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Robots, artificial intelligence, and service automation (RAISA) technologies in the Egyptian hotel sector: A current situation assessment

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ABSTRACT

In the Egyptian marketplace, particularly in the tourism and hotel sector, there needs to be more research on artificial intelligence in the hotel sector. Artificial intelligence (AI) is the newest technological trend in our daily lives. Around the world, the tourist and hospitality industries rely heavily on robots (R), artificial intelligence (AI), and service automation (SA) (RAISA) technology. However, research into the topic in the Egyptian tourism and hospitality industries has been largely ignored. This research aims to examine the use of RAISA technologies in the hotel industry in Egypt. While primary data was gathered through an empirical study conducted using a depth semi-structured interview method, qualitative data was collected from a sample of twenty IT managers in the Egyptian hotel sector and analyzed. Secondary data was gathered from studies on (RAISA) technologies in the Egyptian hotel sector. The findings confirmed that robots have no applications in the Egyptian hotel industry. According to the interviewees, the most significant benefits of RAISA are increased service quality, improved performance, reduced human errors, and resolving employee mental and psychological problems. The disadvantages are the significant investments required and the reduced human interactions between customers and employees.

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1. Introduction

As the economy has developed more rapidly, Technological advances in artificial intelligence (AI) and robotics can profoundly impact many aspects of life (ICAR, 2018). Using AI and robots adds to the global concern about job loss (Manyika et al., 2017; UNA-UK, 2018). However, there is a legitimate concern that robots will displace the demand for human labour, particularly for low-skilled workers and those performing routine tasks, across various sectors and industries (Das and Hilgenstock, 2018). Travel and tourism, a labour-intensive industry, is no exception.

According to the World Economic Forum (2018), over the next five years, 75 million jobs will be lost due to automation, while 133 million new jobs will be created. As a result, a new approach to job transition support, including reskilling and retraining efforts, will be required. Even for occupations that will not be entirely replaced by machines, reskilling and upskilling of employees

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will be necessary due to the significant changes that automation will bring to the workplace (Dobrusin, 2019).

The researcher mentioned that robots (R), artificial intelligence (AI), and service automation (SA) (RAISA) technologies have become critical and dependable for businesses. This adoption results from the significance of these technologies in terms of progression and profitability. Countries such as Japan, the United Kingdom, the United States, and China are at the top of the list because they spend billions of dollars yearly on RAISA applications.

According to Dwivedi et al. (2019), around 70% of businesses will use AI by 2030. The tourism and hospitality industries are not immune to the implementation of RAISA (Murphy et al., 2019). Many tourism and hospitality businesses worldwide have become increasingly reliant on technological advancements at the end of the twentieth and beginning of the twenty-first centuries.

Furthermore, Tourism and hospitality businesses worldwide use RAISA not only to reduce costs, eliminate waste, and improve productivity, economic efficiency, and the financial bottom line but also to streamline operations, design service experiences, and increase revenues, resulting in profound transformations in their business models and the nature of work, as well as to improve overall service quality (Berezina et al., 2019).

The applicability of RAISA is widely acknowledged in various settings (including tourism and hospitality), as well as in some regions and countries. Numerous studies have been conducted in Japan, the United Kingdom, the United States, and China to investigate the use of RAISA in tourism and hospitality (Tuomi et al., 2020). Though, it is worth noting that more needs to be recognized about RAISA's applicability in the Egyptian tourism and hospitality industries. As a result, only one study published in a peer-reviewed journal (Kattara and El-said, 2014) focuses on technology adoption in Egyptian hotels. The study looked into customers' preferences for technology-based self-service versus human interactions during their stay.

Accordingly, there is essential to fill the gap and consider issues concerning RAISA implementation in the Egyptian hospitality setting. The current study aims to contribute further by identifying RAISA-adopted applications in hospitality, considering the available options and significant obstacles for applying RAISA, and exploring the advantages and disadvantages of using RAISA.

