

## THE ROLE OF ASTRONOMY TOURISM IN PROMOTING EGYPT

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**Abstract:** This study aims to increase the awareness about the astronomy tourism in Egypt which can be considered as a new and niche branch of tourism, as well as highlighting the potential resources of astronomy tourism in Egypt. The research used mixed methodology technique quantitative and qualitative methods, upon 535 questionnaire forms was distributed along with in-depth interviews with astronomy tourism participants' then primary data was collected and analyze. The results confirmed that astronomy can be considered as a new type of tourism that have a positive and significant effect on promoting Egypt around the world, in addition results confirm that Egypt is one of the best destinations to go stargazing. This study investigates the importance of taking astronomy tourism into consideration by the ministries and companies and increase awareness about this special interest tourism.

**Key words:** Astronomy Tourism, Stargazing, Astro Destinations, Dark Sky, Light Pollution

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### INTRODUCTION

The “Astronomy” is the science of studying all extraterrestrial objects and phenomena (Encyclopedia Britannica). It is considered one of the oldest sciences in the world which has influenced many civilizations, and still influences our lives as it studied the phenomena of evolution of the Universe and the predictions of the future. It also effects many branches of science because of development of technology. Tourism as a vast activity effecting our lives has expanded beyond the planet's surface and now trying to reach the stars in a variety of ways, such as "Astro tourism” which is terrestrial space travel, "atmospheric space travel," (Van Wyk-Jacobs, 2018; Petrevska et al., 2021). In both theory and practice, Tourism become an important tool which linking the two domains of earth and sky that allow travellers to experience the richness of life on Earth while also literally exploring the stars above (Rodrigues et al., 2015).

Astronomy tourism is completely off the beaten path, it is a less-studied field in tourism literature (Junjie, 2017), although demand on such practice is increasing. Therefore, the goal of the Research is to increase awareness about this new emerging market and promote Egypt through applying this form of tourism in Egypt. Astronomy tourism can also be categorised as adventure tourism applied under the concept of sustainability as well as being engaged in cultural and educational tourism (Văduva et al., 2021). Astronomy tourism is regarded as one of the best ways to attract visitors to nature and rural areas providing socioeconomic benefits (Bjelajac et al., 2021). According to Li (2021) stargazing recently gained more academic attention. Hence, this current study contributes to how to implement astronomy tourism as a new trend of tourism which can contribute in promoting tourism and enhancing tourist demand in Egypt.

Tourists are looking for different, unique, and extraordinary experiences, they are always seeking out of astronomical sites; if they visit anyplace they might look for the Jaipur site, so astronomy tourism fulfils and satisfies their desires to view stars and planets either use their naked eyes or with optical devices such as optical telescopes (Matos, 2017). Those people are called “Astro-Tourist” who is the person that appreciate the uniqueness of such events because it provides them with satisfaction, freedom and peaceful, Astro-tourists have a feeling of belonging to the universe rather than just to the world, they include scientists, amateur, expert astronomers, and members of the general public (Matos, 2017; Michael, 2021; Pásková et al., 2021). Astronomy tourism is based upon special interest of tourist to participate in astronomy-related activity which is category into three types first observing celestial objects or astronomical events such as solar and lunar eclipse and planet opposition, second type is interactions with the local community, such as star parties, astrophotography, workshops for astronomical education, and watching space shuttle launches and finally astronomy related to historical sites and visiting scientific facilities like observatories, planetariums, museums, and labs (Junjie, 2017; Ma et al., 2020; Bjelajac et al., 2021). One of the best and most valuable characteristics of Astro tourism is that the sky is consider the primary

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resource which never needs to be repaired or developed; it is always available and has its unique features, as a result Astro tourism is consider a type of sustainable tourism, which does not harm the environment in addition that focused on the observation of the dark sky which is free of light pollution (Metodijeski et al., 2018; Kanianska et al., 2020; Escario-Sierra et al., 2022). The relationship of human beings with natural phenomena is as old as human history as evidenced by the planets and moon which are mention in ancient texts that date back more than 3,200 years.

