Exploring factors affecting astro-tourism development in Tanzania

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Journal of Tourism, Culinary, and Entrepreneurship

e-ISSN: 2776-0928

Publisher:
School of Tourism,
Universitas Ciputra Surabaya,
Indonesia

ABSTRACT

Factors affecting astro-tourism development in Tanzania have not been well established. The country has several national parks, and conservation areas, and its proximity to the equatorial location, make Tanzania a competitive destination for astro-tourism in Africa. Astro-tourism has the potential to impact on the local developing economies such as Tanzania. However, the factors that make Tanzania continue to lag in positioning itself as an astro-tourism destination are unknown. This study was conducted in Tanzania using qualitative and quantitative methods, involving 196 respondents who were purposively sampled and later on, randomly drawn from a population of over 1912 tourism stakeholders. The few available astro-tourism professionals operate in silos and are not coordinated. Tanzania lacks tourist observatories, and none of the major tourism players, including Hotel Association of Tanzania, Tanzania Association of Tour operators, and Tanzania Tour Guides Association offer astro-tourism services. Overall, majority of Tanzania's visitors said they would return if there were new tourist offers. Similarly, majority of the inbound visitors expressed willingness to return if Tanzania embraces astro-tourism. Conversely, majority of the domestic visitors seemed that were not aware of astro-tourism as one of the tourist products. Future research may focus on profiling astronomical cultural heritage in Tanzania.

Keywords:
Astro-Tourism
Destination
Inbound Visitors
Domestic Visitors
Tanzania

1. INTRODUCTION

Astro-tourism is increasingly becoming very popular and attracts an increasing number of tourists all over the world. According to Rwegoshora (2023), globally astro-tourism is worth almost USD 300 billion annually, but its potential has not been fully utilized. In Japan, approximately 8.5 people have experienced astro-tourism, and over 40 million people are looking forward to participating in such experiences shortly in the country and elsewhere (Agata, 2023). Tanzania stands a chance of tapping the global astro-tourism potential if it addresses the existing challenges.

According to the Ministry of Natural Resources and Tourism (MNRT) in Tanzania, tourism is a very important economic sector and provides 25% of foreign earnings, generates 21.2% of the Gross Domestic -Product (GDP), and offers over 1.5 million jobs (MNRT, 2023).

The 3.8 million international tourists to Tanzania in 2023, represent approximately 0.4% of the global market share of an estimated 975 million tourists travelled internationally in 2023. In terms of revenue, Tanzania earned USD 3.15 billion equal to 0.2% of the total USD 1.4 trillion earned in 2023 globally (MNRT, 2023 & UNWTO, 2023).

Tanzania is blessed to have abundant resources ranging from diverse cultural heritage and natural resources including minerals, natural gas, beautiful beaches, and protected areas full of wildlife, high mountains, rivers, and lakes, such that, in the year 2012, it ranked the second after Brazil in terms of beautiful tourist attractions in the world. Some of the natural resources such as flora and fauna are rapidly being depleted, and increasingly becoming scarce and endangered. Global warming, leave alone the fact that some of the tourist source countries have started establishing wildlife captivities in their places. Tanzania will therefore have to start diversifying its revenue streams, especially its tourism dependence which relies on wildlife safaris. Peer tourist destinations such as Rwanda have started diversifying their revenue stream through MICE tourism (Ronald et al., 2022), while Kenya is exploring astro-tourism ventures, in which few accommodation facilities have been equipped with telescopes in the Maasai Mara game reserve (Kulvinder et al., 2020).

Astro-tourism contributes to the revitalization of the local economy, especially Sustainable Development Goals (SDGs) 8 and 9 on decent work and economic growth; and industry innovation and infrastructure respectively (Agate, 2023). Furthermore, Astro-tourism can contribute to reviving the night-time economy which is equivocated in local communities, offering equal employment opportunities between women and men, providing scientific astronomy communication for the general public, and the potential for passing on star lore in local communities. Astro-tourism development has attracted the attention of local communities, amateur astronomers, tourism operators, and researchers because of its potential to meet SDGs. Astro-tourism is a service sector which has been explored as an economic possibility in South Africa (Jacobs, 2019), Namibia and Chile (Gairiseb, 2019).

For millennia, the dark sky which is one of the key segments of astro-tourism has been an inspiration to humanity in so many ways. The dark sky has created interest in the stars and the science behind them, but also interest in literature like Shakespeare's sonnets, art like Van Gogh's Starry Night and musical compositions like Holst's The Planets (Walker, 2023).

In today’s world, the concept of astro-tourism is increasingly becoming more popular, particularly as the main catalyst of knowledge promotion and economic development of underprivileged communities (Ruggles, 2009; Marov, 2016; Ruggles, 2017; Young et al., 2018). Astro-tourism occurs predominantly in remote areas with no light pollution, where travellers can observe celestial objects undisturbed. Astro-tourism includes astronomy-related activities that do not depend solely on the dark sky (Auala & Backes, 2023).

Generally, astro-tourism is an emerging type of modern and sustainable tourism sector based on the astronomical observation of night skies, free of light pollution, in the best astronomical sites and all the experiences that have developed around it. Wyk-Jacobs (2018) and Matos (2017) noted that astro-tourism has two major forms; Firstly, observation of night skies in the best astronomical sites and all the experiences can be referred to as space tourism. Secondly, terrestrial astro-tourism including astronomical tourism. These two forms; space tourism and terrestrial astro-tourism can be termed as virtual astro-tourism (Damjanov & Crouch, 2019).

