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The Impact of AI Applications (Virtual Reality and Augmented Reality) in the Hospitality Industry: Opportunities and Challenges

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Abstract

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This study aims to explore the opportunities and challenges associated with artificial intelligence (AI) applications in the hospitality industry, especially virtual and augmented reality applications, especially in the upcoming Fourth Generation Cities. Utilizing an exploratory qualitative methodology, semi-structured interviews were conducted with 21 stakeholders. Data collection occurred from January to March 2024 through various mediums, and analysis involved open and axial coding techniques. Findings highlight the transformative potential of AI, VR, and AR technologies in hospitality training, emphasizing enhanced safety, improved learning outcomes, and immersive experiences. Opportunities exist for marketing, skill development, and academic integration. However, challenges include acceptance, implementation, and cost considerations. Despite challenges, AI applications present significant opportunities for the hospitality industry. Future research should focus on scalability, partnerships, and technology adoption strategies to maximize benefits. This study provides insights for industry stakeholders navigating the complexities of AI in hospitality.

1. Introduction

The hospitality industry stands at the forefront of innovation, continually evolving to meet the dynamic demands of modern travelers. Artificial intelligence (AI) has sparked transformative changes across various sectors in recent years, and the hospitality industry is no exception. AI applications, including virtual reality (VR) and augmented reality (AR), offer unprecedented opportunities to enhance guest experiences, streamline operations, and revolutionize employee training. As cities transition into fourth-generation urban centers, characterized by their heavy reliance on advanced technologies and their capacity to accommodate vast numbers of hotels, resorts, and tourist destinations, the need for a skilled workforce equipped with the latest technological competencies becomes increasingly imperative (Martinez , & Mazas (2022)). This shift presents challenges and opportunities for the hospitality industry as stakeholders navigate the complexities of integrating AI technologies into their operations while striving to maintain exceptional service standards.

This research explores the impact of AI applications, particularly VR and AR, in the hospitality industry within fourth-generation cities. By examining the opportunities and

challenges associated with adopting AI technologies, this study seeks to shed light on the role of AI in shaping the future of hospitality and tourism.

Through in-depth interviews with key industry stakeholders, including human resources managers, AI developers, and expert designers in VR stimulations, valuable insights are gathered regarding the current landscape of AI adoption, the perceived benefits of AI applications, and the barriers to implementation. Additionally, this research will investigate the role of training programs in preparing hospitality professionals for the digital era and explore strategies for overcoming challenges related to cost, cultural acceptance, and workforce readiness (Touni,2020 & Magdy). By elucidating the opportunities presented by AI technologies and addressing the challenges hindering their widespread adoption, this study provides actionable recommendations for industry stakeholders seeking to leverage AI to enhance guest experiences, improve operational efficiency, and drive sustainable growth in the hospitality sector. The integration of (AI) applications, such as (VR) and (AR), into the hospitality industry presents a complex set of challenges and opportunities (Abass et al 2023). While AI technologies hold the potential to revolutionize guest experiences, streamline operations, and improve workforce efficiency, their adoption in the context of fourth-generation cities poses unique obstacles (Hassan,2022). The research problem lies in understanding the extent to which AI technologies are being embraced by the hospitality industry in these urban centers and identifying the key challenges hindering their implementation.

The study seeks to determine the overall impact of virtual reality as a training tool, considering its challenges and opportunities. This includes evaluating how VR can enhance training effectiveness and identifying potential drawbacks.

The study will highlight the specific challenges faced by hotel management in implementing virtual reality technologies.

Research Problem

The research seeks to address the following questions:

- What is the reality of developers and academics using and applying Artificial Intelligence (VR) as a training tool?
- What challenges are faced in applying Artificial Intelligence (virtual and augmented reality) in the hospitality industry?
- What opportunities do AI technologies present to enhance guest experiences, improve operational efficiency, and drive innovation in the hospitality sector?
- How can industry stakeholders overcome the barriers to AI adoption and leverage these technologies effectively to achieve their business objectives?

