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## Using Information Technology for Enhancing Sustainable Tourism in Egypt

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### Abstract

This paper identifies a number of new technologies and applications in Information Communication Technologies that gradually revolutionize the tourism industry. Tourism industry is the most competitive business in the world and one of the most complicated industries. The tourism industry primarily consists of businesses that provide accommodation, transportation, flight trips, attractions, food and beverage, and integrated combination of these activities. This research is focused on using the new technologies to develop sustainable tourism in Egypt by increasing the tourist awareness of sustainability and sustainable tourism. This aim is achieved by using new technologies such as Big Data Analytic Technology and knowledge-based information system in order to forecast tourist's needs and demands in tourism industry. Any information concerning the future evolution of tourism flows is of great importance to hoteliers, tour operators and other industries concerned with tourism. Accurate forecasting of tourist services needs will be integrated for the industry's operations and allocation of resources such as manpower, financial management, marketing management... etc. to achieve effectiveness of advance planning and cost reduction. Showing that the Internet and sharp technological development have encouraged the increasing demand for tourism and using new technologies in forecasting the tourist demands and needs will naturally promote or potentiate an increase of tourism demand. **Keywords:** Information and Communication Technologies, ANNs, big data analytics, Tourist's Demands and needs.

**Keywords:** Communication technologies, tourism flows, financial management and Tourist's Demands.

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### 1. Introduction

Information Technology is playing an important role in the tourism industry in many ways as helping in costs reduction, operational efficiency enhancement, and improvement of services and customer experience.

Technological development has been constantly affecting the tourism and travel industry. The Internet and associated digital technologies are influencing the whole customer journey for both tourists and tourism practitioners alike. The way travelers get inspired, book, plan and experience travel has changed (Neuhofer et al., 2012) and the need for tourism marketers to develop

new models to promote and market their destinations has been created (Huang et al., 2012). One of the important contemporary technological developments influencing the tourism sector is Virtual Reality (VR) (Tussyadiah, et al., 2017), which is a computer simulated world that enables the viewer to experience it virtually (Desai et al., 2014).

Both tourists and travel agents can benefit from improved communication, reservations, and guest service systems. Technology has helped tourism industries replacing expensive human labor with technological labor. This is not only helping in reducing labor costs, but also avoiding customer service issues.

Information and communication technologies have been confirmed, as they increase efficiency, productivity and

improve overall business performances through some of new technologies and applications such as Artificial Neural Networks (ANNs), expert systems, GPS, smart phone communication and Big Data Analytics.

**1- Tourism industry worldwide:**

Tourism is defined as ‘all the activities of people travelling to and staying in places outside their usual environment for leisure, business or other purposes for not more than one consecutive year’ (Go2hr, 2016). Tourism industry is as one of the fastest growing industries in the world.

Over the past decades, tourism has experienced continued expansion and diversification to become one of the largest and fastest-growing economic sectors in the world. Many new destinations have emerged in addition to the traditional destinations.

2017 was a record year for international tourism. International tourist arrivals grew for the eighth consecutive year, a sequence of uninterrupted growth not recorded since the 1960s. Destinations worldwide welcomed 1,323 million international tourist arrivals, some 84 million more than in 2016.

International tourist arrivals have increased from 809 million globally in 2005 to 929 million in 2008, 995 million in 2011, 1133 million in 2014 and 1,323 million in 2017.

The tourism industry as one of the world’s largest economic sectors, Travel & Tourism creates jobs, drives exports, and generates prosperity across the world.

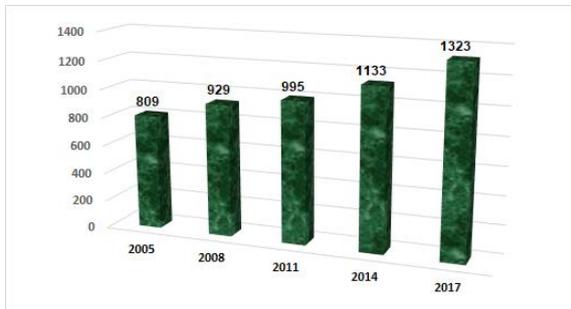


Figure 1: Number of international tourist arrivals worldwide from 2005 to 2017(in millions) (UNWTO 2018).

