Profiling Geoguides at Stong Geopark: Enhancing Local Expertise for Sustainable Ecotourism

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Abstract: Stong Geopark is a prominent natural attraction site in Kelantan, characterized by its rich biodiversity and variety of plant and animal species, catering to diverse visitor interests such as wildlife enthusiasts, explorers, and tourists. Geoguides play a vital role in helping visitors comprehend the significance of the geopark's geological features, the interconnectedness of the ecosystem, and the knowledge of indigenous communities. However, the tourism industry faces challenges in meeting the requirements for various forms of tourism services, including geoguiding. This study aims to profile the geo guides at Stong Geopark and better understand their areas of expertise. The research employs a quantitative approach, surveying 39 geoguides, to provide a comprehensive profile encompassing their age, English proficiency, income distribution, tour frequency, and identified areas of expertise. The findings reveal three distinct clusters of geoguides' areas of expertise: Cluster 1 - Nature and Adventure, Cluster 2 - Nature, and Cluster 3 - Adventure. The study also highlights the need for the majority of geo guides to receive additional training in English communication skills and continuous professional development courses. Overall, this study offers valuable insights into the profiles of geoguides at Stong Geopark, emphasizing the importance of supporting and developing local geoguides' expertise to enhance the effectiveness of geopark management and visitor satisfaction. Furthermore, the study provides a spatial understanding of Stong Geopark by highlighting the locations of active geo guides about the distribution of geosites. This offers a comprehensive overview of the geopark's geography. The findings can inform policymakers, tourism authorities, and geopark management in developing targeted strategies for capacity building and professionalization of geo guides, ultimately contributing to the sustainable development of Stong Geopark as a thriving ecotourism destination.

Keyword: *Stong Geopark, Geoguides, Profiling, Expertise, Tourism Management*

1. Introduction

Malaysia's domestic tourism resources have profoundly impacted the growth of ecotourism, making it one of the country's most rapidly expanding sectors. As mentioned by Abdullah et al. (2022), ecotourism is a form of sustainable tourism involving trips primarily in natural environments, which has attracted substantial attention from both domestic and foreign tourists. This has manifested as nature tourism, educational tourism, and sustainable tourism, where travellers enjoy new experiences that are beneficial to their health, environment, and host communities. In the context of ecotourism, the key areas of interaction include social, economic, and environmental interests, while international travel also considers arts, culture, and historical interests (Pinheiro, Triest & Lopes, 2021). Within the framework of ecotourism, it is a natural resources-based tourism activity aimed at learning and exploring nature. Additionally, Fennell and Grosbois (2023) identified ecosystem conservation, minimal interference, sustainability, community participation, and education as the core components of ecotourism. However, as studied by Alauddin, Kamal, and Chowdhury (2021) on environmental learning, the primary focus has been on the tourists who have visited ecotourism sites. Environmental learning can help in the management of the physical environment and the scope of the earth's natural resources.

Stong Geopark was recognized as a National Geopark in Malaysia on November 14, 2022. The designation acknowledges the park's significant geological, biological, and cultural heritage, and it aims to promote sustainable development, scientific research, and education in the region. The park covers an area of 2,131.99 square kilometers and includes 25 geosites, 7 biosites, and 16 cultural sites, with artifacts dating back 1,000 to

5,000 years. Stong Geopark, located in Kelantan, is a prominent example of a protected natural area that has gained significant attention as an ecotourism destination. The geopark features a diverse range of geological formations, biodiversity, and cultural heritage, attracting a wide array of visitors. Ancient metamorphic rocks, intrusive igneous formations, and diverse landforms, including towering waterfalls, deep gorges, and rugged mountains (Maying et al., 2021). The park's remote location and the relatively undeveloped nature of its surroundings have helped maintain its pristine environment, making it a prime location for ecotourism. The recognition of Stong Geopark as a national geopark not only enhances its visibility and conservation efforts but also provides economic opportunities for local communities through sustainable tourism practices.

The development and recognition of Stong Geopark involve local communities, ensuring that the benefits of geotourism and conservation are shared. As emphasized by Fennell and Grosbois (2023), community involvement is a core element of ecotourism, and geoguides are residents who can provide valuable insights into the region's natural and cultural heritage. These local experts can help visitors better understand the significance of the geopark's geological features, the interconnectedness of the ecosystem, and the traditional practices of the indigenous communities (Jaini et al., 2012). Henceforth, one of the critical components of the Stong Geopark's ecotourism experience is the role of geoguides. The presence of trained and knowledgeable geoguides plays a crucial role in enhancing visitors' understanding and appreciation of the geopark's unique features and significance. Moreover, effective geo guides can contribute to the sustainability of ecotourism in the region by promoting environmental stewardship, fostering cultural appreciation, and encouraging responsible behavior among visitors. In the context of ecotourism, geo guides not only serve as interpreters of the natural and cultural environment but also play a crucial role in shaping the overall experience and fostering a deeper connection between visitors and the destination (Marzuki, Mohammad & Abdullah, 2014). Thus, the study aims to profile the geo guides at Stong Geopark to better understand their areas of expertise and demographic characteristics, to enhance the effectiveness of geopark management and visitor satisfaction. By profiling these local guides, the study seeks to gain a comprehensive understanding of the knowledge, skills, and competencies required to effectively interpret and showcase the geopark's unique geological, ecological, and cultural features to visitors. This exploration of geoguide expertise is crucial for enhancing the overall ecotourism experience and promoting the sustainable management of Stong Geopark.

