



## The Application of Artificial Intelligence (Virtual Reality and Augmented Reality) as a Training Tool in the Hospitality Industry

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### Abstract

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Over the past decade, artificial intelligence (AI) has transitioned remarkably from a field of interest predominantly to researchers and specialists in computer science and information technology to a ubiquitous science integral to contemporary life. The investigation focuses on leveraging VR in training programs to augment efficiency and effectiveness of training while also facilitating the creation of innovative roles that align with technological advancements. This study evaluates the deployment of Virtual Reality (VR) as a training mechanism within human resource management to enhance operational efficiencies and to diminish costs in hotel management. To achieve the study's goals, 123 surveys were distributed among staff, hospitality training employees, program developers, and academic professionals between January and March 2024 to identify and provide insights into the positive and negative aspects of VR training to support innovative training methods in the hospitality sector. The findings indicate that significant investments in developing technological and informational infrastructures support adopting VR technology in training contexts. Training through VR is noted to enhance efficiency and effectiveness. The conclusions include recommendations for the practical implementation of VR training in both small and large hotel enterprises and the proposal of sophisticated academic programs at universities and institutions to bolster the application of AI and VR technologies, thereby aligning with future technological advancements and country strategic planning goals.

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### Introduction

The introduction of Artificial Intelligence (AI) into the hospitality industry has compelled professionals within this sector to familiarize themselves with this emergent technology and its applications. Investigative research suggests that young professionals in the hospitality sector have

acknowledged the substantial impact AI could have on the industry and have been actively pursuing training opportunities to equip themselves for upcoming changes (Holzinger et al., 2021). Recent surveys indicate that most people recognize the necessity of promptly engaging in AI training programs and are enthusiastic about acquiring the skills to incorporate AI into their operations. Another study has indicated that hotel managers view a deficiency in knowledge as a significant obstacle to the efficient utilization of AI in the workplace. This underscores the need to incorporate AI-related training into educational curricula (Wang et al., 2020; Ivanov & Webster, 2019; Ruel & Njoku, 2021). Researchers have emphasized the need for training programs that provide practical applications of Augmented Reality Smart Glasses (ARSG) in the hospitality industry in a professionally effective manner (Ruel & Njoku, 2021) to assist them in understanding how AI works with hotel data and interpretation. Furthermore, rapid technological changes demand the development of new training programs and updated content. Advanced computer science and machine learning training should be included in hospitality curricula (salama, 2024). Despite the lack of systematic incorporation of AI training in their curricula, various initiatives have recently emerged to train information specialists on AI-related topics Fadila (2023).

Which led the researcher to the necessity of addressing all parties concerned and interested in the widespread application of artificial intelligence. For the study to be completed in an integrated manner, the researcher conducted the first study to discuss the opportunities and challenges facing artificial intelligence through an in-depth interview with developers. To complete the study, it was necessary to conduct the current study to include a questionnaire with hotel stakeholders and specialists from academics This was confirmed by both (Touni & Magdy, 2020).

Therefore, this research explores the impacts of Virtual Reality technology in the hospitality industry, particularly after the spread of fourth-generation cities that are immersed with high quality smart and sustainable infrastructure in the Arab Republic of Egypt (such as the Administrative Capital and New Alamein) and the Middle East region (including Riyadh, Neom in Saudi Arabia, and Dubai in the UAE) (Bertolini & Episcopo, 2021). AI plays a crucial role in developing these new cities by enhancing performance, effectiveness, sustainability, and quality of life in urban areas (Hussein et al 2021; Hassan, 2022; Murrone et al 2023). For this purpose, the study offers a detailed exploration of the applications of virtual reality, demonstrating its potential advantages for hotel management. It emphasizes its role as an effective educational training tool and underscores its importance in ensuring safety during training sessions.

## **Research Problem**

The hospitality industry needs to innovate in future-thinking skills and how to confront the inevitable change by developing strategies that support coping with skills and requirements of technological advancement and artificial intelligence (Alsharhan et al., 2022; Dutt, 2022; Kenny, 2022). It also involves equipping oneself to leverage advantages and develop inventive solutions, proactively anticipating future changes and advancements in job roles and necessary skills. This entails moving away from a culture that resists change. While studies have explored the progression of AI using VR glasses, The research gap highlights the need to ascertain how virtual reality can be effectively utilized as a training tool in the hospitality industry Ali (2018). As a result, the study tackles this research gap, including one main research question and relevant sub-questions.

1. What is the impact of applying (VR) as a training tool in the hospitality industry?
  - What are the benefits of training through the application of virtual reality?
  - Does virtual reality in training lead to reduced costs and increased efficiency and effectiveness of training operations under modern management contracts?
  - Does the implementation of artificial intelligence and virtual reality lead to a transformation in the roles and quality of traditional jobs into newly emerging roles?

### **Significance of the Research**

- This research emphasizes the potential benefits of AI and virtual reality to the hospitality industry's human resources training sectors. It aims to explore how these technologies can revolutionize training practices by providing immersive and interactive learning experiences.
- This research underscores the significance of virtual reality as a training tool in the hospitality sector. By simulating real-world scenarios, VR provides a risk-free environment for training employees, which can lead to better preparedness and performance.

### **Research Objectives**

The objectives of the current research are:

- To utilize virtual reality to innovate and develop training programs for hotel management, reducing training costs amidst ongoing crises and disasters.
- To increase awareness and facilitate the creation of modern training programs in the hospitality and hotel sectors that keep pace with the development of fourth-generation cities and the applications of augmented and virtual reality.
- To increase the knowledge and skills of trainers and specialists, enabling them to implement AI technology in training applications effectively.
- To provide recommendations on the practicality of virtual reality for training purposes, aiming to enhance its application and maximize its benefits. This includes devising strategies to integrate VR into existing training frameworks effectively and proposing guidelines for its successful deployment.

### **Research Hypothesis**

**Hypothesis 1:** The increasing adoption of artificial intelligence, virtual reality, and augmented reality applications as fundamental pillars in hotel management tourism and Fourth-Generation Cities is anticipated to contribute to the development of the newly designed infrastructure of smart cities, enhance hotel capabilities.