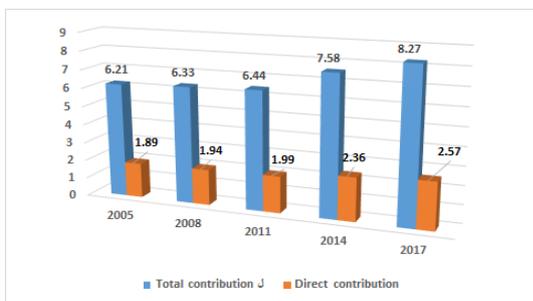


Figure 2: Direct and total contribution of travel and tourism to the global economy from 2005 to 2017 in trillion U.S. dollars (UNWTO 2018)

In the analysis of the global economic impact of Travel & Tourism, the sector is shown to account for 10.4% of

global GDP and 313 million jobs, or 9.9% of total employment, in 2017.

International tourism receipts earned by destinations worldwide have surged from US\$ 2 billion in 1950 to US\$ 104 billion in 1980, US\$ 495 billion in 2000, and US\$ 1.393 Trillion in 2016.

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**Sustainable tourism:** It is defined as tourism that depends on the essential elements of nature such as the sea, forests, desert, archeology and culture, without these elements or a degradation of these elements, the tourism potential of an area would be limited.

Sustainable Tourism involves having a minimum human impact but enough human activity for a project to fund itself which can maximize both the economic as well as the social revenue, while minimizing any adverse impact on environmental and cultural heritage at the same time.

The year 2017 was a highly important one for the global tourism community. In late 2015, the United Nations General Assembly declared 2017 as the International Year of Sustainable Tourism for Development, a global recognition of tourism’s transformative contribution to the development agenda. The activities and events that took place throughout 2017, in the framework of the International Year, served to raise awareness worldwide of the sector’s potential to lead economic growth, social inclusion and cultural and environmental preservation (World Tourism Organization Annual report 2017) .

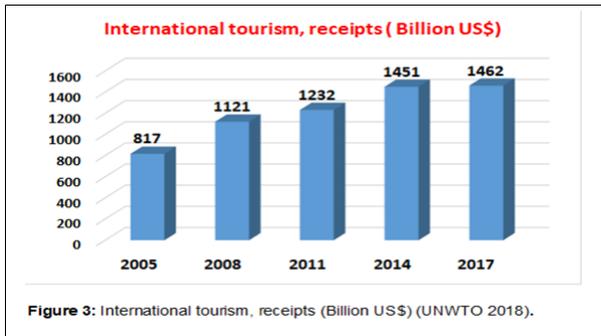
Through online proposal portal can forecast tourists needs and recognize consumers as a way of creating and offering as well as being able to monitor and moderate the discourse, taking on business and governance over themselves and its way to revolutionizing the travel industry, but not by creating a completely new untapped frontier, but by providing personalized and optimized options for each user, lowering the uncertainty of travel, increasing the trust about destinations and services, and generating data for businesses to implement more beneficial, profitable, and sustainable services.

**2- Tourism industry growth and development in Egypt:**

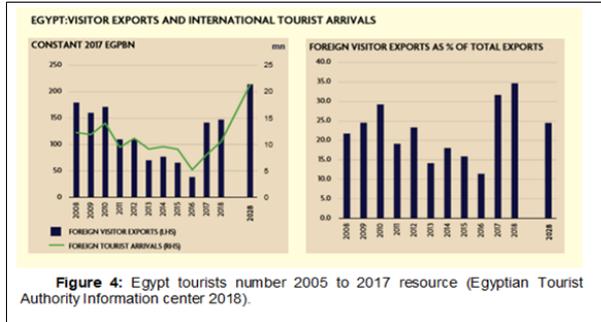
Tourism industry is one of the main sources of the national income in Egypt and that is why the state is keen to promote and develop this important industry. Hence, the government has taken several measures for the benefit of this sector and other sectors as well.