Statement of the Problem

Tourism in Tanzania has historically been profiled around the photographic popularly known as wildlife safari, cultural heritage and beach tourism. Sometimes, visitors tend to stereotype destinations, which makes it difficult to attract repeat tourists (Wyk-Jacobs, 2018). Tourists visiting destinations tend to think that there is nothing new in that particular destination. Tanzania's secret tourism defense is its unique attractions for new tourists, but not for repeat tourists. New products such as astro-tourism should be explored, introduced and promoted to attract new and repeat tourists.

Tanzania offers a lot of potential for astro-tourism due to its dark sky areas, astronomical landmarks, proximity to the Equator line, and rich cultural context. With vast expanses of dark sky regions free of light pollution, remarkable astronomical landmarks, proximity to the Equator line and a vibrant cultural context, Tanzania holds the opportunity to become a premier destination for astro-tourists worldwide. Despite being renowned for its natural and cultural heritage, Tanzania is not commonly associated with astro-tourism.

By developing appropriate infrastructure and involving the private sector and local communities, Tanzania can attract astro-tourists from around the world and offer unique experiences under its magnificent night sky. Embracing Astro-tourism would not only provide economic opportunities but also promote environmental conservation and preserve the country's celestial heritage for future generations. Also, capitalizing on its dark sky areas and combining them with its natural and cultural attractions, Tanzania can develop a distinctive niche within the broader tourism industry.

Conversely, astro-tourism is a phenomenon that can be understood as a social practice by the general public, alienated from artificial light, which is a product of postmodern society, seeking out the darkness that was the object of enlightenment in the past. There is a growing interest in astro-tourism in international general tourism studies but these studies are still few (Sawada et al., 2023). In addition, tourism scholars such as Mkwizu (2023) and Mkwizu & Kimeto (2023) noted that there are limited studies on astro-tourism in Africa particularly for countries like Kenya and Tanzania and thus advocated for more research. Hence, this paper

assesses the factors affecting astro-tourism development in Tanzania. This paper specifically tries to identify the main factors that affect astro-tourism development; establishes the level to which those factors have affected astro-tourism initiatives; explores possible strategies for addressing those challenges; and suggests a model to enable the country to indulge in astro-tourism without further delays. These efforts could serve as a new way to boost tourism contribution to GDP and accelerate the economic diversification initiatives in Tanzania.

2. LITERATURE REVIEW

Astro-tourism is an emerging type of modern and sustainable tourism sector based on the astronomical observation of night skies, free of light pollution, in the best astronomical sites and all the experiences that have developed around it. It brings new opportunities to generate sustainable socio-economic growth, preserve culture, and heritage, and inspire and educate the community at large. Astro-tourism is a driving force for inclusive, affordable, diversified, and sustainable economic development and growth (Sawada et al., 2023).

According to Bashyal & Lamichhane (2023), in many developing countries, including Tanzania, tourism is considered one of the major economic sectors necessary for driving national development agendas. However, astro-tourism which is one of the key segments of the tourism industry has not been considered as part of the economic reform and growth strategy in countries such as Tanzania. Astro-tourism has been an effective tool in motivating young minds to pursue science, technology, engineering, arts, and mathematics (STEAM) education. The observable astronomical heritage features such as meteorites, act as excellent tools to inspire the young generation to pursue STEAM for their future career. Apart from astro-tourism being a powerful tool for promoting education, it also empowers communities and fosters sustainable development in marginalized rural areas.

Figure 1 argues that for astro-tourism development to take off in any destination, there are independent, intervening and dependent factors. The independent variables in this perspective include research training; identification of the potential astro-tourist sites such as dark sky spots, development of the necessary infrastructure, awareness and sensitization, and marketing and promotion of those attractions. However, the astro-tourism journey of development cannot be complete, if there is a lack of a favorable and enabling environment. There is a need for a conducive legal and policy framework for governing such development in that particular destination. Addressing issues such as light pollution requires regulation and legislation in place. Also, the need for political will among the policy and decision-makers is vital to allow astro-tourism businesses to operate.