2. Related Works

Geoguiding in Ecotourism
Recently, the development of the gig economy has received increasing attention, which further attracted attention to the welfare of the gig workers in the tourism industry. Even so, they have not translated this focus to examine the experiences of geoguide, which employs the gig work of the tourism sector (Yi & Yun, 2024). A geo guide is an expert who accompanies individuals or a group of travellers and accompanies them on trips acquaints them with the visited places, explains the features of local culture and customs, and helps with organizational matters. According to The World Federation of Tourist Guides Associations (2023), a geo guide is "a person who guides visitors in the language of their choice and interprets the cultural and natural heritage of an area which person normally possesses an area-specific qualification usually issued and recognized by the appropriate authority". This definition focuses on the dual functions of a geo guide, that is, to interpret and explain the cultural and natural attractions of an area to the visitors as well as to arrange the tourist's geo guide with the role of making sure that a tourist has the best experience that he/she could wish for during the time that he/she is on his/her trip. This is because they act as historians, translators, encouragers of understanding and discovery of cultures, and even policemen since they are supposed to ensure that their tourists are safe (Wong et al., 2024). They also involve themselves in communicating with the tourists, which entails aspects such as knowledge of the history of the region, good interpersonal skills, and the ability to passionately convey the history in a form that would entertain the targeted clients.

Enrolment of technology in geoguiding is an area that has received lots of research attention in the last decade. Zaifri et al. (2023) explored the entrepreneurial application of digital technologies by geoguide and the use of AR and VR applications which bring a unique and detailed perception of the tourists. The study showed that while these technologies are efficient tools in the delivery of information, they have a negative side in that they demand guides to learn new technical skills in their communication. Ly et al. (2022) wrote an article exploring the increasing use of "virtual tour guides", wherein the guides give tours virtually using live streaming or

recording and posting the video to the internet. This new mode of guiding has made it possible for various guides to cover the entire globe; hence, increasing the market for such services, though there has been an emergence of some challenges as to how to capture the attention of the people and how to ensure that the visitors have had the true experience of the sites. The study has also pointed out that there is a challenge in training specifically in the area of digital communication as well as the creation of exciting virtual content.

Recent studies have also concentrated on the shifts in tourist perception as it concerns cultural impact and originality. Leong et al. (2024) also pointed out how tourists demand more culture, including access to genuine cultural interpreters and their personal stories. The results of this study also stressed the concept of cultural sensitivity and the extent to which the guides can engage with the tourists. Gomes and Lopes (2023) focused on the mediating influence of the geo guide on behavioral intention to practice responsible tourism. The paper revealed that guides are expected to inform tourists about the right behavior regarding sustainable practices and to practice the behavior themselves. This change in expectations means that guides ought to have some understanding of the matters of sustainability and should consider this knowledge within their guided tours.

Tourism in Kelantan

Kelantan is one of the states located in the northern region of Malaysia and is commonly dubbed as the Cradle of Malay Culture (King, 2018). The state contains a wealth of original arts, crafts, and devotional exercises and therefore forms a part of the tourism package in Malaysia but is marketed differently. Although it is not as culturally rich as some other states in Malaysia such as Penang or Kuala Lumpur, Kelantan is gradually starting to appeal to travellers as an interesting place to visit to plunge into the Malay culture (Zukri et al, 2024). Tourism especially cultural tourism is popular in Kelantan since it has close relations with traditional Malay culture. Previous research has pointed out that tourists are drawn to genuine nature and the possibility of immersing themselves in Malay culture that is fast disappearing elsewhere in Malaysia (Tan, Lee & Choy, 2020). Local products like batik, songket, and native silverware are also regarded as important boosters of the tourism industry. Craft villages such as Craft Village or Kampung Kraftangan and Kota Bharu's Central Market are usual spots for tourists to visit to purchase handicrafts. The artworks produced are not only means of production but are also ways of patronizing their respective people's cultures (Ahmad, Khairi & Kamarudin, 2023).

Kelantan is mostly an Islamic state and thus its Islamic appeal is a major attraction for tourists for religious purposes. As pointed out by Erasiah et al. (2023), there are many more mosques in the state including the most popular mosques such as the Sultan Ismail Petra Mosque and the Kampung Laut Mosque; the latter is one of the oldest mosques in Malaysia. The features that attract many tourists to these mosques include the fusion of local, Islamic, and even Siam's architectural styles. Apart from mosques, there are religious celebrations including Maulidur Rasul and Ramadhan bazaars which are major draws that attract Muslim visitors to the state. The activities allow one to learn about the religious culture and social aspects of the community in Kelantan.

Kelantan can also be described as having a natural beauty which is slowly being promoted as a tourist attraction, particularly for eco-tourism. The state also houses the Gunung Stong State Park which has one of the highest waterfalls of Southeast Asia, the Jelawang Waterfalls. It is a place that is frequently visited by hikers, bird lovers, and anyone who has an interest in nature. There is also literature on the strategies to develop eco-tourism in Kelantan to support the process of tourism while respecting the environment and benefiting the local people (Hassin et al., 2020). The state has a beautiful coastline stretch including the Cahaya Bulan Beach and Irama Beach. While the sands are not as rich as those in the other regions of Malaysia, these sections provide tourists with relatively more tranquil, unspoiled coasts. It has also been realized there is an increasing desire of people to opt for interests that involve the rivers, mostly the Kelantan River, with activities such as rafting and fishing.

Geoguides and their Role in Ecotourism

The geo guides in Gunung Stong Geopark play a critical role in shaping the visitor experience and promoting the understanding of the geopark's geological and natural heritage. Geoguides serve as the primary interpreters of the geopark's features, providing visitors with an in-depth explanation of the geological processes, the significance of the landforms, and the interconnected ecosystems (Sera et al., 2020, Thong et al., 2019). Through their engaging and informative interpretations, geo guides help visitors develop a deeper appreciation for the geopark's unique features and the importance of their conservation. Geoguides also play a crucial role in

fostering environmental awareness and promoting sustainable behaviors among visitors. They educate visitors on the fragility of the geopark's ecosystems, the impact of human activities, and the importance of responsible tourism practices.

Geoguides, or tour guides within geoparks, are responsible for providing visitors with comprehensive information about the geological, ecological, and cultural aspects of the protected area (Yani et al., 2021, Wijaya et al., 2019). As stated by Farsani et al. (2014), geo guides act as intermediaries between the geopark and its visitors, interpreting the geopark's resources and facilitating meaningful interactions with the environment and local communities. Geoguides play a crucial role in promoting the conservation and sustainable management of geoparks by fostering environmental awareness and educational experiences for visitors.

