



Artificial Intelligence in Egyptian Tourism Companies: Implementation and Perception

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Abstract

Artificial intelligence (AI) is considered one of the most important innovative technology. AI has been used in several industries and has already accomplished notable impacts. The tourism industry is one of several sectors that is affected by AI tools; chatbots, personalized service recommendations, smart solutions are used in travel agencies. This paper aims to explore the implementation of AI techniques in the Egyptian tourism companies and investigate the employees' perceptions towards using AI tools in tourism operations. This paper applies the quantitative approach; an online questionnaire was distributed to tourism companies, only 320 responses were valid for statistical analysis. Concerning applying AI tools in tourism operations, the results revealed significant differences among tourism companies which provide full tourism services. Regarding the size of tourism companies, large and medium-scale tourism companies apply AI techniques more than small and micro-scale ones. This research found two fundamental employees' views of applying AI: advantages of AI (enthusiastic) and disadvantages of AI (suspicious). From a managerial standpoint, this research shows the AI techniques that are applied in tourism as well as identifies the importance of their implementation, which may help managers to draw policies and strategies to improve their technological infrastructure and skills, as well as apply the most beneficial AI tools. This, in turn, enhances their performance and saves time and money.

1. Introduction

Nowadays, tourism businesses search for achieving competitive advantage and increasing their profits. Accordingly, they must apply state-of-the-art technology, improve the digital infrastructure and apps for gathering customers' data, and provide personalized offerings to increase their market share. Artificial intelligence (AI) is considered an innovative technology. AI is the study that contains computational procedures to make actions that humans do and need intelligence, such as problem-solving (Talwar & Koury, 2017). John Mc Mullach was the first one who defined AI in 1955 as "the usage of engineering to fabricate smart machines" (Hsu, 2018: 127).

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Nowadays, AI is widely used by many consumers in their everyday life, even they don't realize it (Shandwick, 2016; Krogue et al., 2017; Tussyadiah and Miller, 2019). The widespread usage of digital personal assistants processed by Natural Language Processing (NLP) and voice recognition apps, such as Google's Allo and Apple's Siri, progressively become the favorable apps to search for personalized recommendations and information for services and products (An, 2017; Alpaydin, 2020).

AI includes knowledge clarification, search, understanding, and interpretation. To have effective results, AI must read the data in forms that enable representation and processing. The usage of AI helps in decision making that depends on the data selection process, data transformation and data mining, which has a vital role to complete the process. At last, results assessment will help in taking the right decision (Theodoridis and Gkikas, 2018). AI can act like tendency modeling that collects and processes large datasets of previous tourists' choices, to predict their future behavior (Dimitris and Prokopis, 2019).

AI techniques allow tourism businesses to be leaders (Brougham and Haar, 2018). It helps tourism service providers understand tourist's needs, behaviors, choices, budget and travel preferences, and provide personalized service and product (Zsarnoczky, 2017; Gajdosik and Marcis, 2019). The adoption of AI has a crucial role in achieving tourist satisfaction and making travel easier, in addition to making tourism processes more efficient, improve productivity, and offer positive tourists experience (Chace, 2016; Kazak and Buchatskiy, 2017; Krogue et al., 2017). Despite the importance of applying AI solutions, they are still not widespread within the tourism field. However, it is predicted that many AI solutions will be applied in the future to improve the quality of products and services as well as increase tourism companies' revenues (Zsarnoczky, 2017; Hsu, 2018).

To the researcher's knowledge, the literature concerning the application of AI in travel & tourism is limited. There are some authors focused on the usage of AI in predicting tourism demand such as Burger et al. (2001), and Peng et al. (2014) who suggested a model for forecasting tourism demand, while Borrás et al. (2014) studied the recommender systems. Murphy et al. (2017) discussed the application of service robots in hotels, while Ivonov and Webster (2017) investigated the adoption of robots in travel, tourism, and hospitality. Li et al. (2017) explained how can Artificial Neural Network (ANN) be used to create a revenue – forecasting model, which is customized to tourism companies to optimize their revenues via improving sales and market share. Tussyadiah and Miller (2019) discussed the impact of AI on tourist's behavior and sustainability.