2. Literature Review

2.1. RAISA Technologies in the hospitality sector

Hospitality companies are adopting new RAISA technologies. They use RAISA to improve operational quality, increase productivity and profitability, reduce employee workload, lower labour costs, and provide customers with high-tech entertainment and delight experiences (Ivanov et al., 2017; Drexler et al., 2019; Lukanova & Ilieva, 2019). The robot is a physically intelligent device with a certain level of autonomy, intelligence, interactivity, mobility, and sensory abilities that allow it to carry out tasks and actions (Wirtz et al., 2018).

The three types of robots are industrial, professional, and personal service (Lukanova & Ilieva, 2019). Industrial robots and professional service robots can perform back-office tasks in tourism and hospitality tasks such as cutting grass and cleaning floors that do not require human interaction (Lukanova & Ilieva, 2019). On the other hand, personal service robots are physical manifestations of automated technology with adaptable interfaces (Hin Ho et al., 2020). Service robots that AI technologies have enhanced are better suited for front-office operations, can perform more complex tasks, and actively communicate with humans. Furthermore, the application and adoption will be expanded soon, and technological advances in robots powered by AI will be implemented to make them more capable of serving customers in tourism and hospitality settings, as well as performing a variety of jobs (Ivanov, 2019; Ivanov & Webster, 2019).

Numerous AI software applications have already automated the industry (Ivanov & Webster, 2019), such as those systems integrated into robots, smartphones, and computers used in various departments in travel agencies and hotels (Berezina et al., 2019).

Hotels use AI to modernise and accelerate operations and actions such as responding to customer queries preparing and serving food and beverages, check-in/out processes, room service tasks forecasting demand and analysing online customer reviews (Ivanov, 2019; et al., 2019; Tuomi et al., 2020)

Based on the tasks as mentioned above, AI methods enable hospitality management to attract

customers, recognise their emotions, reduce costs, eliminate waste, increase productivity, reduce errors, increase speed, develop, improve accuracy, perceived service quality, streamline operations, design service experiences, increase revenues, and improve customer engagement. (Berezina et al., 2019; Ivanov, 2019; Justin et al., 2019; Prentice et al., 2020).

AI has also made inroads into the hospitality industry in various ways. Intelligent hotel rooms, review tracking software, customer statistics monitoring software, and chatbots are some of the most common examples of AI technologies used in hospitality. AI enables hospitality managers to present intelligent/smart hotel rooms that allow guests to interact with in-room facilities via beacons and sensors (such as Marriott International) (Buhalis & Leung, 2018) or control his/her room atmosphere verbally (Lin et al., 2020). As a result, AI can help improve hotel guests' comfort (Buhalis & Leung, 2018).

Alexa (Alexa digital assistant) on Amazon's Echo (such as Wynn hotel in Las Vegas) (Ivanov et al., 2017; Lukanova & Ilieva, 2019), Siri, and Cortana are examples of AI applications used for these purposes (Lu et al., 2019). AI software such as Reviewer enables managers to track online customer reviews on social media and travel websites to monitor online hotel reputations (Buhalis & Leung, 2018). Chatbots are a critical AI technology that can be defined as software that stimulates a human counterpart with whom the user can interact (written, oral, or mixed) (Ukpabi et al., 2019). To summarise, AI in hospitality is used not only to improve efficiency and effectiveness but also to increase performance and develop client experiences (Buhalis & Leung, 2018). Artificial intelligence (AI) is also known as machine intelligence. It is demonstrated by humanoid or non-humanoid robots that act like humans and can be used in businesses to improve and enhance operational efficiency (Russell & Norvig, 2016). Although AI was established as an academic discipline in the 1950s, it only recently gained popularity in the relevant literature. AI permeates various industries and has the potential to generate significant financial profitability for businesses, particularly in service sectors such as banking, human resource recruitment, healthcare transportation, tourism, and the hotel industry (such as Buhalis & Leung, 2018; Kim, 2011; Yu & Schwartz, 2006).

Simon (1980) reported that AI is the science of designing and building computer-based solutions to perform human tasks. To operationalise AI Russell Stuart and Norvig (2009) approached it from three perspectives: thinking humanly, acting humanly, and reasoning. However, Rijsdijk et al. (2007) proposed six dimensions of AI: autonomy, learning ability, reactivity, cooperation ability, humanlike interaction, and personality.