According to Samodra (2018), geo guides in Indonesia's Batur Geopark have been recognized for their contributions to visitor education and the protection of the geopark's natural resources. Geoguides raise awareness about the geological and ecological significance of the area, create job opportunities promote sustainable economic development through geotourism, and foster public understanding of geological heritage and pro-environmental attitudes among the visitors. Similarly, research in other geoparks, such as the study conducted by Zafeiropoulos et al. (2021), has underscored the critical role of geoguides in enhancing visitor satisfaction and promoting the sustainable development of geoparks. Geoguides are essential in enhancing visitor education, satisfaction, and sustainable practices in geoparks by providing interpretive services that deepen understanding of geological features, fostering cultural connections, tailoring educational content to diverse visitor motivations, supporting community involvement, and serving as a feedback mechanism for continuous improvement in park management.

One of the key characteristics of effective geoguides is their deep knowledge of the geopark's geology, ecology, and cultural heritage (Jia, Wu & Hou, 2022). They exhibit a strong understanding of the geological processes that have shaped the unique landforms, rock formations, and ecosystems within the geopark. This comprehensive knowledge allows them to provide visitors with in-depth and engaging explanations of the geopark's features, fostering a deeper level of appreciation and awareness.

In addition to their geological expertise, geologists often possess excellent communication and interpretation skills (Yani et al., 2021, Weiler & Walker, 2014). They can effectively convey complex scientific concepts in a manner that is accessible and captivating to visitors from diverse backgrounds. Geoguides demonstrate the ability to tailor their interpretations to the specific needs and interests of their audience, ensuring that the information is relevant and engaging for each group.

3. Methodology

Study Area
Stong Geopark is situated in the northeastern state of Kelantan, Malaysia, and covers the entire Jeli Colony and Dabong District within the Kuala Krai Colony with an area of 2131.99 square kilometers. The uniqueness of Stong Geopark lies in the Stong Migmatite Complex which is the youngest igneous body in Peninsular Malaysia. The geopark is renowned for its diverse and captivating geological features, including ancient rock formations, unique landforms, and breathtaking waterfalls (Sera et al., 2020, Fauzi & Misni, 2016, Ibrahim et al., 2021, Matshusa, Leonard & Thomas, 2021). In 2021, Gunung Stong Geopark was designated as a UNESCO Global Geopark, a prestigious recognition that underscores its international geological significance and its commitment to sustainable development. Table 1 below provides a list of the various sites within the Stong Geopark, along with their respective areas and coordinates in the RSO (Rectified Skew Orthomorphic) system, which can later be transformed into longitude and latitude. Based on previous reports and studies, five geosites have been identified without respective coordinates, and these will be exempted from this study.

Table 1: Stong Geological Heritage Sites

ID	Geosite Name	Area	Coordinate (RSO)	
			Northing	Easting
1	Air Terjun Jelawang	Dabong Kuala Krai	590825.00	441882.00
2	Kars Gua Ikan	Dabong Kuala Krai	592396.00	448699.00
3	Syis Taku Sungai Galas	Dabong Kuala Krai	463858.81	603414.08
4	Batu Kapur Kemubu	Dabong Kuala Krai	not available	not available
5	Migmatit Stong Lata Kertas	Dabong Kuala Krai	441224.15	580126.33
6	Landskap Puncak Pergunungan Stong	Dabong Kuala Krai	not available	not available
7	Marmar Gunung Reng	Jeli	632211.00	417478.00
8	Mata Air Panas Sg Helang	Jeli	626789.00	413993.00
9	Batu Kapur Kompleks Gua Setir	Jeli	437401.65	626150.56
10	Batuan Klastik Kampong Biak	Jeli	not available	not available
11	Lata Renyok	Jeli	617189.00	431697.00
12	Mata Air Sejuk Batu Hitam Kampong Belimbing	Jeli	414383.33	628773.29
13	Lombong Emas Kampong Kalai	Jeli	not available	not available
14	Granit Kemahang Lata Keding	Jeli	428889.03	635673.52
15	Lata Chenai	Jeli	606263.00	432082.00
16	Rejahan Granit Noring Lata Turbur	Jeli	411438.00	626244.00
17	Migmatit Stong Sungai Ruai	Jeli	422744.84	625364.45
18	Lata Janggut	Jeli	627299.00	420215.00
19	Tasik Pergau	Jeli	411439.62	622936.52
20	Ngarai Sungai Pergau	Jeli	412422.63	627218.75
21	Alluvial Sungai Pergau	Jeli	412340.31	627274.25
22	Bongkah Sungai Long	Jeli	419113.49	624875.77
23	Terowong Emas Kampong Kalai	Jeli	not available	not available
24	Granit Kemahang Politeknik	Jeli	429027.65	631490.35
25	Marmar Gunung Reng	Jeli	417299.58	632373.05

Data Collection and Analysis
This study employed quantitative research methodology, utilizing a comprehensive survey questionnaire to collect detailed data from the geoguides of Stong Geopark. The population surveyed in this study comprised registered geoguides mainly from Dabong and Jeli under the Ministry of Tourism, Arts and Culture (MOTAC), Malaysia. The target population for this study consisted of all registered geoguides under MOTAC, specifically those operating in the Stong Geopark region, including Dabong and Jeli. This group is chosen because they are directly involved in guiding and educating visitors about the geopark's natural and cultural heritage. The sample was selected using a purposive sampling method, targeting geoguides who are actively involved in guiding

activities within Stong Geopark. This approach ensures that the participants have relevant experience and knowledge to provide meaningful insights for the study. The survey instrument captured a wide range of information about the geo guides, including their demographics such as age, gender, and educational background, as well as their professional experience and expertise in guiding visitors through the geopark. The survey also gathered data on the typical size and composition of the tourist groups they guide, and their language proficiency, which enables them to effectively communicate with diverse visitors. A total of 39 geoguides participated in the survey, providing valuable insights into their backgrounds and capabilities. The collected data are then thoroughly analyzed and visualized using the Tableau Desktop software, enabling the researchers to generate detailed descriptive statistics and other relevant findings that shed light on the characteristics and capabilities of the geo guides within Stong Geopark.