The objectives of this research are to a) display the concept of artificial intelligence, b) identify the importance of applying AI in tourism, c) investigate to what extent the AI techniques are implemented in tourism companies in Egypt, and d) explore the employees' perceptions of using AI in tourism operations. This research will show the appropriate AI techniques that can be applied in tourism companies, in addition to identifying the impacts of implementing AI in tourism operations, which may help managers to build tactics and strategies to develop their technological infrastructure and improve the employees' skills. This, in turn, enhances their performance as well as saves time and money.

2. Artificial Intelligence in Tourism

From the beginning of AI technologies, it has been classified into four categories; knowledge presentation and knowledge-based system, Machine Learning (ML), problem-solving, and distributed artificial intelligence (Torra et al., 2019). The most applicable technology in the tourism field is ML as it is concentrated on predictive and viewpoints analytics. It combines learning from data, learning from tourist past and on spot experience, and matching instructions. ML requires an accurate and large amount of data, as the algorithm can be processed and accordingly improves the performance (Oussou et al., 2017).

ML is considered as a new persuader to improve tourism sales. The usage of ML and big data will enable tourism companies to construct a recommendation engine, which assists personalize offers and achieve the customers' desires. ML is very crucial as customers are expecting service providers to offer them packages and services that suit their needs, depending on past preferences (Alpaydin, 2020). ML can be applied in predicting tourist behavior based on their reviews and feedback data (Alaei et al., 2017).

Neural Language Processing (NLP) -is a tool of Machine Learning- united with predictive analytics and learning algorithms, improves customers' reach, and accesses to voice commands via Personal Digital Assistants (PDAs). NLP can be used to detect patterns and tendencies of tourists using social networks. If the tourist publishes any picture, image, or text on Instagram or Facebook, or visit webpages, this can provide information concerning the tourist's interests and preferences (Ivanov and Webster, 2017; Navio-Maroc et al., 2018; Kazak et al., 2020). For example, Metis is a type of AI platform that can assist travel agents to explore customers' feedback through reviews and surveys, evaluate performance, and identify what suits the tourists' needs (Gajdosik and Marcis, 2019).

Several numbers of tourism companies worldwide use Chatbots² to assist their customers to choose from a large number of offers and packages (Kazak et al., 2020). Chatbots are the type of online interaction between tourists and service providers, helping tourists to communicate with digital assistants, utilizing neural language to answer customers' inquiries and complete reservations (Alexis, 2017).

According to Sheffield (2016), Travel Bots can be classified into:

- a) Customer- Service Bots. Usually embedded in the service provider's website, whereas it can answer the tourists' inquiries and help them to surf the homepage.
- b) Travel Artificial Intelligence Bots. Relied on Instant Messaging to connect with users, such system use algorithm and can reach customer's information, to provide suggestions, (e.g. HelloHipmunk – a virtual tourism company which uses email information and calendar to provide personalized recommendations).
- c) Facebook Bots. It allows users to enter search and reservation by using another interface (e.g. Skyscanner's Facebook Messenger Bots).

² With reference to Merriam- Webster dictionary (2020) Chatbot is a computer program that simulates human conversation through voice commands or text chats or both. Chatbot, short for chatterbot, is an AI feature that can be embedded and used through any major messaging applications

Experts assured that personal assistants will be the new gatekeepers to the WWW, displacing many crucial search engines such as Facebook as well as Google (Gesiler, 2018). As a result, the Facebook team tries to compete in the travel search through developing the “Deep Text” AI engine (Samara, 2017).

Leading tourism companies have already used AI systems, which enable them to analyze big data and learn from their own as well as other peers’ experience of satisfying customers’ needs (Ivanov, 2019). Such as Trip Advisor, Booking.com, and Expedia have already started to apply AI techniques to provide personalized recommendations. For instance, Trip Advisor has developed a platform for clustering big data. It applies Hadoop to save and process web registration data, SQL servers to cluster data, Hive to classify data and insert it into tables, and ML to enhance the site experience. Such platforms, which apply ML, help in classifying tourists’ reviews, this classification helps in reading tourists’ reviews, and scores to what extent this review is helpful, accordingly decide whether the review would be refused, or accepted and published (Gajdosik and Marcis, 2019). Booking.com has already launched a pilot platform to offer several choices and opportunities to tourists, to seek within different tourism companies and hotels across different tourism destinations (Samara, 2017).