The value for International tourism number of arrivals in Egypt was 14,051,000 as of 2010 and the number of arrivals in Egypt was 8,300,000 as of 2017.

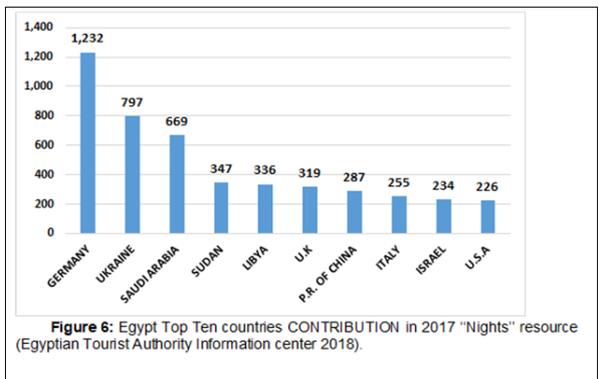
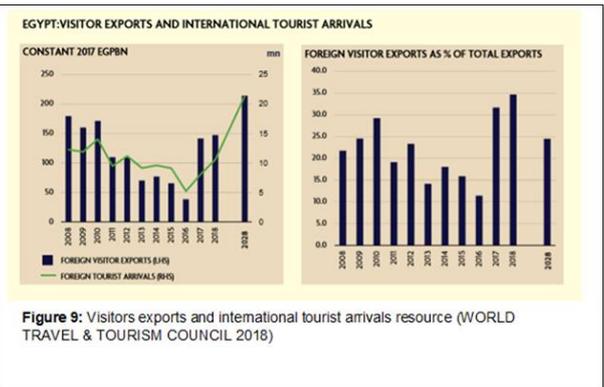
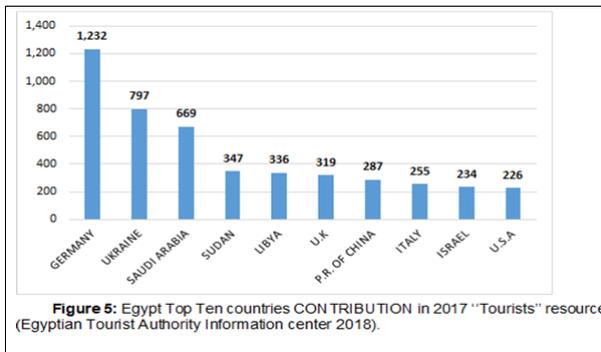
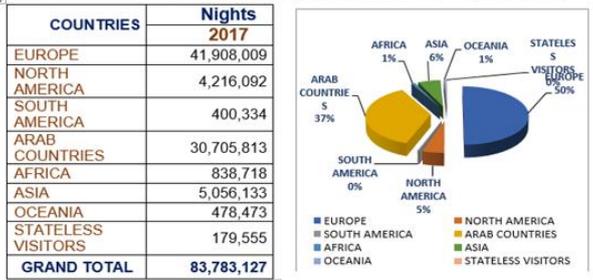
8.3 million Tourists visited Egypt in 2017. This marks 54 percent increase in the number of tourists compared to 2016, the jump in tourist numbers last year boosted tourism revenues by 123.5 percent year-on-year to \$7.6 billion.