AI can also be classified based on its development and applications. AI is divided into three categories: narrow artificial intelligence, artificial general intelligence, and artificial super intelligence (Kaplan & Haenlein, 2019). The first-generation AI is limited artificial intelligence applied to specific tasks.

The use of artificial intelligence (AI) in the hotel and other related industries (such as tourism and hospitality) has grown significantly, with applications including marketing intelligence, customer service, chatbots, and messaging Gursoy, (2018). While acknowledging its prevalence and impact on improving business efficiency, artificial intelligence (AI) is also causing growing concern about replacing human jobs (Larivière et al., 2017). According to Robinson (2017) the "Momentum Machines Project" is one step closer to reducing fast-food jobs. It is estimated that AI-related technology in hotels and restaurants can automate approximately 25% of activities (Chui et al., 2016). According to a 2016 report by the Organization for Economic Cooperation and Development (OECD), 9 per cent of jobs in 21 countries could be automated. A 2017 McKinsey report also shows a 5% job loss due to AI (Manyika et al., 2017), and an Oxford University study predicted that 47% of jobs could be automated by 2033 (Ramaswamy, 2017).

According to Pew Research Internet (Smith & Anderson, 2017), approximately 72 per cent of Americans are concerned about AI replacing human jobs. According to some research (Morikawa, 2017; Smith & Anderson, 2017), AI can only play a dominant role in mundane low-level jobs.

Previous AI research (Ghahramani, 2015; Moravk et al., 2017; Russell & Norvig, 2016) focused on functionality and technical efficiency. To the best of our information, no research has attempted to understand how AI may affect organisational outcomes from employees' perspectives. From an organisational standpoint, research on AI has

primarily focused on its impact on employee job attitudes and behaviours in conjunction with employees' personality and cognitive intelligence (such as Bastian et al., 2005; Prentice & King, 2011, 2012)

3. Methodology

The current study aims to validate the use of RAISA techniques in Egyptian hotels. The researcher chose ten hotels from various international chains to establish appropriate standards for hotel selection. The researcher, on the other hand, chose Marriott Bonvoy (Marriott and Sheraton), Accor Hotels (Sofitel and Movenpick), Hilton Hotels and Resorts (Hilton), and Steigenberger Hotels and Resorts (Steigenberger) among the ten hotel brands (Steigenberger). Furthermore, the geographical distribution of hotels was considered, with Cairo, South Sinai, and the Red Sea included. Finally, the study relied on the hotels as mentioned above because their likelihood of implementing RAISA technologies is greater than that of any other travel agency or hotel brand in Egypt.

The current research gathered information from a group of 20 IT managers and assistant IT managers, the best-qualified employees in IT are IT managers and IT assistant managers' hotels to answer questions about RAISA applications, possibilities, and circumstances for implementing RAISA technologies, as well as the benefits and drawbacks of such new technologies.

3.1. Data Collection and Analysis

The researcher used a qualitative approach based on in-depth interviews to achieve the current study's objectives. An interview is a valuable qualitative data collection method for obtaining more detailed information or extensive knowledge of a topic or concept. An in-depth interview encourages participants to speak extensively about the subject under examination (Alshenqeeti, 2014; Srivastava & Thomson, 2009). A meeting does not require an interview; nevertheless, it can be held over the phone or by various applications that support only audio or both audio and video without the need for the physical presence, of the participants (Saunders et al., 2016).

The researcher conducted semi-structured interviews to investigate: the currently adopted RAISA technologies in hotels for which they work, the available opportunities to apply RAISA technologies, RAISA applicability conditions, and perceived difficulties associated with the introduction of novel technology and the benefits and drawbacks of RAISA applications from their point of view.

4. Finding and Discussion

The IT managers in the hotel industry were singled out as the recipients of the researcher's findings. The following is an explanation of their comments and responses:

4.1. How well do IT managers and IT assistant managers understand RAISA?

All the respondents are familiar with RAISA, and all the interviewees agreed that there are currently no robot applications in Egyptian hotels. However, interviewees stated that two hotels are currently under construction in Egypt's new administrative capital and will open soon. Both hotels compete for solid infrastructure and facility design to offer modern hospitality services aided by new technologies like robots. They went on to say that these hotels would propel Egypt's hospitality industry to a new level of sophistication, allowing it to keep up with global changes.