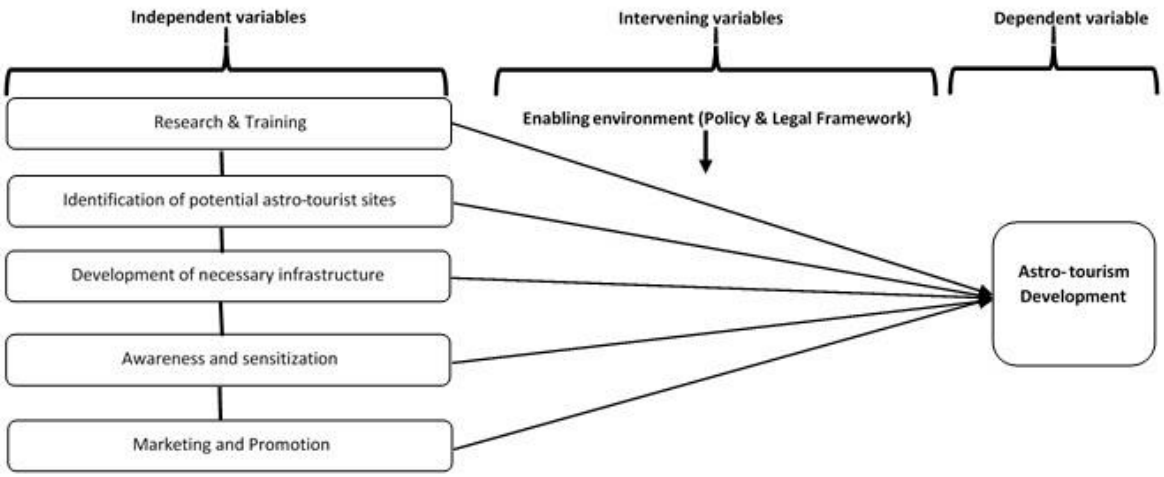

Figure 1 Theoretical Model for the Astro-Tourism Development
Source: Scholar's construct

Factors Affecting Astro-Tourism Development

Accordance to Sawada et al. (2023), recently, astro-tourism, which refers to an activity where people travel from their place of residence to look up at beautiful starry sky and celestial bodies, has begun to attract an increasing number of tourists all over the world. Nonetheless, the worldwide growing seriousness of light pollution is one of the factors hindering the growth of astro-tourism.

A high-quality dark sky is the key aspect of astro-tourism, although it is highly susceptible to natural as well as anthropogenic conditions including atmospheric and meteorological variables. Conversely, the dark sky sharpness is also influenced by man-made factors including land usage, and urbanization, which leads to light pollution, especially if there is no legislation for lighting systems in the country (Středováet al., 2015; Rožnovský et al., 2017; Massad et al., 2019).

Lack of astro-tourism dark sky designations is another hindrance to astro-tourism development. Countries have to recognize and promote recommended standards of the dark sky in communities, parks, and protected areas (Darksky International, 2023). Today, the program has certified more than 200 places since Flagstaff, Arizona, was named the first International Dark Sky City in 2001 (Darksky International, 2023). There are now over 160,000 square kilometers of protected land and night skies in 22 countries on 6 continents, and the list grows every year as new places achieve certification (Darksky International, 2023).

Importance of Astro-Tourism

Astro-tourism contributes to the revitalization of the nighttime economy which is equivocated in local communities, offering equal employment opportunities between women and men, providing scientific astronomy communication to the general public, and the potential for passing on star lore in local communities (Sawada et al., 2023).

Astro-tourism development has attracted the attention of local communities, amateur astronomers, tourism operators, and researchers because of its potential to meet sustainable development goals. The International Dark Sky Association, an international organization that protects spaces from light pollution, also mentions the effectiveness of astro-tourism as a solution to prevent pollution (Sawada et al., 2023).

According to Zewdie (2023), the active engagement of the astro-tourism community in public outreach inspires and inculcates interest in the next generation of astronomers and astro-tourists. Africa has the dark sky resources and potential to benefit from investing in astronomy, which can drive scientific research, technological innovation, educational opportunities, and generate economic growth.

In Kenya for instance, fishermen around the Nyanza Province recognized the significance of the moon's phases in determining fish behavior, with the lunar cycle influencing the location and depth of fish in the lake. By leveraging this astronomical cultural heritage knowledge, it intends to raise awareness in the community, among students, teachers and residents about the untapped potential within their comprehension. Astro-tourism catalyzes transforming perceptions and motivates individuals to pursue education as a means to unlock opportunities beyond traditional livelihoods. Through immersive stargazing experiences, educational workshops, and interactive programs, the aim is to foster an appreciation for astronomy, empowering students to connect their studies with real-life applications and possibilities (Ong'alo, 2023).

In addition, astro-tourism brings new opportunities to generate sustainable socio-economic growth, preserve culture, and heritage, and inspire and educate the community at large. Astro-tourism is a driving force for inclusive, affordable, diversified, and sustainable economic development and growth. In many developing countries, including Tanzania, tourism is considered one of the sustainable economic reform and growth agendas. However, astro-tourism has not been considered part of, economic reform and growth strategy in developing nations, including Tanzania.

Tanzania’s Competitive Advantage for Astro-Tourism

Tanzania offers a variety of options for astro-tourism. Visitors can participate in scientific research initiatives, go on stargazing excursions, and even visit astronomical observatories. The Southern Cross and Magellanic Clouds highlights for stargazers from the Northern Hemisphere are visible. Annually, Tanzanians may already observe several astronomical events. The Perseid meteor shower peaks in August and can be seen with the unaided eye from dark areas up to 100 meteors per hour. Regular solar eclipses are another occurrence, and one will pass straight over northern Tanzania in 2063 (Science News). The nation’s

volcanoes also provide opportunities for viewing aurorae, celestial bodies, and noctilucent clouds (Rwegoshora, 2023).

There are several astronomical heritage sites, such as the Mbozi meteorite, which is the second-largest known meteorite in Africa, and the eighth-largest meteorite in the world, and other several meteorite sites in the country (Mtae, 2023). Over 30% of Tanzania's land is under conservation, housing 22 national parks, the Ngorongoro conservation area, millions of hectares of protected areas, and 48.1 million hectares of forest reserves (Voluntary National Review, 2023). Also, the country's proximity to the Equator line allows viewing of the sky by 95% and features several mountains and vast plains with clear vistas perfect for astronomy. The Ngorongoro Crater rim at 2,286m, Mount Meru at 4,565m, and Mount Kilimanjaro at 5,895m all offer elevated observation locations above the cloud cover and lessen atmospheric interference.

