuums have cleaned over 10 million square feet. This is not just a measure of distance, but a testament to our commitment to delivering innovative AI-assisted cleaning solutions for hotels and commercial properties across the world,” (Mogelonsky and Mogelonsky, 2023). Green also talks more about how this technology will help with all the staffing challenges that hotels have. These vacuums are just one of the many factors that will start making AI a “need” more than a “want”.

Benefits of AI in the Hotel Industry

Previous literature states that AI can help reduce communication errors. In the article “Why Conversational AI Exemplifies the New Era of Hotel Operations” the CEO of Travel Outlook, John Smallwood, discusses debuting the AI Annette, which is a virtual agent implementing the power of a conversational AI.

Conversation AI is a software that uses language processing of how people speak by scanning through social media, movies, television shows, and anything that uses multiple dialog (Mogelonsky,2022). The AI is trained on Q&A’s, foreign language, and to work with accents and muffled sounds. Annette, a conversation AI machine helps out with guests, so they don’t

have to deal with the endless voice questions of an operator to go to and dealing with call abandonment issues. Customers seem to be engaged longer in conversation with AI, which has led to industry and property cost savings. Mogelonsky (2022) indicated the objection was with hotel management. They said that “My guests will always prefer to have their needs met by a real person”. When training Annette, this was found not to be true as customers honestly didn’t care as long as their needs were met and their questions answered. In summary: new tools such as robots or voice-activated assistants can be a way to reduce expenses.

One of the principal reasons for companies introducing service robots is to reduce management and employee costs and increase business efficiency (Ivanov & Webster, 2017). These tools save costs by reducing calls to the concierge desk (Nam et al., 2020). AI significantly contributes to a reduction in a hotels’ operating costs by 15%, an increase in revenues by 10% (WTM, 2018), and an improvement in employees’ satisfaction by relieving them from tedious, routine and repetitive tasks (Li et. al, 2019). In an interview with CEO and Chairman of Relay Robot, Michael O’Donnell, talks about the cost of a Relay Robot and the issue with future purposes and he says “implementing a Relay Robot doesn’t require a capital-outlay at all. RaaS (Robots as a service), is the primary way we provide our robots. It’s a monthly, all-inclusive program that includes the robot, all service and maintenance, and 24/7 hotline support.” (Editors, H., 2023). O’Donnell makes it clear that it's a “no-brainer” implementing that it would be inefficient if you didn’t get a Relay Robot.

Increasing profitability is a major and significant result to determine if AI is working. Bowen (2018) found AI reported significant benefits in cost reduction of labor by 25%. As the future costs of robotics are reduced, companies that can create service delivery systems designed to use robots will have a competitive advantage, to the point where this disruptive technology

could be the demise of multi-unit operators who fail to adopt it or fail to redesign their service delivery systems (Peter, 2018). Multi-million-dollar companies will be looking at the creation of benefits that make them money and keeps the business flowing.

There are efficiencies in productivity in AI and robotics. (Bornet et. al, 2020) discusses:

“predict that hybrid human-robot teams and collaboration will be the service model of the future for many more complex service contexts. These hybrid teams will be able to realize productivity and service quality gains for the company by combining the advantages of AI and human employees. Robots’ enormous knowledge of data is an undeniable advantage for creating customized services.”

This will allow the employees to handle more complex issues and human interactions. AI and robotics are of increasing importance to hotels with new benefits being identified daily.

Disadvantages of AI in the Hotel Industry

The biggest disadvantage you can have in the hotel industry is losing your customer service through a lack of guest interaction. Human interaction is one of the key reasons that hotels have such a high satisfaction rate, and this can decrease if guests’ feel that the service they received is lacking; thereby, resulting in a lack of trust. This argument is consistent with that of Seo and Jee (2021), who argued that “consumers who have high trust in service robots and expectation for their desired performance task will think that robots are useful and easy to use.” (Seo & Jee 2021, p. 4). The decrease in the workforce post Covid-19 is also due to the disloyalty that companies are facing by not keeping the employees employed and happy.

Privacy issues have always had a negative impact when it comes to technology.

Researchers at a university decided to conduct a survey among a few hotels in China which

included questions that attempted to understand whether guests were pleased with the robots and the assistance they provided. They surveyed a total of 94 guests who stayed at six different hotels in China. The only concern from the guests was with privacy issues: guests were concerned with the cameras located inside of the robots (Johnson and Ogunnaike, 2020). AI is powered like any other technology with facial recognition and data analytics tools to help with personalizing services for its customers. Issues with privacy breaches can come with the technology if not careful. Krzak (2023) brought up how hacking and cyber-attacks can happen which requires hospitality businesses to act and responsibility to avoid these data breaches by putting in a robust data protection policy and processes.

