

Empowering Mountain Guides in the Kinabalu UNESCO Global Geopark: A Multi-Stakeholder Thematic Saturation Study

Hiew Soon Sang

Faculty of Business, Economic and Accountancy

Dr. Sharifah Rahama Amirul (Corresponding Author)

Faculty of Business, Economic and Accountancy

E-mail: sra@ums.edu.my

Received: Aug. 30, 2025 Accepted: Sep. 19, 2025 Online published: Nov. 10, 2025

doi:10.5296/ijhrs.v16i1.23030

URL: <https://doi.org/10.5296/ijhrs.v16i1.23030>

Abstract

This study explores the professional development (PD) needs of mountain guides (MG) and aims to develop a structured empowerment model for mountain guide at the Kinabalu UNESCO Global Geopark (KUGG). A qualitative and purposive sampling design was utilised in this study. Semi-structured interviews, observations, and document analysis were conducted, whereby the collected data was obtained from 40 mountain guides, 10 Geopark officials, and 20 climbers of KUGG. Through thematic analysis, data saturation was achieved across the three participant groups, whereby the recurring themes emerged consistently. The study found six key important areas of PD needed by the MG including environmental awareness and sustainability (1), cultural competency (2), visitor management and personalisation (3), advanced training skills (4), safety and emergency preparedness (5), communication and language proficiency (6). This study offers the first empirical grounded empowerment model through integrated multi-stakeholder approach in KUGG to enhance the professional capacity of mountain guide. The study indicates the important role of professionalized mountain guides to support sustainable tourism and engage with preserving the unique cultural and natural heritage in the Kinabalu UNESCO Global Geopark.

Keywords: UNESCO Global Geopark, professional development, mountain guides

1. Introduction

The UNESCO Global Geoparks (UGGs) designation acknowledges geological sites of international significance, with an emphasis on professional development, education, and the preservation of the extraordinary geological and cultural diversity of various regions. As of midJuly 2025, there are 229 have been recognised by UNESCO across 50 countries. Kinabalu UNESCO Global Geopark (KUGG) was officially recognised by UNESCO in 2022. Despite numerous studies on Mountain Guides (MG) conducted in various countries, there is a notable research gap when it comes to the specific context of Sabah. These studies, such as those by Hwang and Lee (2018), Harris and Hofer (2017), and Zink et al. (2018), have provided valuable insights into MG's competencies, professional development, and attitudes in diverse regions. However, the absence of research in Sabah leaves an unexplored terrain, preventing a comprehensive understanding of the unique challenges and opportunities faced by MG in this particular location. Investigating MG in Sabah could enrich the existing body of knowledge and contribute to more context-specific strategies for their development and well-being. The preponderance of research efforts in Sabah has overwhelmingly centered on tour guides, as demonstrated by a multitude of sources (e.g Esfahani et al., 2017; Abdullah et al., 2023; Bidder et al., 2017). Yet, it is undeniably regrettable that there remains a conspicuous absence of studies focusing on Mount Kinabalu UNESCO Global Geopark, despite its status as a prominent tourist attraction in Malaysia. While these investigations have shed light on various aspects of tourism and mountaineering in the region, the oversight concerning Mount Kinabalu at KUGG is a missed opportunity to comprehensively understand and enhance the experiences of both climbers and tourists in this iconic tourist attraction in Malaysia. Studies on MGs' professional development are limited, and this research represents one of the first focused studies in Malaysia. Therefore, it is important to close the gap in the existing literature. As Mount Kinabalu is the centerpiece of the KUGG, it is critical to improve the management professionalism. This study is relatively new and will add valuable insights to the existing literature while filling current research gaps.

2. Literature Review

Existing studies on tour guides (Ariffin & Ching, 2019; Dave & Bidul, 2022) often overlook mountain guides (MGs), resulting in limited investment in their professional development. This has created a shortage of qualified guides and raised concerns about the long-term sustainability of Kinabalu UNESCO Global Geopark (Kuilis-Bosimin & Chan, 2019). With adventure tourism growing, the need for well-trained guides is urgent, as expeditions are increasingly challenging and risky (Lee & Jayakumar, 2021). Professional development is understood as improving skills and adapting to evolving job demands (Aoulad-Sidi-Mhend et al., 2020; Megerle, 2022). MGs not only guide climbers but also act as interpreters, educators, and stewards of the geopark's cultural and natural heritage (Corpuz, 2017). This study anticipates providing a clear understanding of MGs' professional development trajectory in Kinabalu UNESCO Global Geopark, informing targeted training programs and an empowerment model. Such a model supports sustainable tourism and benefits the wider community by strengthening professional standards within the geopark.

3. Research Method

The philosophical foundation of this study is based on interpretivism, which posits that reality is constructed through the subjective interpretations and experiences of individuals rather than being objective and universal. In this study, the focus is on understanding the experiences and perspectives of the participants, including mountain guides and other stakeholders, in relation to the of the KUGG and the empowerment of mountain guide professional development. Interpretivism recognizes that the meanings and interpretations that individuals give to their experiences are shaped by their cultural, social, and historical contexts, and therefore, it is important to take these factors into consideration when conducting research . This philosophy emphasizes the need for qualitative research methods, such as in-depth interviews and focus group discussions, which allow for an exploration of the complex and subjective experiences of individuals (Kamal, 2019).

The study has used purposeful sampling design to ensure that the sample is representative of the population of interest and that it allows the researcher to answer the research questions effectively (Ames et al., 2019). Additionally, the study also incorporated snowball sampling into the methodology, where initial participants were encouraged to refer other potential participants who met the specified criteria. This approach facilitated the identification of individuals deeply embedded within the context of the study, enriching the depth and diversity of perspectives gathered. Data collection were conducted through a participatory process at the Sabah Park Kinabalu Park Kundasang Ranau, which served as a central hub for engaging with the mountain guides. Interview sessions were scheduled at mutually convenient times, allowing for in-depth discussions while accommodating the busy schedules of the guides. Face-to-face interviews were conducted in a private and comfortable setting at the Sabah Parks (Kinabalu Park), Kundasang Ranau to ensure confidentiality and minimize external distractions. Informed consent was obtained from each participant, affirming their voluntary participation and understanding of the study's implications. Participants were assured that their anonymity and confidentiality would be maintained throughout the research process. A semi-structured interview protocol is developed to guide the interviews. In this study, thematic analysis was employed, a well-established qualitative data analysis technique known for its ability to identify and interpret meaningful patterns, themes, and categories within a dataset. In conducting the thematic analysis for this research project, an adapted version of Braun and Clarke's (2022) approach was employed.