3. METHODOLOGY

This study adopted both qualitative and quantitative methods. This study was conducted in Tanzania. The sample size of 196 respondents was purposively sampled and later on, randomly drawn from a population of over 1912 tourism stakeholders, including representatives from the government ministerial departments and agencies, the tourism private sector, tourism research and academia, civil society institutions, and visitors. In-depth interviews covered 56 respondents, focus group discussions involved 74 respondents, and 66 respondents were reached through questionnaires.

With regards to FGDs, a variety of voices were heard in a short time. Participants were carefully recruited to involve only those who were likely to provide relevant information. The focus groups were composed of similar types of people and each group had 8-10 participants. The researchers ensured that venues for the FGDs were conducive and away from noise. Group participants were organized in a manner that participants sat in circles during discussions.

With in-depth interviews, key informants were interviewed individually face-to-face. One of the advantages of in-depth interviews is that participants have the undivided attention of the interviewer and subjects can be explored in more detail. The role of the researcher was only to probe as much as possible on issues to gather rich information.

At the end of each FGD session, the researcher jotted down key points that they noted during the discussions. Voice-recorded information was transcribed sequentially according to the groups which were reached and interviewed; thereafter transcribed data was printed in hard copy for proofreading and perusal. The transcribed data was categorized into identified themes. Data from in-depth interviews were transcribed and analyzed using thematic data analysis.

Thereafter, researchers looked for information that was descriptive and captured the essence of the conversation. The following were considered during analysis; actual words used by the participants and the meanings of those words were considered, context of the responses, internal consistency, frequency or extensiveness, special intensity or depth of feeling and specificity. Quantitative data were analyzed using SPSS version 20 for Windows.

4. RESULTS AND DISCUSSION

Legal and Policy Framework

Findings have revealed that Tanzania lacks a policy and legal framework to govern astro-tourism development. Both the Tanzania Tourism Act of 2008 and the National Tourism Policy of 1999 have not mentioned astro-tourism. This finding was also revealed by the majority of the respondents (82.1%) who stated that Tanzania's policy and legal framework to allow astro-tourism development does not exist. Other respondents (15.8%) stated that they do not know whether Tanzania maintains such a framework. On the contrary, 2% of the respondents indicated that astro-tourism as the sub-sector of the tourism industry, may operate under the existing policy and legal frameworks, which govern other sectors of the tourism industry in the country.

Training on Astro-Tourism

The study reveals that no training institution in Tanzania offers astronomy or astro-tourism as a standalone discipline. It should be noted that Tanzania has thousands of public and private training institutions, including colleges, high-learning institutions and universities.

Lack of Coordination

Tanzania has very few trained astronomers and those who trained in astro-tourism abroad. However, the only available few astronomers and astro-tourism professionals in the country operate in silos and an uncoordinated manner. The Astronomers Association of Tanzania is not operational. At the University of Dar es Salaam, the astronomers club is operating in isolation from the astronomers available at The Open University of Tanzania and those at the University of Dodoma, to name the least.

Lack of Infrastructure

There is neither a tourist observatory center nor an accommodation facility with a telescope for viewing the sky in the evening in the country. However, there is the Kilimanjaro telescope project, which is a private initiative, that maintains a portable small planetarium to showcase what astro-tourism and space science entail. On the foot of Mount Meru, another group of enthusiastic secondary school teachers with support from USA friends have put up a

telescope for viewing the sky. Both the Kilimanjaro telescope project and the Mount Meru telescope initiatives have attracted people of different cadres, including parliamentarians.

Lack of Awareness of Astro-Tourism among the Residents

This study found that there is a serious lack of awareness of astro-tourism its benefits to the community and what it would contribute to the tourism industry and national economy. Accordingly, the majority of respondents (63.3%) indicated that they lack awareness of astro-tourism as a tourism product. There, 9.7% of the respondents stated that they never heard of astro-tourism. However, 27% of the informants, especially those from public institutions, research and academia indicated that they were aware of astro-tourism (Figure 2).

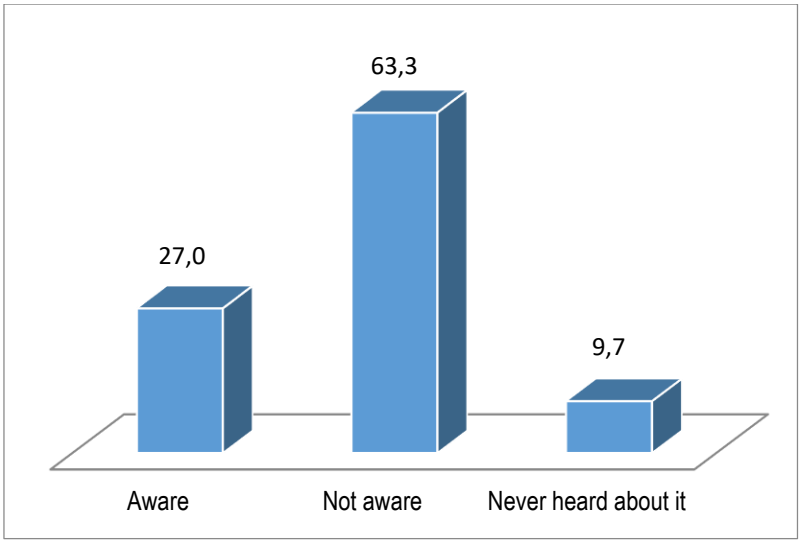

Figure 2. Level of Awareness of Astro-Tourism among Residents

This finding is similar to Wyk-Jacobs (2018) on the importance of astro-tourism to rural communities in South Africa, where results indicated that, although tourism is a priority economic sector in some developing countries, it is often not well understood among residents or even by policymakers.