In addition to the primary survey data, the study also incorporated relevant secondary sources, such as academic publications, reports, and official documents, to contextualize the findings and explore the broader implications for geopark management and sustainable tourism development. These secondary sources provide valuable background information, expert insights, and best practices from similar geoparks or natural heritage sites. By integrating both primary and secondary data, the researchers can develop a more well-rounded understanding of the challenges and opportunities faced by the geoguides in Stong Geopark. The survey instrument was developed specifically for this study, drawing on existing literature and best practices in survey design. It was reviewed and validated by experts in the field to ensure its reliability and relevance. The instrument included both closed and open-ended questions to capture a comprehensive range of data from the geo guides. Additionally, the study utilized ArcGIS software to map the geosites within the geopark, providing a comprehensive visual representation of the area's diverse geological assets. The spatial analysis through mapping reveals the diverse and abundant geological assets within the geopark. Additionally, it helps to pinpoint the locations where geoguides are situated. This geographic information can inform strategies for the sustainable stewardship and interpretation of the geopark's resources.

4. Results and Discussion

The study findings reveal several key insights into the characteristics, expertise, and role of the geoguides, as well as the diverse geological features and resources that comprise the Stong Geopark.

Demographic Profiles of Geoguides

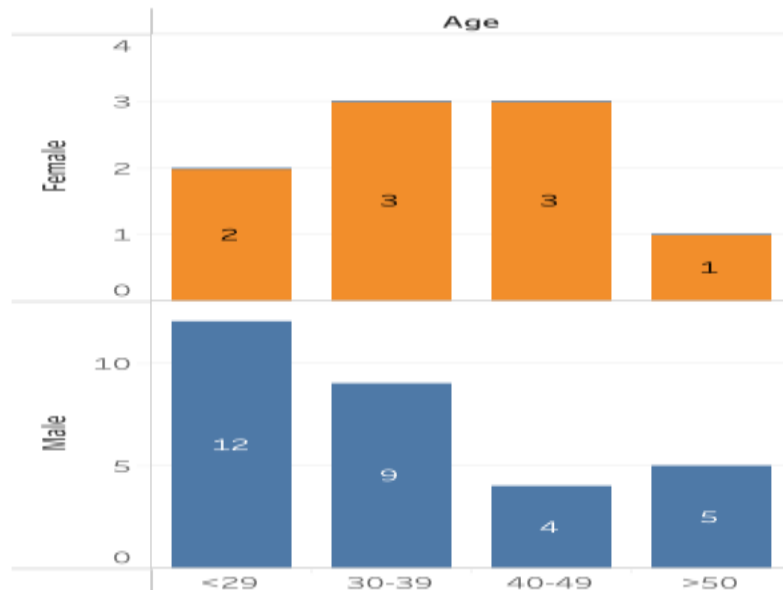**Figure 1: Age Distribution of Geoguides according to Gender**

Figure 1 illustrates the age distribution of male and female geoguides at Stong Geopark, Kelantan. The data are segmented into four age groups: less than 29 years, 30-39 years, 40-49 years, and greater than 50 years. For male geoguides, the largest group is the under 29 years category, with 12 individuals. The next largest is the 30-39 years group, which includes 9 males. The 40-49 years category has a smaller representation with 4 males, and the over 50 years group includes 5 males.

In contrast, female geoguides have their highest representation in both groups of under 29 years and 30-39 years categories, with 3 individuals each. The 40-49 years group also has 3 females, while the over 50 years category has only 1 female. This distribution indicates that younger male geoguides are more prevalent compared to their female counterparts, particularly in the under 29 years and 30-39 years age groups. The data also suggest a relatively balanced representation of females across most age groups, except for the over 50 years category, where there is a notable drop. This chart provides valuable insights into the age and gender dynamics among geo guides at Stong Geopark, revealing a younger male-dominated workforce with a more evenly distributed female presence across most age groups.

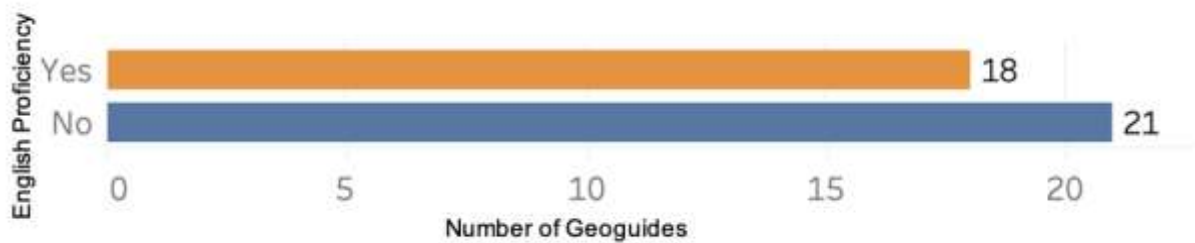**Figure 2: English Proficiency Among Geoguides**

Figure 2 illustrates the English proficiency of geoguides at Stong Geopark, Kelantan. The x-axis represents the number of geo guides, ranging from 0 to 20, while the y-axis categorizes English proficiency into two groups: "Yes" and "No." The data presented in Figure 2 indicates the English proficiency of geoguides at Stong Geopark. The chart is divided into two bars: the top bar colored in orange represents geo guides who are proficient in English and labelled as "Yes", while the bottom bar colored in blue represents those who are not proficient and labelled as "No". The x-axis, labelled as "Number of Geoguides," ranges from 0 to 20 in increments of 5.