Table 1. Thematic Analysis Steps from Braun and Clarke (2019)

Step	Description
1. Familiarisation with the Data	Involves reading and re-reading transcripts, notes, or other data sources to become immersed in the content. Initial ideas may be noted.
2. Generating Initial Codes	Systematically highlighting and labeling interesting features in the data across the dataset. Coding is done manually or using software.
3. Searching for Themes	Collating codes into potential themes and gathering relevant data for each theme.
4. Reviewing Themes	Refining themes by checking how they relate to coded data extracts and the dataset as a whole.

Step	Description
5. Defining and Naming Themes	Clearly defining what each theme represents, including sub-themes if necessary, and naming them appropriately.
6. Producing the Report	Final analysis and write-up of findings with supporting evidence (data extracts).

To ensure the trustworthiness of this study, respondent validation and member checking were conducted. It involves seeking feedback and verification from the participants or respondents involved in the study. Researchers can share their findings or interpretations with the participants and ask for their input or confirmation. This process helps ensure that the researchers' understanding aligns with the participants' perspectives and experiences, enhancing the credibility and validity of the research.

4. Findings and Discussion

Participants Demographic Profile

Table 2. Number of participants based on groups

Participants' Group	Number of participants
Mountain Guides	40
Geopark Management Teams	10
Tourist (Climbers)	20

MGs participants were male dominated, with 95% of respondents being men. Most guides (40%) were aged 31–40, followed by 35% aged 41–50, indicating a workforce in its most active years. For KUGG management teams, the positions held range from officers to senior leadership, with one serving as a Chief Assistant Director reflecting a mix of operational and managerial roles within the team. Third group were tourist (climbers) which came from various nationalities, with Malaysians forming the largest group (30%), followed by Chinese and British nationals (15% each), and others from the Philippines, Canada, Korea, Italy, and the U.S. All climbers had visited the site between 2021 and 2024, indicating recent engagement with the Kinabalu UNESCO Global Geopark.

Thematics Analysis (TA) Findings

TA Findings 1: The PD needs by MGs at the KUGG

Interviews conducted with mountain guides at the KUGG revealed several key professional development needs. In order to answer this research question, the perspective, experience and expectation from the mountain guide, management and tourist have been taken into account. Therefore, this section presents three hierarchical notes or layered format structured themes from thematic analysis mountain guide perspectives, KUGG management perspectives and climber's perspectives.

Table 3 presents six themes generated from MGs data which are all important concerns to be taken for their professional development. These six themes consist of Language and Communication Barriers (1), Lack of Funding and Financial Support (2), Outdated Resources and Technology (3), Lack of Structured Programs and Support Systems (4), Limited Access

to Research and Data (5), Dealing with Unexpected Weather (6).

Table 3. Hierarchical notes of mountain guides and their description related to professional development needed by mountain guide

Hierarchical names	Description
Language and Communication Barriers	Adequate resources and personalized training for language skills and interpretation services are needed to enable guides to communicate effectively with a diverse range of visitors and provide personalized guiding experiences. Example case statements <i>“diverse participant expectations demanding effective communication” (Participant No.4)</i> <i>“effective communication to keep participants engaged“ (Participant No.6)</i> <i>“Clear communication for timely response” (Participant No.36)</i> <i>“Limited resources for language training” (Participant No.7)</i> <i>“Lack of comprehensive training for language diversity” (Participant No.22)</i> <i>“Insufficient support for language interpretation services” (Participant No.36)</i> <i>“obstacles related to communication in diverse groups” (Participant No.39)</i>
Lack of Funding and Financial Support	Mountain guides need increased funding and financial support for workshops, training programs, conservation initiatives, geological research, interpretive signage, technology upgrades, marketing campaigns, and specialized safety training to enhance their professional development and effectiveness. Example case statements <i>“Lack of funding for workshops” (Participant No.1)</i> <i>“Insufficient financial support for training programs and conferences” (Participant No.5)</i> <i>“Inadequate funding for conservation initiatives” (Participant No.12)</i> <i>“Limited funding for geological research expeditions” (Participant No.17)</i> <i>“Insufficient funding for interpretive signage” (Participant No.20)</i> <i>“Inadequate funding for geological conservation efforts” (Participant No.23)</i> <i>“Limited financial support for technology upgrades (Participant No.24)</i> <i>“Inadequate funding for marketing campaigns” (Participant No.28)</i> <i>“Limited support for on going professional development” (Participant No.29)</i> <i>“Lack of funding for specialized safety training” (Participant No.30)</i>
Outdated Resources and Technology	Guides require updated geological reference materials, advanced interpretation technology, modern visitor center facilities, accurate mapping resources, an updated online presence, interactive mobile applications, and reliable communication infrastructure to improve their capacity to provide high-quality educational experiences. Example case statements <i>“Absence of updated geological reference materials” (Participant No.2)</i> <i>“Limited availability of advanced technology for interpretation” (Participant No.3)</i>

Hierarchical names	Description
	<i>"Outdated visitor center technology" (Participant No.11)</i> <i>"Outdated mapping resources" (Participant No.18)</i> <i>"Outdated website and online presence (Participant No.27) "</i> <i>"Limited financial support for interactive mobile applications" (Participant No.38)</i> <i>"Outdated communication infrastructure" (Participant No.39)</i>
Lack of Structured Programs and Support Systems	The establishment of structured mentorship programs, environmental education programs, knowledge-sharing platforms, career advancement paths, scientific collaborations, and community engagement initiatives is essential for the professional growth and skill development of mountain guides. Example case statements <i>"Absence of a structured mentorship program" (Participant No.6)</i> <i>"Lack of a dedicated environmental education program" (Participant No.10)</i> <i>"Absence of a central platform for knowledge-sharing" (Participant No.14)</i> <i>"Lack of a platform for showcasing guides' achievements" (Participant No.19)</i> <i>"Absence of a mentorship program" (Participant No.21)</i> <i>"Lack of a career advancement path" (Participant No.25)</i> <i>"Insufficient support for scientific collaborations" (Participant No.26)</i> <i>"Lack of support for collaborations with cultural organizations" (Participant No.31)</i> <i>"Absence of a mentorship program for guides (Participant No.32)</i> <i>"Inadequate support for trail maintenance" (Participant No.33)</i> <i>"Limited resources for organizing environmental education programs" (Participant No.34)</i>
Limited Access to Research and Data	The creation of a dedicated research center, a central repository for geological data, and funding for research on local flora and fauna would provide guides with the latest scientific information and enhance their ability to educate visitors. Example case statements <i>"Absence of a dedicated research center" (Participant No.4)</i> <i>"Absence of a central repository for geological data" (Participant No.35)</i> <i>"Lack of funding for research on local flora and fauna" (Participant No.37)</i>
Dealing with unexpected weather	Mountain guides have to cope with unexpected weather changes, including safety concerns from extreme temperatures and precipitation, limited accuracy in weather forecasting for mountainous terrain, the rapid onset of adverse conditions, navigational difficulties due to poor visibility, managing client comfort and morale, and ensuring adequate equipment and communication tools to mitigate weather. Example case statements <i>"unexpected weather changes while ensuring the safety and enjoyment" (Participant No.1)</i>