**Hypothesis 2 :** There is a statistically significant impact of the expansion and adoption of AI applications on job creation in the hospitality sector and on the change in job requirements.

**Hypothesis 3:** There is a statistical significance effect of using artificial intelligence and virtual reality as training tools in human resource management, which will improve employee performance and ability to deal with the challenges faced in the application virtual and augmented reality in hotels.

### **Literature reviews**

Over the last decades, numerous institutions have backed investments in research and development. However, the primary challenge lies in these investment entities' capability to strategize endeavors that facilitate contemporary technology's innovation, production, and distribution and foster knowledge dissemination among users. This aligns with the modern management approach, which measures its success by how much knowledge it possesses and its conversion into the knowledge economy (Ivanov et al 2022; Murrioni et al 2023).

Artificial intelligence is the science of creating smart machines that behave as humans are expected to behave. It also studies intellectual capacities using computer models, focusing on simulating human thinking. According to Jain and Aggarwal (2020), artificial intelligence is beneficial because marketers can use it to process big data. Artificial intelligence aims to understand the nature of human intelligence and enable machines to process information, like how humans solve problems, using parallel processing to execute multiple commands simultaneously.

### **Areas of Artificial Intelligence Application:**

Artificial intelligence has been applied in diverse fields, including cognitive science, smart machines, and natural environments. Mentioning Cognitive Science Expert Systems - Learning Systems - Fuzzy Logic – Genetic Algorithms. Smart Machine Applications encompasses Visual Perception, Touch Sensing, Motor Navigation, Neural Networks, Intelligent Agents, and Robotics. Natural Environment Destination Applications include Speech Recognition - Natural Language Processing - Virtual Reality - Augmented Reality. Bergamasco et al. (2012) and Grabowski (2020) mentioned that being in virtual environments, since their first appearance in the 1980s, is based on three main axes for presence: sensory data transmission, environmental navigation, and environment direction. The system can transmit sensory data to the human operator, including visual displays, cameras, and audio feedback incorporating three-dimensional sound objects. Additionally, the capability to navigate the environment by moving sensors using eye movements and visually exploring different perspectives by adjusting head position Fan & Wang (2012).

Directing the environment by comprehending objects, manipulating their spatial positioning and orientations and engaging with the surroundings to create a sense of presence. Sheridan proposed that virtual reality can be achieved by fulfilling these principles and attaining an optimal sense of object presence.

Limna et al. (2021). Davenport et al. (2020) and others recommended that artificial intelligence is expected to significantly impact future marketing strategies, including business models, sales processes, customer choices, and customer behavior. Mentioning Three broad areas to investigate the full scope of artificial intelligence's impact are: How marketing strategies will change, How customer behaviors will change, and Data privacy, bias, and ethics issues. In this research paper, we will explore the importance of using virtual reality in training programs within the hospitality

sector, focusing on the significance, benefits, advantages, and disadvantages of implementing virtual reality in training programs.

### **3.1 Application in the Hospitality and Tourism Industry**

Robots have recently become a significant addition to the tourism and hospitality industry's technological arsenal, as Kumar et al. (2021) outlined. They are typically deployed to automate repetitive, undesirable, tedious, and hazardous tasks such as providing information (e.g., hotel receptionists, hosts in hotels and restaurants, curators, and museum guides). This is one of the most common applications of social robots in the hospitality and tourism sectors. Other tasks include floor or swimming pool cleaning, building disinfection using UV light robots against COVID-19, and item transportation like room service delivery robots and housekeeping Martinez & Mazas (2022) Ivanov & Webster (2017).

### **3.2 Impact of Technological Advancements Using Virtual Reality in the Hospitality Industry**

Marriott launched a leadership training program across 733 hotels in 23 American countries. The training program aims to align goals from the top of the organization and communicate them to colleagues to help enhance managers' performance across hundreds of hotels. Participants are required to complete the training to obtain certification. The Virtual Learning Environment (VLE) includes multilingual capabilities, allowing for the "switching" of names and addresses between multiple languages (Foxen, 2012).

Initially, the program faced challenges in implementing training in secondary and tertiary markets, often requiring attendees to travel by plane or drive for hours to participate. This became logistically difficult and very costly. As a result, Marriott's leaders looked for more efficient ways to implement the program, eventually seeking a platform that included all the necessary functionalities for such virtual remote learning Mitaskills (2023).

There has been an unprecedented surge in VR technology, with major companies like Samsung and LG developing tools such as VR goggles linked to Android devices to maximize efficiency. Moreover, many companies have started creating VR platforms for designing programs focused on soft skills, reducing costs to overcome previous challenges (Alrawadieh & Cetin, 2020). Virtual reality technology has invaded many areas of our lives, enabling online activities virtually without effort or significant costs. VR and augmented reality have provided many services in the field of remote education and training in various ways, making things easier through VR goggles that offer a suitable training environment that takes trainees into a virtual world, allowing them to immerse in the experience (Ma'rafei, 2023) easily. The applications of VR technology are limitless, enabling companies and institutions to conduct all training activities remotely and work on the self-development of employees or workers in the institution, aimed at improving work efficiency through modern technologies that ensure the safety of trainees and lower costs for the company.

### **3.3 Concept of Virtual Training**

Virtual training is an unconventional training system that uses internet sites to deliver information to trainees and benefit from the training process in all its aspects without the need to travel to the training site and without the trainer and trainees being in the same physical space. It achieves three-dimensional interaction (digital training content - trainees - trainer and trainees). It manages the training process in the fastest and least costly manner, providing an exceptional

experience for trainees that combines enjoyment and the maximization of benefits Coursera., (2023).

### **3.4 Virtual Simulation**

Virtual simulation involves interactive computer-based simulations that make the user feel present in the location and actions, supported by artificial feedback for one or more senses, making the user feel immersed in the scene. Virtual reality modelling language transforms three-dimensional computer graphics into virtual environments that can be displayed through various browsers Koo et al (2021).

### **3.5 Benefits of Virtual Reality Training**

Why choose virtual reality for training? According to a Price water house Coopers report, individuals trained in virtual reality absorb materials faster, feel more confident in their skills, and are more emotionally connected to the learning process than traditional classroom or e-learning methods. With Meta skills, you not only learn but also experience Mourtzis (2023).