Human touch is a survival moment as when a baby is born and needs warm skin to keep its heart rate up. In the hospitality industry it is a lifeline to a brand. Hospitality as defined by Merriam Webster's Dictionary says, "generous and friendly treatment of visitors and guests or hospitable treatment." (Social Tables, 2023). Involving service robots destroy this definition as AI is a lack of human touch.

AI being brought into the systems of hotels and hospitality could create a cultural shock based on the lack of human touch, leading to a disconnect from the service around the guests. Krzak (2023) wrote about human interactions as essential in the hospitality industry as employees create emotional connections with customers. It can be said that AI is promoting the lack of human touch and emotion. Being hospitable is what keeps industries afloat, and no machine can change or replace that. Service robots have already replaced humans in a range of tasks that exceed the physical capabilities of humans, involve possible negative health impacts, or go against natural diurnal rhythms such as night shift work (McCartney & McCartney, 2020). This can cause a loss of customers and repeat business.

A moment of truth interaction can leave a negative impact on a customer when they have a lack of human touch. In an article titled “The Downside of AI Technology in The Hospitality Industry” Krzak (2023) talks about some downsides in AI technology for humans and one of the apparent downsides in the hospitality industry is a decrease in human interaction. AI-powered chatbots and virtual assistants are replacing human-to-human interactions, which can lead to a loss of personal touch and a lack of human empathy. Customers may feel that the conversation is robotic and impersonal, leading to dissatisfaction with the service (Krzak, 2023).

Lack of communication is always going to be an issue for humans; however, hotels feel a solution can be found in AI technology. Current research indicates that robots have the technology needed, but the major disadvantages lies in the practical use, including communication. Communication is vitally important and can cause satisfaction issues with customers (Zhong et al., 2021). In turn, this can impact a company’s income and reputation when the service isn’t to the customer’s satisfaction.

Implementing AI and Robots can be expensive. Krzak (2023) in an article, talks about implementing this technology in the hospitality industry can also be quite costly, especially for small businesses. Not only the cost of the hardware, but to hire people that can manage and fix the technology. And these costs can be moved onto the consumer if pricey. “It may take time for these investments to be recouped; however, payback of projects is often less than 12 months for successful implementations.” (Bornet et al., 2020). In addition, new ways of implementing these technologies are helping to bring the costs down. For example, RaaS — robots-as-a-service. Some companies are providing monthly, all-inclusive programs that include the robot, all service and maintenance, and 24×7 phone support.

AI technology is always advancing and being modified every day. Service robots have not yet reached the desired technology, but even with the current state of the technology, robots are outdoing the current employee standard and doubling up the expectations that employees are facing to advance their technical and skills (Reis et al., 2020). Something new, such as an update, requires someone in the back office who can help with the technology and fix it. Whether that's training existing employees or hiring specialists, additional human time is required.

METHODOLOGY

Research Design

Planning and development for the research design began in the spring 2023. An extensive literature review in combination with the objectives of this study was used as the guideline to build the qualitative questionnaire. A qualitative approach was used in this study in order to develop a non-experimental research design for the purpose of reporting on AI in the hotel industry and its impacts on hotel properties and corporations.

The research design utilized for this study consisted of a non-experimental descriptive survey, for the purpose of assessing the perceptions of AI in hotels. Because typical survey studies are used to assess attitudes, preferences, opinions, practices, procedures, and demographics (Gay & Airasian, 2003), a descriptive survey research design was deemed appropriate for this study. An approval form for research involving human subjects was submitted to the Institutional Review Board. The approval form was accepted and approved in September, 2023 (Appendix A). A questionnaire survey was designed and administered to hotel executives, owners, and managers (See Appendix B). Changes and modifications were made to the questionnaire based on the Institutional Review Board suggestions. The questionnaire was then distributed to the participants via an interview with the researcher over Microsoft Teams or Zoom.

Population and Sample Selection

The target population selected for analysis consisted of hotel executives, owners, and managers in the United States who utilize AI in their properties. However, it would be impossible to survey every hotel executive, owner or manager in the United States who employ AI in their properties to collect data. Therefore, hotel executives, owners, and managers who utilize AI, were located in major tourists' cities in the United States, and elected to participate in the study were utilized to collect data.