Egypt Number Of tourists Per Market in 2017 (Thousand)

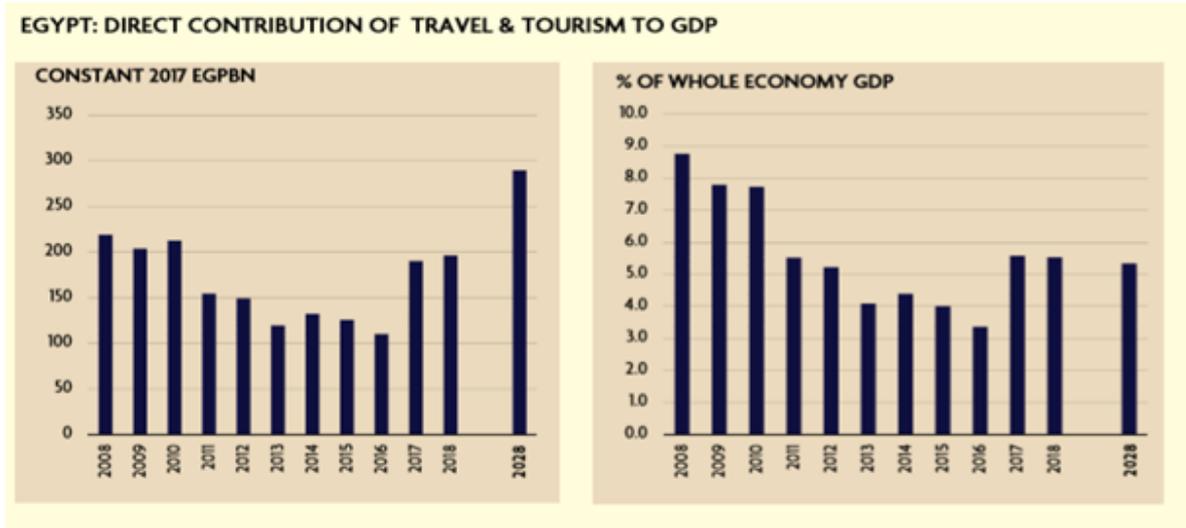


Egypt Number Of tourists Nights per Market in 2017 (Thousand)



### The contribution of Travel & tourism industry to Growth Domestic Product in Egypt

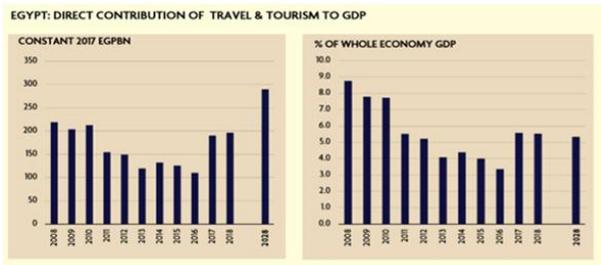
The direct contribution of Travel & Tourism to GDP in 2016 was EGP87.4bn (3.2% of GDP) and the direct contribution of Travel & Tourism to GDP in 2017 was EGP190.3bn (5.6% of GDP). This is forecast to rise by 3.2% to EGP196.5bn in 2018. This primarily reflects the economic activity generated by industries such as hotels, travel agents, airlines and other passenger transportation services (excluding commuter services). But it also includes, for example, the activities of the restaurant and leisure industries directly supported by tourists.



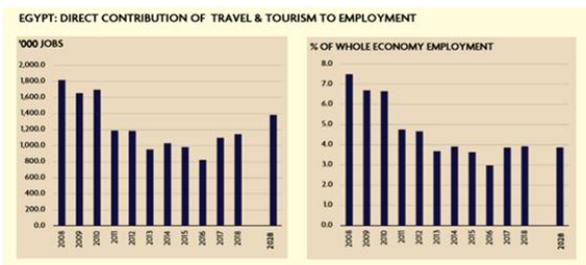
**Figure 10:** EGYPT DIRECT CONTRIBUTION OF TRAVEL & TOURISM TO GDP (WORLD TRAVEL & TOURISM COUNCIL 2018).