Many companies have emerged that offer pre-designed and equipped Virtual Reality (VR) training programs tailored to the needs of all companies, regardless of size. These companies are also prepared to develop specialized programs based on the needs of institutions by creating customizable VR training scenarios, opening a world of innovative possibilities Saura et al( 2021).

Martínez & Mazas (2022) reported that, Despite some beliefs that implementing VR training incurs unchecked costs, no specific VR equipment is required. Meta Skills integrates seamlessly with any VR equipment, offers easy VR rental options, and provides a two-dimensional system for laptops and smartphones, ensuring access to diverse training. The tools used in virtual reality allow users to interact with and handle the virtual world. Computers create virtual reality, and other examples of VR input devices include specialized headsets or certain gloves.

To our knowledge, no study has proven any psychological risks to users of these headsets. Some studies (Jose,2022) have mentioned that the only risk to users might be addiction to these headsets and gaming in general, which could cause fatigue, anxiety, and lack of focus, especially with excessive immersion in the virtual world. However, this paper focuses on using virtual reality in training to take advantage of modern technology, ensuring that the trainee does not use the VR headsets for more than two hours at a time, spaced out to prevent any harm, unlike gaming addiction.

### **Benefits of Using Virtual Reality and Augmented Reality in Training:**

The immersion of virtual reality and augmented reality in training has shown significant advantages. The application of these technologies reduced the risks that workers might face, especially in hazardous jobs by providing safe and controlled training scenarios. Using AI technologies. In addition to that, it saves costs on diminishing the occurrence of equipment damage when training people on actual machines. They also enable ability for repeated training without incurring excessive costs. Furthermore, VR and AR contribute to enhance the development and productivity by providing a qualified trained workforce. Lastly, these technologies overcome space limitations and by allowing for training many employees virtually. (Yasin et al 2022., Murronei et al,2023; Salama,2024).



The acknowledged evidence from recent research reveals that the application of artificial intelligence has shown a great impact and demonstrated its potential particularly in the implementation and use of virtual reality for training within human resource management in the hospitality industry agreed with (Stanković & Portolan A,2023) Finally,( Salama,2024 ) it also showed that the integration of artificial intelligence in Fourth-Generation cities, especially in the hospitality sector, has encountered both challenges and opportunities. To overcome these challenges and aim for opportunities, hotel companies must fund in educating and training their employees and workforce by emerging these technologies in training if they want to overcome these difficulties. Also, by the embedding AI to create a culture of innovation and experiments and form strategic partnerships with technology providers and educational institutions. Furthermore, even though hospitality industry faces many of challenges, the opportunities greatly diminished the risks. Using innovation and collaboration, stakeholders can achieve new potentials and effectively shape the future of hospitality.

### Research Methodology

The researcher used the descriptive-analytical approach. The importance of industry is analyzing the benefits of the fields and applications of AI (VR) in the areas of human resources training in the hospitality industry, investigating the challenges facing the application of VR technology in hotel departments, examining the importance of applying VR as a training tool in the hospitality industry, and determining the extent of the impact of applying VR and its positive and negative aspects as a training tool since it is the most appropriate approach to describe the phenomenon in question. In this approach, the researcher is trying to describe the subject of the study, analyze the data, and compare, explain, and assess, hoping to reach meaningful generalizations to increase and enrich knowledge on the subject.

### Data Collection

Data was collected through questionnaires prepared in a way that was relevant to the situation to decrease invalid responses. They were distributed to 123 staff in the information technology field, employees of training in the hospitality industry, program developers, and members teaching in the academic field. Respondents were retrieved from January to March 2024.

### Determining the Population/ Sample

The target population for this study was staff in the information technology field, employees of training in the hospitality industry, program developers, and members teaching in the academic field. The number of study sample is 123. The researcher used the equation of Stephen K. Thompson to calculate the sample size from the next formula:

$$n = \frac{N \times p(1-p)}{\left[ \left[ N - 1 \times \left( d^2 \div z^2 \right) \right] + p(1-p) \right]}$$

Source: (Thompson, 2014)

Where:

- (n) Sample size (123)
- (N) Indicates Population size (180)
- (Z) Confidence level at 95% (standard value of 1.96)
- (d) Error proportion =0.05
- (p) Is the probability 50%.

As a result, a sample of 123 staff in the information technology field, employees of training in the hospitality industry, program developers, and members teaching in the academic field were selected randomly. All the responses were obtained valid.

**Table 1: The effects of using artificial intelligence (VR) in the field of training (Anova)**

**Descriptives**

the effects of using artificial intelligence (VR) in the field of training

|                                      | N   | Mean  | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Minimum | Maximum |
|--------------------------------------|-----|-------|----------------|------------|----------------------------------|-------------|---------|---------|
|                                      |     |       |                |            | Lower Bound                      | Upper Bound |         |         |
| Information technology field         | 9   | 15.33 | 1.000          | .333       | 14.56                            | 16.10       | 14      | 16      |
| Training in the hospitality industry | 36  | 13.25 | 1.903          | .317       | 12.61                            | 13.89       | 9       | 16      |
| Program developer                    | 18  | 15.17 | .707           | .167       | 14.82                            | 15.52       | 14      | 16      |
| Teaching in the academic field       | 60  | 14.00 | 2.725          | .352       | 13.30                            | 14.70       | 7       | 16      |
| Total                                | 123 | 14.05 | 2.293          | .207       | 13.64                            | 14.46       | 7       | 16      |

**Table 2: The effects of using artificial intelligence (VR) in the field of training**

**ANOVA**

the effects of using artificial intelligence (VR) in the field of training

|                | Sum of Squares | df  | Mean Square | F     | Sig. |
|----------------|----------------|-----|-------------|-------|------|
| Between Groups | 60.457         | 3   | 20.152      | 4.126 | .008 |
| Within Groups  | 581.250        | 119 | 4.884       |       |      |
| Total          | 641.707        | 122 |             |       |      |

The highest impact category in order according to Anova analysis:

- Information technology field
- Program developer
- Teaching in the academic field
- Training in the hospitality industry



**Table 3: The effects of using artificial intelligence (VR) in the field of training**

**Multiple Comparisons**

Dependent Variable: the effects of using artificial intelligence (VR) in the field of training