These texts demonstrate human curiosity about astronomical objects and events (Joseph et al., 2022). Ancient cultures used astronomy to determine and understand time for the purposes of their concerns (Metodijeski et al., 2018). The night sky in the past was a precious asset which has a significant resource for measuring time, measure seasons, tell stories, decide the time of plant and harvest and periodic weather occurrences like floods and droughts. (Collison and Poe, 2013; Farmany and Mickaelian, 2018; Gretzel and Stankov, 2021). This research is addressed the following gap is that no one in Egypt talk about this topic academically i consider the first one in Egypt who is linking between astronomy and tourism, as it will reflect with many benefits to Egypt whether in attracting more tourist to experience the beauty of clear dark sky which consequently effect in positive way to the economics of the country, also raise awareness about the preservation of the night sky. The hypotheses of the research are developing the infrastructure for astronomy tourism in Egypt will enhance its touristic demand and promotes Egypt as a market for Astronomy tourism.

## **LITERATURE REVIEW**

### **The dimension of astronomy tourism**

Astro tourism or terrestrial space tourism is regarded as a type of space tourism since it falls into one of two categories, orbital space tourism, suborbital space tourism (Junjie, 2017). Unlike astronomy tourism, which is based on the Earth's surface, watching solar eclipses, rocket launches, aurora viewing, and even stargazing. Space tourism occurs above the surface of the Earth in outer or atmosphere space. over the past few years, the world perception about space tourism has significantly changed from being considered "science fiction" for a significant new goal for the space industry (Collins, 2000; Petrevska et al., 2021). Space travel is uncommon, and it differs from the type of travel that is classified as heritage, it is characterized by massive costs, a limited resident population, a lack of infrastructure, participant responsibility for their own safety, and unknown destinations (Ao, 2018; Weibel, 2020). Kanianska et al. (2020) highlight that astronomy tourism can be consider as a new form of ecotourism, which is identical with rural tourism, green tourism, adventure tourism, it's categorized as a rural tourism industry due to urban growth and light, so it is typically practiced in rural, semi-urban, or non-industrialized places that are remote from major cities. The most well-known astronomy tourism destinations are also in deserts, high mountains, or low population density areas. As a result, inhabited areas which are far from urban areas are ideal for expanding astronomical tourism. There are additional advantages for rural areas because when tourists arrive, these areas must have the infrastructure and services required to meet their needs as well as to improve those that already exist, which benefits the local economy (Bjelajac et al., 2021; Escario-Sierra et al., 2022). Consequently, let's spot the light about the benefits gain from astronomy tourism.

### **The benefits of astronomy tourism**

Astronomy tourism offers many benefits in different ways, the destination uses dark and clear skies to attract tourists to enjoy nature and science, gain knowledge in a simple and exciting way, to create a unique experience that last for years. The destination should clarify its skies from pollution. According to the declaration of Starlight which states that Astronomy tourism has opportunities for increased collaboration among tourism stakeholders, local communities, and scientific organizations and as any industry, Astronomy tourism depends on individual business owners (small projects) to supply essential tourism services including housing, transportation, tour packages (Fayos Solá et al., 2014; Rodrigues et al., 2015; Joseph et al., 2022). Along with the economic benefits, Astronomy tourism has emerged as an effective way of bringing deeper issues to the public's attention and educate the public important values like the preservation of the night sky, the dangers of light pollution, and the need to safeguard cultural and historical landmarks and landscapes (Matos, 2017). It is a type of tourism linked to cultural activities, interacting with local residence to achieve their services. It has been categorized as sustainable tourism in which its greatest assets never need maintenance or development. It is always available, completely unique in its features and, whether it be day or night, the sky is considered as one of the highest sustainable fascinations (Najafabadi, 2012) after discussed the importance of applying astronomy tourism in Egypt it is important to know how to engage astronomy as type of tourism which is not less important than others types of tourism as well ways of promoting astronomy tourism in Egypt.