Instrumentation

The instrument design encompassed a descriptive survey with probing questions strategically formulated to initiate discussions. The questionnaire was developed for this study based on a comprehensive literature review. The questionnaire utilized in the study was comprised of four major sections.

The first section focused on demographic questions related to the respondent, including inquiries regarding age, education, employment position, race/ethnicity, and other aspects of their current status. The second section, consisted of three probing questions that concerned the utilization of artificial intelligence (AI) within or on hotel properties. The third section of the questionnaire, featured two probing questions that explored participants' perceptions of AI and their experiences with AI on hotel properties. Moving on, the fourth section included three probing questions related to guest satisfaction and experiences with AI. Finally, the fifth section posed an additional four questions, specifically addressing their experiences with AI in the context of the hotel industry.

Data Collection Techniques

The intended approach for data collection involved conducting online interviews with hotel executives, owners, and managers through platforms such as Zoom or Microsoft Teams. No incentives were offered for survey participation. Respondents were notified that their involvement was voluntary, and all information obtained from the survey would be treated confidentially.

Data Analysis

The interviews were conducted between October, 2023 and concluded in February, 2024. Interviews were conducted and transcribed by a combination of the researcher (Zoom) and Microsoft transcriber (Teams). Once data collection was complete, the data was analyzed using Askly.AI software, an artificial intelligence powered question – answering engine. Data was uploaded into Askly.AI and incorporated into the question pattern analysis. This allowed the researcher to view all participants replies and display any patterns in their responses. After data was produced by Askly.AI, the researcher then compared the output to their own transcription to verify the data was accurate.

Respondent Profile

Participants were selected via their LinkedIn profile and association with the hotel industry. Participants were contacted via direct message on LinkedIn and asked if they would participate in the honor's thesis research. Participants were asked about their demographics to reveal insights into their background and experiences, including the various types of hotels they had previously worked in. The participants' industry experience ranged from a minimum of eleven years to a maximum of forty years. All participants possessed backgrounds in large hotel

chains or luxury resorts. The primary outcome of recruiting these participants was the identification of individuals with extensive experience in hotels or those transitioning into roles as tech industry experts.

All participants were of the male gender as only men responded to the request for interviews on this study. All participants were currently working in the hotel industry, with the exception of one participant who is currently an executive at a global technology company and whose position is vital in the evolution of artificial intelligence. All participants were assigned a gender-neutral name to protect their identity and ensure confidentiality. This demographic information is listed in Table 1.

Table 1: Demographic Profile of Participants

Identifier Name	Years in the Hotel Industry	Employment- Hotel Types	Current Position
Terry	13 years in hotels 17 years in technology	Boutique Hotels Small Hotel Chains Large Hotel Chains.	Vice President of Engagement
River	31 years	Large Hotel Chain	Vice President Operations
Alex	30 years in hotels 8 months in technology	Small Hotel Chain Large Hotel Chain Luxury Five Star Resorts	Global Director, Travel, Transportation, and Hospitality
Riley	14 years	Large Hotel Chain	Senior Director of Data Science
Drew	40 years	Luxury Five Star Resorts	Chief Commercial Officer
Charlie	30 Years	Mid to Upscale Hotel Chain	Regional Director of Operations
Morgan	27 years.	Boutique Hotel Small Hotel Chain Large Hotel Chain	Culinary FOH/Banquet Manager Former Dual Director of Sales
Carey	28 years	Mid to Upscale Hotel Chain	Chief executive officer
Jordan	11 years	Large hotel chain Limited service	General Manager

RESULTS

This study offers insights into the knowledge and firsthand experiences of hotel executives regarding the implementation of artificial intelligence (AI) in their establishments. Participants willingly contributed to this research by responding to a set of interview questions. The collected feedback was aggregated using Askly.AI to streamline information and recognize any patterns. To ensure confidentiality and safeguard the identity of the participants, company-specific details were omitted, and participant names were substituted with gender-neutral alternatives.

Research Question 1: How is AI being used in the hospitality industry today and what positive and negative impacts are companies experiencing?

Using probing questions participants discussed their experiences with AI on their properties. Through the pattern analysis, it was determined the utilization of AI is still brand new at quite a few of the well-known, large-scale hotels. Many participants indicated they had some background knowledge of the use of AI in hotels or were in the early stages of AI being used at their property(ies). One of the participants, Alex, expressed his knowledge of AI in the industry and how it is being adopted.

“The hospitality industry as a whole is behind in adopting AI technology”.