Facial recognition is another way of applying AI in the tourism field, this technology helps tourists to travel through airports and board aircraft without travel documents. If facial recognition combined with blockchain³, visitors can visit duty free-shops, restaurants, or access entertainment easily with his facial scan (Entis, 2017). The blockchain technology guarantees that the data and information of traveler are trusted, and help in recognizing the customer’s arrival and automatically check them in (Makridakis and Christodoulou, 2019). In airports, self-check-in machines, and automated passport check via face recognition facilitate the flow of travelers (Ivanov and Webster, 2017; Inan & Arslan, 2018; Ueda & Kurahashi, 2018).

Also, some airlines have commenced using AI in dealing with social media inquiries, such as KLM dealt with 50% of all their travelers’ inquiries through applying AI in 2017, British Airlines Easy Jet applies AI systems to forecast their travelers’ needs of beverages and meals aboard, to minimize the inventory costs (Gesiler, 2018). Also, there’s a travel application for iPhone named ‘Lola’ is a type of chat platform that emerges travel within online communication with their customers, it uses both AI chat functions and working staff live interaction in tourism companies (Saulat, 2018). Such platforms can increase customers’ engagement as well as improve the quality of service (Gkikas and Theodoridis, 2017).

3. The importance of AI in Tourism

The adoption of AI systems in tourism can diminish the time taken to accomplish tasks, in addition to enhancing the accuracy of processes and outputs. The tourism industry needs technological systems able to store, analyze big data related to stakeholders and information concerning tourist preferences. AI will help tourism providers/destinations

³ According to Merriam- Webster dictionary (2020) Blockchain refers to a digital database containing information that can be simultaneously used and shared within a large decentralized, publicly accessible network. Block represents digital information; the chain represents how digital data is stored in the database.

to well understand the requirements of their customers and provide sustainable services that achieve customer's satisfaction. AI has a crucial role in improving the quality of tourism services by minimizing errors (Persing and Ng, 2009), and achieving the customers' expectations throughout offering personalized service that suits customers' needs (Nick, 2014).

AI techniques can add values to the provided services, which enable tourism companies to offer products and services at a lower price with high quality, and promote their offers at a convenient price to the right target tourists, in addition to providing positive experiences for their customers (Saulat, 2018). In the context of revenue management, AI helps tourism companies to build strategies to improve their revenues, and forecast potential financial challenges and opportunities (Li et al., 2017).

AI systems can forecast tourist loyalty throughout demonstrating the attractive elements, such as the quick response and the quality of tourism services, and implement them in tourism service platform. Accordingly, customers can be switched into frequent visitors and finally loyal ones (Hsu et al., 2009). The usage of AI systems enables tourism companies to send personalized offerings to their customers relying on analyzing customer's location data, preferences, and characteristics (Alexis, 2017).

Today, it's very crucial for tourism companies to provide immediate and efficient delivery of services and products, and achieve positive tourism experience to attract new tourists and improve their market share. So, they must give great concern to the application of the latest technology and apply AI techniques to increase revenues, organize operations, enhance productivity and improve efficiency (Makridakis, 2017; Talwar et al., 2017; Davenport, 2018). Subsequently, they can compete professionally in the tourism field (Kazak et al., 2020).

4. Methodology

To accomplish the objectives of this research, a quantitative approach was applied, as an online questionnaire was designed on Microsoft Forms to investigate the implementation of AI techniques in tourism companies in Egypt and to explore the perception of employees using AI in their operations. The participants were asked to answer the questionnaire after reading a scenario informing them about the benefits of using AI in some travel agents. A stratified random sampling method was applied. The selection of participants relied on their nearness to the researcher and the ease to contact them. The questionnaire has an introduction, in which the aim of the research was stated. Also, respondents were informed of their right to complete the survey or withdraw. The data was confidentially gathered from employers and employees.