LSD

| (I) Work field                       | (J) Work field                       | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval |             |
|--------------------------------------|--------------------------------------|-----------------------|------------|------|-------------------------|-------------|
|                                      |                                      |                       |            |      | Lower Bound             | Upper Bound |
| Information technology field         | Training in the hospitality industry | 2.083*                | .824       | .013 | .45                     | 3.71        |
|                                      | Program developer                    | .167                  | .902       | .854 | -1.62                   | 1.95        |
|                                      | Teaching in the academic field       | 1.333                 | .790       | .094 | -.23                    | 2.90        |
| Training in the hospitality industry | Information technology field         | -2.083*               | .824       | .013 | -3.71                   | -.45        |
|                                      | Program developer                    | -1.917*               | .638       | .003 | -3.18                   | -.65        |
|                                      | Teaching in the academic field       | -.750                 | .466       | .110 | -1.67                   | .17         |
| Program developer                    | Information technology field         | -.167                 | .902       | .854 | -1.95                   | 1.62        |
|                                      | Training in the hospitality industry | 1.917*                | .638       | .003 | .65                     | 3.18        |
|                                      | Teaching in the academic field       | 1.167                 | .594       | .052 | -.01                    | 2.34        |
| Teaching in the academic field       | Information technology field         | -1.333                | .790       | .094 | -2.90                   | .23         |
|                                      | Training in the hospitality industry | .750                  | .466       | .110 | -.17                    | 1.67        |
|                                      | Program developer                    | -1.167                | .594       | .052 | -2.34                   | .01         |

\*. The mean difference is significant at the 0.05 level.

**Questionnaire Design and Measure**

The research aims to benefit from the application of virtual reality in presenting and developing training programs for hotel departments and reducing training costs in light of successive crises and disasters Hassan (2022). Identify the negative and positive effects resulting from the application of virtual reality in the hotel industry and the challenges facing the application of virtual reality technology in hotel departments. This research employed a descriptive-analytical methodology using a questionnaire tool. A survey consisting of seven sections was used as a data collection tool. The researchers relied on a reference study to develop the questionnaire questions and formulated them to answer the study hypotheses. The first section includes the demographic characteristics of respondents (work field and years of experience in the field). The second section included six variables representing motivation and the advantages of applying artificial intelligence (virtual reality) in training. The third section included four variables representing the disadvantages of applying virtual reality in the field of training in the hospitality industry. The fourth section included four variables representing the effects of using artificial intelligence (virtual reality) in training. The fifth section included four variables representing the benefits of virtual reality training (the psychological factor). The sixth section included seven variables representing challenges facing the application of artificial intelligence (virtual and augmented reality) in the hospitality industry. The seventh section included four variables representing efforts

to develop the technological information infrastructure available in fourth-generation cities. The questionnaire items were anchored according to the four-point Likert scale: "1 I have no idea, "2 = disagree, "3 = neutral, and "4 = agree.

**Data Validity and Reliability**

**Data Validity**

To validate the data collection instrument used in this study in terms of its readability, format, and ability to measure the study’s constructs, the researcher distributed the questionnaire instrument to staff in the information technology, employees of training in the hospitality industry, program developers, and members teaching in the academic field and with those who have specializations and expertise in the field of this study. The questionnaire instrument was then updated and refined to reflect the comments and suggestions received by the domain experts. Moreover, the experts showed interest and interacted with the researcher concerning the questionnaire instrument, which adds to its validity.

**Data Reliability**

Before moving on, the methodology of the reliability testing has been led to ensure uniform measurement across the different items of the questionnaire. In other words, the measure of reliability indicates the stability and uniformity of the tool. Therefore, this method evaluates the reliability by looking at the internal uniformity of the research tool, such as the questions (item) of the questionnaire that are commonly presented. One of the most commonly used metrics to measure the scale's reliability is Cronbach's Alpha. The scale index ranges between 0.0 and 1.0, and the the researcher should aim for a value closer than 1.0, as the Alpha value indicates that the instrument is robust and uniform. However, in social sciences, the threshold value is 0.7.

**Table 4: Cronbach’s Alpha Value**

| Variables                                                                                                             | No. of items | Cronbach’s Alpha | Validity Coefficient* |
|-----------------------------------------------------------------------------------------------------------------------|--------------|------------------|-----------------------|
| Motivation and advantages of applying artificial intelligence (VR) in training.                                       | 6            | 0.766            | 0.875                 |
| The disadvantages of applying virtual reality in the hospitality industry's training field.                           | 4            | 0.752            | 0.867                 |
| The effects of using artificial intelligence (VR) in training.                                                        | 4            | 0.755            | 0.869                 |
| The benefits of virtual reality training (psychological factor).                                                      | 4            | 0.760            | 0.872                 |
| Challenges facing the application of artificial intelligence (VR & AR) in the hospitality industry.                   | 7            | 0.822            | 0.907                 |
| Efforts have been made to develop the technological information infrastructure available in fourth-generation cities. | 4            | 0.790            | 0.889                 |
| <b>Total</b>                                                                                                          | <b>29</b>    | <b>0.840</b>     | <b>0.917</b>          |

\* Validity coefficient =  $\sqrt{\text{Reliability coefficient}}$

To measure the internal consistency and reliability of the study’s constructs, Cronbach’s alpha ( $\alpha$ ) measure was used. The scales’ reliabilities were measured, and the Cronbach’s Alpha of all scales in Table (4) ranged from 0.752 to 0.822. For total questionnaire items, it was (0.840). This indicates an acceptable Cronbach’s Alpha value for each field whenever Cronbach’s Alpha value is acceptable if it is more than (0.7).

**Results and Discussion**

**Descriptive Analysis of Research Variables**

In this section, the researcher relied mainly on descriptive analysis to obtain the means and standard deviations for the study constructs and their items, which were measured using a Likert-type scale.