However, he mentions that large-scale hotel companies are starting to explore AI’s potential to address the labor marketplace challenge by doing more with less. While he doesn’t provide specific examples of AI being used on his properties, he does mention that AI’s application in the hospitality industry goes beyond automation and includes areas such as translation, speech recognition, and generative AI.

Overall, Alex's response suggested that while AI is being considered in the hotel industry its implementation is still in the early stages. Alex wasn't the only participant to state this, as the majority of the participants felt that AI can provide value for the hotel industry, but that it is still in its early stages. While AI can assist guests with basic tasks and help automate mundane tasks for employees, a lot of the participants said that it is crucial to balance AI with the use of human touch as hospitality is about people and not a "thing". Participants agreed that in numerous surveys and study findings involving AI, it has been consistently observed that guests continue to highly appreciate personalized service and interactions with hotel staff. Furthermore, a common challenge faced by many hotel companies is the difficulty in adopting AI, primarily because a significant portion of hotels are not directly owned by the hotel companies. This ownership structure adds complexity, making the rapid scaling of AI adoption more challenging within the hotel industry.

Participant Terry followed this thought by emphasizing the importance of being transparent with guests about technology and making it intuitive and seamless for them. In his example,

"AI has the potential to address labor shortages, provide more efficient and personalized service, and allow employees to focus on higher-level tasks."

Terry did not give any specific information regarding increases or decreases in customer satisfaction scores or expenses due to AI, at his property, but he did not rule out the possibility of cost savings in areas such as food and labor costs. Overall, participants indicated that the introduction of AI is seen as a good decision for the future of the hotel industry. There were some main factors that the participants stated when answering the question: "What made you

want to start using AI in your property(ies)?” The following are summaries of all the participants responses matched with the common themes that were mentioned (See Table 2).

Table 2: What Made You Want to Use AI in Your Property(ies)

Answer	Common Themes
Cost Savings and Staff Efficiencies	AI has the potential to reduce expenses and increase staffing efficiencies. AI can streamline operational processes, automate mundane tasks, and provide personalized services without replacing human interaction.
Guest Experience Enhancement	AI technologies, such as speech recognition, text-to-speech, and personalized recommendations, have enhanced the guest experience by providing tailored services and recommendations based on individual preferences.
Employee Acceptance and Interaction	As employees have generally accepted the introduction of AI, with some expressing positive interactions with AI technologies. Front Desk and Food and Beverage staff have been noted to interact the most with AI.
Guest Interaction and Attraction	An area of interest for hotels when starting to use AI, and in particular they have a basic need for AI to perform simple tasks and services that can aid with the employee.
Marketing to Multiple Generations	AI has the potential to attract more guests to properties, especially among younger generations who enjoy interacting with AI.
Balancing Human Touch and Automation	It is crucial to balance the use of AI with human touch, as personalized service and interaction with hotel staff are still valued by guests. AI should be used to complement human interaction and provide the best possible guest experience.
Challenges and Concerns	AI offers numerous benefits there are concerns about job displacement, the need for empathy and understanding for employees’ concerns, and the potential impact on the industry as a whole.

Transparency and Education	As transparency with guests about AI technology and making it intuitive and seamless for them is essential. Educating guests on the benefits of AI and managing their expectations is crucial for a successful AI implementation. These insights highlight the multifaceted impact of AI on the hotel industry, emphasizing the need to balance technological advancements while preserving a personalized guest experience and employee well-being.
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The questionnaire then asked: “What do you see as being the long-term outcome of using AI in your properties.” This question was a focal point in discussions with all the interviewees. The envisioned long-term advantages of incorporating AI in these properties revolved around cost reduction. AI is anticipated to automate tasks such as housekeeping, maintenance, and guests' check-ins, resulting in diminished labor and operational costs.

Next, evident theme was revenue increase as AI can provide personalized recommendations to guests, optimize pricing strategies, and enhance the guests experience, resulting in higher occupancy rates and revenue. Employee efficiency also was discussed, as automating tasks with AI can free up employees to focus on more complex or important tasks, improving workforce efficiency. Lastly, the theme of customer satisfaction was reasoned as a key component within hotels, as AI can improve the guest experience by providing personalized recommendations, resolving issues quickly and anticipating guest needs, leading to higher satisfaction and loyalty.

Within these overarching themes, additional benefits became evident, including heightened employee satisfaction, enhanced revenue management, and improved profitability. One participant, Drew, emphasized the necessity for AI in his hotels, stating:

AI as 'a widely utilized technology in the near future, driven by consumer demand and competitive pressures'.