The questionnaire consisted of three parts. The first one focuses on profile data, the second part consists of 10 items demonstrating the availability of AI tools in tourism companies, and the third one displays 12 items to demonstrate the employees' perception of applying AI in tourism companies. These items were displayed on a 5-point Likert scale, rated from (1) strongly disagree to (5) strongly agree. The questionnaire was distributed online starting from November 2019 targeting the employers and employees of the Egyptian tourism companies through using social networking such as LinkedIn, WhatsApp and Facebook. Five hundred questionnaires

were distributed, only 320 responses were received: 200 respondents work in tourism companies that provide full tourism services (inbound, outbound and domestic packages), while 64 of respondents work in tourism companies, which provide transport service, and 56 of the sample work in companies that provide Haj and Omra.

To analyze the research data, the following statistical tools were applied: descriptive data, One-Way ANOVA to explore the differences among groups; and Exploratory Factor Analysis (EFC), which is considered a statistical technique that is utilized to identify the factors that affect the phenomena.

5. Results

Table 1 indicates the descriptive data of the sample, as 36.2% of the respondents work in large scale tourism companies, which employ more than 30 employees. Concerning profession, more than half of the sample are employees and operation managers, about 58% assured working in their position for 3 years or more. Most of the surveyed tourism companies have websites (84.1%), and 37.2% update their websites daily, whereas 15.9% never update or publish their service offerings because they don't have websites.

Table 1

Demographic profile of the respondents

Profile	Frequencies (n=320)	Percentage %
Size of the organization		
Micro company up to 10 employees	79	24.7
Small scale company up to 20 employees	108	33.8
Medium-scale up to 30 employees	17	5.3
More than 30 employees	116	36.2
Profession		
Owner	91	28.4
Employee	127	39.7
Operation manager	102	31.9
How many years have you held this position		
Less than one year	67	20.9
Between 1 & 2 years	66	20.6
3 years and more	187	58.4
Does your organization have a website		
Yes	269	84.1
No	51	15.9
How often this website updated		
Daily	119	37.2
Weekly	57	17.8
Monthly	54	16.9
Seasonal	20	6.3
Yearly	19	5.9
Never	51	15.9

The following table indicates the means of availability of successful AI tools that are applied in the investigated tourism companies. Most of the respondents strongly agree with using social networks such as Facebook, Twitter, and Instagram to communicate with their customers. Respondents are agreed with updating their websites, providing online reservations, and using text-based communication channels (e-mail, chat, social

media, mobile messaging). While respondents disagree and strongly disagree with using systems to auto-reply to customers' inquiries, applying In-house technology that uses algorithms to enable the prediction of tourists' interests and preferences, and providing 24/7 customer care.

Table 2

Means of the availability of AI tools that can be applied in tourism companies

Items	Mean	Std. Deviation	Classification
Communicate with our customers by using social networks (e.g. Facebook, Tweeter, Instagram)	4.33	1.106	positive
An updated website filled with all information about provided services	3.99	1.297	positive
On-line reservation	3.91	1.267	positive
Text-based communication channels (e.g. e-mail, chat, social media, mobile messaging)	3.91	.967	positive
Offering personalized recommendations during the customer's journey planning phase	3.25	1.324	Neutral
Real-time communication with customers	3.16	1.463	Neutral
Technological systems to evaluate our customers' reviews and feedback	3.00	1.320	Neutral
System to auto-reply the customers' inquiries and questions	2.85	1.454	Negative
Provide 24/7 customer care service	2.55	1.135	Negative
In-house technology that uses algorithms to enable the prediction of tourists' interests and preferences	2.39	1.390	Negative

One-way ANOVA is applied to investigate if there are differences among tourism companies' sizes and the usage of AI tools. Table 3 indicates differences among groups ($p < 0.0001$) favor large-sized companies (more than 30 employees) and Medium-scale companies up to 30 employees, there means are 40.5345 and 39.5882 respectively. While Micro company up to 10 employees scored the lowest mean (24.7215). Table 4 demonstrates differences among tourism companies concerning the application of AI ($p < 0.0001$), favor tourism companies that provide full tourism services (international and domestic packages), followed by tourism transport companies, their means are 35.8298 and 33.2857.