Lack of Awareness of Astro-Tourism among Domestic and Inbound Visitors

It was also discovered that 92.3% of the inbound visitors, especially those who came from outside Africa were aware of astro-tourism compared to the domestic visitors (4.6%). Conversely, 83.7% of the domestic visitors indicated that they were not aware of the astro-tourism compared to 6.1% of the inbound visitors. Also, 11.7% of the domestic visitors stated they never heard about astro-tourism, compared to their counterparts, the inbound visitors (1.5%) (Figure 3). This shows that the majority of inbound tourists view astro-tourism as not something new to them. These findings further demonstrate that there is a serious need to create awareness of astro-tourism in the general public in Tanzania.

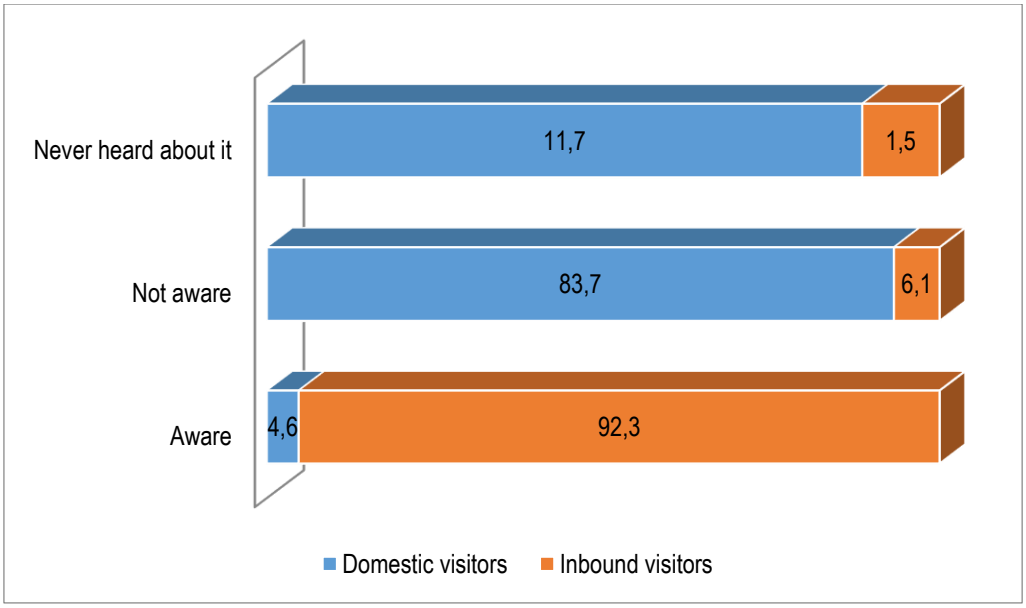

Figure 3. Level of Awareness of Astro-Tourism among Domestic and Inbound Visitors Opinion over the Lack of Astro-Tourism in Tanzania

This research established that 55.1% of the respondents thought that Tanzania has not ventured into astro-tourism due to the obstruction of existing diverse products, which attract many tourists and earn the country handsome revenue (Figure 4). In 2023, Tanzania received 3.8 million tourists and earned USD 3.15 billion compared to 2019, the year before the COVID-19 pandemic, when the country had 1.5 million tourists and generated USD 2.7 billion (MNRT, 2023).

Of other respondents, 23% stated that the country's delay in embarking on astro-tourism was due to inadequate awareness of the subsector among the policy and decision-makers. Inadequate creativity (19.4%) was also mentioned to be among the reasons for Tanzania to lag in astro-tourism issues (Figure 5).