Hierarchical names	Description
	<i>“regular updates on weather and trail conditions” (Participant No.3)</i>
	<i>“unexpected weather challenges stood out, demonstrating their coordination” (Participant No.4)</i>
	<i>“changing weather conditions, implementing adjustments” (Participant No.8)</i>
	<i>“unforeseen circumstances, such as sudden weather changes” (Participant No.12)</i>
	<i>“varying weather conditions for the safety of participants” (Participant No.18)</i>
	<i>“with unexpected weather changes affects the dynamics” (Participant No.20)</i>
	<i>“unforeseen circumstances like sudden weather changes” (Participant No.37)</i>

Table 4. Hierarchical notes of management and their description related to professional development needed by mountain guide

Hierarchical names	Description
Advanced Training and Skill Enhancement	Participants emphasized the need for ongoing professional development to ensure mountain guides have advanced skills and knowledge. This includes technical skills and customer services. Example case statement Technical Skills: <i>“Guides require continuous training in advanced navigation, risk management, and emergency response. This includes using technology such as GPS devices and integrating augmented reality for enhanced learning” (Participant 1).</i> <i>“To become a mountain guide, individuals usually undergo a structured training program, which includes acquiring technical skills, knowledge about the geopark's features, and a commitment to safety and conservation practices”. (Participant 4)</i> Customer Service: <i>“Workshops and courses that focus on customer engagement, communication skills, and interpreting local culture and geology are crucial.” (Participant 7)</i> <i>“guide training programs, ensuring they meet international standards for safety, ethics, and customer service”. (Participant 2)</i> <i>“We have partnered with a local adventure sports academy to provide specialized training courses for our guides, covering technical skills and customer service”. (Participant 3)</i> <i>“Implement regular training programs on customer service, enabling guides to enhance their interpersonal skills and provide a more welcoming experience for visitors. (Participant 40)</i>
Safety and Emergency Preparedness	Ensuring the safety of both guides and visitors is a priority. Participants highlighted several aspects of safety training and emergency preparedness. Example case statement: <i>“Comprehensive training in first aid, emergency evacuation procedures, and</i>

Hierarchical names	Description
	scenario-based exercises are necessary to handle unpredictable situations (Participant 2). “Regular briefings and updates on safety protocols and trail conditions help guides stay prepared for emerging risks.” (Participant 5). Mountain guides undergo rigorous safety and emergency preparedness training, including first aid certifications, evacuation procedures, and continuous updates on safety protocols. (Participant 1) “comprehensive training in first aid, risk assessment, and emergency response protocols” (Participant No.2) “commitment to safety and conservation practices “ (Participant No.3) “safety and emergency response protocols, including first aid, communication strategies, and risk assessment” (Participant No.7) “safety through specialized training for mountain guides” (Participant No.8)
Environmental Conservation and Sustainability	Environmental stewardship is integral to guiding practices. Professional development should focus on: Conservation Training: “Guides need to be well-versed in sustainable tourism practices and the geopark’s conservation policies. This includes training on waste management, biodiversity, and the impact of tourism on natural resources” (Participant 9). Practical Involvement: “Engaging guides in hands-on conservation projects and integrating sustainability into their daily operations will foster a deeper commitment to environmental preservation” (Participant 4).
Technological Integration	Utilizing technology can significantly enhance guide training and performance. Key areas include: Technology Utilization: “Implementing tools such as mobile apps, virtual reality, and GIS can improve guides’ situational awareness and educational delivery” (Participant 1). Future Innovations: “Exploring new technologies, such as AI-powered tools and blockchain for conservation tracking, will further enhance guide effectiveness and efficiency” (Participant 2).
Cultural Competency	Guides must integrate traditional cultural knowledge with modern guiding techniques, respecting both heritage and industry standards, highlighting the need for cultural preservation and ongoing education in heritage practices. Example Case Statement “cultural insights to create a memorable journey” (Participant No.4) “cultural heritage organization to incorporate storytelling and cultural interpretation into our guide training” (Participant No.5) “demonstrating a passion for the geopark’s cultural and natural heritage” (Participant No.6) “guidance but also cultural and environmental education” (Participant No.7)

Hierarchical names	Description
Communication and Language Proficiency	Guides must effectively communicate and engage with a diverse range of visitors. Example case statement: <i>“Guides need to be trained in cross-cultural communication and interpretation to provide enriching experiences for visitors from various backgrounds (8).</i> <i>“Developing proficiency in multiple languages and understanding diverse cultural norms are essential for improving visitor interactions (Participant 5).</i> <i>“commitment to preserving the geopark's natural and cultural heritage” (Participant No.10)</i>
Visitor Management	Balancing the increasing number of visitors while ensuring personalized experiences, environmental conservation, and waste management demands effective communication, cultural sensitivity, education on responsible behavior, and strategic marketing and branding efforts to sustain a thriving guiding community. Example case statements <i>“enriching the visitor experience by imparting knowledge” (Participant No.2)</i> <i>“crafting a positive visitor experience” (Participant No.6)</i> <i>“facilitators of positive visitor experiences” (Participant No.7)</i> <i>“lens of management, are central to enhancing the visitor experience” (Participant No.8)</i> <i>“pivotal role of mountain guides in shaping positive visitor experiences” (Participant No.9)</i> <i>“mountain guides serve as the face of the geopark, contributing to positive visitor experiences” (Participant No.10)</i>
Respect for Local Customs and Traditions	Mountain guides ensure respect for local customs by participating in community workshops and engaging in dialogues with leaders. Establishing partnerships and seeking local feedback further foster mutual respect. Example case statements <i>“educate tourists effectively, creating a more respectful and enriching experience” (Participant No.2)</i> <i>“tailor tours that respect customs and traditions” (Participant No.5)</i> <i>“incorporate community insights into tour planning, fostering a more respectful approach” (Participant No.9)</i> <i>“beneficial relationship that respects local customs and traditions” (Participant No.10)</i>