While his hotel is not currently using AI, he sees opportunities for its future use.

The adverse effects of AI can impact a hotel in various ways. One challenge is related to costs. While AI holds the potential to reduce expenses by automating tasks and decreasing the reliance on staff, there are substantial upfront costs associated with implementing AI technology. Hotels must thoroughly evaluate the long-term financial benefits of AI compared to the initial investment required.

Another challenge lies in employee impact. The introduction of AI in properties may result in job displacement, particularly in areas where tasks can be automated. However, it could also create new job opportunities in fields like AI development and maintenance. Hotels need to carefully consider the impact of AI on their workforce and provide training and support to help employees adapt to new technologies.

Data privacy and security are major issues for guests as the use of AI in properties will generate large amounts of data, which in-turn, will need to be carefully managed and protected. Hotels will need to ensure they have robust data privacy and security measures in place to protect guest data and prevent data breaches. Regulatory and legal considerations are a concern with the use of AI in properties, particularly in areas as data protection, privacy, and intellectual property. Hotels will need to ensure they are compliant with all relevant laws and regulations to make the transition to AI successful. The implementation and maintenance of AI technology will require a high level of technical expertise, which may be a challenge for some hotels. Hotels will need to

ensure that they have the necessary technical expertise in-house or partner with external providers to ensure that their AI technology is properly implemented and maintained.

Additional challenges include, integration with existing systems. The integration of AI technology with existing hotel systems such as PMS, POS, and CRM will also be a challenge. Hotels will need to ensure that their AI technology is compatible with their existing systems and can be easily integrated. One of the main challenges is customer acceptance, the use of AI in properties may raise concerns about customer acceptance and trust. Hotels will need to ensure that they are transparent about the use of AI and provide clear expectations of how it is being used to benefit the guests. They will also need to ensure they are providing a high level of customer service and support, even as AI technology becomes more prevalent.

Lastly, maintenance issues can be a negative factor for hotels wanting to bring in AI. These examples include technical glitches, that the AI systems can encounter. These glitches may cause malfunctions or break downs, leading to data delays and system crashes and lastly, operational issues. Also related is data accuracy. AI systems rely on accurate data, and if the data fed into the system is inaccurate or incomplete, it could lead to incorrect results or recommendations, impacting guest experience.

In addressing the research regarding long-term benefits of AI in the hotel industry, it's essential to acknowledge that while AI holds the potential for substantial advantages, including heightened revenue, decreased costs, and enhanced customer satisfaction, it is not without its accompanying risks and challenges. Hotels must meticulously assess both the positive and negative aspects, ensuring that decisions are well-informed and aligned with a comprehensive understanding of the implications associated with the integration of AI.

Research Questions 2: How are companies engaging and educating their customers on the use of AI at their properties?

Based off the context and themes from the participants when asked the question “Do you think guests like interacting with AI (robots, etc.) on the property?” It is unclear whether guests generally like interacting with AI on their properties. Some participants expressed excitement in the potential of AI, while on the other hand some raised concerns. When considering the limitations and the potential to replace human jobs, it's crucial to look into the challenges and the capacity of AI to replace traditional employment roles. Some guests might like or enjoy the novelty of interacting with AI, but others enjoy the interactions with humans as well. The overall consensus and theme seemed to be that AI should be intuitive, seamless, and blend into the environment of the hotel in a way that enhances the guest experience without replacing human jobs. Another subject discussed was the emotional intelligence of AI, with varying perspectives: some participants asserted its proficiency in understanding emotions, while others harbored reservations. Overall, there needs to be more research and development on AI to fully understand guests' perceptions and experiences with interactions with AI and how it can enhance the overall hotel experience. Another question in this series was “Do you think AI has assisted guests with basic/simple tasks?” It's very clear that guests have been aided by AI for simple and basic tasks. Two of the participants, Charlie and River talked about examples where they had seen AI assist guests.

Charlie stated that “Guests have used digital keys to check in and out of hotels without having to interact with the hotel staff.” River included that “You can request towels through AI-enabled technology.”

Nevertheless, guest preferences lean towards traditional human interaction at the front desk, with the perception that AI is not perceived as a suitable replacement for specific tasks, such as cleaning and bed-making. Overall, it seems that AI can enhance guest satisfaction by making tasks more efficient and convenient, but it will not completely replace human interaction with guests.