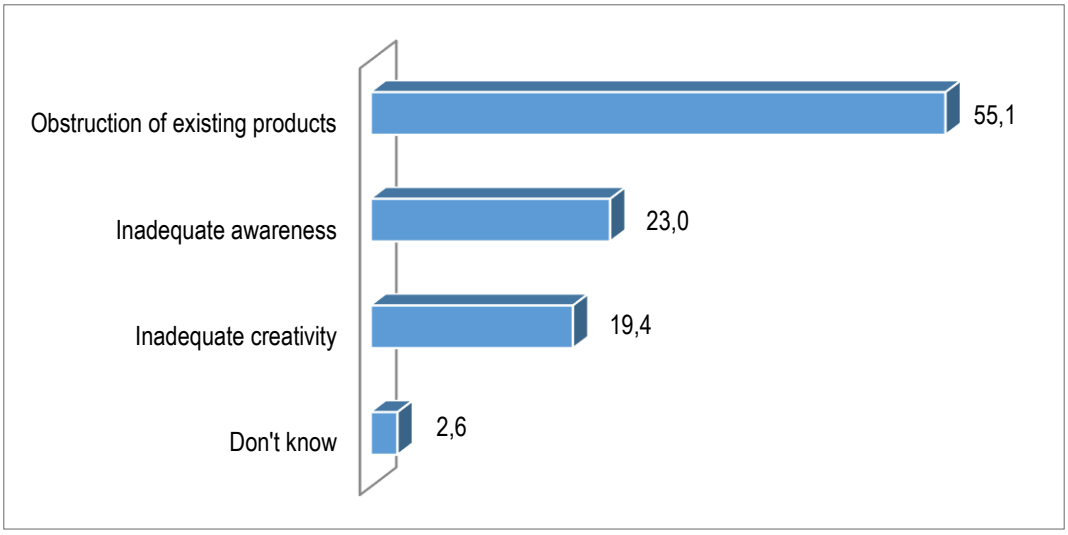

Figure 4. Opinion over Astro-Tourism Products in Tanzania

The Problem of Light Pollution

Due to a lack of regulations to address the problem of light pollution, many dark areas in Tanzania are getting brighter every year. This is a big problem for astro-tourists, astronomers, astro-photographers, artists and every human desire to explore the universe at night with their eyes. Need to emphasize the paramount importance of preserving pristine skies, both for advancing scientific research and as a treasured universal heritage. In the face of rapid industrialization and urbanization, it is crucial to designate protected areas that offer exceptional conditions conducive to maintaining a beautiful dark sky.

Demand for Astro-Tourism Product

This study reveals that the majority of inbound visitors (94.4%) and domestic visitors (86.2%) expressed that they were interested in astro-tourism products (Figure 5). The visitors indicated that they were interested in astro-tourism products including visiting observatories, and planetariums, using telescopes, and astro-exhibitions, attending expert lectures on astronomy and cosmology, and meeting astronauts. Visitors also said that astro-tourism was interesting because it entails virtual reality, which in reality adequately substitutes real travels into the stratosphere. Other areas of interest mentioned by the respondents included travelling to experience astronomical phenomena such as solar eclipses which is similar to study findings reported by Beconytė et al. (2015), Kunjaya et al. (2019), Ma et al. (2020) and travelling to observe space objects on dark sky sites with minimal light pollution (Matos, 2017).

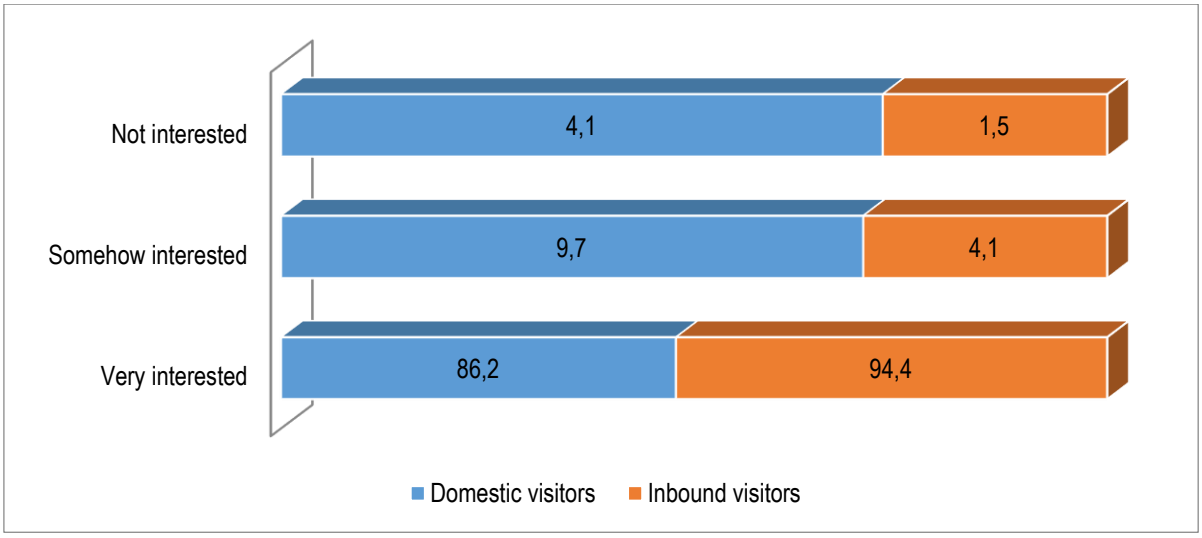

Figure 5. Demand for Astro-Tourism Services among Domestic and Inbound Visitors

This study reveals that the majority of inbound visitors (94.4%) and domestic visitors (86.2%) expressed that they were interested in astro-tourism products (Figure 5). The visitors indicated that they were interested in astro-tourism products including visiting observatories, and planetariums, using telescopes, and astro-exhibitions, attending expert lectures on

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Expression of Returning Visitors and if Astro-tourism Products Were Introduced in Tanzania

Accordingly, 43.9% of the visitors to Tanzania expressed that they would not return after their visit. On the same note, 28.1% stated they were not sure if they could return. Those who said would return were only 8.7%. The reasons stated by the visitors who stated they would not return and those who were not sure if they could return were that they did not see the reasons for returning to Tanzania for visitation. In other words, 72%t of the visitors to Tanzania thought that they would not return (Figure 6).