Research Objectives

The objectives of the current research are:

- To determine the extent to which artificial intelligence (AI) applications, including virtual reality (VR) and augmented reality (AR), are currently being utilized within the hospitality industry.
- To Identify and analyze the main challenges hospitality stakeholders face in adopting and integrating AI technologies into their operations, including cost considerations, cultural acceptance, and workforce readiness.

- To explore future artificial intelligence applications and virtual reality services in the tourism and hospitality industry.
- To investigate the opportunities presented by AI technologies for enhancing guest experiences, improving operational efficiency, and driving innovation in the hospitality sector within fourth-generation cities.
- To develop practical recommendations for industry stakeholders on overcoming barriers to AI adoption and leveraging these technologies effectively to achieve their business objectives in the context of fourth-generation urban centers.

Research Hypothesis

Hypothesis 1: There is a positive relationship between the level of AI adoption and the degree of technological advancement in fourth-generation cities within the hospitality industry.

Hypothesis 2: Challenges related to cost, cultural acceptance, and workforce readiness significantly hinder the adoption of AI technologies in hospitality operations in fourth-generation cities.

Hypothesis 3: AI technologies offer substantial opportunities to enhance guest experiences, improve operational efficiency, and drive innovation in the hospitality sector within fourth-generation urban centers.

2. Literature Reviews

2.1 Virtual Reality (VR)

Virtual reality is an interactive and immersive experience created by a computer to simulate a real or imagined environment, enabling physical presence to allow interaction. This electronic simulation of environments is typically experienced through goggles connected to a computer by a cable. It is important to note that, in this case, technology replaces the environment with a digital one, isolating the user's vision and hearing, thus immersing them in a virtual world. (VR) and (AR), along with Big Data (BD) and (AI), are used as educational tools to help visitors explore new worlds initially and then transition to the knowledge economy and link with modern technology used as tools for training applications, thereby enabling investment institutions to generate profits as previously mentioned. (Ma'rafei , 2023; Mitaskills , 2023).

2.2 Augmented Reality (AR)

Augmented reality is a "real interactive experience." The real-world environment where objects in the real world are enhanced by computer-generated "perceptual information," sometimes across multiple sensory modes, including visual and auditory. When augmented reality is combined with virtual reality, we speak of mixed reality (MR), which is "the merging of real and virtual worlds" to generate new environments where physical and artificial objects coexist and interact. While virtual reality users are fully immersed and require specialized equipment (VR goggles and headsets or head-mounted displays/HMD) to stimulate their senses in an artificially generated three-dimensional reality, augmented reality occurs in the regular physical environment with only digital elements imposed on the actual surroundings. Although virtual and augmented reality are often examined together due to their shared technology, from the consumer and company perspectives, each has its advantages, disadvantages, and distinct applications, so they are presented separately. (Grabowski 2020; Koo et al 2021).

2.3 Virtual and Augmented Reality in the Hospitality Industry

Virtual reality technology has become highly popular in tourism, particularly at the destination level. It is a promotional tool to attract potential tourists by showcasing their experiences and interesting attractions, stimulating their senses, and encouraging them to travel and have an immediate real experience (Hassan, 2022; Mourtzis, 2023). Similarly, virtual reality is utilized by tour operators and travel agents to inspire their clients by giving them a preview of their planned destinations and what to expect upon arrival. Hotels and other lodging establishments and tourist attractions can have virtual reality tours or become part of tours offered by other companies, allowing potential customers to preview specific rooms and amenities and make bookings. Some companies specialize in providing virtual reality tours and experiences only, without any actual travel. Virtual reality is an entertaining and educational element in museums or other attractions that complements the main product. (Fan & Wang, 2012).