Table 5 demonstrates the six key themes identified from tourist (climbers) perspectives. Six themes emerged from the analysis, each highlighting critical aspects that are vital for the professional development of Mountain Guides (MGs). These themes reflect the diverse expectations of climbers and emphasize the importance of ongoing improvement in service delivery: Personalized Attention and Tailored Guidance (1), Motivation and Support (2), Engagement from MGs (3), Adapting to Sudden Weather Change (4), Accommodating Various Fitness Level (5), Environmental Awareness and Challenges (6).

Table 5. Hierarchical notes of climbers and their description related to professional development needed by mountain guide

Hierarchical names	Description
Personalized Attention and Tailored Guidance	Guides were praised for adapting to individual needs, providing personalized support, and encouraging participants. This indicates that climbers value the personalized attention and tailored guidance they receive. Professional development in this area could include training on personalization techniques, customer service skills, and motivational strategies. <i>"Yes, guides adapted to my pace and skill level, offering encouragement and support based on individual capabilities." (Climber 1)</i> <i>"Felt they took individual preferences into consideration, customizing the track to accommodate specific interests within the group." (Climber 2)</i> Example case statements <i>"guides helped a participant overcome a fear of heights" (Participant No.2)</i> <i>"guide assisted a participant with altitude adjustment" (Participant No.8)</i> <i>"assisted a participant with a fear of river crossings" (Participant No.12)</i> <i>"flexibility in adapting to individual preferences" (Participant No.10)</i> <i>"Guides assisted a participant with a fear of river crossings" (Participant No.12)</i> <i>"Guide shared insights into the medicinal uses of local plants" (Participant No.15)</i> <i>"Encouragement during a physically demanding climb was impactful" (Participant No.16)</i> <i>"guide assisted a participant with altitude adjustment" (Participant No.18)</i>
Motivation and Support	The feedback from climbers highlights how mountain guides provided encouragement and support, which significantly impacted their trekking experience. <i>"Received encouragement from a guide during a physically demanding climb, motivating perseverance." (Climber 7)</i> <i>"Guides provided clear instructions during challenging descents, minimizing the risk of slips and falls." (Climber 15)</i>
Engagement from Guides	Some climbers experienced a lack of engagement from guides, which led to a sense of detachment and missed opportunities for deeper learning and connection with the Geopark. Example case statements <i>"interactions with the mountain guides enhanced the overall experience" (Participant No.5)</i> <i>"visit into an informative and engaging learning opportunity " (Participant No.19)</i> <i>"engaging interactions with the guides created a sense of camaraderie within the group" (Participant No.10)</i> <i>"restricted exploration and hindered the sense of freedom" (Participant No.18)</i> <i>"disappointing due to a lack of engagement from the guides" (Participant</i>

Hierarchical names	Description
	No.20)
Adapting to Sudden Weather Changes	Climbers noted the mountain guides' exceptional ability to adapt to sudden weather changes, ensuring safety and comfort by swiftly organizing shelter and adjusting plans accordingly. Example case statements <i>"handled unexpected changes, like sudden weather shifts"</i> (Participant No.4) <i>"unforeseen circumstances, such as sudden weather changes"</i> (Participant No.12) <i>"efficiently managed changing weather conditions"</i> (Participant No.8) <i>"efficiently managed changing weather conditions "</i> (Participant No.18) <i>"safety during challenging weather conditions"</i> (Participant No.9)
Accommodating Varying Fitness Levels	Tourists appreciated the mountain guides' efforts to accommodate varying fitness levels within the group, ensuring that all participants could enjoy the trek without feeling left behind or overwhelmed. Example case statements <i>"accommodated varying fitness levels within the group"</i> (Participant No.5) <i>"adjusted the pace to accommodate diverse preferences"</i> (Participant No.8) <i>"individual preferences into consideration"</i> (Participant No.12) <i>"guides accommodated varying fitness levels within the group"</i> (Participant No.15) <i>"adjusted the pace to accommodate diverse preferences"</i> (Participant No.18)
Raising Awareness About Environmental Challenges	Tourists appreciated the mountain guides' efforts to raise awareness about environmental challenges, providing insights on the impact of climate change and conservation initiatives, fostering a deeper understanding and commitment to preserving the Geopark's natural heritage. Example case statements <i>"shared information on the historical volcanic activity"</i> (Participant No.3) <i>"explained the cultural significance of certain geological features"</i> (Participant No.6) <i>"shared insights into the impact of climate change on the region"</i> (Participant No. 8) <i>"Informed about the role of the Geopark in global conservation efforts"</i> (Participant No.10) <i>"Absolutely, guiding visitors involves sharing information about both the geological and cultural richness of the Geopark."</i> (climber 6) <i>"Ongoing research projects within the Geopark, bridging scientific"</i> (Participant No.17) <i>"impact of invasive plant species on local ecosystems"</i> (Participant No.19)
Environmental Awareness and Challenges	The feedback from climbers underscores how mountain guides played a pivotal role in promoting environmental awareness and sustainability, which greatly enhanced their overall trekking experience. Example case statements

Hierarchical names	Description
	<i>“shared information on the historical volcanic activity” (Participant No.3)</i>
	<i>“explained the cultural significance of certain geological features” (Participant No.6)</i>
	<i>“shared insights into the impact of climate change on the region” (Participant No. 8)</i>
	<i>“Informed about the role of the Geopark in global conservation efforts” (Participant No.10)</i>
	<i>“Ongoing research projects within the Geopark, bridging scientific” (Participant No.17)</i>
	<i>“impact of invasive plant species on local ecosystems” (Participant No.19)</i>