The findings revealed that out of the 39 geoguides surveyed, 18 geoguides (approximately 46%) have English proficiency, while 21 geoguides (approximately 54%) do not. This visual representation highlights a significant portion of geo guides lacking in English proficiency, which could impact their ability to effectively communicate with international visitors. This insight could be crucial for understanding potential communication barriers and identifying areas where additional language training might be beneficial for the geo guides to improve the overall visitor experience at Stong Geopark.

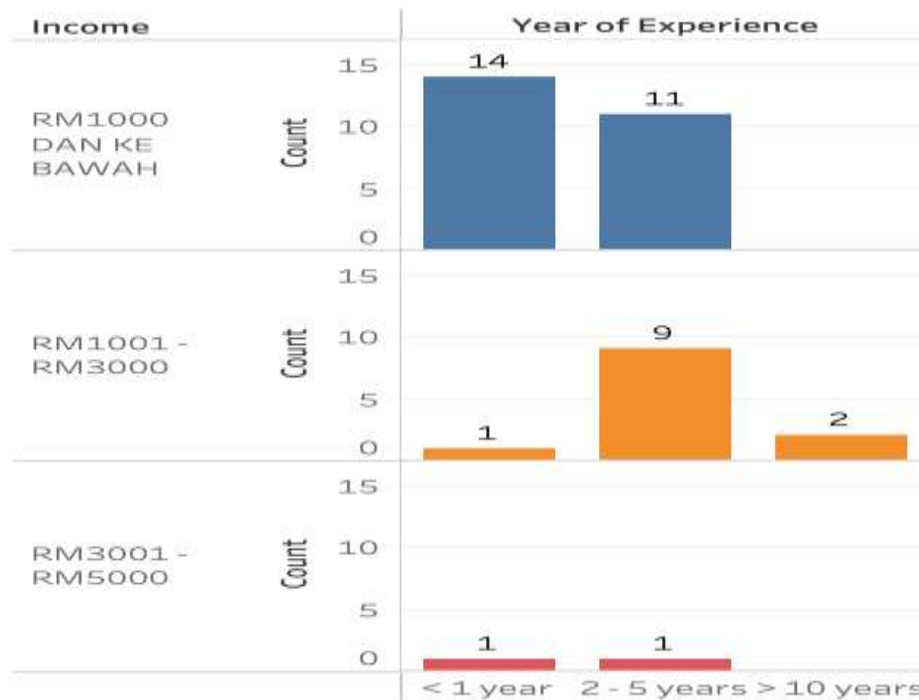**Figure 3: Income Distribution by Years of Experience Among Geoguides**

Figure 3 provides a detailed breakdown of the income distribution among geoguides at Stong Geopark, Kelantan, categorized by their years of experience. The income ranges are divided into three categories: RM1000 and below, RM1001 - RM3000, and RM3001 - RM5000. The majority of geoguides, regardless of their experience level, fall into the RM1000 and below income category. This includes 15 geoguides with less than 1 year of experience, 14 with 2-5 years of experience, and 11 with more than 10 years of experience. This indicates that a significant portion of geoguides earn within the lower income bracket.

The RM1001 - RM3000 category shows a notable decrease in numbers. Only one geo guide with less than 1 year of experience falls into this middle-income range, while 9 geo guides have 2 5 years of experience, and 2 have more than 10 years of experience. This suggests that as geo guides gain more experience, some can move into the middle-income bracket, but the numbers remain relatively low compared to the lowest-income category. In the highest income category of RM3001 - RM5000, the numbers are the lowest across all experience levels. There is one geoguide with less than 1 year of experience and one with more than 10 years of experience, but none with 2-5 years of experience. This indicates that very few geo guides achieve this higher income level, regardless of their years of experience.

Overall, the findings suggest that most geoguides at Stong Geopark earn relatively low incomes, with the majority earning RM1000 or less per month. A smaller number earn between RM1001 and RM3000, while very few geoguides reach the higher income range of RM3001 to RM5000. This distribution highlights the need for potential income growth opportunities and improved compensation for geoguides, especially as they gain more experience and expertise in their roles. Addressing the financial challenges faced by geo guides is crucial to ensuring their professional development, improving the overall visitor experience, and promoting the long-term sustainability of the geopark.

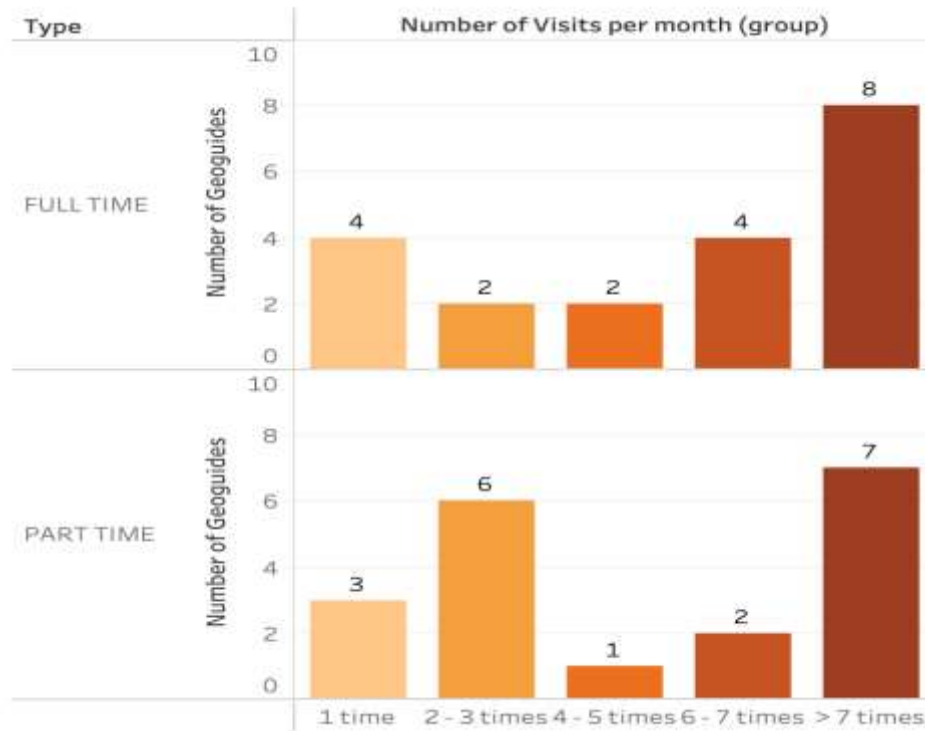**Figure 4: Monthly Visit Frequencies of Geoguides**