In recent years tourism has become a powerful transformative force that has had a decisive influence on the lives of thousands of people. This is because it is one of the main employment generation sectors in the world (Scowsill, D., 2017) , The contribution of Travel & tourism industry to Employment in Egypt Travel& Tourism generated 773,000 jobs directly in 2016 (2.9% of total employment) and generated 1,099,000 jobs directly in 2017 (3.9% of total employment) and this is forecast to grow by 4.0% in2018 to 1,143,000 (3.9% of total employment). This includes employment by hotels, travel agents, airlines and other passenger transportation

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**Figure 10:** EGYPT DIRECT CONTRIBUTION OF TRAVEL & TOURISM TO GDP (WORLD TRAVEL & TOURISM COUNCIL 2018).



**Figure 11:** EGYPT DIRECT CONTRIBUTION OF TRAVEL & TOURISM TO Employment (WORLD TRAVEL & TOURISM COUNCIL 2018).

**The Egyptian sustainable tourism destinations:**  
**Medical Tourism and Youth Renewal:** Egypt offers the best medical tourism sites with health and natural materials in Safaga and the oasis of restorative oases in Siwa and Dakhla. Just a few hours from the bustle of Cairo, the atmosphere of Siwa oasis is comfortable, with rivers and tranquil gardens blending with traditional local culture. Surrounded by wonderful fruit Farms and gardens, dating back to the time of the Pharaohs. These and other selected sites in Egypt promote wellness and renewal through therapeutic sand, rich mineral water for skin and body care. In less conventional, Egypt has become the popularity of medical tourism is growing, with Arabs and Europeans looking for high quality,

Affordable prices cosmetics, accommodation costs and attractions.

**Environmental sites:** Egypt has amazing natural sites throughout the country, such as the Sinai Peninsula, Western Sahara, Eastern Province, oases and Fayoum, as well as sunny beaches, including the desert Landscapes, oases, valleys and waterfalls. The unique Eastern and Western desert in Egypt offers some of them from the most popular desert safaris in the world, while trips across the sands The Sinai Mountains are an opportunity to explore wildlife and unique ecological sites, including glacial lakes and olive groves. The oases, located to the west of the Nile.

**Beaches and Resorts:** Egypt has a sunny weather throughout the year, and has a wonderful underwater life, with the closest coral reefs to Europe off the Sinai Peninsula in the Red Sea. The northern coast attracts Arab, European and East Asian tourists with an environment similar to southern Greece, Italy and Spain. From tourist towns along the Red Sea coast to diving and explorations off the shores of the Gulf of Aqaba.

**Historical sites:** The remains of Egypt's long and diverse past are still present along the banks of the Nile, from Upper Egypt in Abu Simbel near the Sudanese border, and through Greater Cairo and Alexandria. Sites in Upper Egypt, including Abu Simbel, Aswan and Luxor, serve as links to the pharaonic past in Egypt. In Greater Cairo, tourists can visit Egypt's most famous destination: The Pyramids of Giza and the Sphinx. The Egyptian Grand Museum on the Giza plateau will soon contain some of Egypt's most important archaeological treasures, allowing the Egyptian Museum in downtown Cairo to display some hundreds of thousands of valuable pieces that are not currently being displayed. The Roman ruins are mentioned in the northern coastal city of Alexandria with Egypt's diverse background. Medieval architecture is clear throughout Cairo, and Khan el Khalili is one of the oldest bazaars in the world. Exploration sites throughout the country continue to uncover evidence of Egypt's rich heritage.

**Religious sites:** Religious tourism has increased steadily over the past several years. One of the most popular destinations is the Monastery of St. Catherine in the Sinai Peninsula, and also the location of the burning bush of Bush. Tourists can also follow the path of the Holy Family in Egypt. The monastery of St. Virgin was built near a cave where the Holy Family is believed to have been stopped. The monks still organize daily visits to the cave and celebrations near the site. Back in the capital, tourists can visit Coptic Cairo and Islamic Cairo in Al-Moez and Al-Gamalya Street and also the Islamic tourism of the Buhara family, where they can visit some of Egypt's oldest Christian and Islamic religious sites, including the Hanging Church. The capital is also home to important mosques