Table 3

Differences among tourism companies' sizes concerning the availability of AI tools

Tourism companies' sizes	Mean	F	Sig.
Micro company up to 10 employees	24.7215	76.035	0.000
Small scale company up to 20 employees	30.9259		
Medium-scale up to 30 employees	39.5882		
Large scale company more than 30 employees	40.5345		

Table 4

Differences among tourism companies filed concerning the application of AI

Organization field	Mean	F	Sig.
Inbound, outbound and domestic tourism	35.8298	7.737	0.001
Transport	33.2857		
Haj and Omra	29.4483		

To demonstrate the important dimensions that indicate the advantages and disadvantages of applying AI in tourism companies, EFC was applied by using principal component analysis (PCA) in SPSS. The analysis was carried out on a list of 12 items. The analysis developed two factors, representing 82.321% of the total variance in the research data (Table 5). The score of Kaiser-Mayer-Olkin (KMO) test was 0.918 ($p < 0.001$), demonstrating the adequacy of the sample for each of the variables in the data. According to Yong and Pearce (2013) if the value of KMO is greater than 0.5 so the sample is adequate, subsequently the sample size is perfect. The analysis revealed two factors as the Initial Eigenvalues for the first 2 factors are significant as they achieve Eigenvalues > 1 . Factors 1 and 2 explain 54.117% and 28.204% of the variance, with a cumulative total of 82.321%.

Table 5

Principle factors of AI impacts

Impacts of AI	Factor loading	Eigenvalue	Cumulative%	Cronbach's α
Factor 1: Advantages of AI		6.294	54.117	0.937
Solve complex problems facing the management	.952			
Save business time and money	.901			
Accomplish tasks quickly 24/7	.895			
Achieve positive impacts on the business revenues	.862			
Assist in increasing market-share	.799			
Achieve customers' preferences	.774			
Improve customer experience	.695			
Factor 2: Disadvantages of AI		3.585	82.321	0.901
Cause computer hacking	.956			
Cause job losses	.890			
Causing employees lazy and less productive	.786			
Decrease the employee's skills	.942			
Give rise to less security for customer's data and information	.939			

The previous table shows that the first factor named AI advantages, which identifies the benefits of applying AI in tourism companies from the viewpoints of respondents, which include the merits of applying AI in tourism companies; solving complex problems, saving business time and money, increasing the companies' revenues, and achieving customer satisfaction as well as improving their experience. The second factor named AI disadvantages, which demonstrates the expected negative impacts of applying AI in tourism companies such as computer hacking, job losses, causing

employees to be lazy and less productive, decreasing the employee's skills, and less security for customer's data and information.

6. Conclusion

This research investigates the implementation of artificial intelligence tools in Egyptian tourism companies and the employees' perceptions of applying AI in the tourism business. The results revealed that the majority of tourism companies are applying few tools of AI in their business. The most applied AI tools are using the social networks to communicate with the tourists, online reservation, and text-based communication channels such as e-mail, chat, and mobile messaging. On the other hand, there is a lack of processing In-house technology that uses algorithms to enable the prediction of tourists' interests and preferences, developing systems to auto-reply the customers' inquiries and questions, and providing 24/7 customer care service. There is a deficiency in using real-time communication with customers, offering personalized recommendations, and applying technological systems to evaluate the tourists' reviews and feedback.

There were significant differences among studied groups concerning the application of AI tools, favor large and medium-scale tourism companies. This is may refer to the financial capacity that enables them to construct the latest technology infrastructure. Also, results showed that tourism companies that provide full tourism services such as inbound, outbound, and domestic packages, ranked first in applying AI tools, followed by tourism transport companies. Concerning employees' perceptions of applying AI tools in the tourism operations, two factors emerged: advantages of AI (enthusiastic) and disadvantages of AI (suspicious). The advantages of AI represent the direct outputs of implementing AI, such as solve complex problems facing the management, save time and money, accomplish tasks perfectly, and boost business revenues as well as increase market share. While the second factor represents the demerits of applying AI, such as computer hacking, decreasing the employee's skills, causing less security for the customer's profile, and losing jobs. Regarding the suspicious employees who fear losing their jobs, the application of AI will not threaten them, as any task that needs complicated processes and analytics can be carried out through technology. On the other hand, tasks that need communication, innovation, and development of innovative solutions need human skills.