Although AI technologies in hospitality vary, the interviewees are familiar with smart hotel rooms and chatbots. Smart meeting room and smart room limited smart rooms and smart meeting room services emerged in Egypt in 2019 and are now available in some Egyptian hotels, particularly luxury hotels. They agreed that their hotels' rooms, particularly "presidential suites," have limited smart room services. One of these services is controlling light, air conditioning, television, windows, curtains, and other room devices with tablets or mobile applications.

Despite the popularity of chatbots as AI technology, all interviewees confirmed that chatbots are not supported on their websites or social media pages. They claimed two main reasons for this: A hotel's official website aggregates thousands of hotels managed by the same chain management company, making it challenging to insert automated responses appropriate for various inquiries. Second, hospitality services differ from hotel to hotel, making it difficult to rely on chatbots as a good communication tool. Furthermore, Egyptian hospitality enterprises believe that human contact through online chatting is more effective and appropriate in the hospitality sector.

Hotels in Egypt have begun to allow customers to find hotel services via mobile applications. According to the interviewees, several hotels in Egypt offer applications that will enable customers to choose hotel services, request them, and pay for them online simultaneously; the applications of some other hotels are limited to recognising and ordering services without online payment. They also stated that Egyptian hotels are currently working to develop and upgrade their applications to overcome this limitation and enable online payment.

Although mobile applications for check-in/out have been used in hospitality for many years outside of Egypt, this technology is only recently used in Egyptian hotels. All interviewees agreed that their hotels provide these applications for customers to check in/out without contacting the front office employees directly. They declared that customers who rely on these applications could not only check-in/out but also open their rooms using QR codes on their mobile devices (keyless solutions).

4.2. Available possibilities to apply RAISA technologies in the hotel sector.

In general, interviewees stated that new hotels could use RAISA technologies because they have the vital infrastructure and facility designs that allow them to upgrade and keep up with technological changes. It has been demonstrated that the Egyptian hospitality sector is advancing significantly due to the government's efforts and investments in applying new technologies in various industries. This is evident in the new administrative capital, where investors and the government establish unique hotels that provide hospitality services based on multiple RAISA applications.

4.3. RAISA applications challenges

According to interviewees, the most significant barriers to implementing RAISA technologies in hotels cost, a need for more human resources with the qualifications and skills to operate and maintain these technologies, particularly robots, and the type and desires of Egyptian hotel customers. In terms of cost, the interviewees emphasised that the main barrier is the cost of upgrading infrastructure and facility design and purchasing, operating, and maintaining robots, SA appliances, and AI software. According to human resources, one of the main barriers is the absenteeism of qualified local employees in the hospitality sector who can use or maintain RAISA technologies.

4.4. Advantages

All interviewees agreed that using RAISA in Egyptian hotels has several advantages.

- explained how RAISA technologies improve the quality of hospitality services, improve performance and productivity, allow hotel management to control operations, reduce errors and human errors, reduce problems caused by employees' mental and psychological states, and save money in the long run.
- Declared that RAISA technologies benefit customers who do not require face-to-face or human contact, particularly in the context of the Covid-19 pandemic and the need for social distance.
- They also predicted that hotel managers would be required to use critical RAISA technologies that enable social distancing.
- Furthermore, the interviewees confirmed that reducing the number of hotel employees is one of the benefits that help management reduce salary costs.

4.5. Disadvantages

- In terms of the disadvantages of RAISA's applicability in the Egyptian hospitality industry, the interviewees stated that RAISA necessitates significant investment, which places a substantial burden on Egyptian hotel management.
- In the same context, the interviewees stated that the absenteeism of local employees who can operate and maintain RAISA applications would force managers to hire foreign specialists with the expertise to deal with these new technologies. Hiring them will cost the hotel management additional expenses.
- Using RAISA technologies reduces face-to-face communication between customers and service providers, according to interviewees; they also stated that the hotels would lose one of their distinguishing features, as Egyptian hotels are known for their exceptional hospitality.