### 3- Information technology and smart tourism

Egypt the most important and interesting civilizations in history and remains just as interesting as so many of the old structures and monuments still exist. Not only that

but Egypt is rather special for other reasons; it has many incredible beaches, wildlife, cuisine and weather. That reasons makes Egypt becoming a place that is interesting to be visited by many tourists either local or international. Every year the number of tourists who visited Egypt has greatly increased, and transformed the tourism to be an important sector for Egyptian economical. The rapid development of tourism sector in Egypt must be equilibrated by the evolution of technology and the supported facilities. Now, the usage of a smartphone technology is one of the important things and a part of modern people daily activities. By taking the advantages of a new technology, Information Technology has played an very important role in the tourism industry over the last decade. Technology has helped reduce costs, enhance operational efficiency, and improve services and customer experience. Both customers and businesses can benefit from improved communication, reservations, and transportation and guest service systems and helped to replace expensive human labor with technological labor. This helps reduce labor costs, but also helps avoid customer service issues. The new technologies is smart tourism tools enable tourism decision maker to make smart decisions when using technology into tourism industry and Implement Information and Communication Technologies to enhance quality of Life, efficiency of mobility, economy and sustainability.

Smart tourism through using a new technology can be defined as the following: "a platform, which is implementing ICTs such as Artificial Intelligence, Cloud Computing and Internet of Things to offer the tourist personalized information and enhanced services established by mobile end-user devices" (Boes, 2015). In order to make a tourism destination smart the dynamic connection of stakeholders through technological platforms is a key factor. The main objective of these platforms is to create a quick information exchange regarding all tourism related activities (Buhalis & Amaranggana, 2013).

Here are some examples of new technologies continues to improve the tourism industry.

- Smart Phone and GPS.
- E-tourism, Internet, social media
- Big Data& Big data Analytics.
- Artificial Intelligence (AI).
- Cloud Computing.
- Internet of Things (IOT).

#### Smart phones & GPS

Mobile tablets and smartphones have replaced large desktop computers this is helpful, because many travelers take some type of mobile device with them on a trip. This helps hospitality businesses keep customers advised of changes and delays to their reservations, offer deals, and advertise by using GPS tracking and Tourists can simply use their mobile phones to explore the destination and events. Users enabled by technology

in SMART Tourism Tools are able to navigate their way through countries and cities.

smart phone commerce effectively assisted to reach the tourist anywhere at any time to meet the travelers' sophisticated needs, for instances, Web information search, SMS (short message services), MMS (multimedia message service), banking, payment, gaming, emailing, chat, weather forecast, GPS (global positioning service), map, personal navigation system, location-based mobile guide and so forth (Brown & Chalmers, 2003; Li, 2013; Wang et al., 2014).

E-tourism, Internet, social media:

The internet has a powerful impact on tourism industry. A customer's first experience with your business is a visit to your website. This includes looking at pictures and reviews from past guests. It is vital for a business to effectively utilize online advertising, social media, blogs, and online booking, purchasing and payment to help convenience their customers, especially when your competitors are doing the same thing.

The importance of the E-commerce is felt and greatly emphasized in the all business field. The E-tourism and its utility provide a lot of information on destinations, accommodation places, facilities, prices and geographical features and climate. More number of companies integrated all the services on their websites like the Global Distribution system (Amadeus, Travel Port and Saber) in flight fields in one portal and provides a complete package with a competitive price to the required customers.

Big Data & Big data Analytics:

Big Data refers to digital data volume, velocity and/or variety that Data refers to digital data volume, velocity and/or variety that enable novel approaches to frontier questions previously enable novel approaches to frontier questions previously inaccessible or impractical using current or conventional methods; inaccessible or impractical using current or conventional methods; and/or exceed the capacity or capability of current or conventional and/or exceed the capacity or capability of current or conventional methods and systems (National Institute of Standards and methods and systems (National Institute of Standards and Technology, 2013 ).