Participants were then asked: “Do you think that AI will attract more guests to your property/properties?” Some expressed that AI could make the brand more popular or attractive, while others felt it may not be a deciding factor for guests choosing a hotel. Ultimately, it appears that if a property has intentions of implementing AI, one must be careful and consider guest preferences. Carey explains in about guests’ attraction as:

“The technology holds a 90% opportunity, but its potential may be lost if hotels fail to embrace it, leading to a disconnection in the future.”

All participants were in unanimous agreement that neglecting the chance to explore the offerings available for guests would result in a future disconnect for those attempting to fully embrace AI for its potential. Lastly, the question was asked: “Do you have any examples of guests interacting with AI you can share with me?” Typical examples provided included speech recognition, text-to-speech technology, and the management of bidding and pricing for finance section of the hotel. Robin, one of the participants, offered an example of a system in use:

“The Renai Navigator, which provides local recommendations to guests using AI technology instead of a human concierge.”

In summary, based on the participants responses, it can be concluded that guests (especially the younger generations) express a preference for engaging with technology, paving the way for a successful integration of AI in hotel properties. From digital key cards to ordering room service and receiving local recommendations, guests have discovered that interacting with AI is not only well-received but also holds the potential to become a prominent trend in the near future.

Research Question 3: What steps are hotels taking to ensure a smooth transition to AI with employees?

The probing question used was, “How did employees receive the introduction of AI at your properties?” One of the themes discovered was positive reception; which means employees at certain properties have received the introduction of AI positively. These employees have embraced AI technologies and indicate little concern if any about being replaced by AI. The implementation of AI has been positively embraced, especially by staff directly engaged with AI technologies. While this sentiment holds true for certain properties, the contrasting view is that AI poses a potential risk of job displacement for some roles. Management should have empathy for this predicament and understand employees’ fears and concerns. While certain employees may harbor concerns about the impact of AI on future job security, there is a shared acknowledgment, even among higher-level employees, that the human touch remains essential in the hospitality industry. The hotel sector is still in the beginning phases of exploring and experimenting with AI, with companies conducting “proofs of concepts” to gain insights into the potential benefits and challenges associated with its integration.

One frequently cited example in the evidence reiterated by participants is the utilization of AI, with the mobile key being a prime example. This innovation has been integrated into the hotel industry, standing out as a pioneer. The mobile key has not only established a global user base, benefiting individuals in various ways, but it has also proven advantageous for hotel employees. Hearing from Jordan

“The mobile keys have been impacting for 8 plus years and everyone is trained on those and connect that through the Moment app, that can check in and can read an id and all the basics on the information.”

This assists employees in tracking when a guest checks in and understanding the potential impact on tasks that might otherwise consume more time than anticipated. It represents a novel application of technology that transforms seemingly simple tasks, which might be perceived as quick, into time-consuming processes for both employees and guests. In general, the reception and response to AI at hotel properties has been diverse, with some employees embracing the technology, while others voice concerns about potential job loss and the importance of maintaining a human touch in the workplace. A specific group of employees that tends to work more directly with AI is the sales team. There are others hotel departments and personnel that can benefit from working with AI, as Jesse indicated:

“That AI could be beneficial in tasks with repeated processes, such as revenue management, marketing, and finance.”

The last probing question in this series was “Do you feel that your employees are concerned about the future of AI and potentially being replaced by AI in their positions?” Terry, one of the participants talks about his knowledge of adoption and utilization of AI.

“The there are legitimate concerns about adoption and utilization of AI by employees, but also mentions that the proper adoption of AI is critical because it could go sideways and not be such an amazing tool. 75% of all jobs will change as a result of the widespread use of AI but clarifies that they will not all be eliminated.”

Therefore, it is possible to construed that the Terry’s employees are concerned about the impact of AI, but he doesn’t fully state this. Also, Terry stated how owners of hotels are doing an exercise around the cost-benefit analysis of investing in AI versus hiring employees. Overall, the participants didn’t show concern for employees being replaced by AI, but felt that it could be a consideration in the future.

In conclusion, the participant responses to the first research question revealed a prevailing theme: AI is still in its infancy and in the initial stages of implementation. Despite the acknowledgment from higher-level employees that AI holds potential for future success in the hotel industry, guests still anticipate and value the human touch in hotel properties. The second research question inquired about the education background of AI for customers. It was determined that the participants felt that guests have no idea or haven’t shown a significant interest in AI being used in some of the hotel properties. The participants felt that the majority of their guests think that AI is very utilized, or guests simply haven’t noticed AI being used on property.

Lastly, research question three asked how employees were dealing with the transition to AI. Participants felt that employees mostly had positivity embraced AI at their jobs as opposed to fearing the implementation of AI on property. The majority of employees are understanding how AI cannot only assist them with the jobs, but aid the guests during their stay.