Figure 4 provides a detailed comparison of the visit frequencies of full-time and part-time geoguides at Stong Geopark. It categorizes the geo guides based on the number of tours they conduct per month, divided into four intervals: '1 time', '2-3 times', '4-5 times', '6-7 times' and '> 7 times'. For full-time geoguides, the data showed that the majority of them (8) conduct more than 7 tours per month. This is followed by 4 geo guides who lead tours 4-5 times per month. Additionally, 2 geoguides conduct tours either once or 2-3 times a month. This indicates that full-time geoguides are highly active, with most leading tours very frequently.

In contrast, part-time geoguides showed a broader distribution in their tour visit frequencies. The highest number of part-time geo guides (7) also conduct more than 7 hours per month. However, a significant number of part-time geoguides (6) conduct tours only once a month. 3 part-time geo guides lead tours 2-3 times monthly, 2 part-timers who guide tours 6-7 times monthly, and 1 part-timer who conducts tours 4-5 times monthly. This suggests that part-time geo guides have a more varied and lower frequency of tours compared to their full-time counterparts. These findings highlight the differences in responsibilities and commitment between full-time and part-time geoguides at Stong Geopark. This information is valuable for understanding the operational dynamics and staffing requirements in managing tours at the geopark. The higher frequency of tours conducted by full-time geo guides suggests they play a more central role in the park's visitor experience, while part-time geo guides provide supplementary support with more varied schedules. This insight can help geopark managers optimize staffing and tour scheduling to ensure a consistently high-quality visitor experience.

Table 5: Cluster of Geoguides at Stong Geopark by Gender and Areas of Expertise

Gender	Nature	Adventure	Nature and Adventure	Total
Male	11	1	18	30
Female	3	2	4	9

Lastly, based on Crosstabs analysis, Table 5 illustrates the distribution of geo guides at Stong Geopark based on gender and areas of expertise. It categorizes the geo guides into three clusters:

Cluster 1: Nature & Adventure - This is the largest cluster, comprising 22 geoguides whereby 18 are male and 4 are female. These guides are proficient in both nature and trekking, indicating a strong capability to lead tours that involve natural exploration and physical activities.
Cluster 2: Nature - This cluster includes 14 geoguides who specialize exclusively in nature and the majority are male. These guides focus on the natural aspects of the geopark, likely providing in-depth knowledge about the local flora and fauna.
Cluster 3: Adventure - The smallest cluster, with only 3 geo guides, focuses on adventure activities. These guides are specialized in leading more physically demanding and adventurous tours.

The overlap between these clusters suggests that many geoguides possess a combination of skills, particularly in nature and trekking. This diversity in expertise allows the geopark to cater to a wide range of tourist preferences, from those interested in leisurely nature walks to those seeking more adventurous trekking experiences. The presence of these clusters highlights the varied skill sets among the geo guides, which is beneficial for providing comprehensive and engaging tours at Stong Geopark. This diverse range of expertise among the geo guides enables the geopark to offer a versatile and adaptable visitor experience, catering to the needs and interests of a wide spectrum of tourists. By having guides skilled in both nature appreciation and physically demanding activities, the geopark can accommodate visitors with varying levels of fitness and interests, ensuring that everyone can find an engaging and fulfilling tour that aligns with their preferences.

Spatial Distribution of Geological Sites and Geoguides in Stong Geopark

Figure 6: Map of Key Geological Sites and Geoguides' Locations

The geographical information system map of Stong Geopark, Kelantan, presented in Figure 6, highlights the distribution of key geological sites and the locations of active geoguides within the park. The map illustrates the geographical distribution of geosites referenced in Table 1. A red circle marks the location of the geogrid address in Kuala Krai and Jeli, which serves as a central point for guiding visitors to various geosites. Surrounding this central point are several numbered black circles, each corresponding to specific geosites listed in Table 1.

For example, the black circle labelled "1" represents Air Terjun Jelawang, a prominent waterfall located in Dabong, Kuala Krai, and the black circle numbered "2" corresponds to Kars Gua Ikan, another significant geosite

in the same area. The diagram also includes other notable geosites, such as Syis Taku Sungai Galas, Batu Kapur Kemubu, and Migmatit Stong Lata Kertas, each marked with their respective RSO system coordinates. This visual representation helps in understanding the spatial arrangement of these geosites about the central guiding location in Kuala Krai. It highlights the accessibility and proximity of various geological attractions within the geopark, making it easier for visitors and researchers to plan their visits and studies. The map also includes other notable locations in the region, providing a broader geographic context. By integrating the locations of the active geo guides with the distribution of the geosites, this map offers a comprehensive spatial understanding of Stong Geopark. This information can be useful for geopark management, tour planning, and visitor orientation, facilitating the efficient organization and coordination of guided tours to the various geological attractions within the park.

5. Conclusion

This study aims to develop a profile of geoguides and their expertise, to contribute to a better understanding of this group. The information generated could assist tourism companies and visitors in identifying qualified geoguides who meet their preferences. The results indicate that the majority of geoguides are young to middle-aged men, which raises concerns about a potential shortage of experienced professionals in this field. Additionally, the findings suggest that a notable proportion of geoguides are not proficient in English. This insight highlights the need to recognize possible communication barriers and identify areas where additional language training could benefit the geo guides at Stong Geopark. Furthermore, the majority of geoguides at Stong Geopark earn relatively low incomes, with most earning RM1000 or less per month, which is comparatively low pay. Few geoguides make between RM1001 and RM5000. This income distribution highlights the need for potential growth opportunities and improved compensation, especially as geoguides gain more experience and expertise in their roles. It is imperative to address the financial challenges faced by geo guides to ensure their professional development, improve the overall visitor experience, and promote the long-term sustainability of the geopark. Additionally, it was found that full-time geo guides at Stong Geopark are likely to conduct tours, with the majority leading tours more than seven times per month. This information is valuable for understanding the operational dynamics and staffing requirements in managing tours at the geopark.