### **Promoting astronomy tourism**

Several significant astronomical events had quietly occurred and passed without any activity intended to attract tourists, whether by domestic and foreign tourists, over the previous four decades (Kunjaya et al., 2019). So, a starry sky alone isn't enough. promotion and the implementation of a number of measures to facilitate are needed, these include training tourism staff, preparing the necessary infrastructure for sky observations, educating people about the protection of the black sky, and taking steps to keep the environment in its natural condition (Mitura et al., 2017). Consequently, to promote stargazing tourism, there is a need for planning and development of essential terrestrial resources and infrastructures that offer services to tourists by facilitating and improving the observing experience (Fernández-Hernández et al., 2022).

Therefore, it's essential to address the light pollution problem before focusing on the development of astronomy tourism (Vrdoljak Raguž et al., 2022). As Ingle (2010) identified that the ideal place for stargazing is the area with the least amount of artificial light. Mizon (2016) described light Pollution as a thief of the stars. According to the Starlight declaration for

the growth of astronomy tourism, astronomy tourism must add in educational activities because children are naturally curious about astronomy, so the Ministry of Education should incorporate astronomy teaching for basic education to exploring the world and organized trips for school-age and pre-school children to planetarium shows, observatories tours, and meteor exhibits, this will encourage children the abilities, attitudes and knowledge that allow them to understand, appreciate and care for their natural environment. Astronomy is very interesting to children because day and night, the sun, moon, and stars are all part of their daily experiences they are in their surroundings. Consequently, it will have favorable impact on their future interests and their ability to learn about the environment (Mitura et al., 2017; Pérez-Lisboa et al., 2020; Vrdoljak Raguž et al., 2022). One of the most essential way to promote astronomy tourism in Egypt is to obtain an international dark sky certification as Egypt meets the requirements that the organization placed, by obtaining these kind of certifications for sky quality as it connects to the image of quality and professionalism in the development of this type of tourism in the country, therefore Egypt will gains recognition from astronomers around the world.

### **International sky quality certifications**

So many international organizations have paid attention to the preservation of night skies. Among them, the International Dark Sky Association (IDA) (Li, 2021). Its primary goal is to identify international Dark-Sky Places where people can participate in astronomical activities (Isono and Itoh, 2021). To be accredited as a destination suitable for astronomy tourism. The destination must meet certain requirements such as high elevation, vast amounts of space, the observer's position, the percentage of clear skies, weather conditions in the form of wind and temperature, Sky transparency, laws and regulations regulating such activity, infrastructure accessibility, risk factors, and suitable costs, providing sky darkness which is characterized by no light pollution and suitable atmospheric conditions, including average annual cloud coverage, so that celestial objects can be seen (Li, 2021; Butar-Butar et al., 2022).

Based on a published IDA guideline from 2018, there are many requirements and standards that must be met to obtain a Dark-Sky Certificate, by obtaining a Dark-Sky certification is a part of the attempt to successfully achieve two key strategic objectives: the reduction of light pollution and the growth of astronomy tourism (Vrdoljak Raguž et al., 2022). Getting certificates for the night sky's quality is one of the ways to promote astronomy tourism so it will attracting travelers interested in astronomy who value the guarantee of starry skies that these international certifications provide (Escario-Sierra et al., 2022: 14). Egypt was one of the earliest destinations to recognize science of astronomy.

Its greatest evidence is shown through the different structures like the Pyramids of Giza (4th Dynasty), Abu Simbel Temple (21st Dynasty). As well as many prominent stars and astronomical terms, like Aldebaran, Betelgeuse, Altair, and Algol, which are still known by their Arabic names. All these facts demonstrate how obsessed the Egyptians were with monitoring the heavenly bodies and their motion (Al-Naimiy, 2009; UNESCO, N.D). In addition, that the science of astronomical observatory was an Arab invention presenting the greatest contributions to human civilization (Al-Naimiy, 2009). Egypt has long been a prime destination for stargazers from ancient time, as Egypt is truly a unique place to experience the night skies, Egypt provides a unique chance to observe the stars and constellations in all their beauty, the brightest star, to witness the milky way, the mysterious planets and the meteor shower, all you need to do is to travel to Egypt and enjoy stargazing vibes, so here are some of the famous astronomy destinations in Egypt.