Big Data & Big data Analytics in tourism industry:

Tourism industry and the Big Data, at first sight, may not be two fields that seem to have much in common. But the reality is that today the tourism industry takes advantage of a lot of the technology provided from the latter, to continue growing and improving the services performance.

Tourism is an information-intensive industry so the Big Data topic has gained incredible popularity in mass media and scientific world. It is one of the most notable technical buzzwords nowadays (Pries & Dunnigan 2015, 2). The phenomenon of Big Data received a great response in all spheres of human interactivities. Big Data is not only the direction of the industry, but it represents an entire science, capable of forecasting the future prospects. Moreover, Big Data is considered to be the revolution of the digital era, compared with "novel petrol" in the significance level for the society (Rotella 2012, 1). As well as raw materials, the massive data

quantity in a pure form involves a much lower key insight value in contrast with the production, derived from data management and analyzing. Big Data is a source of knowledge that brings a superb impact into the routine life.

Big data brings endless opportunities for the travel industry, The bounty of tourism big data has the potential to deliver new and more highly informed inferences about human activity and behavior that will give the tourism industry a big boost and benefit not only customers but also those who participate in the tourism industry (Fuchs, Hopken, & Lexhagen, 2014).

Forecasting Tourist needs Using Big Data:

The Big Data through proposed portal provides great potential for tourists seeking excursions in decision-making by tracking and analyze shopping patterns, recommendations, purchasing and behavior.

Travel agents by this portal can find innovative ways to use a variety of data resources to connect with potential tourists' visitors at each stage of the journey and use these Big data sources to understand the tourists needs to forecast tourist's needs and demands in tourism industry and offering the sustainable tourism information and programs in Egypt to develop sustainable tourism in Egypt by increasing the tourist awareness of sustainability and sustainable tourism.

Since the new availability of web-based data sources such as, search engine traffic, customer feedback on review platforms and web traffic, has a natural relation with tourism demand, this big data has been used for tourism demand prediction (Hopkin, Ernesti, Fuchs, Kronenberg, & Lexhagen, 2017).

The use of tourists means of modern technology such as smart phone, social media such as Facebook, Twitter, YouTube, Instagram and also technology of things produces huge amounts either through search and planning of the trip or through the booking of air and accommodations and transportation and tourist attractions and The Most of this data is of an external nature: for example, in the form of Twitter, Facebook, Instagram or other social networking feeds.

#### **The importance of using big data in the field of tourism:**

According to Song and Liu (2017) the use of tourism related big data appears to have advantages over traditional methodologies. Firstly, the reliability of the data is higher since it is unprovoked data based on users' real actions and not on samples which allows us to consider all aspects of the information in order to provide accurate results instead of biased conclusions due to data loss because of the usage of sampled data. Secondly, since tourism big data is produced by tourists themselves, it enriches the knowledge of tourism businesses' target markets and is useful for analyzing consumers' demand for touristic products and services (Hendrik & Perdana, 2014).

Travelers leave different digital traces behind on the Web when using mobile technologies. Through every traveler, large amounts of data are available about

anything that is relevant to any travel stage: prior to, during, and after travel (Hendrik & Perdana, 2014).

**Tourism Forecasting using Big Data:**

The use of massive data in tourism forecasting as massive data could bring many benefits to the tourism industry, Tourism services companies, such as the Global Distribution System, are specialized in providing flight booking services, car rental and accommodation booking ... that effectively capture and implement big data strategies gain a competitive advantage since the technology required to process big data is a hindrance for many business users because of its complexity and cost.

There is a great quantity of user-generated content on Egypt mainstream online travel websites the data include not only text and photos in travel blogs, but also tagged data such as travel dates, travel expenses, lengths of stay, associated destinations, With the popularization of internet web-based technologies, social media, smart phones, GPS and other hand-held computing devices the tourism data collection has become easier.