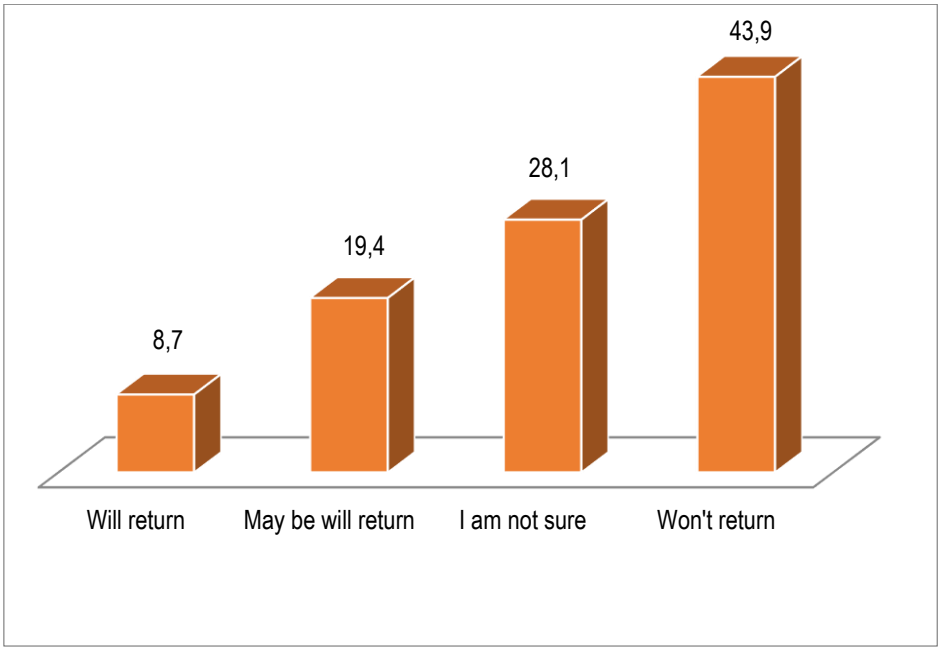


Figure 6. Expression of Returning Visitors to Tanzania

Surprisingly, 71.9% of the inbound visitors showed that they would return if there were some new tourist products to showcase the world, such as tourist observatories, planetariums, astro-exhibitions, participation in professional lectures on astronomy and cosmology, and even travelling to visit dark skies in remote places to view the Tanzanian night sky. Combining those who would be willing to return (71.9%) and those who were likely to return (14.3%), it is evident that if Tanzania moves into astro-tourism, there are high chance that the initiative will attract more visitors (Figure 7).

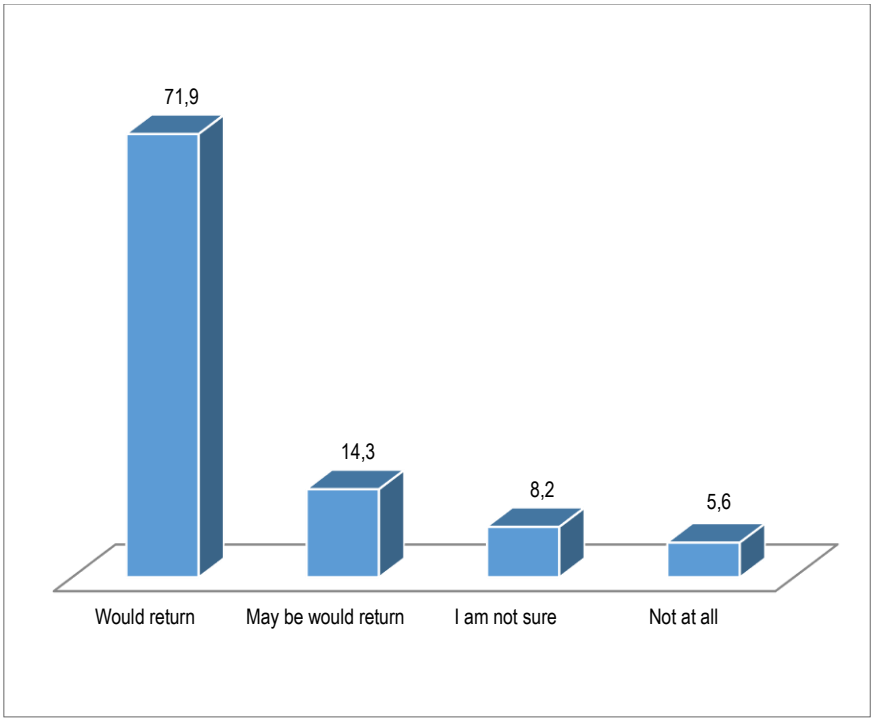
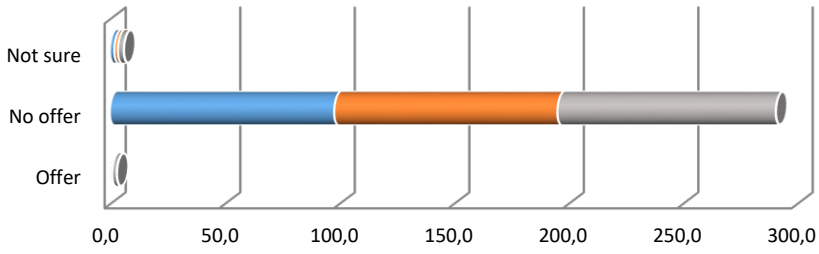


Figure 7. Expression of Returning Visitors if Astro-Tourism Products Were Introduced in Tanzania

Astro-tourism services among Tourism Players

It was reported by the majority of main tourism players, including the apex associations for the hotels (98%), tour operators (97.4%) and tour guides (95.4%) that Tanzania does not offer astro-tourism services. However, one or two tour operating companies indicated that they do have some kind of astro-tourism services, which are offered by their tour guides (Figure 8).