DISCUSSION AND CONCLUSION

The purpose of this study was to investigate the current applications of artificial intelligence in the hotel industry and the benefits, challenges, or impacts on hotel companies. Research on artificial intelligence (AI) in the hotel industry is crucial for numerous reasons. First and foremost, AI has the potential to revolutionize the hotel industry by enhancing efficiency, and driving economic growth. The development of AI technologies can lead to innovations in the hotel industry by creating solutions to complex problems and improving overall quality of a guest's experience. Research is essential for understanding the limitations, risks, and ethical considerations associated with AI, and for developing frameworks to govern its use. Furthermore, ongoing research is vital for advancing the capabilities of AI, pushing the boundaries of what is possible, and addressing challenges such as interpretability, transparency, and accountability. Essentially, AI research is indispensable for shaping a future where artificial intelligence contributes positively to human progress and addresses the evolving needs of the hotel industry.

Most of the participants were hotel company executives that are experts on the use of AI. Although many of them had knowledge of AI technology being utilized in their operating systems, some of them were still in the process of identifying the impacts of AI on their properties and/or organizations. The interview questions were designed to obtain honest and truthful answers regarding the use of and impacts of the AI technology. All participants had similar backgrounds and had several years of working experience, leadership, and innovational experimentation in the hotel industry; additionally, all had common goals for implementing AI. The overarching goal participants shared was focusing on finding ways to implement AI in their

operating systems to increase guest satisfaction, while also creating new ways hotels can efficiently and effectively operate “behind the scenes”.

The study findings suggest that the hotel industry is in the initial phases of incorporating AI, with significant large-scale hotels yet to fully tackle the technology. The results highlight the preference of guests for human touch and interaction over interactions with robots, despite the advancements in AI capabilities. The desire for personalized and human experiences remains a constant, even with the ongoing evolution of AI technologies. Furthermore, the research examines the advantages of AI, as detailed in (Table 1).

Furthermore, the study results stated challenges associated with the implementation of AI in the hotel industry. When participants were questioned about obstacles, a recurring theme emerged concerning the impact on employees. Respondents acknowledged that AI could potentially have negative effects on the employee experience; however, they supported a proactive approach, urging employees to embrace and adapt to these changes rather than perceiving them in a negative light. While the long-term outcome is anticipated to be beneficial for hotels, enhancing overall guest experiences, it is crucial for establishments to monitor both the negative and positive impacts. A full understanding of the implications of AI integration is essential for hotels to navigate the situation effectively.

Ensuring guest satisfaction is vital in the hotel industry, as it directly influences the hotel’s primary source of income. The findings indicate that guests may not fully grasp their engagement with AI technology, as its impact on their experience is not yet fully known. This suggests a need for further studies on the interaction between hotel guests and AI, especially as the utilization of this technology continues to evolve. Additional research in this area would

provide valuable insights into guest perceptions, preferences, and the optimal integration of AI to enhance overall satisfaction in the hotel sector.

In summary, while AI is making significant strides across various industries, its presence in the hotel sector is still in its beginning stages. Establishing an environment that incorporates high-tech elements is both new and formative. Employees express a willingness to learn but have suspicions about the potential implications of this technology. On the other hand, guests are aware of AI but may not fully comprehend that the enhancements in the hotel experience stem from this technological innovation. Although the transformative impact is not yet fully realized, it is on the horizon, with the expectation that as more technological advancements are integrated, the influence of AI in hotels will become more pronounced.

FUTURE RESEARCH

Future research should explore strategies to expand the utilization of AI technology within the hotel industry in the “snack” or hotel lobby “gift shop”. An intriguing angle worth exploring is similar to the self-checkout systems employed recently by some domestic airports. This involves an automated scanning process at the exit, allowing patrons to pick up items and depart without the need for traditional checkouts. Subsequently, the charges are automatically applied to their card, with a notification from the bank confirming the transaction. Implementing a similar approach in hotel “snack or gift shops” could not only streamline operations, reducing the need for extensive employee presence and associated costs but also potentially enhance revenue generation. Investigating such innovative applications of AI in hotel retail spaces holds promise for both operational efficiency and financial impact.