Tourists leave lengthy trails of data when they travel. Onlinebooking, purchasing and payment are made online, itineraries are stored in digital calendars, and GPS coordinates are shared every step of the way. Voluminous data is produced by various stake holders, which can't be handled with traditional data techniques. The Big Data techniques have very promising feature to deal with such massive data set. Big Data is capable to analyze this data from tourist industry and make a prediction for further growth of industry.

**Big data capturing in tourism sector**

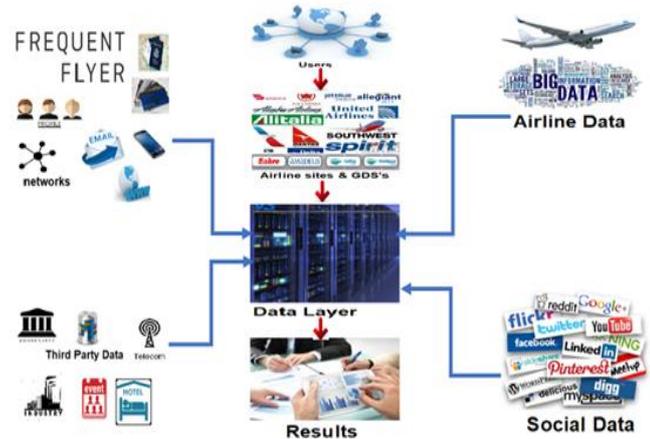


Figure 13: Big data capturing in tourism sector.

**4-Conclusion:**

To answer the problem of forecasting the tourist's needs and develop sustainable tourism in Egypt by increasing the tourist awareness of sustainability and sustainable tourism through using Cloud Computing and Big Data is needed to support a tourism industry in Egypt and to obtain both financial and operational stability, The technological revolution in the tourism industry has led to a growing demand for tourism, marketing and tourism design. Both tourism companies and destinations have been forced to adjust their tourism planning and management strategies so that they can adapt to the new needs of the sector. The Big Data technology enables to process large volumes of data, one of the biggest opportunities of the Big Data is that predictive analyses can be carried in tourist industry, thanks the generation of knowledge acquired after the structured, semi structured and unstructured data has been processed. The timely use of big data for forecasting and decision-making using proper approaches and methods is the best way to capitalize the benefits of big data.

Big Data and data analytics are changing the theory and practice of tourism industry and using these technologies to anticipate customer needs, rewrite how they meet customer expectations by the smart tourism programs covering the tourist need, redefine customer engagement, and achieve new levels of customer satisfaction and offering the sustainable tourism programs, the preferences of tourists and their needs and guiding them towards sustainable.

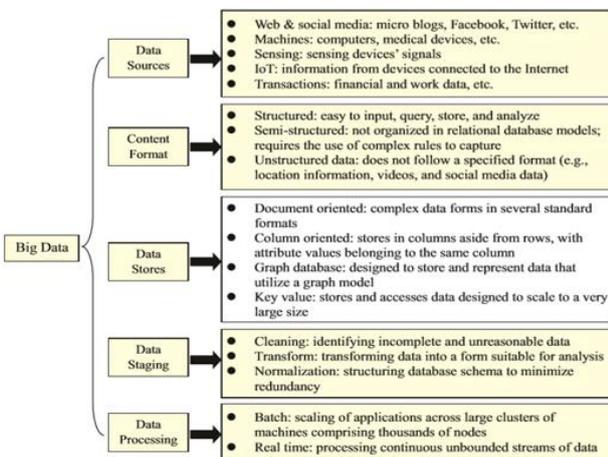


Figure 12: Big data classification (Hashem et al., 2015)

Tourism companies and travel agents now can use this information to provide more targeted customer service, marketing and forecasting the tourist's needs and cover it and still difficult to access the data in servers of travel companies, but with the transformation into cloud computing, departmental walls break down as data starts to be held in the cloud, data lakes that can be shared across businesses.

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