**First Section: Respondent Demographic Characteristics**

**Table 5: Work Field**

|       |                                      | Frequency  | Percent      |
|-------|--------------------------------------|------------|--------------|
| Valid | Information technology field         | 9          | 7.3          |
|       | Training in the hospitality industry | 36         | 29.3         |
|       | Program developer                    | 18         | 14.6         |
|       | Teaching in the academic field       | 60         | 48.8         |
|       | <b>Total</b>                         | <b>123</b> | <b>100.0</b> |

Table (5) demonstrates the discussion of the research findings and begins with a brief demographic profile of respondents regarding job positions. Most of the respondents were program developers (48.80%), Followed by Training in the hospitality industry (29.30%) of respondents.

**Table 6 : Years of experience in the field**

|       |                      | Frequency  | Percent      |
|-------|----------------------|------------|--------------|
| Valid | Less than five years | 48         | 39.0         |
|       | From 6 to 10 years   | 24         | 19.5         |
|       | From 11 to 15 years  | 18         | 14.6         |
|       | More than 15 years   | 33         | 26.8         |
|       | <b>Total</b>         | <b>123</b> | <b>100.0</b> |

Table (6) describes the years of experience in the study sample: the majority (39%) of the sample spent less than five years, while 26.80% of respondents spent more than 15 years.

**Second section: Motivation and advantages of applying artificial intelligence (virtual reality) in training.**

**Table 7: Motivation and advantages of applying artificial intelligence (VR) in training**

| Variables                                                                                     | Mean        | SD           | Factor loading | Rank     | Attitude      |
|-----------------------------------------------------------------------------------------------|-------------|--------------|----------------|----------|---------------|
| Achieving a competitive advantage for hotel departments by applying virtual reality training. | <b>3.76</b> | <b>.577</b>  | <b>.756</b>    | <b>1</b> | <b>Severe</b> |
| Virtual training (VT) application is more suitable for large and small hotels.                | <b>3.32</b> | <b>1.027</b> | <b>.715</b>    | <b>6</b> | <b>Severe</b> |

|                                                                                                                  |             |      |      |   |               |
|------------------------------------------------------------------------------------------------------------------|-------------|------|------|---|---------------|
| Special scenarios can be developed according to the training topic.                                              | 3.73        | .769 | .799 | 3 | Severe        |
| The risks of virtual training are lower compared to the real-life consequences.                                  | 3.63        | .760 | .703 | 4 | Severe        |
| Increase participation and learning efficiency.                                                                  | 3.76        | .619 | .803 | 2 | Severe        |
| Reducing training costs by applying virtual reality (tools - equipment - materials - logistical transportation). | 3.49        | .944 | .704 | 5 | Severe        |
| <b>Total Mean</b>                                                                                                | <b>3.62</b> |      |      |   | <b>Severe</b> |

Table (7) presents the means and standard deviations of motivation and advantages of applying artificial intelligence (virtual reality) in training, where the means ranged between 3.67 and 3.32 compared with the total instrument mean for the domain (3.62). The item "Achieving a competitive advantage for hotel departments by applying virtual reality training" ranked first with a mean and standard deviation (mean = 3.67, standard deviation = 0.577) compared with the total instrument mean and standard deviation. The item "Virtual training (VT) application is more suitable for large hotels than small hotels" ranked last and reached a mean of (3.32) and a standard deviation of (1.027) compared with the mean and standard deviation of the total instrument.

**Third section: One of the disadvantages of applying virtual reality in the field of training in the hospitality industry**

**Table 8: The disadvantages of applying (VR) in the field of training in the hospitality industry**

| Variables                                                                                              | Mean        | SD    | Factor loading | Rank | Attitude        |
|--------------------------------------------------------------------------------------------------------|-------------|-------|----------------|------|-----------------|
| Virtual Training (VRT) is not suitable for small hotels.                                               | 2.80        | 1.136 | .807           | 3    | Moderate        |
| Human resources such as the training director, supervisor, and specialist are expected to be laid off. | 2.90        | .936  | .748           | 2    | Moderate        |
| High costs of tools and glasses used in virtual reality training.                                      | 3.27        | 1.017 | .665           | 1    | Severe          |
| The presence of psychological dangers to users of virtual reality glasses in training.                 | 2.66        | 1.122 | .728           | 4    | Moderate        |
| <b>Total Mean</b>                                                                                      | <b>2.91</b> |       |                |      | <b>Moderate</b> |

The table clarifies the disadvantages of applying virtual reality in the field of training in the hospitality industry. The most common items are "high costs of tools and glasses used in virtual reality training," "it is expected that human resources such as the training director, training supervisor, and training specialist will be laid off," and "virtual training (VRT) is not suitable for small hotels," with a mean of 3.27, 2.90, and 2.80, respectively.

**Fourth section: The effects of using artificial intelligence (VR) in the field of training****Table 9: The effects of using artificial intelligence (VR) in the field of training**

| Variables                                                                                                                                         | Mean        | SD   | Factor loading | Rank | Attitude      |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------|----------------|------|---------------|
| New jobs can be established in artificial intelligence (Independent trainers and supervisors enhanced with artificial intelligence capabilities). | 3.56        | .888 | .789           | 1    | Severe        |
| Resistance and rejection of change are expected from human cadres within hotels.                                                                  | 3.49        | .862 | .775           | 4    | Severe        |
| Technology-related costs are expected to decrease over the next five years.                                                                       | 3.51        | .862 | .776           | 2    | Severe        |
| The competition factor between these companies, such as Samsung, LG, and Apple, affects cost reduction and product development.                   | 3.49        | .890 | .753           | 3    | Severe        |
| <b>Total Mean</b>                                                                                                                                 | <b>3.51</b> |      |                |      | <b>Severe</b> |

Table (9) presents the means and standard deviations of the effects of using artificial intelligence (virtual reality) in the field of training, where the means ranged between 3.56 and 3.49 compared with the total instrument mean for the domain (3.51). The item "New jobs can be established in the field of artificial intelligence (Independent trainers and supervisors enhanced with artificial intelligence capabilities)" ranked first with a mean and standard deviation ( $M = 3.56$ ,  $SD = 0.888$ ). The item "Resistance and rejection of change is expected for human cadres within hotels." ranked last and reached a mean of (3.56) and a standard deviation of (0.862).