2.4 The Evolution of the Use of Information and Communication Technology in the Tourism and Hospitality Industry

AI consists of two components: artificial, referring to something created by humans, and intelligent, referring to the capacity to think. Thus, AI is defined as a form of thinking power humans create (Limna et al., 2021). AI effectively simulates human intelligence processes through computer systems (Wang et al., 2020) and is highly effective in performing specific tasks. It also transforms nearly every sector of a nation's economy by enabling computers to assist in making sound decisions that lead to more efficient operations (Holzinger et al., 2021; Kumar et al., 2021). Additionally, AI enables people to work smarter, leading to better business outcomes. However, it also requires developing new skills and capabilities ranging from technological expertise to social and emotional skills and creative abilities (Ivanov & Webster, 2019; Ruel & Njoku, 2021).

Web 4.0 primarily transforms production through technology, AI, simulation, IoT, cloud computing, cybersecurity, augmented reality, AI analytics, and other IT communication systems. Fourth-generation technologies enable a symbiotic interaction between humans and living and non-living machines, establishing faster and more intuitive methods for transmitting and sharing information. It has been applied in the museum sector, handicrafts, and for visitors using IT to enable accessible human-style conversations. Every automation technology has advantages and disadvantages, so TTH companies need to perform a cost-benefit analysis before deciding on investments in automation (Ivanov & Webster, 2018; Ivanov et al., 2022; Martínez & Mazas, 2022).

Limna,(2021) Al-sami et al. (2021) mentioned that the hospitality industry's adoption of advanced technology and high-level AI systems provides excellent opportunities for improving marketing, customer service, customer experience, and retention. The study recommended maximizing the use of AI applications to attain maximum economic benefits. In hotels, AI has been integrated into advanced sensing systems and comprehensive service delivery systems, including features like pre-arrival room temperature adjustment and lighting sensing. These implementations have resulted in cost savings and resource preservation. Consequently, hotel management is encouraged to adopt such systems, despite the perceived initial luxury expenses, due to their long-term profitability (Foxn,2012).

2.5 Disadvantages of Virtual Reality

The most known disadvantage about Virtual reality is that it's an expensive investment. Developing a virtual reality application can cost tens of thousands of euros. It also requires regular updates and specific skills to maintain, increasing costs. Virtual reality also requires

special equipment (Jose,2022). As with virtual reality, developing and maintaining augmented reality applications can be costly, especially for small lodging establishments or food and beverage outlets. However, it is more suitable for large hotels or chains of hotels/restaurants, destinations, museums, exhibitions, or amusement parks Martínez & Mazas (2022). Another drawback in virtual reality is Protective goggles, VR headsets, or head-mounted displays (HMD) incur additional purchase and maintenance costs. Therefore, virtual reality may not be suitable for small, individual properties. Adding that Virtual reality tours are not yet suitable for group use, as the number of VR headsets sold globally is still low, although it is increasing. Lastly, it is inconvenient for users to stay long with VR headsets. Coccia (2015).

2.6 Advantages of Applying Artificial Intelligence

Considering the advantages of AI programs is that they can find solutions even when full information is not available at the time required, and the lack of complete information leads to less realistic or credible conclusions. Naik & Daptardar (2019). The use of intelligence in solving problems presented with the absence of complete information. Also, the ability to think, perceive, acquire, apply knowledge, learn, and understand from past experiences and the capability to improve performance. Adding to the advantages, the ability to use trial and error to explore different matters, to quickly respond to new situations and conditions, to deal with difficult and complex situations, and the possibility of representing knowledge and the ability for reasoning. Contributing to the virtual reality by preserving human expertise by transferring it to databases. Additionally, costs can be reduced by transitioning to artificial intelligence, speeding up response time, and saving time (see figure 1). Lastly, diagnosing and treating various problems in a timely and brief manner. (Hassan, 2022).

From the above, it can be concluded that the benefits of applying artificial intelligence can be one of the most important supporting points for the application and use of virtual reality in training within human resource management in the hospitality industry agreed with (Yasin et al 2022).



Figure (1) :Photos About the Usage of VR Technology for Training Students or employees

Source: photos are Generated Using AI.

2.7. Investing in AI Applications

Despite the limited number of studies conducted on artificial intelligence in the hotel industry, such as by Ivanov and Webster (2017), and Tussyadiah and Park (2018), most of the focus has been on the adoption of AI and the description of the future industry rather than providing a clear understanding of how AI technologies are used in hotels and their impact on various aspects of hotel services.