This study makes several contributions to the existing literature. First, by developing a profile of the geoguides, it provides empirical evidence on the categorization of the geoguides based on their areas of expertise. The geoguides are classified into three clusters. Cluster 1 is the largest which comprises 22 geoguides who specialize in both nature and adventure activities. Cluster 2 involves 14 geo guides who focus exclusively on the natural aspects of the geopark. Cluster 3, the smallest with only 3 geo guides, specializes in adventure activities. The overlap between these clusters suggests that many geoguides possess a combination of skills, particularly in nature and trekking. This spectrum of experience enables the geopark to accommodate a wide range of visitors' needs, from those seeking bold trekking excursions to those interested in peaceful nature hikes. Second, by highlighting the distribution of key geological sites and the locations of active geo guides within the park, the study provides insights into the accessibility and proximity of various geosite attractions, making it easier for visitors and researchers to plan their visits and studies. Third, the study contributes to the literature by focusing on the profiling of geo guides at one of the UNESCO Global Geoparks, which are the key drivers of tourism growth and ecosystem development in Malaysia. The study acknowledges a limitation that should be considered when interpreting the results. The sample size of 39 registered geo guides from Stong Geopark in Kelantan may limit the generalizability of the findings to other geoparks or regions. Future research could address these limitations by using a larger and more diverse sample of participants.

The findings of this study have several important policy implications. Firstly, there is a clear need for targeted recruitment and training programs to attract and retain experienced geoguides. The study highlights that most geoguides are young to middle-aged geoguides, suggesting a potential shortage of seasoned professionals. By implementing targeted recruitment strategies, such as outreach programs and partnerships with educational institutions, and developing comprehensive training programs, the industry can ensure a steady pipeline of qualified geoguides who can meet the demands of the tourism sector. Secondly, the study revealed that a significant number of geo guides are not proficient in English, which can create communication barriers with international visitors. Enhancing language training programs can mitigate these barriers, improving the overall

visitor experience. This can be achieved through language courses, workshops, and immersive learning experiences, enabling geoguides to communicate more effectively with visitors and enhance their satisfaction. Lastly, the study underscores the importance of continuous professional development and support for geo guides to ensure the sustainability and quality of guided tours. Providing ongoing training and development opportunities can help geo guides stay updated with the latest knowledge and skills. This could include advanced training in geology, ecology, and tour management, as well as soft skills like customer service and leadership. Establishing support systems, such as mentorship programs and professional networks, can also help geoguides navigate their careers and address challenges they may face.

Since the study focused primarily on Stong Geopark in Kelantan, it is recommended that future research investigate other geopark areas in Malaysia as well. Comparative studies between different geoparks and regions are encouraged to be explored, as this could provide valuable insights into the contextual factors that may influence the geoguides' areas of expertise and the tourism industry. Additionally, qualitative research could be applied to gain a deeper understanding of the geoguides' skills and areas of expertise according to the different clusters. By integrating the locations of the active geo guides with the distribution of the geosites, this map offers a comprehensive spatial understanding of Stong Geopark. This information can be useful for geopark management, tour planning, and visitor orientation, facilitating the efficient organization and coordination of guided tours to the various geological attractions within the park.

References

Abdullah, F. A., Daud, R. R. R., Othman, N. A., Razak, N. F. A., Simpong, D. B., & Yusoff, A. M. (2022). The Relationship of Ecotourism Development towards Ecotourism Destination Competitiveness. A Case Study in Kelantan.

Ahmad, S. M. F. S., Khairi, H., & Kamarudin, M. F. (2023). The Resilience of Malay Silver Craft Design: Sustaining Cultural Heritage and Promoting Sustainable Industrialization. *e-BANGI, 20*(4), 393-404.

Alauddin, M., Kamal, M. A., & Chowdhury, M. A. I. (2021). Ecotourism in Bangladesh: Investment and Development Contexts. *Tourism in Bangladesh: Investment and Development Perspectives*, 259-275.

Erasiah, E., Pratama, F. S., Zain, F. M., Ardy, M. S., & Dalela, R. (2023). Kelantan The Little Mecca: Its Influence on the Archipelago's 15th-19th century Islamic Civilisation to the Present Day. *Jurnal Lektur Keagamaan, 21*(1), 125-156.

Farsani, N. T., Coelho, C. O., Costa, C. M., & Amrikazemi, A. (2014). Geo-knowledge management and geoconservation viageoparks and geotourism. *Geoheritage*, 6, 185-192.

Fauzi, N S M., & Misni, A. (2016, June 1). Geoheritage Conservation: Indicators Affecting the Condition and Sustainability of Geopark – A Conceptual Review. *Elsevier BV, 222*, 676-684. https://doi.org/10.1016/j.sbspro.2016.05.224

Fennell, D. A., & de Grosbois, D. (2023). Communicating sustainability and ecotourism principles by ecolodges: A global analysis. *Tourism Recreation Research, 48*(3), 333-351.

Gomes, S., & Lopes, J. M. (2023). Insights for pro-sustainable tourist behavior: the role of sustainable destination information and pro-sustainable tourist habits. *Sustainability*, *15*(11), 8856.

Hassin, N. H., Abas, M. A., Sidik, S. N. A., Amin, M. F. M., & Iman, M. (2020). A Study of Local Community Perception and Attitude on Environmental Impact of Ecotourism at Kuala Koh National Park (KKNP), Kelantan.