**Fifth section: Benefits of virtual reality training (psychological factor)****Table 10: Benefits of virtual reality training (psychological factor)**

| Variables                                                                                          | Mean        | SD   | Factor loading | Rank | Attitude      |
|----------------------------------------------------------------------------------------------------|-------------|------|----------------|------|---------------|
| Through virtual reality, trainees assimilate the material faster.                                  | 3.49        | .833 | .759           | 4    | Severe        |
| They feel more confident in their skills without social anxiety.                                   | 3.63        | .880 | .768           | 2    | Severe        |
| More emotionally connected to the learning process than traditional classes or e-learning methods. | 3.54        | .739 | .731           | 3    | Severe        |
| Learn with tests and applications at the same time.                                                | 3.66        | .787 | .958           | 1    | Severe        |
| <b>Total Mean</b>                                                                                  | <b>3.58</b> |      |                |      | <b>Severe</b> |

Table (10) shows the benefits of virtual reality training (the psychological factor). The most common items are "Learn with test and application at the same time," "They feel more confident

in their skills without social anxiety," and "More emotionally connected to the learning process compared to traditional classes or e-learning methods," with a mean of 3.66, 3.63, and 3.54, respectively.

**Sixth section: Challenges facing the application of artificial intelligence (VR & AR)in the hospitality industry**

**Table 11: Challenges facing the application of artificial intelligence (VR & AR) in the hospitality industry**

| Variables                                                                                              | Mean        | SD    | Factor loading | Rank | Attitude      |
|--------------------------------------------------------------------------------------------------------|-------------|-------|----------------|------|---------------|
| The infrastructure is not qualified to achieve the technology leap.                                    | 3.51        | .890  | .744           | 5    | Severe        |
| Using applications and devices with high-cost virtual reality technology.                              | 3.59        | .914  | .705           | 2    | Severe        |
| Developing and maintaining AR applications is expensive.                                               | 3.56        | .801  | .793           | 3    | Severe        |
| Lack of sufficient awareness of technological progress in the future.                                  | 3.51        | .862  | .736           | 4    | Severe        |
| Hotel departments do not adopt technological change but adopt its application within a limited scope.  | 3.24        | 1.058 | .719           | 7    | Moderate      |
| Developer companies did not adequately market the application of virtual training and its benefits.    | 3.44        | .942  | .721           | 6    | Severe        |
| Preparing human cadres specialized in artificial intelligence technology and the hospitality industry. | 3.63        | .792  | .741           | 1    | Severe        |
| <b>Total Mean</b>                                                                                      | <b>3.50</b> |       |                |      | <b>Severe</b> |

Table (11) identifies the challenges facing the application of artificial intelligence (virtual and augmented reality) in the hospitality industry. The most common items are "preparing human cadres specialized in artificial intelligence technology and the hospitality industry," "using applications and devices with high-cost virtual reality technology," and "developing and maintaining AR applications is expensive," with a mean of 3.63, 3.59, and 3.56, respectively.



**Seventh section: Efforts made to develop the technological information infrastructure available in fourth-generation cities**

**Table 12: Efforts made to develop the technological information infrastructure available in fourth-generation cities**

| Variables                                                                                                                                    | Mean        | SD    | Factor loading | Rank | Attitude      |
|----------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------|----------------|------|---------------|
| The infrastructure in fourth-generation cities is compatible with the advanced leap in information technology.                               | 3.17        | 1.107 | .741           | 3    | Moderate      |
| The development of programs offered at universities and institutes is parallel to technological progress and artificial intelligence.        | 3.10        | 1.082 | .702           | 4    | Moderate      |
| The government contributes to digital transformation, automation, and support by reducing costs and increasing efficiency and effectiveness. | 3.46        | .943  | .796           | 1    | Severe        |
| Fourth-generation cities based on information and communications technology provide new job opportunities in the hospitality industry.       | 3.46        | 1.042 | .723           | 2    | Severe        |
| <b>Total Mean</b>                                                                                                                            | <b>3.30</b> |       |                |      | <b>Severe</b> |

Table (12) presents the means and standard deviations of the Efforts made to develop the technological information infrastructure available in fourth-generation cities, where the means ranged between 3.46 and 3.10 compared with the total instrument mean for the domain (3.30). The item "The government contributes to digital transformation, automation and support by reducing costs and increasing efficiency and effectiveness" ranked first with a mean and standard deviation (M = 3.46, SD = 0.943). The item "The development of programs offered at universities and institutes are parallel to technological progress and artificial intelligence" ranked last and reached a mean of (3.10) and a standard deviation of (1.082).

**Pearson Correlation analysis**

**Table 13: Pearson Correlation between Efforts made to develop the technological information infrastructure available in fourth-generation cities and motivation and advantages of applying artificial intelligence (VR) in training**

|                                                                                                            |                                | motivation and advantages of applying artificial intelligence (virtual reality) in training |
|------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------------------------------------------------------------------|
| Efforts made to develop the technological information infrastructure available in fourth-generation cities | <b>Correlation Coefficient</b> | <b>.764**</b>                                                                               |
|                                                                                                            | <b>Sig.</b>                    | <b>.003</b>                                                                                 |

Table (13) demonstrates a strong and positive correlation between the technological information infrastructure available in fourth-generation cities and the motivation and advantages of applying artificial intelligence (virtual reality) in training. The value of the Pearson correlation coefficient was (.764\*\* -sig = 0.000).

**Table 14: Pearson Correlation between efforts made to develop the technological information infrastructure available in fourth-generation cities and the benefits of (VR) training.**

|                                                                                                            |                                | The benefits of virtual reality training (psychological factor) |
|------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------|
| Efforts made to develop the technological information infrastructure available in fourth-generation cities | <b>Correlation Coefficient</b> | <b>.456**</b>                                                   |
|                                                                                                            | <b>Sig.</b>                    | <b>.003</b>                                                     |

As seen in Table (14), a positive and significant relationship exists between efforts to develop the technological information infrastructure available in fourth-generation cities and the benefits of virtual reality training (the psychological factor). The Pearson correlation coefficient came out to be (.788\*\* -sig = 0.000). These findings demonstrated a moderately positive correlation between the variables.