4.6. The impact of RAISA on human resource

On the one hand, interviewees stated that RAISA technologies benefit hospitality workers. They stated that these technologies aid them in their work by saving time and effort.

Furthermore, interviewees stated that RAISA technologies would not replace human resources in the hospitality industry, particularly in Egypt.

On the other hand, interviewees demonstrated that the negative impact of RAISA's applicability on hotel employees might reduce the number of workers in a few positions. They concluded that RAISA adoption in the hospitality industry threatens employment.

4.7. In your opinion, do RAISA technologies likely to be adopted in the Egyptian hotel sector shortly

Interviewees stated that several RAISA technologies are already used in the Egyptian hospitality setting. Those additional improvements will be made soon to keep up with global progress in hospitality.

This brings us back to the fact that the Egyptian government is moving toward using new technologies and issuing mandatory decisions in this regard. Furthermore, interviewees stated that luxury chain hotels would account for most of the progression.

4.8. Summary

The findings indicate an increased knowledge about the current state of RAISA-approved technologies in Egyptian hotels.

In terms of the currently used RAISA technologies, interviewees confirmed that there are no robot applications in the tourism and hospitality sectors. These findings imply that hotels require more management support to develop the current robotics applications. This result is in the context of Berezina et al. (2019), who suggested that the future of robotics in hospitality is promising, with an increase in the number of robot units manufactured and used in various settings expected.

Hotels in Egypt have embedded AI in several SA technologies, such as the “limited smart room” and “smart meeting room” services available in some hotels, particularly luxury hotels (presidential suites). As a result, the adoption of AI applications remains limited. Tourism and hospitality executives believe Egypt's tourism industry is distinct and characterised by warm interactions between service providers and customers. For example, in the tourism and hospitality sectors, they see that human contact through online chatting is more effective and appropriate.

According to the study findings, SA is widely used in Egypt's travel agencies and hotels. They use digital kiosks, particularly in city centre hotels, airport hotels, and hotel business centres; virtual reality, which allows customers to watch a mini video of all the elements of the tourism product and facilities; and mobile check-in/out, which simplifies check-in/out by allowing electronic payment without the need to go to the front desk. Although the SA as mentioned earlier technologies have been used in tourism and hospitality for many years outside of Egypt, they are only recently used in Egypt.

The findings revealed that Egypt's travel agencies and hotels have good infrastructure and facilities design-assist them in implementing RAISA. However, the older ones, which have been in place for five years or more, need better infrastructure that cannot support the adoption of such new technologies and require massive investments to make improvements.

Several challenges and obstacles must be addressed and overcome to develop and present smart tourism and hospitality services. The findings suggested: 1) Cost: technology is costly and requires ongoing upgrades for infrastructure and facility design, as well as purchasing, operating, and maintaining RAISA technologies. 2) One of the significant factors is a need for more skilled and qualified human resources who can use RAISA applications. 3) Customer requirements and desires: Most visitors to Egypt for leisure or recreation (particularly to the Red Sea and South Sinai) prefer human contact with Egyptian employees who are well-known for their hospitality. Furthermore, many are concerned about booking and purchasing the tour online. As a result, from tourism and hospitality management in some Egyptian destinations, there is no need to implement sophisticated RAISA technologies (particularly robots) that could eliminate or reduce direct customer-brand contacts and relationships. However, the situation in city centre hotels is different because customers’ types, needs, and desires differ. In summary, the most significant circumstances that must be overcome are cost, a lack of qualified employees, and customer desires.

The findings revealed several benefits and drawbacks of using RAISA. On the one hand, the most significant benefits of RAISA include

improving service quality, increasing performance and productivity, promoting marketing, reducing human errors, overcoming some issues related to employees' mental and psychological health, and reducing the number of hotel employees and salaries costs. This result is consistent with Berezina et al. (2019) and Drexler et al. (2019), who confirmed that RAISA reduces errors, allows for portion control and thus cost management, allows for long hours with no time off, no vacation, and no sick days reduces labour costs, which account for approximately 33% of total expenditures. Thus RAISA will aid in total cost reduction. Furthermore, RAISA technologies are appropriate for customers who do not require face-to-face or human contact, particularly in the context of the Covid-19 pandemic and the need for social distancing. It is expected that hotel and travel agency managers in Egypt will use essential RAISA technologies that enable social distancing.