Additionally, some studies highlight a close relationship between research and development efforts and the development of information and communication technologies, which facilitates economic growth (Nair et al., 2020; Ivanov et al., 2023). Investment in innovation often requires prior investments in technology, paving the way for R&D activities

within the company, improving outcomes, and generating additional value for the business (Bardhan et al., 2013) (Mohamad et al., 2017).

In this regard, Coccia (2015) explains that the decision to invest in Research and Development management (R&D) often indicates the development of new technologies or intermediate solutions somewhere between old and new technological achievements. In this way, as previously mentioned by Brian et al, (2007) and Kenny & Dutt (2022), the company can improve product development costs and effectively respond to market changes and needs.

Investment in R&D generates a greater impact on technology companies than other industries. Much research has been conducted on R&D carried out by IT and communication technology companies, focusing mainly on the impact it has on productivity (Koutroumpis et al., 2020) and business performance (Koutroumpis et al., 2020; Hunady et al., 2020) This approach allows for better development of a technological product, which can be used on a large scale due to a better understanding of its application and reduced user cost. Furthermore, ongoing R&D efforts foster technological change and its widespread adoption. Considering this, R&D is the initial stage of the technology lifecycle, involving high risks and costs. When the technological solution is reasonably successful and marketed, the initial costs will be recouped, and later, during the maturity phase, higher profits will be realized.

According to Klaus (2016), if technology progresses and is effectively utilized, it can generate significant economic prospects and improved business practices, ushering in new sectors and higher-quality employment opportunities. He further emphasized that skills such as creativity, decision-making, technical proficiency, and proficiency in information and communication technologies will soon become highly valued by employers. Additionally, IT, communication technologies, big data, and cybersecurity professions will emerge as the predominant occupations in advanced economies' labor markets. It is likely that professions that significantly benefit from human skills, such as customer service workers, sales and marketing professionals, training and development, human resources and organizational development specialists, and innovation managers, will grow. New skills required by IT will demand changes in educational profiles and education and training policies by incorporating robotics into their programs. (Saura et al., 2021; Fadila, 2023).

2.8 The Impact of Technology on Changing the Nature of Potential Jobs

Klaus (2016) and The Riyadh Economic Report 2019 reported that many jobs will be created in the coming era due to the entry of technical, social, and cultural factors. The "Future Jobs 2040" report by the Future Foresight Foundation in Abu Dhabi highlights several fields where numerous jobs will become available:

- Human-augmented intelligence systems (AI-enhanced trainers and supervisors, writers, accountants - experts in cybersecurity, AI specialists).
- Mixed/Hybrid/Blended Reality (travel agents relying on mixed reality, therapists, supervisors, and trainers using mixed reality - game designers and film producers depending on mixed reality).
- Internet of Things (IoT) Technology (specialists in newly developed devices operating on the IoT principle —designers of smart buildings working according to the IoT principle).

The Riyadh Economic Forum 2019 report also discusses smart learning activities and job creation:

- Designers of interactive interfaces for AI-based teaching systems - developers of AI-based educational programs - engineers of smart teaching systems based on AI.
- Technicians for repairing and maintaining AI-based smart teaching systems.
- Educational trainers working on AI educational systems.
- Develop personal skills enhanced by AI and personal monitors for life enhanced by AI systems and developers of smart educational processes.

3.Methodology of the Study

This study is exploratory; hence, a Deductive method is most suited. The researcher chose the qualitative method based on interviews because it can provide a comprehensive understanding of the participant's experience, perspectives, and information about the benefits of AI (VR) fields and applications in the areas of human resources training in the hospitality industry. The qualitative technique effectively gathered large data on the study topic and responded to the research questions. When examining, describing, or explaining anything is the primary goal, qualitative research is usually acceptable (Leavy, 2017).

Interviews with human resources managers, developers in artificial intelligence companies, and field interviews during several conferences, including those with the director of the Coursera platform, Oculus for Business, and the human resources manager at Marriott and Ritz Carlton hotels NEOM University for Artificial Intelligence, developers of the largest artificial intelligence companies. (Taylor et al., 2016).