**Table 15: Pearson Correlation between challenges facing the application of artificial intelligence (VR & AR) in the hospitality industry and the effects of using artificial intelligence (VR) in the field of training**

|                                                                                                      |                                | the effects of using artificial intelligence (virtual reality) in the field of training |
|------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------------|
| challenges facing the application of artificial intelligence ((VR & AR)) in the hospitality industry | <b>Correlation Coefficient</b> | <b>.507**</b>                                                                           |
|                                                                                                      | <b>Sig.</b>                    | <b>.000</b>                                                                             |

According to Table (15), there is a significant relationship between challenges facing the application of artificial intelligence (virtual reality and augmented reality) in the hospitality industry and the effects of using artificial intelligence (VR) in the field of training (R =.507, p ≤ .01).

**Table 16: Pearson Correlation between challenges facing the application of artificial intelligence (VR & AR) in the hospitality industry and the disadvantages of applying (VR) in the field of training in the hospitality industry**

|                                                                                                    |                                |                                                                                       |
|----------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------------------------------------------------------------|
|                                                                                                    |                                | the disadvantages of applying VR in the field of training in the hospitality industry |
| challenges facing the application of artificial intelligence (VR & AR) in the hospitality industry | <b>Correlation Coefficient</b> | <b>.667**</b>                                                                         |
|                                                                                                    | <b>Sig.</b>                    | <b>.000</b>                                                                           |

Table (16) indicates that there is a significant correlation between obstacles in implementing artificial intelligence (virtual reality and augmented reality) in the hospitality sector and the disadvantages of using VR for training purposes in the sector ( $R = .667, p \leq .01$ ).

**Regression analysis**

**Table 17: Simple Linear Regression analysis**

|                                                                                                                                                                                                                                        | <b>R</b>                | <b>R Square</b> | <b>Beta</b>  | <b>F</b>      | <b>Sig.</b>              | <b>Results</b>  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------|--------------|---------------|--------------------------|-----------------|
| Impact efforts made to develop the technological information infrastructure available in fourth-generation cities and motivation on advantages of applying artificial intelligence (VR) in training.                                   | <b>.764<sup>a</sup></b> | <b>.584</b>     | <b>0.764</b> | <b>9.030</b>  | <b>0.003<sup>b</sup></b> | <b>Accepted</b> |
| Impact efforts were made to develop the technological information infrastructure available in fourth-generation cities based on the benefits of VRT (psychological factor).                                                            | <b>.456<sup>a</sup></b> | <b>.208</b>     | <b>0.456</b> | <b>31.724</b> | <b>0.000<sup>b</sup></b> | <b>Accepted</b> |
| Impact challenges facing the application of artificial intelligence (virtual and augmented reality) in the hospitality industry on the effects of using artificial intelligence (VR) in training.                                      | <b>.507<sup>a</sup></b> | <b>.257</b>     | <b>0.507</b> | <b>41.954</b> | <b>0.000<sup>b</sup></b> | <b>Accepted</b> |
| Impact challenges facing the application of artificial intelligence (virtual and augmented reality) in the hospitality industry on the disadvantages of applying virtual reality in the field of training in the hospitality industry. | <b>.667<sup>a</sup></b> | <b>.445</b>     | <b>0.667</b> | <b>96.931</b> | <b>0.000<sup>b</sup></b> | <b>Accepted</b> |

From the results in Table (17), the efforts made to develop the technological information infrastructure available in fourth-generation cities affect motivation on the advantages of applying artificial intelligence (VR) in training and the benefits of virtual reality training (a psychological factor) by 67.4% and 45.60%, respectively. It is clear from the previous table, and by looking at the regression coefficient ( $\beta$ ), it becomes clear that the statistical constant ( $\beta$ ) is equal to 0.507 (B=0.507: A one-unit increase in Independent Variable 1 increases the dependent variable by 0.507 units). and 0.667, respectively, with a significance level less than 5%. It is also clear that the challenges facing the application of artificial intelligence (virtual reality and augmented reality) in the hospitality industry directly affect the effects of using artificial intelligence (VR) in the field of training and the disadvantages of applying VR in the field of training in the hospitality industry, as that value is 1%.

### **Discussion:**

Firstly, the study reveals that virtual reality (VR) and augmented reality (AR) immersive training are the most effective forms, with VR being the most efficient training environment. Such programs and scenarios immerse trainees in real-life settings, allowing them to move around, learn, inspect, and manipulate as if physically present. This approach saves time and money while providing trainees with a more efficient and effective learning environment. Following the training, their knowledge is assessed using a Learning Management System. As a trainer, you have complete control over the situation and the assessment. Through your dedicated control panel, you can monitor individual trainee results and group performance, effectively transitioning the role of the trainer to that of an observer. Furthermore, the reference study indicates that AI-based training achieves definite results by employing training methods and opportunities for trainees to simulate virtual reality experiences, in addition to immersing them in the training environment by controlling neural cells and guiding trainees in a way that enables them to achieve a higher level of learning within the real environment. Additionally, there are no reported health or psychological risks associated with using VR, according to a study by Schuur et al. (2021) Stanković & Portolan (2023).

Secondly, survey results indicate concerns about implementing artificial intelligence applications among workers regarding human substitution. However, interview findings suggest that these concerns are minimal, particularly in human resource management, compared to other departments, where virtual reality in training allows for creating various virtual environments and scenarios. The researcher agrees with Schwab Klaus (2023), as stated in the Riyadh Economic Forum (2019), that additional recruitment criteria for human resource specialists should include proficiency in technology related to artificial intelligence and its management rather than replacing HR training specialists. The goal is not to replace or eliminate training specialists but to provide trainers and specialists with the skills necessary to utilize artificial intelligence technology in training applications (VRT).

In applying Virtual Reality Training (VRT) in the hospitality and tourism industry, the study indicates that Artificial Intelligence (AI) has already positively impacted marketing in major tourism companies Naik & Daptardar (2019). Its impact is expected to be even greater, with much to be learned. Understanding the potential implications of adopting AI can help organizations better prepare to integrate VRT into their operations. The study highlights knowledge gaps as a

primary obstacle to effectively using AI in the workplace, especially in virtual training (VR). Consequently, there is a demand to include AI-related training in curricula. This is supported by several survey studies conducted on hotel managers, such as Alsharhan (2022). The study also reveals that the adoption of VRT in hotel management departments like Movenpick and Hilton has become widespread. Since these companies have many hotels in Egypt and the Middle East, virtual training is considered part of their policies. It also provides virtual training for safety and security personnel, reducing risks and costs, as previously mentioned.