### **The best stargazing locations in Egypt**

In the early morning, people go to see the magnificent Pyramids of Giza and the Sphinx, but what if they visit this area at night? The pyramids have cosmic significance and were constructed with mastery of the sky. It's a destination that offers astronomy tourism, culture, and recreation. It is in Giza, the third largest city in Egypt and the fourth largest city in Africa. Although the city is big but the area of the pyramids plateau is vast. El-Fayoum is another ideal location, to enjoy Astronomy tourism in the Egyptian desert linked with eco-tourism activities and enjoy the Egyptian culture. There are a lot of activities participated in Fayoum along with stargazing, tourists can enjoy sand sailing, horse riding, discovering ancient monuments, and more. It is a wonderful location to observe the constellations overlooking its magnificent magic lake in the central of the desert. Tourists can camp in the white desert, between Rocky Mountains, count the stars as you fall off to sleep while enjoying the sound of nature's calmness and water springs. Located 100 kilometers southwest of Cairo.

Saint Catherine is one of the highest mountains in Sinai. Most visitors often enjoy watching the sunrise from a great height. However, they can choose to have a completely different experience and see the starry dark sky, as the sky is clear away from pollution. Also stargazing in the desert of Sharm El-Sheikh to escape the city lights and travel to the desert for a romantic night of star gazing and Bedouin feasting. You can see more than 2500 stars with your eyes, the Milky Way and our galaxy also can be seen in the sky in a dark place. You can experience a several kinds of stargazing in Nuweiba while enjoying nature, peace, and tranquilly as well as the beach and its white sand. Far away from the noise and rush of the city, there is an Egyptian oasis which is Siwa Oasis unlike any other with a lot of activities like riding a bike, climbing mountains, camping in the desert, or gazing at the stars at night (EPICtravelTV, 2019; Betz, 2021; Abdelhakim et al., 2022).

### **Specialized authorities in astronomical observation and planetariums in Egypt**

The Astronomical Society of Mostafa Mahmoud (ASMM) is a private scientific organisation in Egypt that promotes astronomy and space sciences and aims to support, encourage, and educate astronomy enthusiasts both inside and outside Egypt. National Research Institute of Astronomy and Geophysics (NRIAG) it is the oldest research institute in North Africa, its main goals are conduct scientific research on celestial objects (such as stars, planets, meteors, comets, galaxies, etc.) as well as to investigates the evolution of celestial bodies, physical and chemical qualities, and evolution of the universe. The Egyptian Society for Astronomy (ESA) is a non-profit organization that aims to raising scientific

awareness of the public in astronomy and space, additionally, the website of the organization shares latest astronomy news and newest astronomical discoveries. Al-Kottamia Astronomical Observatory (KAO) is the largest telescope in the Middle East, North Africa, and the Arab world and one of the most important observatories in Egypt used by scientists and researchers. The Egyptian Space Agency (EGSA) is a public economic authority in Egypt, its objective is to strengthen the understanding of space technology, and the capacity for leading and managing space technology projects, enhancing the space industry for a sustainable future and encourage a peaceful use of the space. Helwan observatory (HO) provided a lot of international services through it like observe the New Crescent and determine the start of Hijra months, Ramadan prayers, fasting, and defining of the direction of Mecca from any location in the world.

One of the most amazing features of astronomy is its ability to teach us about the universe in ways that no other science can. The term "planetarium" is used to refer the structure where a mechanical device displays stars and planets. The planetarium has always been the perfect setting for simulating the night sky and carrying us to worlds we would otherwise never have the chance to explore. Planetariums serve as a vital link between astronomers and the public as it has a major role in the astronomical information (Petersen and Petersen, 2000). There are two planetariums in Egypt Children's Civilization and Creativity Centre. They adopt a program includes a variety of scientific workshops in the field of astronomy and space to show the children the basics of space exploration, and illustrate the scientific information such as the movement, and the location of stars, planets, the sun and the moon. The second is The Planetarium Science Centre (PSC), Bibliotheca Alexandrina which launch the Amateur Astronomy Club (AAC) where amateur astronomers can engage in astronomical activity for leisure and interest (El-Mitaky, 2009).

