



MUSINGS ON MODERN COMPUTING IN HOSPITALITY INDUSTRY

Dhanu Prakaash. V¹, Dr. J. Eugene²

¹Final Year, B.Sc. Hospitality and Hotel Administration, Institute of Hotel Management Catering Technology and Applied Nutrition, CIT Campus, Chennai – 600113

²Lecturer, Institute of Hotel Management Catering Technology & Applied Nutrition, C.I.T Campus, Taramani, Chennai – 600 113 ORCID iD: <https://orcid.org/0000-0001-6206-7938>

Article DOI: <https://doi.org/10.36713/epra16117>

DOI No: 10.36713/epra16117

ABSTRACT

The hospitality industry is undergoing a significant transformation driven by advancements in modern computing and artificial intelligence. This evolution is characterized by the integration of algorithms to tailor personalized experiences, the utilization of robotics to redefine service delivery, and the strategic leveraging of data to portray an ideal guest profile. Furthermore, emerging trends such as dynamic pricing, customized immersive experiences, and the prospect of seamless visits signify a profound shift towards digitalization within the sector. This outlines the impending paradigm shift in hospitality, emphasizing the pivotal role of technology in reshaping traditional models and setting the stage for a future marked by enhanced guest engagement and operational efficiency.

KEYWORDS: Computers, Hospitality Industry, Artificial Intelligence, Technology

INTRODUCTION

Before going deep into this topic, we need to understand what the term hospitality means. To explain the term hospitality, “it is a friendly and generous behavior towards guests”; “foods, drinks or services that are provided by an organization for guests, customer, etc.” are the definitions given in the Oxford Learner’s Dictionaries. With this, we can come to a basic understanding of hospitality which includes the behavior of the host towards the guests, like how one speaks, how one greets them, how comfortable one makes the guest, making sure of a warm stay for them, etc. Form the second definition, we can also get that it may also include the act of sharing or providing food, drinks or some service if required, which may or may not be a business. That is why the customers in the hotels and restaurants are termed as “Guests” not customers, this shows how much the industry values their customers who use their product or service.

On the other hand, computers are basically modern machines that are able to perform very complex calculations within seconds, mostly even faster nowadays, which may take a long time and energy for human beings to complete the same amount of tasks. Artificial Intelligence, shortly known as AI, is becoming a very popular term in every industry recently, it is just a part of modern-day computing, but it’s not just a part but a major part of the subject matter. We could clearly observe the development and the implementation of AI in various fields, but this does not mean that the concept of Artificial Intelligence is also very recent. The term AI (Artificial Intelligence) was first coined by John McCarthy and was introduced during the Dartmouth Workshop, in 1956. The term is defined as the construction of computer programs that engage in tasks that are currently more satisfactorily performed by human beings because they require high-level mental processes such as perceptual learning, memory organization and critical reasoning by Marvin Minsky, an American cognitive and computer scientist concerned largely with research of artificial intelligence (AI), co-founder of the Massachusetts Institute of Technology's AI laboratory, and author of several texts concerning AI and philosophy. With Marvin’s definition, we can understand that AI is something like the ability of the computer to think, memorize, and reason close to human beings. Roger C. Schank, an Artificial Intelligence theorist, quotes AI as “AI is the machine’s attempt to explain the behavior of the(human) system it is trying to model, the ability of a program to designed to scale up is critical” in his paper under the topic, Where’s the AI in the



year 1991. This paper gives us a better understanding of the concept of AI which is just a program that may be software that requires hardware to the requirement which will be able to perform tasks like human beings. In the modern days, there are multiple terms and concepts like fuzzy logic, cloud-based computing, deep learning, machine learning, etc., around Artificial Intelligence(AI) based on their usage, inputs, scale of use, scale of implementation, etc.

OBJECTIVES

Computer are being the most versatile machines it could be used for a 'n' number of tasks in the hotel industry, hence it could be used from a simple word processing to a high task like level forecasting applications based on fuzzy logic and more. As the applications of the computer in the hospitality industry is very vast and wide, every aspects of the computers and the industry could not be covered in a single study. Thus the aims and objective is narrowed down as follows:

- Identify the difference between the traditional analog systems and the modern computing systems in the industry.
- Identify the opportunities and challenges in the hospitality industry (mostly in hotels) due to the implementation of modern computing.
- Discuss the potential area of development of the applications of computers in the industry and widen the research area on the topic