This research contributes by investigating AI tools that can be implemented in tourism companies and demonstrating the importance of applying AI techniques, as a result opening a pathway for drawing policies and strategies to support using such technology. From a managerial viewpoint, AI can enable tourism companies to improve their performance, achieve customer satisfaction and perceptions, and enhance tourist experience as well as achieve competitive advantage. In the future, it's predicted that more systems will be developed, and AI will be widely applied in the tourism field, so managers and employees should be ready for this. It is recommended that tourism companies should select and implement the useful tools of AI, improve their technological infrastructure, provide training courses for their employees to develop their technological skills. As the human element is very vital for the tourism field that can't be substituted. This paper investigated the applied AI tools in tourism companies

in Egypt. There are many other concerns that can be studied in future research. First, future research should carry out a cost-benefit analysis for implementing AI in travel and tourism. Second, this paper discussed the employees' perception of using AI techniques in tourism operations but didn't discuss tourists' viewpoints concerning using AI tools. Future studies should study tourists' perceptions of using AI in planning their trips.

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الذكاء الاصطناعي في شركات السياحة المصرية: التطبيق والإدراك

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المخلص

يعتبر الذكاء الاصطناعي (AI) من أهم التقنيات المبتكرة. تم تطبيق الذكاء الاصطناعي في العديد من الصناعات المختلفة، والتي حقق فيها تأثيرات إيجابية ملحوظة. وتعتبر صناعة السياحة واحدة من أهم القطاعات التي تأثرت بتطبيق الذكاء الاصطناعي. حيث قامت العديد من شركات السياحة والسفر على مستوى العالم باستخدام الذكاء الاصطناعي، وتطبيق تقنياته في بيئة العمل لتقديم خدمات متميزة للعملاء تحقق رغباتهم واحتياجاتهم، من أمثلة تقنيات الذكاء الاصطناعي برامج المحادثات الإلكترونية، وتقديم خدمات شخصية إلكترونية تساعد العميل في اتخاذ القرار. يهدف هذا البحث إلى استكشاف مدى توافر تقنيات الذكاء الاصطناعي في شركات السياحة المصرية، والتعرف على تصورات العاملين بشركات السياحة عن استخدام أدوات الذكاء الاصطناعي في بيئة العمل. تم تطبيق المنهج الكمي، حيث تم تصميم استبيان وتوزيعه إلكترونياً على مجموعة من العاملين بشركات السياحة المصرية. بلغت الردود الصالحة للتحليل الإحصائي 320 مفردة. أظهرت نتائج البحث وجود اختلافات بين شركات السياحة بخصوص تطبيق أدوات الذكاء الاصطناعي في العمليات السياحية، حيث إن الشركات التي تقدم رحلات سياحية داخلية ودولية هي الأكثر استخداماً لأدوات الذكاء الاصطناعي، يليها شركات النقل السياحي. كما أوضحت النتائج أن شركات السياحة الكبيرة والمتوسطة تطبق تقنيات الذكاء الاصطناعي أكثر من الشركات الصغيرة والمتناهية الصغر. أفرزت النتائج وجود عاملين رئيسيين لتطبيق الذكاء الاصطناعي وفقاً لتصورات وإدراك العاملين بشركات السياحة: مزايا تطبيق الذكاء الاصطناعي (من وجهة نظر العاملين المتحمسين)، ومساوئ تطبيق الذكاء الاصطناعي (من وجهة نظر العاملين المتشككين). يساهم هذا البحث في عرض أهم تقنيات الذكاء الاصطناعي المطبقة في شركات السياحة بالإضافة إلى عرض العائد من تطبيق مثل هذه التقنيات، والتي قد تساعد المديرين في وضع سياسات واستراتيجيات لتحسين البنية التحتية التكنولوجية، ورفع مستوى المهارات التكنولوجية للعاملين، وتطبيق أدوات الذكاء الاصطناعي الأكثر فائدة. وهذا بدوره يعزز أداءهم، ويوفر الوقت، ويحقق ميزة تنافسية.

معلومات المقالة

الكلمات المفتاحية

الذكاء الاصطناعي ؛
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