## MATERIALS AND METHODS

This study aims to increase the awareness about the astronomy tourism in Egypt. In order to do so, research aims and questions were first identified, followed by the literature review; a questionnaire was then distributed in order to collect primary data from the sample in addition to semi-structured interviews; both primary and secondary data were analyzed and results were discussed, and finally, a conclusion was made (Figure 1).

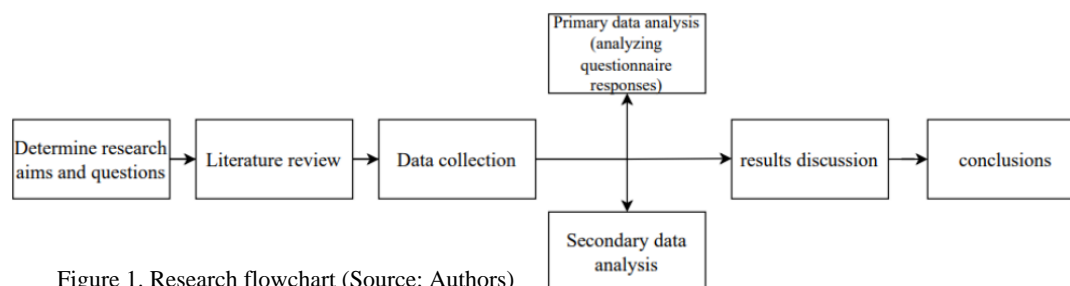


Figure 1. Research flowchart (Source: Authors)

The current study uses mixed methodology quantitative and qualitative methods, primary data was collected from semi-structured interviews and questionnaire form, involving systematic inquiries into quantitative data that enable analyzing, interpreting, and presenting results in numerical form. The criteria for selecting participants in the quantitative method are first the populations are the people whose interested in the field of astronomy and whose are not interested in order to know their opinion about this new type of tourism if it will attract them or not, second i was distributed my questionnaire domestic and internationally as i want to collect data from people around the world. About the criteria for selecting participants in the qualitative method, in total, 6 participants from different tourism companies and communities who experience positive experiences with astronomy trips, one of them is owner of Egyptian society of astronomy Sciences in Egypt and member of the Arab Union for space sciences, other is owner of travel company which made a domestic trips to astronomy destinations. Astronomy Participants were asked to provide answers with fewer constraints the participants were fully informed about the research objectives to ensure transparency when participating.

During the months of January and February of 2023, a total of five hundred and thirty-five 535 online questionnaire form was distributed on various social media platforms using Google Form, such as Facebook and WhatsApp groups relating to tourism and astronomy in Egypt. The questionnaire included five parts with a total of 17 questions: the first include 4 questions which identify the demographic information. The second part to measure the status of astronomy tourism in Egypt, as in knowledge of Astronomy tourism and the areas affording stargazing which include 8 questions. The third part include 3 questions and identifying how well is it marketed, the fourth part to recognize which areas attract the Egyptian market to participate in such phenomena. The questionnaire ended by two open-ended questions to collect suggestions or recommendations that could contribute to develop, market, and raise awareness of astronomy tourism in Egypt. The measurement of the questionnaire was adapted from Wen (2017); Gerasimova (2021) and Soleimani (2019). As well as the difficulties facing participants. The data was processed with the Statistical Package for the Social Sciences (SPSS) for windows v.28. In addition, the study used semi-structured interviews with six pioneers in the field of astronomy, that allow for more inductive rationalizing, as participants were asked to provide answers with fewer constraints (Yıldırım, 2021). The interview questions recordings were partially transcribed by 'fits' with the aforementioned research scope, reducing the data. Afterward, the study suggested 4 themes: (1) Astronomy tourism is a special interest tourism; (2) Astronomy tourism activities; (3) Marketing astronomy tourism in Egypt; (4) Obstacles that faces astronomy tourism in Egypt. All interviewees' comments were recorded and passed through thematic and inductive approach (Stoffelen, 2019) to examine their most significant key themes patterns (Priyatikanto et al., 2019).