STUDY METHODOLOGY

A study methodology defines the transparency of the work, which also acts like a map in a library to help anyone identify the resources that you have to focus on the research questions efficiently. This paper is a secondary study carried out on the related topics of the study. This is also made with the concept of content analysis which comes under the Qualitative study. A technique called 'immersion' is used to complete this paper. Immersion refers to deeply engaging with the data to gain a deep understanding. This technique may involve reading, re-reading, coding them, identifying themes, and reflecting on the overall means. Google Scholar is used to source the required articles and other research papers over the internet on related topics between the years 2022 to 2024. Several keywords were used to source the required papers, some of them are AI in hospitality, AI in hotels, Advanced forecasting in hotels, customer relations, marketing using AI and modern computing, Language models in hotels, competitive advantage, and so on. By the articles that appeared on the search 21 most relevant papers were taken to construct the review paper. This is a systematic study, under which both systematic review and development of a research question or hypothesis are followed. Based on the above-mentioned methods this paper is completed and further direction of research is being opened.

APPRAISAL AND ANALYSIS OF ARTICLES

Marketing Segment

The contents for the study are reviewing and analyzing the contents of the 21 selected articles on the topic for a deeper understanding of the concepts and their applications. Tamzil Yusuf and Yuliauti Keke analyzed the positions of the star-rated hotels in Indonesia. The positioning of the hotels is based on the SWOT analysis for digital marketing. The top three hotels in the country are studied in order to make the analysis, namely, Ibis, Kempinski, and Shangri-la Hotel. These hotels are put into the study under the following categories of digital marketing in order to know how much a person could be attracted to the particular hotel through digital marketing which is one of the new trends in the world of sales and marketing in order to generate a higher revenue: Website designing and development rates the hotel's website on the basis of their up to date trend, inclusion of the social and eco-friendly activities if in case of the 5-star hotel and the implementation of the chatbots and other AI tools on the hotel's website; SEO(Search Engine Optimization), this is basically what link appears on the top of the results when the name of the hotel is searched on the search engine like google over the internet. If the results shown are relevant and reliable and if the results directly lead to the hotel's website and Content marketing, this makes videos for the sake of promotions in order to influence the public to consume their product or service.

The criteria mentioned above all indicate the basic implementation of digital marketing in their business and the investments made in that direction as nothing mentioned above comes at free of cost. The sample taken here might be small in number but all three hotels studied are international hotels. The study shows that none of the hotels have implemented any significant amount of AI in their website for the guests to interact with or for 24/7 customer support.



Shangri-la even didn't participate in implementing the Eco-friendly policy and regulation despite being a five-star hotel which might not

attract some investors in the near future. Two out of the three hotels have very poor SEO which means there are no direct links shown in the results from the Google search, but they all lead to the third-party website like Agoda. This also shows the brands are not that much interested in investing in SEO to get some extra advantage in the market. One of the good things that's been found in the research is that all the hotels have good exposure through Content marketing, which means that the brands are also staying in trend in order to meet the market demand and competition. They are making a good amount of investment in the fields of social media and advertisements.

This study shows the mentality of various hotel brands toward investment in digital marketing. It also shows that hotels in the country have started to adopt modern digital marketing from the easiest ie, to pay out the influencers and promote them as that is the most effective one too. However, the study shows no new method opted by the hotel brands. With the amount of information available in the research, it is assumed that the hotels find the traditional way of marketing like word of mouth more effective and it also makes more sense when they start investing in content marketing because it is as same as the word of mouth but at a different level. (Tamzil Yusuf and Yuliauti Keke, 2023)

So, what will the marketing will look like with the full implementation of Artificial Intelligence and other related technologies? This will be highly personalized and efficient towards the target customers with the assumption that the data of the users are already available. Even if we have the data about the customers it is very challenging for the human to analyze the data to make any related decisions as it would require a huge amount of time and energy into it. However, the RAISA (Robotics, Artificial Intelligence & Service Automation) will be able to achieve the same high level of tailored experience for each and every guest or traveler in an efficient and elegant manner.