Recapitulation and Discussion of Research Findings 1

Professional development needs of mountain guides at KUGG reveal the complexity of skill, resource, and systemic improvement needs to upgrade the guiding profession toward contemporary standards. Analysis of TA findings 1 indicates several critical areas of concern that range from communication barriers to the lack of proper access to training and resources. All these affect the guides' ability to deliver high-quality meaningful experiences to the visitors. Insights are aligned with and diverge from existing literature, shedding light on the unique challenges mountain guides face in this particular UNESCO context. A critical theme to emerge from this study is that of the language and communication barriers. Many mountain guides find it hard to communicate with international visitors in an effective way because of language proficiency and inadequate training in interpretation. This outcome echoes the remarks by Ap and Wong (2001), which underscore that language proficiency is vital for tourism as it allows tour guides to cross the cultural divide to maximize visitor experience. But while prior research has tended to focus on the improvement of visitor satisfaction using language competency, this research directly relates professional impact to the tour guide. Guides who do not have the ability to communicate effectively cannot satisfy the needs of visitors, and this in turn limits their professional growth and the value attached to their services. This gap calls for tailor-made language training programs, especially in widely spoken languages among international tourists, to bridge this gap. However, recent studies of Clivaz and Langenbach in 2020 emphasize the addition of intercultural communication competencies to a guide training curriculum, pointing out that effective communication is not merely about language use but also entails cultural sensitivity and adaptability - both of which are particularly germane in the Geopark context in which diverse visitor backgrounds are usual.

Another important finding is the lack of funding and resources for professional development, which restricts access to training programs, modern tools, and updated reference materials. This finding is consistent with Carvalho et al. (2024) argument that a lack of financial and institutional support often hinders the professionalization of tour guiding. However, in this study, a new dimension is added on how this absence of resources was specifically affect the guides working within a UNESCO Global Geopark, as the peculiar status of such places often requires higher professional standards because of the dual objective of conservation and

sustainable tourism. This highlights a need for strategic investment in training guide programs and facilities, with specific emphasis on training guides in state-of-the-art tools for geological interpretation and environmental education. In this regard, recent work by Chan (2023) further support this, and it is claimed that incorporating digital tools and interactive technologies greatly enhances the value of guided tours as an educational experience. It also implies that dealing with resource constraints is not just about the performance of guides but a vital component of meeting the Geopark's more comprehensive mission in conservation and education. Another aspect is the absence of structured support systems, which may include mentorship and career development opportunities. This aligns with earlier findings by Chan (2023), which pointed out that professional development in the tour guiding industry was informal and, often ad hoc. However, the current study goes further than that by highlighting the role of structured mentorship programs in developing long-term careers for mountain guides. Mentorship and knowledge-sharing access helps guides find their way in these complex roles, especially in such demanding environments as Kinabalu. This is supported by recent studies in human resource development, such as that by Dousin et al (2022) which underlines the need for continuous professional development and peer learning to improve job satisfaction and performance. In this regard, the implementation of mentorship programs can be seen as a good way to address skill gaps and develop a more cohesive and knowledgeable guiding community.

This study further shows that there is a rising trend of the role of environmental conservation and sustainability in professional development among mountain guides. The guides are expected to act as guardians of the environment and inform visitors on sustainable practices and the ecological importance of the Geopark. This is in line with the views of Ariffin and Ching (2019), who argue that tour guides play a critical role in promoting environmental awareness and fostering sustainable tourism behaviors among visitors. However, the current study provides a more nuanced perspective by emphasizing the need for specialized training in these areas. For example, the guides need a basic understanding of environmental principles besides advanced skills in environmental interpretation, as well as the ability to convey complex ecological concepts to diverse audiences. Such a finding further underlines the need for the training programs tailored to the requirements of integrating sustainability education with practical guiding skills so that guides can easily balance their roles as educators and conservation advocates.

The professional development needs of mountain guides in the Kinabalu UNESCO Global Geopark are multidimensional, with aspects including communication skills, access to resources, well-structured support systems, and sustainability training. Situating these findings in the broader context of the existing literature allows this study to contribute toward a better understanding of the unique challenges faced by mountain guides in the area designated by UNESCO. Such needs would call for joint efforts from both Geopark management and external stakeholders, including the development of targeted training programs, increased funding for resources, and the establishment of mentorship and career development initiatives. Such measures can improve the professional competence of mountain guides but also serve broader goals in terms of sustainable tourism and

environmental conservation within the Geopark.

TA Findings 2: The Saturation Insights from Multi-stakeholders in KUGG

In order to develop the professional empowerment model for MGs, the findings from the analysis 1 was used as a ground to this model. Figure 1 illustrates the saturation of professional development (PD) needs for mountain guides (MGs) based on three key stakeholder perspectives: mountain guides themselves, geopark management, and climbers.