Data Collection

Data was gathered using the qualitative technique by conducting semi-structured interviews with 21 participants from January to March 2024, in-person, over the phone, or online (using Zoom Cloud Meetings) until data saturation was reached. The "saturation" process, which is the point at which more interviews stop revealing new themes, insights, or theoretical categories, may be used in grounded theory research to calculate the sample size. In this case, the analysis and sampling processes are intertwined. A sample size of 21 would be considered extremely large and good for quantitative research. Most respondents have worked as developers in artificial intelligence businesses and human resources trainers in the hospitality sector; purposeful sampling was employed in this process (see Table1). Purposive sampling is crucial when a researcher wishes to develop something that is rarely mentioned, demonstrate phenomena, or construct a historical reality. The primary component of purposive sampling is the researcher's judgment of who can contribute the most knowledge to support the study's goals (Kumar, 2014).

Data Analysis

The interview data was analyzed using deductive qualitative analysis, which involved data definition, coding, and reduction coupled under related order themes. The transcription process includes information on recording and transcribing interviews. All interviews were done, recorded, and completely transcribed. The data was analyzed using both axial and open coding. The features and dimensions of the dataset's ideas were specified using open coding. Axial coding was used to identify the optimum category and topic and connect concepts and categories. Certain codes were generated during and after data processing, while others were deleted. Some data points were captured, while others were deemed more appropriate for a

different topic than the originally assigned one. Finally, the interviewees' exact comments are interpreted analytically.

Table (1): Interviewees' profile

Coding Number	Position and (company)	Practical field	Number of interviews
C-1	consultant (THINKMDIX)	Digital Health.	1
C-2	"Rodrigo Cerqueira" is a Brazilian VR director.	Film director in 2015.	2
C-3	"Jeff Maggioncalda" chief Executive officer.	Coursera (CEO) A worldwide educational platform.	2
C-4	TECHNOLOGY CONTROL COMPANY(TCC).	Cyber-security, technology control, and provision of digital services and solutions.	4
C-5	Director of an academic institution, TUWAIQ ACADEMY.	Technology training - acquiring specialized skills in the labor market (technology, programming, cyber-security - artificial intelligence - virtual world).	4
C-6	<ul style="list-style-type: none"> The Ritz-Carlton-Marriott Relationship Manager Oculus for Business(Assistant Manager). 	Hospitality.	2
C-7	Program developer.	(KAPSARC) King Abdullah petroleum studies and research center.	1
C-8	Teaching in the academic field.	NEOM- education research and innovation.	3
C-9	Sponsor SDAIA.	Saudi and AI authority.	1
C-10	Sponsor Aramco constitution.	Petrol company.	1

Findings

As shown in Table (1), personal interviews were conducted with several IT managers and IT assistant managers who are marketers, developers, and service providers through VR as the best-qualified AI employees to answer questions about VR applications as a training tool.

The study collected data from 21 IT managers and IT assistant managers who are marketers, developers, and service providers through virtual reality as the best-qualified employees in artificial intelligence to answer questions about the applications of virtual reality as a training tool, the possibilities and conditions for applying VR technologies, and the advantages and disadvantages of such new technologies. This study shows the usage of VR technology from developers' perspective. Participants were mostly male (90%), and the majority were IT managers (70%). They had over ten years of experience in the position (65%).

The researcher also tried many realistic experiments during conferences, including using glasses to apply virtual reality in training, confirming the use and spread of virtual reality glasses soon.

1. To what extent is it possible to apply and spread AI technology, especially VR, in all fields?

All the interviewees (C-1 to C-10) pointed out that *“relying on AI has become an urgent necessity on which the extent of progress and development depends, and we cannot go back. We have no choice but to accept change because it is an inevitable change regarding VR technology. They emphasized that since COVID-19, technology has become commonplace and an alternative solution to many problems, especially using virtual reality glasses (considered one of the virtual training tools)”*.