Modern digital marketing in the artificially intelligent world could be divided into two major variables Place and Promotions. The variable place will determine the actual place where the marketing activities will be carried out and the second variable promotion will define how the actual marketing could be carried out in order to attain maximum revenue. Under the variable place, there are AI to AI marketing, Meta verse marketing and more are available. Meta verse marketing is basically the virtual world where MR (Mixed Reality) technology is utilized to provide the customer with the immersive experience of the actual product or service. This is the next level of online stores where the online stores are not just projected in the 2-D display but in the virtual 3-D world where the customers could be provided with the best near real-time experience of the product. This is very effective with the mix of AI to AI marketing where the IoT (Internet of Things) could be utilized to increase the return on the investment of the hospitality business. Under the variable promotion, there are various implementation options available some of them are as follows, Marketing Automation and AI Marketing, where there is a set of user information available with the brand in order to push the marketing and promotional advertisements to the right customers at the right time using the AI which will save a lot of time and energy for the human. AI applications and AI Influencers are expected to be adopted by a lot of companies. We have already discussed that the reach to the target customers through influencers is the most effective and efficient manner to market a particular brand to a vast amount of the public. With AI influencers, this will be made even easier and more effective in order to achieve the goal. Smart Destination marketing is a method where the geographical location and the information of the customers are collected in order to understand the preferences of the people in the surroundings which could be utilized to push more relevant advertisements and promotions in that particular area. This could be achieved by the IoT (Internet of Things), Cloud Services, and End-user Internet services. In the near future, real-time data will drive the most efficient and elegant ways to market the product or service in the hospitality industry as each and every individual experience could be tailored to the needs of the individual guests. The evaluation of these solutions will encourage collaboration and data sharing to achieve the best tailored for the individual traveler or guest fit will foster a form of knowledge-driven management associated with the concepts of a learning destination or an innovation- driven learning economy (Seden Dogan and Sinan Baran Bayar, 2023).

While speaking of taking the business to the internet, it is also very important to analyze the performance of the same. Multiple studies conducted on this topic show that the quality of the image used to list the property online will directly affect the sales of the property which means that better the quality of the image will lead to better sales (Schloss & Palmer, 2011; Bauerly & Liu, 2008; Jacobsen & Hofel, 2002). But it does not stop there, the quality of the service that the hotel provides will also affect the sales. A study in West Sulawesi found service quality directly impacts hotel choice, but not necessarily satisfaction. Marketing efforts significantly influence both choice and satisfaction. While service quality doesn't directly boost satisfaction, it indirectly helps by influencing purchase decisions. The study



suggests adjusting marketing messages and service quality to improve both purchase decisions and satisfaction (Abdul Haris, Muhammad Bakri, Maulana, Muhammad Erfan & Muh. Asdar, 2022).

The research done by Joanne Yu, Astrid Dickinger, Kevin Kam Fung So & Roman Egger investigates how CGI influencers convey emotions to their audience, shedding light on the intersection of technology, human behavior, and marketing strategies. It emphasizes the importance of the CASA paradigm, which focuses on the emotional connection between CGI influencers and the public, unlike the traditional CASA paradigm centered on humans and agents. The study highlights the significance of optimizing emotional experiences in computer-mediated communication for influencing viewer reactions in marketing. It identifies specific emotions like surprise, sadness, and disgust, uncovering their effectiveness in different situational contexts. By analyzing facial expressions and muscle movements, the research provides a nuanced understanding of emotional expression beyond overall intensity. Additionally, it contributes to the uncanny valley theory by identifying features of CGI influencers that affect user engagement, thus informing the design of future robotic systems and digital images for social media. Understanding CGI influencers' emotional expressions fosters deeper connections and intimacy in human-to-virtual-agent interactions, enhancing the interpretation and response to emotions in digital interpersonal interactions across various market sectors (Joanne Yu; Astrid Dickinger; Kevin Kam Fung So; Roman Egger, 2024).

Language Models

In recent days, the implementation of AI-based language models in the business in order to help the customers of the business 24/7 is made possible. These will work based on Natural Language Processing (NLP) which combines human advantage and AI. However, these fail to meet the customer's expectations due to the inconsistency caused by the models (Katsiuba Dzmityr; Dolata Mateusz;

Schwabe Gerhard, 2024). The same model is also used in the online feedback responses. When a business is registered online it makes it very easy for the customers to reach out and leave feedback online. This is no exception to the hospitality industry, where any complaint could spread like wildfire which will greatly affect the business. There is going to be a huge number of reviews and feedback on the service or product by the customers. The challenge is how are we going to organize it and give a reasonable reply to all of them. This will build goodwill around the brand just by showing that the customer's opinion and feedback matter to the brand and that it's been valued. The NLP comes in here as going through all the text online and responding will require a large human and time resources. The NLP will be able to learn from the existing data to generate a response for the simple review (Katsiuba et al., 2022).