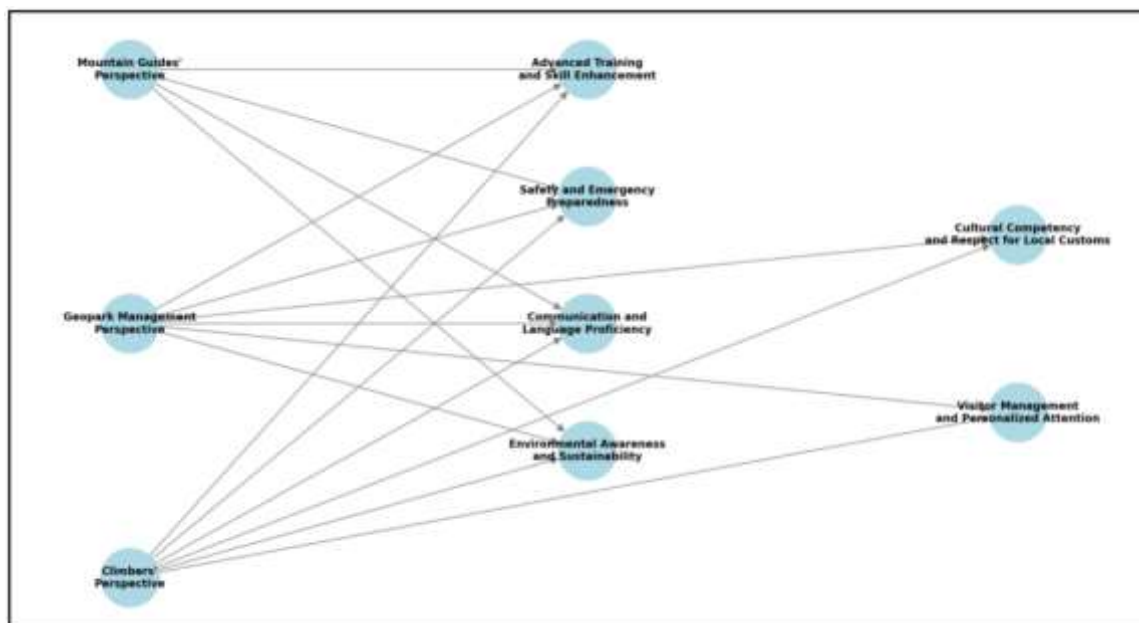


Figure 1. Saturation between three perspectives

The diagram highlights areas of convergence where multiple stakeholders identified similar needs, reinforcing the relevance and validity of these themes. Six saturated themes were determined from the view of mountain guides, geopark management and climbers, reflecting the main needs mountain guides have for PD. Shared expectations and similar priorities among stakeholders are made visible by these themes. Interestingly, there was a strong agreement across all three groups about four main points: advanced training, skill improvement, safety and emergency readiness, effective communication and sustainability. These last points, cultural awareness and consideration of local customs, plus handling tourists with personal attention, were important to both guiding staff and climbers, according to the managers of the geoparks. This shows that these themes should be included in a formal program for developing mountain guides in the Kinabalu UNESCO Global Geopark.

Table 6. Comprehensive Professional Development Needs for Mountain Guides

Comprehensive Professional Development Needs for Mountain Guides	
Saturation between three perspectives	Saturated Theme(s)
Mountain Guides' Perspective: Address outdated resources and technology, and lack of structured programs.	Advanced Training and Skill Enhancement
Geopark Management Perspective: Emphasizes advanced	

Comprehensive Professional Development Needs for Mountain Guides	
Saturation between three perspectives	Saturated Theme(s)
training and skill enhancement. Climbers' Perspective: Highlights the need for personalized attention and engagement from MGs.	
Mountain Guides' Perspective: Includes dealing with unexpected weather. Geopark Management Perspective: Focuses on safety and emergency preparedness. Climbers' Perspective: Points out the importance of adapting to sudden weather changes.	Safety and Emergency Preparedness
Mountain Guides' Perspective: Identifies language and communication barriers. Geopark Management Perspective: Stresses communication and language proficiency. Climbers' Perspective: Implies the need for clear and effective communication.	Communication and Language Proficiency
Mountain Guides' Perspective: Limited access to research and data on environmental issues. Geopark Management Perspective: Emphasizes environmental conservation and sustainability. Climbers' Perspective: Highlights environmental challenges.	Environmental Awareness and Sustainability
Geopark Management Perspective: Includes cultural competency and respect for local customs and traditions. Climbers' Perspective: Implies the need for respect for local cultures. Synthesis: Guides should be knowledgeable about and respectful towards local cultures and traditions. This helps in fostering positive interactions with climbers and the local community.	Cultural Competency and Respect for Local Customs
Geopark Management Perspective: Addresses visitor management. Climbers' Perspective: Emphasizes personalized attention and accommodating various fitness levels. Synthesis: Guides should be able to manage groups effectively and provide personalized attention tailored to individual climber needs. This includes accommodating different fitness levels and providing motivation and support.	Visitor Management and Personalized Attention

Recapitulation and Discussion of Research Findings 2

One of the key themes that emerge includes the need for Advanced Training and Enhancement of Skills. Issues raised by mountain guides touch on outdated resources and technology and, importantly, a lack of structured development programs. Similarly, geopark management shows concern for advanced training aimed at enhancing performance and

ensuring safety. Climbers, too, affirm the need for personalized care and interaction, implying that the guides should be highly skilled and versatile. Advanced training, therefore, became an area of priority in development. It has to ensure that guides are able to meet today's challenges, client expectations, and high standards of their profession. The second dominant theme pertains to Safety and Emergency Preparedness. Mountain guides acknowledge the challenge due to unpredictable weather conditions. It is noted that one has to be vigilant and ready at any time for such variables. Such safety and emergency preparedness form part of the core management of Geopark, something quite important in the view of saving climbers and maintaining good park reputation. Climbers also emphasize that guides are supposed to adapt to abrupt weather changes, which again guarantees the essence of safety training. What can be concluded from the three perspectives put together is that safety and preparedness in cases of emergency are core concerns of the professional role of the guide and, therefore, they must be placed at the heart of the professional development process of the guide.

Communication and Language Proficiency forms another point of convergence in the perspectives. Mountain guides perceive language and communication barriers as serious issues when serving climbers of diverse linguistic identity. It is underlined by the management of geoparks that good communication and good language are the keys to smooth operations and added value for the visitor experience. Similarly, in climbing, clients have expressed the need for active and clear communication by the guide, as this is directly related to their safe conduct and overall experience. In this context, it creates a correspondence between guide efforts towards improving their own communication skills, including language competence, in interacting with clients and enabling successful guiding experiences.

Other apparent themes are environmental awareness and sustainability. The guides of mountain groups discussed the importance of a lack of access to current research and data on environmental issues, hence a need for improved resources and knowledge on environmental matters. Geopark management also focuses on the aspect of environmental conservation and sustainability as core means of preserving the natural environment and ecological balance of the park. The climbers are concerned about the environmental challenges, showing that guides should also promote sustainability. Both these have highlighted together that the mountain guides need to be informed on environmental issues and take part in the promotion of sustainability and responsible forms of tourism.

Cultural Competency and Respect for Local Customs is also an area of focus. Geopark management also insists that guides show cultural competency and respect towards the local culture and traditions, very important in fostering good relations guides for climbers. Climbers acknowledge that respect for local culture adds to the authenticity and quality of their experience. This mutual understanding would, therefore, imply knowledge of the guides about the local cultures and traditions, thus allowing them to manage positive contacts with climbers.

Finally, Visitor Management and Personal Attention is another aspect in which all opinions converge. To the geopark management, this aspect was underlined as important to visitor management, ensuring that guides would be able to manage big groups without losing control,

with the quality of the visit assured for all. Meanwhile, climbers focus on individual attention and the ability to handle a diversity of fitness levels; this would suggest that guides tailor their approach to individual needs. Bringing the two perspectives together, this synthesis suggests that mountain guides balance effective visitor management with personalized attention in order to meet the needs of all, regardless of either their fitness level or experience. The table outlines a number of themes essential to the professional development of mountain guides: enhanced training, field preparedness in safety, communication skills, environmental awareness, cultural competency, and personalized service. These themes, in fact, correspond with the complexity of responsibility required for mountain guides, whose establishment calls for comprehensive developmental programs that assure effectiveness in mountain guides for positive experiences of climbers and geopark management.