**RESULTS AND DISCUSSION**

As shown in Figure 2, indicates that out of 535 respondents, 345 (64.7 %) were female and 190 (35.3%) were male. Regarding the age of respondents, the age segments from 26 to 40 years had the greatest number of respondents by 48% (257 respondents), followed by the age segments from 10 to 25 years by 36.6% (196 respondents), then the age segments from 41 to 60 years by 14.3% (76 respondents) and finally, the age segments over 60 years by 1.1% (6 respondents). Additionally, the majority of respondents are post graduate 55.6% (296 respondents) followed by the bachelor’s degree segments 36.3% (197 respondents) and finally the school segment 8.1% (42 respondents).

The majority of respondents (221 respondents) prefer traveling with their family, accounting for 41.4% of total responses. followed by traveling with friends (142 respondents), accounting for 26.6%, and (70 respondents) stating that they prefer couples travel, making up for 12.7%, then (52 respondents) prefer traveling individual accounting for 9.9%, and finally, (50 respondents) stating that they prefer travel with groups making up for the last 9.4%.

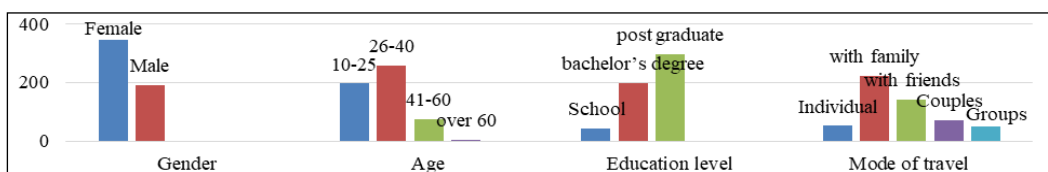


Figure 2. The profile sample (Source: Authors)

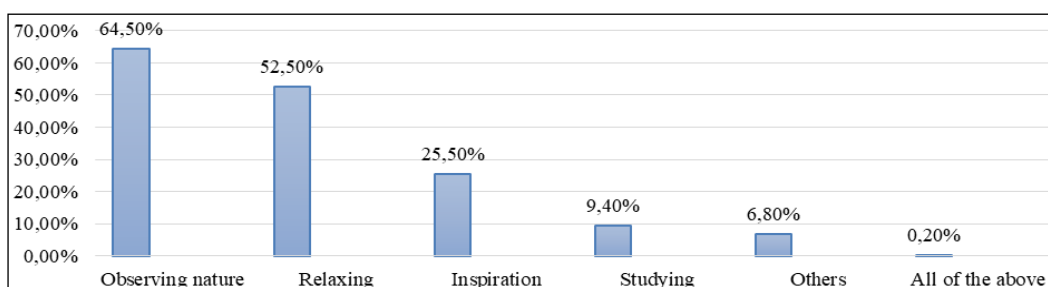


Figure 3. Reasons of observing the sky (Source: Authors)

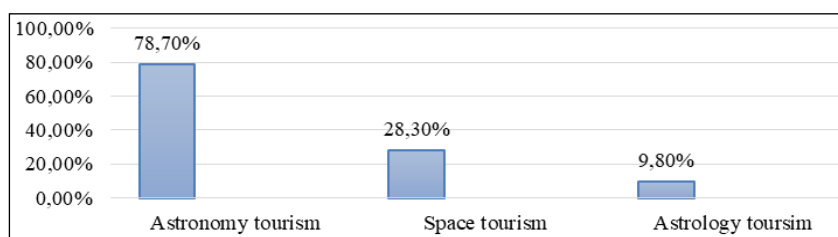


Figure 4. Preferences of tourists (Source: Authors)

According to Figure 3 more than half of the participants by 64% observing the sky for the purpose of observe nature, while 52.5% chose relaxation, 25.5% answered inspiration, while 9.4% observed the sky for studying purposes. As 0.2% chose all of the above answers, and 6.8% chose other as they observe for other purposes. As shown in Figure 4 most of the participants representing 78.7% percentage prefer “Astronomy tourism” while 28.3% preferred “Space tourism”, and 9.8% answered “Astrology tourism”. These findings agreed with Malville (2008) who proved that space tourism unlike astronomy tourism nor exclusive nor adventurous/extreme form of tourism, it is open to all tourists, not a risk to health and life-threatening. Astronomy tourism creates new opportunities for bridging science and tourism, motivating alliances for starry nights, science, culture, and nature.