This could take advantage of the huge datasets like ChatGPT, to make NLP and AI more integrated with the CFM (Customer Feedback Management). ChatGPT-4 is the most advanced language-based model available to use for chatbots, customer service, food and beverage service (order taking), commerce, etc. This basically involves six steps as follows: User input, ChatGPT for hospitality, understanding query, fetching relevant information, Generate response, and User output. There is a wide use of the model if implemented into the existing industry. For example, a tourist is staying in a hotel and he wants to know some of the places nearby to visit as he has some time. Normally the person would approach an actual human in the front office department. The personnel will give out the information that he knows but the downside of this is, that there is a chance that the personnel is not up to date and may miss out on a few important information which is very normal for human beings. But with the implementation of the NLP, like chatGPT, the tourist will be getting up-to-date information which is comparatively more accurate when compared to the human's response. The computer will also be able to give more detailed responses based on the reviews that the previous customers left and convey a better understanding of the destination, price that might require to visit the place, and restaurant on the way in order to reduce the time waste or to even plan a whole trip there and back with expected budgeting instantly which might take a long time for a human and sometimes might not be able to complete it. This is just one of the many tasks that could be performed by models like ChatGPT-4, which will lead a business in the hospitality industry to a whole new level in the future (Abdullah ULKU, 2023).

Customer Mindset and Satisfaction

All the above mentioned implementations of the modern computing an AI are mostly from the perspective of the business and revenue oriented, but the hospitality industry is a lot about the customers, how they feel, are they comfortable, what should be done to make them feel good, etc. This also speaks about the use of robots in service, kitchen, QR payments, menu and the limitations are endless. The real question or challenge here is being the guests/customers really satisfied with the service provided by the Robots, AI and Service Automations(RAISA) or do



the public expect the actual human being to assist them. In order to understand the attitude of the customer towards the implementations of the RAISA in the hospitality industry, there are many research done in the past, but they all contradict with each other as some of the articles concludes that the shift from the traditional to the automated service is happening positively (McCartney and McCartney, 2020) and there are some authors concludes that the implementations of the RAISA is giving a positive outcome among the customers (Borghi and Mariani, 2022; Gretzel and Murphy, 2019). A study that was conducted in china shows that the customers are not only happy with the service provide, but also more likely to revisit the same place again and to recommend the place to others. This positively impacted the customer experience in the restaurant by the RAISA due to the efficient, effective, consistent and more personalized service that was provided (Joanna Santiago; Maria Teresa Borges-Tiago; Flavio Tiago, 2024).

RAISA in the hotel industry is engaged with works like welcoming guests, delivering goods, voice control of smart devices in guest rooms, and many more places. All these implementations are made to reduce the time required to attend to the guests and to increase the efficiency of the work done in the hotels. The main advantage of using the RAISA is the ability of the computer to learn actively with the new and current information that is available. Thus the level of socialization of service robot technology will continue to develop positively in the near future and put forward the automated service presence, shortly ASP. This means the general public will be able to witness an increased number of robots as another social entity. But the cost for implementation of the RAISA is very high with the high maintenance cost in the long run, thus the employer will have to consider these factors as well (Fei Wu; Nadezda Sorokina; Eka Diraksa Putra, 2023)

Now businesses are happening online, for example, the person who is going to visit a country, is going to book a hotel online where the person will be provided with some of the images of the hotel, hotel surroundings, and the rooms. There are studies that show that the images will affect the mindset of the customer on the hotel, but the aesthetics of the image, photo size, hotel entrance, hotel's outside view, photo composition rules, etc are also very important points to understand in the process of understanding the customer (Sergey Kazakov; Pablo Gutiérrez-Rodríguez; Orlando Lima Rua, 2023).

Consumers are largely influenced by social media, from where they are gathering their first information and concept of the product. From here they come to the official websites of the product or the brand in order to understand it more, only from this stage a person be converted to a customer of the brand of product or service. It's all so very important to satisfy the customer as it will not only help the brand to build a good relationship with the customer but there is a high chance of the particular customer to spread a wide word of mouth market. The study shows that people from social media and becoming customers at a later period are more satisfied with the end product or service overall (Muhammad Bilal; Yunfeng Zhang; Shukai Cai; Umair Akram; Alrence Halibas, 2024).

In the pre-internet days, people relied on word of mouth from family members and friends, but in the age of the internet, almost all businesses are carried online as well in order to stay in the race with their competitors. This also gives the consumers i.e., the end users of the product or service the chance to share their experience over the internet and the people who are curious about the same will be able to get their hands on these reviews or thoughts before trying the actual product or service. This has both positive and negative effects on the business as there is a high chance of a negative review going viral on the internet which could even bring the business significantly low. Let us not forget that there is no need to use or try the product or service before writing the review online, which means that there is a high chance of a bunch of fake negative reviews about the brand. But there is a need to worry as there are a few language models available that are implemented for analysis, sorting, replying, and more of the guest reviews and complaints online. Few researches are carried out to find fake reviews on the internet with the help of machine learning and artificial intelligence (Shruti Meenakshi & Sheryl F. Kline, 2023).