On the other hand, regarding the drawbacks of RAISA's applicability in Egyptian travel agencies and hotels, the findings confirmed that RAISA necessitates significant investments to purchase such new technologies. Furthermore, as previously stated, there are no qualified employees to operate or maintain RAISA applications. The lack of local human resources will force management to hire foreign specialists at high salaries. One of the main disadvantages of RAISA is that it reduces critical Human interactions between customers and employees are essential from the perspective of Egyptian management, particularly for customers seeking leisure and recreation. This finding is consistent with Kattara and El-Said (2014). They investigated hotel customers' preferences for using technology-based self-service versus human interactions during their stay in South Sinai (Sharm El-Sheik). They confirmed that hotel employees would instead serve hotel customers with cutting-edge technology.

In terms of the effect of RAISA technologies on human resources, a group of respondents agreed that RAISA technologies have a positive impact because they help them do their jobs by saving time and effort; additionally, they will never replace human resources in the tourism and hospitality sector, particularly in Egypt. However, another group of respondents stated that RAISA negatively impacts it because it may reduce the number of employees in certain positions. They concluded that the implementation of RAISA in tourism and hospitality poses a threat to employment. According to the researchers, RAISA will not replace humans in tourism and hospitality in Egypt. However, it will affect employment conditions in the sector and the need for different skills to match the new requirements. To summarise, RAISA does not replace employees but instead assists them in performing their duties.

5. Conclusion

According to the study, hospitality businesses in Egypt have yet to adopt any robot applications, but they plan to do so soon. At the same time, hotels in Egypt are implementing AI (smart rooms and smart meeting rooms) and SA (mobile check-in/out apps, order services, and digital kiosks). The vital infrastructure in new enterprises and facility design is applying RAISA in Egypt's travel agencies and hotels. However, the costs, absenteeism of qualified employees to operate and maintain such new technologies, and customers' preferences for face-to-face customer-employee communications are all obstacles.

The benefits of the RAISA application include improved service quality, performance, and productivity, as well as the creation of a positive image of Egypt as a tourist destination; salary cost savings, and reduced face-to-face communication, which is consistent with the new restrictions imposed by the Covid-19 pandemic and social distance. Cons include the need for massive investments to be made by tourism and hotel administration to implement these technologies, which represents a significant burden.

It is recommended that:

- Hotel management in Egypt should recognise the importance of robots and SA applications during the Covid-19 pandemic. They must also recognise the benefits of the RAISA application in improving service quality, lowering costs, and creating a positive image.
- Old enterprises must set aside funds to upgrade their ageing infrastructure, which is incapable of supporting the adoption of new RAISA technologies, and recognise that doing so is not a waste of money because using these technologies has become necessary.
- Hotel management and decision-makers should recognise that the cost of implementing RAISA now could save money in the long run, such as employee salaries, training costs, and

absenteeism. As a result, they must alter some managerial beliefs and reshape their policies.

- To address the shortage of skilled and qualified human resources, tourism and hospitality executives should organise training programs for their employees and teach them how to use these new technologies. Furthermore, they must educate them that RAISA technologies do not replace them but rather assist them in performing their duties.
- Finally, the Egyptian government should focus on implementing these RAISA technologies in the tourism and hospitality industries and making mandatory decisions to ensure that they keep up with global changes.

6. Limitation and Future Research

The current study gathered data from Egyptian hotels. Researchers should investigate RAISA in other tourism and hospitality enterprises, such as airports and restaurants, in the future.

The study concluded a broad investigation into the impact of RAISA applicability on hospitality operations. Future research should conduct a more in-depth investigation into the extent to which RAISA technology affects employee turnover, satisfaction, loyalty, and engagement.

Because the study only used one data collection method (interview), future studies should utilise different methods, such as observation and questionnaires.

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