**The evaluation of astronomy tourism in Egypt**

Table 1 revealed the Descriptive Analysis of the Evaluation of astronomy tourism in Egypt. Regarding the statement "Have you heard about astronomical tourism in Egypt" The mean value was 2.01. This means that approximately more than half of the respondents knew about astronomy tourism in Egypt and the others had no knowledge. Regarding the statement "Egypt is one of the best places to go stargazing as it has ideal locations for stargazing which considers Astro destinations" The mean value was 1.42. This means that the respondents agreed to the statement. This finding agrees with Abdelhakim et al. (2022) who stated that Egypt’s sky is unique due to the presence of many places far from the light pollution of the large cities, which are main attraction areas. Also, according to Najafabadi (2012) and Kunjaya et al. (2019) Egypt has the potential to attract the care of tourism participants as it has terrestrial astronomy locations includes ancient Egyptian Archeoastronomy locations, besides the various astronomical Observatories. Regarding the statement "Astronomy tourism is well marketed in Egypt", the mean value was 2.64. This mean that astronomy tourism is not marketed well in Egypt. It needs marketing efforts and facilities to be provided in such areas. This finding agreed with Abdelhakim et al. (2022) who stated that, astronomy tourism is active in Egypt, but yet it should gain more attention from stakeholders to be promoted and developed as a new trend in Egypt. Regarding the statement "Did you want to travel to another country to observe such

a phenomenon in the sky" The mean value was 1.56. This means that the respondents agreed to the statement. This finding is vital with Najafabadi (2012) who showed that Location is a key to looking deeper into space by means of a clear dark night sky free from artificial light, so people whose interested in astronomy have the keen to travel to places even, so it is not in their own country in order to enjoy such type of activity.

Table 1. Descriptive Analysis of the Evaluation of astronomy tourism in Egypt

N	Item		Yes	Maybe	No	Total	Mean
1	Have you heard about astronomical tourism in Egypt	Frequency	207	116	212	535	2.01
		Percentage	38.5	21.7	39.6	99.8	
2	Egypt is one of the best places to go stargazing as it has ideal locations for stargazing which considers Astro destinations	Frequency	316	212	7	535	1.42
		Percentage	59.1	39.6	1.3	100.0	
3	Astronomy tourism is well marketed in Egypt	Frequency	28	134	373	535	2.64
		Percentage	5.2	25.0	69.7	100.0	
4	Did you want to travel to another country to observe such a phenomenon in the sky	Frequency	320	129	86	535	1.56
		Percentage	59.8	24.1	16.1	100.0	
5	The feeling of visiting astrodestinations is different from other places and other types of tourism	Frequency	404	123	8	535	1.26
		Percentage	75.1	23.0	1.5	99.6	
6	Are you interested in engaging in astronomy tourism activities which is "astrophotography or visits scientific facilities like observatories, planetariums"	Frequency	312	123	100	535	1.60
		Percentage	58.1	23.0	18.7	99.8	

Regarding the statement "practicing Astronomy tourism achieves stress relief. The mean value was 1.26. This means that the respondents agreed to the statement. These results agreed with Tadič (2016) who stated that the majority of tourists began to search for niche trends in tourism away from the traditional ones, especially after the Covid-19 Pandemic, they are selecting destinations and products that offer them unique experiences, and astronomy tourism offers great option as it creates an experience effecting the mind and body. Regarding the statement "Are you interested in engaging in astronomy tourism activities which is "astrophotography visits scientific facilities like observatories, planetariums" " The mean value was 1.60. This means that the respondents agreed to the statement. This finding agrees with Griffiths (2012) who highlighted that it is essential to understand what motivates tourists to be engaged in Astro-activities, and what are the positive factors that contributes to their experience. Also, Beggs and Elkins (2010) illustrated that people seek to travel to be engaged in certain activities to reach their self-esteem, achieve satisfaction and fulfil their internal motives.