	Offer	No offer	Not sure
HAT	0,0	98,0	2,0
TATO	1,0	97,4	1,5
TTGA	2,0	95,4	2,6

Figure 8. Availability of Astro-Tourism Services in Tanzania

5. CONCLUSION AND RECOMMENDATIONS

Conclusion

This paper aimed to explore factors that affect astro-tourism development in Tanzania. In particular, the paper intended to identify the main factors which are affecting astro-tourism

development; establish the level to which those factors have affected astro-tourism initiatives; explore possible strategies for addressing those challenges; and suggest a model to enable the country to indulge in astro-tourism without further delays. These efforts could help to introduce astro-tourism as a new product to boost tourism contribution to GDP and optimize the economic diversification initiatives in Tanzania.

Through qualitative and quantitative approaches, the study reveals that the policy and legal framework to govern astro-tourism development does exist in Tanzania. In addition, the Tanzania Tourism Act of 2008 and the National Tourism Policy of 1999 have not mentioned astro-tourism. This was revealed by the majority of the respondents who stated that Tanzania lacks both policy and legal framework to allow astro-tourism development. It was also found that there is no single training institution in Tanzania that offers astronomy or astro-tourism as a standalone discipline. In addition, the only available few astronomers and astro-tourism professionals in the country operate in silos and an uncoordinated manner. Tanzania lacks the necessary infrastructure for astro-tourism to flourish. For instance, it lacks a tourist observatory center and no accommodation facility in the country with a telescope for basic astro-tourism activities.

This study also discovered that there is a serious lack of awareness of astro-tourism and its benefits to the community as well as its contribution to the tourism industry and national economy. This was confirmed by the majority of respondents who indicated that they lack awareness of astro-tourism as a tourism product and that the residents never heard of astro-tourism. However, some informants from public institutions, research and academia indicated that they were aware of astro-tourism and that they would embrace it if it were established in the country. On the awareness level among visitors, the study found that inbound visitors especially those outside Africa were aware of astro-tourism compared to the domestic visitors. Conversely, the domestic visitors indicated that they were not aware of the astro-tourism compared to inbound visitors.

It was further established that more than half of the respondents thought that Tanzania has not ventured into astro-tourism due to the obstruction of existing diverse products, which earn the country handsome revenue. Other respondents stated that the country's delay in embarking on astro-tourism was due to inadequate awareness of the subsector among the policy and decision-makers. Inadequate creativity was also mentioned to be among the reasons for Tanzania to lag in astro-tourism issues.

The study also noted that the majority of inbound visitors and domestic visitors expressed that they were interested in astro-tourism products. These visitors indicated that they were interested in the astro-tourism product such as tourist observatories, planetariums, astro-exhibitions, attending expert lectures on astronomy and cosmology, and meeting astronauts if there were any.

Accordingly, visitors to Tanzania expressed that they would not return after their visit. On the same note, some of the respondents stated that they were not sure if they would return. Those who said would return were very few. The reasons stated by these visitors who stated they would not return and those who were not sure if they would return were that they did not see the reasons for returning to Tanzania for visitation. In other words, these visitors to Tanzania thought that they would not return.

Surprisingly, most inbound visitors indicated that they would return if there were some new tourist products to showcase the world, such as astro-exhibitions, observatories, planetariums, professional lectures on astronomy and cosmology, and travelling to visit dark skies in remote places to view the Tanzanian night sky. This is evident that if Tanzania moves into astro-tourism, there is a high chance that the initiative will attract more visitors.

It was reported by the majority of the tourism players, including the apex associations for the hotels, tour operators and tour guides that Tanzania does not offer astro-tourism services. However, one or two tour operating companies indicated that they do have some kind of astro-tourism services, which are offered by their tour guides.

Recommendations

There is a need to emphasize the importance of preserving pristine skies, both for advancing scientific research and as a treasured universal heritage. In the face of rapid industrialization and urbanization, it is crucial to designate protected areas that offer exceptional conditions conducive to maintaining a beautiful dark sky. Tanzania should formulate a legal and policy framework for astro-tourism development. It is high time for Tanzania to enact a law to address the problem of light pollution which is encroaching areas with dark skies.

Direction for Future Research

Future research may focus on establishing astro-tourism potential in unlocking Tanzania's destination competitiveness. Astronomical cultural heritage has not been explored yet and therefore, astronomical cultural heritage education and outreach activities in the country are lacking.

Limitation and Delimitation

The study was conducted during the peak season for tourism in Tanzania. It was sometimes difficult to get hold of respondents from the tourism businesses during working hours. However, through the use of Zoom, telephone, and WhatsApp calls, discussions and interviews were possible.

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