- One of the professors (C-8) at NEOM University stated, *“AI and VR technology is being relied upon in training in a major way.”*

2. To what extent is virtual training possible in the field of training in general and in the field of tourism and hotels in particular?

- (C-1, C-2, C-6, C-10) confirmed that *“the use of VR is being applied in many areas, especially those characterized by high risks, such as Aramco Constitution, which has used VR (virtual reality) and AR (augmented reality) to enhance employee safety and training programs using specialized digital helmets and helps reduce risks.”*
- (C-2), *“finding it challenging to apply it to human fields like heavy industries, petroleum, and medical. They affirmed that training involves using virtual reality to promote tourism and antiquities”*.
- (C-3), *“It achieved amazing and unprecedented success by the organizing countries, in addition to the use of major tourism companies to market the tourism product through the realistic experience of hotel service and hotel locations.”*
- (C-6), Director of Relations at the Ritz-Carlton Hotel, confirmed that *“the management of the Movenpick Hotels Company, since 2012, has held meetings for managers through virtual reality, and virtual training is applied in the company’s chains”*.
- C-6, Oculus for Business Marketers reports that *“major universities worldwide promote virtual reality learning and development. Employees and a human resources manager were taught how Hilton employs virtual reality training scenarios and Oculus for Business to assist corporate teams in comprehending the nuances of working in a hotel, allowing them to develop empathy for hotel team members and guests. Hilton employees use Oculus headsets and complete a series of modules demonstrating hotel operations’ intricacy and efficiency, such as putting up room service trays, cleaning a guest room, and checking in visitors. The firm director stated that by employing Oculus for Business, Hilton can quickly grow virtual reality”*.

3. What is required to implement training through (VR)?

(C-2, C-5, C-7), stated that *“preparing a place equipped with VR glasses necessitates preparing the required training program through the hotel’s training director and presenting the program to the producer at the development companies to create and produce a scenario through the company, during which the trainee interacts in the virtual work environment and trains at any time using the glasses. The experiment was previously accomplished but with a pre-planned training program and Apple spectacles. He noted that it is conceivable and vital that the trainee may be observed via the program, and the program offers a particular signal to seek the remedy of the bad condition, that is, it is possible to assess.”*

4. What is the estimated cost of preparing training programs?

(C-5, C-7, C-2), specialists in VR training development programs acknowledged that *“the expenses are just in the beginning, but there are no charges in the long run save for development or maintenance, which has become affordable. The expense for big corporations is cheap owing to the ability to use VR training in all their hotels and the assurance of performance and standardization. The creators also stated that it is clear that as demand rises, so will production of glasses, resulting in a price fall shortly”*.

5. What benefit does the trainee achieve by using (VR)?

(C-6, C-8, C-10) indicated that *“training through a virtual reality environment generates the highest learning rate utilizing VR glasses since it is more effective, according to Schuur et al. (2021), in addition to providing them confidence—the test At the same time, the application lowers the dangers that are likely to be encountered during real-life training, such as exposure to culinary hazards, and client-facing experience in F&B”*.

6. What about the maintenance and security of training programs?

(C-7, C-4), one of the developer companies, confirmed that *“most hotels currently rely on (AI) systems and have cyber-security systems, which is considered part of the systems and does not require additional cost, only maintenance, in addition to the widespread of maintenance and development companies.”*

7. Is it possible to prepare and develop skills related to AI and VR technology for graduates and academic programs in colleges, as well as programs in tourism and hotel colleges?

(C-3, C-5, C-8), including one of the speakers on the Coursera platform at the Human Resources Development Initiative conference, stated in an interview that *“the experience can be generalized through the Coursera training platform, that it is a fantastic opportunity, and that it is currently being implemented on the Coursera platform. He stated that the concept is not popular among small and medium-sized firms, and he emphasized the need to collaborate with colleges to help gain current skills via the Coursera platform as a worldwide platform”*.

8. What is the extent of the impact of applying artificial intelligence (AI) and virtual reality (VR) to the recruitment of human resources specialists?