**The importance of astronomy tourism**

Regarding the statement "Astronomy tourism has economic impacts to the country" The mean value was 4.14. This means that the respondents agreed with the statement. As Kunjaya et al. (2019) mentioned. As, the results showed that Astronomy-tourism increase the national income, increase employment, and elevates the standard of living for residence participating in tourism. Regarding the statement "It is important to teach astronomy to school students and universities in order to expand their vision and creates their expectations for exploring the world beyond, the mean value was 4.35.

This means that the respondents agreed to the statement. This finding agrees with Abdelhakim et al. (2022), who's recommendations enhanced the need to increase the awareness about astronomy tourism in Egypt. by, the collaboration of the astronomical organizations in Egypt with the community in schools, colleges, residential areas, and public places to give talks, conduct solar observation sessions, stargazing sessions and planetarium shows. Regarding the statement".

It is important to Increase awareness about reduction of light pollution for the ideal observing and being committed to sustainability development goals. The mean value was 4.59. Which means that the respondents agreed to the statement, this finding agreed with Najafabadi (2012) who identified that astronomy tourism is a form of ecotourism which protects the environment and maintain the SDG. As well as, Longcore and Rich (2004) who illustrated that light pollution is one of the main obstacles that effect the clarity of the night sky, the human experience, influence animal behaviour and ecology. All variables presented in Table 2.

Table 2. Descriptive Analysis of the importance of astronomy tourism

N	Items		strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Total	Mean
1	Astronomy tourism has economic benefits for the country	Frequency	1	8	104	225	197	535	4.14
		Percentage	.2	1.5	19.4	42.1	36.8	100.0	
2	It is important to teach astronomy in schools and university in order to expanding students' horizons	Frequency	0	12	62	190	271	535	4.35
		Percentage	0	2.2	11.6	35.5	50.7	100.0	
3	It is important to Increase awareness about reduce light pollution for the ideal observing and it will sequently have positive impacts on human and environment	Frequency	1	3	26	154	351	535	4.59
		Percentage	.2	.6	4.9	28.8	65.6	100.0	

## CONCLUSION AND IMPLICATIONS

This article discussed astronomy tourism as a unique and niche type of tourism which attract tourists and enhance the demand for the destination. As Egypt was differentiated throughout the world in the field of astronomy by its clear skies, deserts, and rich history. Astronomy tourism can enhance tourist demand and help the destination follow the sustainable development goals to protect the environment and increase the economic and social benefits. The findings shed light on the importance of taking the science of astronomy into consideration by the ministries and authorities in Egypt as well the promotion of astronomy tourism in Egypt should be done through various marketing tools such as: the internet and social media which has great influence on a large number of tourists; organization of international astronomy events that attract professional and amateur astronomers from all over the world; astronomers should be segmented and categorized according to their motivations and preferences in order to attract a large number of astronomy tourists and provide them with suitable offers. Astronomy tourism has numerous positive economic, social, environmental and cultural impacts on astro-tourism destinations. Egypt has great potential to develop astronomy tourism with its beautiful dark sky; many of destinations spots; temperate climate; affordable prices; variety of accommodation; friendly local people and good safety and security.

### Limitation and future research

There have been no previous studies on astronomy tourism in Egypt. This study can serve as a reference point for future researchers. Future research may study developing astronomy tourism in a specific region. Furthermore, future studies can depend on assessments and observations for collecting data. Finally, researcher can focus deeply on astronomy tourist's motivations and preferences according to their age, gender, income and nationalities also focus in details about Egyptian astronomy destinations and ways of promoting and raising awareness about astronomy tourism in Egypt.

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