Tourism

The other form of computers is Robots and this is implemented in multiple segments of the hospitality industry as the robots could be programmed individually to cater to the needs. One of the most effective and beneficial segments of the hospitality industry is the tourism industry. The tourism industry is already ahead in the game by implementing robots in the actual field even though they might be in the testing and developing stage, the industry is way ahead in the race of computerizing the functionality of the industry. Implementations of robots like Pepper in the museum, where the robot is trained to act as the guide in the museum and most of the visitors in the museum find it very informative and satisfactory and often likely to act as the human being as it has the abilities like Facial recognition,



voice input and touch inputs for the input to the robots and a display for the output. The visitors feel very close to human-like interaction with this robot (Vásquez & Matía, 2020).

Yes, this comes at a cost, the impact of the robots in the tourism industry as tour guides is not affecting any actual tour guides immediately but there might be a notable impact on the job opportunities in the near future soon after the application of the robot tour guides in the tourist destinations (Nazlı, 2020). But there are two other opinions the robots will take the jobs of tour guides (Bose, 2022; Webster & Ivanov, 2022; Samala, 2020) and the robots will not be able to take the human job as tour guides at any tourist destination (Sotohy, 2020).

But there is a good reason that is observed around us when traveling as a tourist, that while traveling in the early days of the internet or before that, the tourist will depend on the travel agency or the tour operator completely for the traveling and shopping which will let the tour agency to cross-sell some of their travel packages which lead for them to generate more revenue. But after the adaptation of individuals to the smartphones and internet, all the information is available readymade for the tourist to take note of which allowed them to go alone while traveling and a few were able to travel without any help from the travel agency side for the whole trip known as self-guided trips which lead to the difficulties for the tour operators or the tour agency to sell additional tour packages to their customers. This might not affect the income from the tourists and travelers in a huge number but the fact that it affected the revenue from the industry, and the case might stay the same with the implementations of robots as the tour guides where it could be reduced by adapting to the informative technology that is available to the guides in order to protect their profession (Oyku Demir; Ahmet Vatan, 2024).

While speaking of tourism, the experience of the travelers is what the travelers are paying for. This could not be replaced with computers and software, but this could be marketed using current technologies like VR (Virtual Reality), AR(Augmented Reality), and MR(Mixed Reality) as they are getting popular in recent days (Hyunsu Kim; Jing Li; Kevin Kam Fung So, 2024). This will create an idea about the destinations in the minds of the travelers before even visiting the destination for the first time. Marketing the destination in the MR-world, and giving out the zest of experience of the destination to the travelers are some of the potential ways to push the revenue of the travel agency or travel planners.

Facial recognition is one of the most advanced and important elements in the field of Artificial Intelligence and Machine Learning, where the machines will be trained with a number of images and will be able to recognize the image by categorizing, mapping, grouping and detecting the elements present in the images provided. This technology could be implemented in the field of tourism which will be able to provide the travelers with more personalized service like suggesting a new location after going through the history and other data about the traveler. Of course this comes with some potential security threats to the data that we are going to provide to the machine and software (Shivam Gupta; Sachin Modgil; Choong-Ki Lee; Uthayasankar Sivarajah, 2023).

The hospitality industry is very vast and wide where there are dedicated institutes to provide the needs and to fulfill the demands of the industry. This might be the last place where computers might take place in the entire industry due to the cost to be implementing the technology. For now, the generative text is the most suitable example for the implementation of AI in hospitality education. There are many advantages as well as disadvantages in this. But the fact is there is a high chance of malpractice taking place in the assignments is also possible, yet, this is a highly welcomed innovation in the field of hospitality education. Let us not forget that these education institutes are providing the manpower with a high level of skill set and knowledge to the industry (Nouran M Radwan, 2024)

CONCLUSION

At this time, the implementation of AI and other advanced and modern computing are some of the expensive methods of developing the business. Luxury tourism brands and luxury hotel brands are most expected to implement the technologies in the business in order to create a competitive market. On the other hand, educational institutions are expected to be last to implement the same into their operations due to their low revenue nature in general (Anette Snall, 2023). The transition of the small- scale and medium-scale brands in the industry might not be able to adapt to the technologies like the large luxury brands can but they show progress in the same by adapting the ready-to-use technologies just like they are doing currently (Xiyan Ka; Tianyu Ying; Jingyi Tang, 2023).

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