(C-5, C-3) Moreover, developer businesses claim that *“employment will be generated, necessitating a shift in work standards to train employees with AI and VR capabilities for job survival and continuity.”*

9. What are the effects of using artificial intelligence (virtual reality) in training?

All the interviewees (C-1 to C-10) agreed that *“there are no psychological or health risks to users of virtual reality glasses in training, given that the devices surround us all the time, and that the trainee’s exposure to any risks while wearing VR glasses does not exceed a few hours.”*

10. What are the challenges facing the application of artificial intelligence (virtual and augmented reality) in the hospitality industry?

All the interviewees (C-1 to C-10) and providers of AI and VR technology services stated that *“there are no difficulties except in marketing, accepting the idea, and introducing the services that can be provided, and this is achieved through conferences and exhibitions.”*

Discussion

Hotels have used AI and VR for training and personal interviews, but this has not been widely adopted due to limited knowledge of the technology. However, with more hotel departments, it may gain popularity. He mentioned that one of the essential soft skills training programs that can be supplied by (AI) and (VR) is diversity-communication-management-leadership-customer service seals and that (AI) can deliver many training programs totally and safely. Topics for complete (AI) and (VR) training.

Regarding the challenges identified in previous research studies (Touni, 2020 & Magdy), including skilled labor shortages, maintenance, infrastructure, and rising costs, the study anticipates an abundance of skilled labor in AI in the coming years, leading to reduced system maintenance development costs (Yasin et al 2022). Additionally, the study indicates the proliferation of AI technology developers worldwide through interviews. These companies seek to promote their products, whether manufacturers or producers, indicating a potential cost reduction due to increased demand, particularly after the COVID-19 crisis and the surge in AI. Furthermore, the Ministry of Communications has focused on technological infrastructure, progress, and development in fourth-generation cities. This has become a reality, confirming a decline in negative challenges in AI advancement.

Conclusion

The hospitality industry in fourth-generation cities faces various challenges and opportunities regarding the implementation of artificial intelligence (AI) applications, including virtual reality (VR) and augmented reality (AR). While these challenges may be daunting, significant opportunities exist to enhance tourist experiences and improve operational efficiency. Modern technologies enable the improvement of guest interactions, the development of advanced training programs for employees, and the promotion of innovation in the industry. To seize these opportunities and overcome challenges, hotel companies must invest in educating and training their workforce on modern technology, foster a culture of innovation and experimentation, and establish strategic partnerships with technology providers and educational institutions. By effectively leveraging smart technologies, hotel companies can enhance their competitive advantage and contribute to developing sustainable urban centers that offer unique tourist experiences (Grabowski,2020; Murrone et al,2023; Stanković & Portolan A,2023). In summary, despite the challenges facing the hospitality industry in fourth-generation cities, the opportunities far outweigh the risks. Through innovation adoption and collaboration, stakeholders can realize new potentials and effectively shape the future of hospitality.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are provided for stakeholders in the hospitality industry in fourth-generation cities:

- Hotels should prioritize investing in training programs to effectively equip their workforce with the necessary skills to utilize AI technologies, including VR and AR. This includes technical skills related to operating AI systems and soft skills required for guest interaction and service delivery.
- Establish a culture within the organization that encourages innovation and experimentation with AI technologies. Encourage employees to suggest new ideas and initiatives for implementing AI in various aspects of hospitality operations.
- Forge strategic partnerships with technology providers and educational institutions to access cutting-edge AI solutions and stay abreast of the latest developments in the field.

Collaborating with experts can provide valuable insights and resources for successful AI integration.

- Start with small-scale pilot projects to test the feasibility and effectiveness of AI applications in specific areas of hospitality operations. This allows for iterative improvement and refinement of AI solutions before full-scale implementation.
- Recognize and address cultural barriers that may hinder the adoption of AI technologies. Provide training and education to employees to help them understand the benefits of AI and alleviate concerns about job displacement or technological complexity.
- Stay informed about emerging trends and best practices in AI adoption within the hospitality industry by attending industry conferences, participating in networking events, and engaging with industry associations.
- Evaluate the performance and impact of AI implementations in hospitality operations. Solicit feedback from employees and guests to identify areas for improvement and optimization.