Finally, the development and implementation of facial recognition technology represents a significant stride in influencing AI, considering its popularity in smartphones and various devices. Utilizing facial recognition during guest check-ins could empower hotels with a wider and more thorough understanding of a guest's stay history. For instance, information like a preference for mints on their pillows or a specific room temperature can be recorded. These instances exemplify how AI can profoundly enhance guest satisfaction by personalizing experiences. Moreover, this data can be harnessed for strategic marketing opportunities, showcasing how hotels are advancing new experiences and benefits. The incorporation of facial recognition technology is a promising avenue to not only increase guest satisfaction but also to position hotels as innovators in the ever-evolving landscape of hospitality services.

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APPENDIX A

To:Carlie Reese Malone

From:Douglas J Adams, Chair
IRB Expedited Review

Date: 10/03/2023

Action:Expedited Approval

Action Date:10/03/2023

Protocol #:2308487793

Study Title:Artificial Intelligence in the Hotel Industry: Benefits and Effects on Corporations

Expiration Date:09/13/2024

Last Approval Date:

The above-referenced protocol has been approved following expedited review by the IRB Committee that oversees research with human subjects.

If the research involves collaboration with another institution then the research cannot commence until the Committee receives written notification of approval from the collaborating institution's IRB.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date.

Protocols are approved for a maximum period of one year. You may not continue any research activity beyond the expiration date without Committee approval. Please submit continuation requests early enough to allow sufficient time for review. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study closure.

Adverse Events: Any serious or unexpected adverse event must be reported to the IRB Committee within 48 hours. All other adverse events should be reported within 10 working days.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, study personnel, or number of participants, please submit an amendment to the IRB. All changes must be approved by the IRB Committee before they can be initiated.

You must maintain a research file for at least 3 years after completion of the study. This file should include all correspondence with the IRB Committee, original signed consent forms, and study data.

Correspondence Notes:

- Having determined that the protocol involves no more than minimal risk, this protocol was reviewed under expedited categories 6: Collection of data from voice, video, digital, or image recordings made for research purposes; and 7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.
- The PDF of the consent materials should be downloaded from the Attachments of the approved protocol in the Streamlyne system, as the protocol number, approval and expiration dates will be watermarked on the consent form.

cc:Kelly A Way, Investigator

APPENDIX B

INTERVIEWER GUIDE

Name of Business:

Date of Interview:

Interviewer:

“Thank you for participating in this honors research. Our purpose is to understand AI and the hotel industry: benefits and challenges, your input will be very helpful. Any questions before we begin?”

Section 1: Demographics

How many years have you worked in the hotel industry?

How would you best describe your hotel? Examples: is it a boutique hotel, small hotel chain or large hotel chain?

What is your exact position title?

Section 2: AI utilized in/on the hotel property. (*Questions directed to the participant regarding their property or properties.*)

To what extent are you aware of AI being used in the hotel industry, specifically in your properties?

Probe 1: What made you want to start using AI in your property(s)?

Probe 2: What do you see being the long-term outcome of using AI in your properties?

Examples: reduce costs, increase revenues, reduce employee headcount, free up employees for more complicated or important tasks, increase customer satisfaction, other, please specify

Probe 3: What methods or trainings did you utilize when introducing AI to employees?

Additional probes: Maintenance issue with the technology? Has one type of AI been more popular than another?

Section 3: AI and Employee Experiences.

How did employee receive the introduction of AI at your properties?

Probe 1: Of your employees, which group works more directly with AI? (*example: front desk, housekeeping, facilities maintenance, food & beverage, etc.*)

Probe 2: Do you feel that your employees are concerned about the future of AI and potentially being replaced by AI in their positions?

Section 4: Guest satisfaction with AI.

Do you think guests like interacting with AI (robots, etc) on the property?

Probe 1: Do you think AI has assisted guests with basic / simple tasks?

Probe 2: Do you think that AI will attract more guests to your property/properties?

Probe 3: Do you have any examples of guests interacting with AI you can share with me?

Section 5: Additional Questions:

- Do you feel like the introduction of AI was the best decision for the future of hotel industry? Why or why not?
- Has your company / property experienced any increases or decreases in customer satisfaction scores due to AI?
- Similar to the last question, have you seen any decrease in expenses (food costs, labor costs, hiring costs) due to having incorporate AI?
- Do you have a ball-park dollar figure on how much you have spent setting up AI in your property / properties? *If you're comfortable disclosing this information?*

Valid and reliable research is heavily influenced by the number of participants. Do you know of any potential executives or owners of hotels that would be willing to participate in this study? If yes, please share their name, contact information (if readily known), and the hotel that they are associated with. Once again, thank you so much for your time and willingness to participate! Have a great rest of your day! You are the best.

End Interview.