### **Conclusion**

In conclusion, the study emphasizes the importance of leveraging Artificial Intelligence (AI), Virtual Reality (VR), and Augmented Reality (AR) as training tools in human resource management in the hotel industry. Agreed with Ivanov (2023) It highlights VR's efficacy in fostering psychological engagement and learning outcomes compared to traditional methods. Moreover, governmental efforts in technological infrastructure development, particularly in Fourth Generation cities, signal progress. The study emphasizes the need to upskill human resources to meet evolving demands—anticipated cost reductions for VR and AR devices with increased demand and AI-skilled labor support future integration. Effective utilization of technological advancements ultimately promises significant economic opportunities and job quality enhancement in the hospitality sector, emphasizing the importance of prioritizing innovation policies.

### **Recommendations:**

1. Hotel administrations must recognize the importance of AI technologies and their application, implementing suitable strategies to meet customer and employee expectations through VR technologies. Providing adequately skilled human resources enables organizations to achieve a competitive edge by successfully implementing AI and identifying necessary changes more effectively. Understanding AI usage empowers institutions to make informed decisions regarding implementing AI and VR solutions throughout their value chain.
2. The study recommends that augmented reality developers and producers collaborate with hotel administrations for intensive marketing to enhance knowledge and service offerings. Software skills can be developed using the latest AR concepts and tools, which can be achieved through collaboration between AR developers and hotel management.
3. Human resource managers, particularly in emerging hotel management sectors in the Middle East, should maximize AI applications, specifically VR training, to achieve the highest economic return and cost reduction through scenario-based training.
4. Training human resource trainers through professional training programs offered by global educational platforms like Coursera and those provided by governmental entities is essential to equip them with the necessary skills for utilizing and implementing AI and VR technologies efficiently.
5. The country should develop a comprehensive roadmap to disseminate AI and VR technologies across all hotel administrations, outlining strategies for alignment with governmental vision and workforce market trends. Information technology infrastructure supports the country's investment in keeping up with global developments while maintaining its reputation.

6. Focus on identifying the potential application of AI and VR technologies in the job market and leveraging statistical studies from support centers for decision-making and information utilization (cognitive economics) to study their benefits.
7. Qualifying educational and training professionals to teach students in early stages (technical diplomas) the necessary sciences to enable them to adapt to future labor market requirements is crucial.
8. Developing graduates through professional Meta AR developer certification from global platforms like Coursera as additional prerequisites for graduation to open up various job opportunities in the job market.
9. Universities and institutes should focus on establishing or upgrading academic programs to graduate qualified human resources to work in the evolving hospitality job market, especially in technology requirements such as AI, VR, and AR skills, such as Double Major specialization, given the widespread demand in Fourth Generation cities' job markets.

### **Limitations and Future Research:**

The current study explored the feasibility of using virtual reality as a training tool in human resource management, necessitating future research on emerging job roles in the context of technology and the effective response to these changes. With the application and utilization of artificial intelligence, there should be a focus on providing the workforce with suitable competencies and adaptability through education and training in the hospitality industry. This can be achieved by conducting studies on the types of jobs that need to be created and by introducing new job roles within hotels (by HR management) with new standards that keep pace with technological advancements, necessitating changes in learning outcomes for new graduates. Further studies are needed to anticipate future job demands and prepare the workforce for these expectations. This includes conducting necessary studies to identify potential future job needs and equip the workforce to meet these expectations.

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## تطبيق الذكاء الاصطناعي (الواقع الافتراضي والواقع المعزز)

### كأداة تدريب في صناعة الضيافة

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#### الملخص باللغة العربية:

على مدى العقد الماضي، تحول الذكاء الاصطناعي بشكل ملحوظ من مجال اهتمام خاص بالباحثين والمتخصصين في علوم الحاسب وتكنولوجيا المعلومات إلى علم شامل لا يتجزأ من الحياة المعاصرة. وقد أجبر هذا التحول الأكاديميين والممارسين في هذه المجالات وجميع العاملين في قطاعي الخدمات والصناعة على تبني الذكاء الاصطناعي كأداة حاسمة لتجاوز هوامش الربح المتوقعة. تقيم هذه الدراسة نشر الواقع الافتراضي كألية تدريب داخل إدارة الموارد البشرية لتعزيز الكفاءات التشغيلية في إدارة الفنادق. تركز الدراسة على الاستفادة من الواقع الافتراضي في برامج التدريب لتقليل التكاليف وزيادة الكفاءة والفعالية مع تسهيل إنشاء أدوار مبتكرة تتوافق مع التقدم التكنولوجي. لتحقيق أهداف الدراسة، تم توزيع 123 استبياناً بين الموظفين وموظفي التدريب في مجال الضيافة ومطوري البرامج والمهنيين الأكاديميين بين يناير ومارس 2024 لتحديد وتقديم رؤى حول الجوانب الإيجابية والسلبية لتدريب الواقع الافتراضي لدعم أساليب التدريب المبتكرة في قطاع الضيافة. تشير النتائج إلى أن الاستثمارات الكبيرة في تطوير البنى التحتية التكنولوجية والمعلوماتية تدعم تبني تقنية الواقع الافتراضي في سياقات التدريب. وقد لوحظ أن التدريب من خلال الواقع الافتراضي يعزز الكفاءة والفعالية. وتتضمن الاستنتاجات توصيات للتطبيق العملي للتدريب من خلال الواقع الافتراضي في كل من المؤسسات الفندقية الصغيرة والكبيرة واقتراح برامج أكاديمية متطورة في الجامعات والمؤسسات لتعزيز تطبيق تقنيات الذكاء الاصطناعي والواقع الافتراضي، وبالتالي مواكبتها مع التطورات التكنولوجية المستقبلية وأهداف التخطيط الاستراتيجي للدولة.

**الكلمات المفتاحية:** الذكاء الاصطناعي؛ الواقع الافتراضي؛ الواقع المعزز؛ التدريب؛ الوظائف الناشئة.