Ibrahim, M S N., Abdul-Halim, S., Ishak, M Y., & Hassan, S. (2021, June 1). The local community awareness on Langkawi UNESCO Global Geopark status: Case of Kampung Padang Puteh, Langkawi, Malaysia. *Elsevier BV, 9*(2), 233-241. https://doi.org/10.1016/j.ijgeop.2021.02.009

Jaini, N., Anuar, A N A., & Daim, M S. (2012, March 27). The Practice of Sustainable Tourism in Ecotourism Sites among Ecotourism Providers. *Canadian Center of Science and Education, 8*(4). https://doi.org/10.5539/ass.v8n4p175

Jia, Z., Wu, F., & Hou, D. (2022, December 20). Geodiversity, Geotourism, Geoconservation, and Sustainable Development in Longyan Aspiring Geopark (China). *Springer Science+Business Media, 15*(1). https://doi.org/10.1007/s12371-022-00784-8

King, V. T. (2018). Tourism and culture in Malaysia 1. In *Tourism in South-East Asia* (pp. 99-116). Routledge.

Leong, A. M. W., Yeh, S. S., Zhou, Y., Hung, C. W., & Huan, T. C. (2024). Exploring the influence of historical storytelling on cultural heritage tourists' value co-creation using tour guide interaction and authentic place as mediators. *Tourism Management Perspectives, 50*, 101198.

Ly, D. N., La, T. T., Le, K. D., Nguyen, C., Fjeld, M., Tran, T. N. D., & Tran, M. T. (2022, September). 360TourGuiding: Towards virtual reality training for tour guiding. In *Adjunct Publication of the 24th International Conference on Human-Computer Interaction with Mobile Devices and Services* (pp. 1-6).

Marzuki, A., Mohammad, D., & Abdullah, S. (2014, January 2). Visitors' satisfaction towards geopark attractions. *Taylor & Francis, 26*(1), 21-31. https://doi.org/10.1080/13032917.2013.870916

Matshusa, K., Leonard, L., & Thomas, P. (2021, October 21). Challenges of Geotourism in South Africa: A Case Study of the Kruger National Park. *Multidisciplinary Digital Publishing Institute, 10*(11), 108-108. https://doi.org/10.3390/resources10110108

Maying, D., Rafee, Y., Azizan, M A., Arshad, A H A., & Hassan, M Z A. (2021, November 30). Visual Experiential in Digital Documentation for Rural Tourism Promotion of Ba'kelalan, Sarawak. *UNIMAS Publisher, 4*(1), 14-27. https://doi.org/10.33736/ijaca.4192.2021

Pinheiro, R. O., Triest, L., & Lopes, P. F. (2021). Cultural ecosystem services: Linking landscape and social attributes to ecotourism in protected areas. *Ecosystem Services, 50*, 101340.

Samodra, H. (2018). Geotourism in Batur UNESCO Global Geopark, Indonesia. In *Handbook of Geotourism* (pp. 367-378). Edward Elgar Publishing.

Sera, K., Sugawara, H., Sakakibara, M., Arifin, Y. I., & Eraku, S. S. (2020, July 1). The Potential of Gorontalo Province as a Global Geopark. *IOP Publishing, 536*(1), 012004-012004. https://doi.org/10.1088/1755-1315/536/1/012004

Tan, K. K. H., Lee, S. E., & Choy, C. W. (2020). Academic Tourism' and Art: Student Submissions as a Means of Capturing Meaning at Pulai Village, Kelantan. *Contemporary Asian Artistic Expressions and Tourism*, 39-57.

The World Federation of Tourist Guides Associations (WFTGA), (2023). *Tour guide's definition*. https://wftga.org/about (Accessed 3 September 2024).

Thong, J Z., Lo, M., Suaidi, M K., Mohamad, A. A., & Chin, C. (2019, November 10). Tourists' Perceived Destination Competitiveness in Protected Areas: The Case of Semenggoh Nature Reserve. *The Journal of Social Sciences Research, 5*(11), 1600-1608. https://doi.org/10.32861/jssr.511.1600.1608

Weiler, B., & Walker, K. (2014, December 5). Enhancing the visitor experience: reconceptualizing the tour guide's communicative role. https://www.sciencedirect.com/science/article/pii/S1447677014000102

Wijaya, T., & Ying, Z. & Suan, L. (2020). Gender and Self-Regulated Learning During COVID-19 Pandemic in Indonesia. Jurnal Basicedu. 4. 725-732. 10.31004/basicedu.v4i3.422.

Wong, C. U. I., Ren, L., Ma, C., & Lam, J. F. I. (2024). What do today's Chinese tourists expect from tour guides? A mixed-method approach to understanding the evolving guide roles. *Journal of Hospitality and Tourism Management*, *59*, 102-115.

Yani, A., Mulyadi, A., & Rosita, R. (2021, March 1). Profile and competency of a tourist guide on ciletuh-palabuhanratu Unesco global geopark. *IOP Publishing, 683*(1), 012118-012118. https://doi.org/10.1088/1755-1315/683/1/012118

Yi, H., & Yun, J. (2024). Mobility and stability: How do tour guides manage multiple identities? *Journal of Hospitality and Tourism Management*, *58*, 322-332.

Zafeiropoulos, G., Drinia, H., Antonarakou, A., & Zouros, N. (2021). From geoheritage to geo education, geoethics, and geotourism: A critical evaluation of the Greek region. *Geosciences*, *11*(9), 381.

Zaifri, M., Khalloufi, H., Kaghat, F. Z., Azough, A., & Zidani, K. A. (2023). From Earlier Exploration to Advanced Applications: Bibliometric and Systematic Review of Augmented Reality in the Tourism Industry (2002–2022). Multimodal Technologies and Interaction, 7(7), 64.

Zukri, N. A. M. Z. M., Zainuddin, N. N., Manshoor, A., Mohamad, N. H., Idris, N. A., & Zaki, M. I. M. (2024). Domestic Tourist Satisfaction Toward Kelantanese Cuisine in Kelantan. Asian Journal of Research in Education and Social Sciences, 6(S1), 70-80.