Limitations and Future Research

The study's limitations include a narrow focus on VR and AR applications, potentially overlooking other AI applications, and the reliance on a single perspective, limiting the study's scope. Other AI applications, such as chatbots, predictive analytics, and robotic automation, may have been overlooked. Future research could explore a broader range of AI applications to provide a more comprehensive understanding of their impact on the hospitality sector. The study may have relied on a single perspective, such as interviews with industry professionals or case studies of specific hotels or resorts. This limited perspective may not capture the diverse range of experiences and perspectives within the hospitality industry. Future research could incorporate multiple perspectives, including those of guests, employees, and technology providers, to provide a holistic view of AI adoption in hospitality. Additionally, findings may lack generalizability due to specific contextual factors. Future research could explore a broader range of AI applications, incorporate multiple perspectives, and assess broader implications across diverse contexts. To address these limitations, future research could include longitudinal studies to track AI adoption trends, comparative analysis to identify best practices, user experience studies to optimize usability, exploration of ethical considerations, and investigation of emerging AI trends and innovations to anticipate future developments in the hospitality industry.

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تأثير تطبيق الذكاء الاصطناعي (الواقع الافتراضي والواقع المعزز) الفرص والتحديات في صناعة الضيافة

الفاطمة فتح الله سلامة

قسم إدارة الفنادق - كلية السياحة والفنادق - جامعة المنيا

قسم العلوم الانسانية - الكلية التطبيقية- جامعة الاميرة نورة بنت عبد الرحمن - الرياض - المملكة العربية السعودية.

المعلومات المقالة	الملخص
<p>الكلمات المفتاحية</p> <p>الذكاء الاصطناعي؛ الواقع الافتراضي؛ الوظائف الناشئة؛ مدن الجيل الرابع.</p>	<p>تناقش الدراسة تأثير تطبيقات الذكاء الاصطناعي (AI)، وتحديدًا الواقع الافتراضي (VR) والواقع المعزز (AR)، في صناعة الضيافة، مركزة على الفرص والتحديات، خاصة بعد ازدياد تكنولوجيا ال (4G&5G). وباستخدام منهجية وصفية استكشافية، تم إجراء مقابلات شبه منظمة مع ٢١ من أصحاب الاختصاص، بما في ذلك مديري الموارد البشرية ومطوري الذكاء الاصطناعي وخبراء الصناعة. اعتمدت الدراسة على جمع البيانات في الفترة من يناير إلى مارس ٢٠٢٤ من خلال وسائل مختلفة، وشمل التحليل تقنيات الترميز المفتوحة والمحورية.</p> <p>تسلط النتائج الضوء على الإمكانيات التحويلية لتقنيات الذكاء الاصطناعي والواقع الافتراضي والواقع المعزز في التدريب في صناعة الضيافة، مع التركيز على تعزيز السلامة وتحسين نتائج التعلم والتجارب . توصي الدراسة بأهمية تنمية فرص التسويق من خلال المطورين وتنمية المهارات والتكامل الأكاديمي. ومن ابرز التحديات صعوبة قبول التغيير، وارتفاع التكلفة. و بالرغم من هذه التحديات، توفر تطبيقات الذكاء الاصطناعي فرصًا كبيرة لقطاع الضيافة مثل الكفاءة في التعلم، التدريب في الوقت المناسب للعاملين وتقليل المخاطر. يجب أن تركز الأبحاث المستقبلية على قابلية التوسع والشراكات واستراتيجيات اعتماد التكنولوجيا لتحقيق أقصى قدر من الفوائد. تتيح هذه الدراسة الرؤى للمتعاملين في مجال الضيافة و تقنيات الذكاء الاصطناعي(الواقع الافتراضي والواقع المعزز).</p>

(JAAUTH)
المجلد ٢٧، العدد ١،
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ص ١٠٩-١٢٤.