5. Conclusion and the Way Forward

The implications of this research are very substantial, both to the academic area and in real-life application within the mountain guiding profession in Kinabalu, the UNESCO Global Geopark region. Of course, what is unique here is that its focus is specifically on the professional development of mountain guides in relation to a UNESCO Global Geopark. Although there exist numerous literatures on professional development in a wide range of sectors, research that specifically tackles mountain guides who work within the UNESCO-designated areas is a scarce few. This study takes a unique approach by focusing not only on the professional needs of the guides but also involving the views of other stakeholders including Geopark management and tourists. Through this, the research of Abd Gani et al. (2020) gives a broader perspective of professional development challenges and opportunities for mountain guides in that region. The present study is quite unique as far as the development of soft skills among mountain guides is concerned. Conventionally, mountain guides' training focused on technical skills such as navigation, safety, and survival skills that are relevant to the position. However, in the context of sustainable tourism and the increasing demand for quality visitor experiences, soft skills such as communication, leadership, customer service, and conflict resolution have become equally important. Addressing this gap is what the study contributes to a more holistic view of what constitutes effective professional development for mountain guides. It acknowledges the technical competence is no longer enough, as the changing demand of the tourism industry requires meeting this new expectation. It stresses the importance of guides not only being proficient in outdoor skills but also being able to interact with different groups of visitors and to create pleasurable experiences.

Grounded on these recommendations, this research offers an all-rounded professional development module for mountain guides operating within Kinabalu UNESCO Global Geopark. This module would focus on improving technical and soft skills. By the Edwards (2019) the technical training side, the module would equip guides with advanced knowledge of navigation, first aid, and wilderness survival, which are still essential for their safety and that of their clients. It does, however note that guides have to convey information about geological, environmental, and cultural topics, which could be very complex in a captivating way and clearly understood by tourists. Therefore, training in environmental interpretation,

cultural sensitivity, and storytelling would form the basis for enabling visitors to be educated on Geopark's heritage as the experience for them is maximized. Leadership and decision-making training was form another component of the professional development module. In the mountain guide's leadership, the leadership roles are most commonly assumed while guiding groups through difficult terrain. Under such conditions, strong decision-making skills would be essential in ensuring the safety of the group and the success of the tour. The module would include scenario-based training to help guides improve their ability to assess risks, make quick decisions, and manage emergencies effectively. This would not only give confidence to the guides but also ensure that they are well prepared to handle any challenges that may arise during their tours. The module would, therefore, emphasize the development of conflict resolution skills since mountain guides are often tasked with managing interpersonal dynamics within their groups. It is also of utmost importance that mountain guides, whose work demands heavy physical and mental efforts, should be properly looked after regarding their well-being.

Research on the mountain guide professional development needs and empowerment model at Kinabalu UNESCO Global Geopark reveals some valuable insights but also opens up many other areas of future research. Future research will include more geography and guiding contexts and this study is anticipating expanding the study. The case study focuses on Kinabalu UNESCO Global Geopark, where aspects of mountain guiding environments vary in terms of geography, culture, and operational challenges. Such studies, conducted in other regions, may further help to determine whether these needs for professional development and empowerment identified are generally applicable or should be adjusted to local conditions. Cross-case studies would then show similarities and differences in guidance practices with an enrichment of the understanding of the best means for supporting and empowering mountain guides in various contexts. Future studies must employ longitudinal designs that can monitor the long-term efficiency of the proposed empowerment model as well as professional development programs proposed for mountain guides. Although this study provides an overview of the current needs and perceptions of the mountain guides, it is well important to evaluate the evolution of such needs over time and the effect on professional growth and empowerment of the guides due to the implemented training programs in the long term. Longitudinal studies will enable follow-ups of changes of skills, job satisfaction, and career development of guides over longer periods and give information about sustainability and long-lasting effects of the empowerment initiatives.

References

- Abd Gani, N. I., Rathakrishnan, M., & Krishnasamy, H. N. (2020). A pilot test for establishing validity and reliability of qualitative interview in the blended learning English proficiency course. *J Crit Rev*, 7(5), 140–143.
- Abdullah, T., Carr, N., & Lee, C. (2022). Re-conceptualising the empowerment of local people in tourism. *International Journal of Tourism Research*, 24(4), 550–562. <https://doi.org/10.1002/jtr.2517>

- Ahmadpour, A., Nour Mohammadi, N., Moumeni Helali, H., & Aliloo, J. (2020). Educational needs assessment of managing directors of rural cooperatives in Mazandaran Province in the field of entrepreneurship management. *Co-Operation and Agriculture*, 9(35), 81–114.
- Alharahsheh, H. H., & Pius, A. (2020). A review of key paradigms: Positivism VS interpretivism. *Global Academic Journal of Humanities and Social Sciences*, 2(3), 39–43.
- Ali, M., Zhang, L., Shah, S. J., Khan, S., & Shah, A. M. (2020). Impact of humble leadership on project success: The mediating role of psychological empowerment and innovative work behavior. *Leadership & Organization Development Journal*, 41(3), 349–367. <https://doi.org/10.1108/LODJ-07-2019-0279>
- Ames, H., Glenton, C., & Lewin, S. (2019). Purposive sampling in a qualitative evidence synthesis: A worked example from a synthesis on parental perceptions of vaccination communication. *BMC Medical Research Methodology*, 19(1), 1–9. <https://doi.org/10.1186/s12874-019-0770-5>
- Ariffin, W. N. S. W. M., & Ching, G. H. (2019). The effectiveness of environmental interpretation in influencing visitors' knowledge in UNESCO Kinabalu Global Geopark. *Asian Journal of Environment-Behaviour Studies*, 4(14), 67–80. <https://doi.org/10.21834/ajebs.v4i14.166>
- Bello, F. G., Kamanga, G., & Jamu, E. S. (2019). Skills gaps and training needs in the tourism sector in Malawi. *African Journal of Hospitality, Tourism and Leisure*, 8(4), 1–18.
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597. <https://doi.org/10.1080/2159676X.2019.1628806>
- Braun, V., & Clarke, V. (2022). Conceptual and design thinking for thematic analysis. *Qualitative Psychology*, 9(1), 3–26. <https://doi.org/10.1037/qup0000194>
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive sampling: Complex or simple? Research case examples. *Journal of Research in Nursing*, 25(8), 652–661. <https://doi.org/10.1177/1744987120937340>
- Carvalho, F., Ramos, R. F., & Fortes, N. (2024). Customer satisfaction in mountain hotels within UNESCO Global Geoparks: An empirical study based on sentiment analysis of online consumer reviews. *Tourism & Management Studies*, 20(1), 45–56. <https://doi.org/10.18089/tms.2024.20105>
- Centobelli, P., Cerchione, R., Chiaroni, D., Del Vecchio, P., & Urbinati, A. (2020). Designing business models in circular economy: A systematic literature review and research agenda. *Business Strategy and the Environment*, 29(4), 1734–1749. <https://doi.org/10.1002/bse.2477>
- Chan, J. K. L. (2023). Exploring economic development strategies towards the sustainable development of Kinabalu UNESCO Global Geopark: The perspective of district local

authorities. *Journal of Sustainable Tourism*, 31(7), 1280–1298.
<https://doi.org/10.1080/09669582.2023.2194062>

Chan, J. K. L., & Tay, K. X. (2016). Tour operator perspectives on responsible tourism practices: A case of Kinabalu National Park, Sabah. *International Journal of Culture, Tourism and Hospitality Research*, 10(2), 121–137.
<https://doi.org/10.1108/IJCTHR-12-2015-0122>

Clivaz, C., & Langenbach, M. (2020). Organization and professional development of mountain guides and leaders in tourist regions: The Swiss case compared with the French experience. *Journal of Outdoor Recreation and Tourism*, 29, 100257.
<https://doi.org/10.1016/j.jort.2020.100257>

Corpuz, R. (2017). ‘Wild Borneo’: A study of visitor perception and experience of nature tourism in Sandakan, Sabah, Malaysian Borneo. *Borneo Studies in History, Society and Culture*, 1(1), 443–461. https://doi.org/10.1142/9789813206253_0025

Dave, D. J., & Bidul, M. A. H. (2022). A study to determine factors influencing hotel guest satisfaction: Hotel and tourism in Kota UNESCO Kinabalu Geopark, Sabah Malaysia. *Planning Malaysia*, 20, 1–12.

Dousin, O., Boroh, R. P., & Aralas, S. B. (2023). UNESCO Kinabalu Geopark development and community well-being: Insights from policymakers. *Business Perspectives and Research*, 11(2), 245–260. <https://doi.org/10.1177/22785337221113150>

Edwards Jr, D. B. (2019). Shifting the perspective on community-based management of education: From systems theory to social capital and community empowerment. *International Journal of Educational Development*, 64, 17–26.
<https://doi.org/10.1016/j.ijedudev.2018.10.002>

Elfithri, R., Mokhtar, M. B., & Abdullah, M. P. (2021). Water and environmental sustainability in Langkawi UNESCO Global Geopark, Malaysia: Issues and challenges towards sustainable development. *Arabian Journal of Geosciences*, 14(12), 1168.
<https://doi.org/10.1007/s12517-021-07554-8>

Esfahani, M., Khoo, S., Musa, G., Heydari, R., & Keshtidar, M. (2021). The influences of personality and knowledge on safety-related behaviour among climbers. *Current Issues in Tourism*, 24(23), 3296–3308. <https://doi.org/10.1080/13683500.2021.1881034>

Farsani, N. T., Coelho, C., & Costa, C. (2011). Geotourism and geoparks as novel strategies for socio-economic development in rural areas. *International Journal of Tourism Research*, 13(1), 68–81. <https://doi.org/10.1002/jtr.800>

Gillespie, J. (2020). *Protected areas: A legal geography approach*. Springer Nature.

Joseph, R. (2020). The theory of empowerment: A critical analysis with the theory evaluation scale. *Journal of Human Behavior in the Social Environment*, 30(2), 138–157.
<https://doi.org/10.1080/10911359.2019.1658581>

- Kamal, S. S. L. B. A. (2019). Research paradigm and the philosophical foundations of a qualitative study. *PEOPLE: International Journal of Social Sciences*, 4(3), 1386–1394.
- Kim, E. J., & Roh, Y. S. (2019). Competence-based training needs assessment for basic life support instructors. *Nursing & Health Sciences*, 21(2), 198–205. <https://doi.org/10.1111/nhs.12574>
- Kuilis-Bosimin, P., & Chan, J. K. L. (2018). Perception of Sabah as a safe tourist destination from the perspective of the tour operators and tourists. *Journal of Tourism*, 3(11), 1–13.
- Latip, N. A., Jaafar, M., Marzuki, A., Roufechaei, K. M., Umar, M. U., & Karim, R. (2020). The impact of tourism activities on the environment of Mount UNESCO Kinabalu Geopark, UNESCO world heritage site. *Planning Malaysia*, 18, 1–10.
- Latip, N. A., Karim, R., Jaafar, M., Marzuki, A., Ahmad, A. G., Abdullah, S. Z. S., & Omar, M. U. (2021). UNESCO Kinabalu Geopark National Park, Unesco world heritage site: Assessment of environmental issues, tourist satisfaction and park management. *Planning Malaysia*, 19, 1–15.
- Lee, Y., & Jayakumar, R. (2021). Economic impact of UNESCO Global Geoparks on local communities: Comparative analysis of three UNESCO Global Geoparks in Asia. *International Journal of Geoheritage and Parks*, 9(2), 189–198. <https://doi.org/10.1016/j.ijgeop.2021.07.002>
- Lee, Y., & Jayakumar, R. (2023). Capacity-building of mountain guides in Asian UNESCO Global Geoparks: A comparative study. *International Journal of Geoheritage and Parks*, 11(3), 210–222. <https://doi.org/10.1016/j.ijgeop.2023.07.004>
- Liamputtong, P. (2020). *Qualitative research methods* (5th ed.). Oxford University Press.
- Mapjabil, J., Johnes, J., & Latip, N. A. (2022). Backpacker tourism circuit in Kota UNESCO Kinabalu Geopark, Sabah. *Planning Malaysia*, 20, 1–12.
- Matte, D. (2018). Optimizing the multiple downscaling approach to achieving a high-resolution climate projection of mixed precipitation. *Climate Dynamics*, 51(5), 2025–2042. <https://doi.org/10.1007/s00382-017-3993-8>
- Monasterio, E., & Cloninger, C. R. (2019). Self-transcendence in mountaineering and BASE jumping. *Frontiers in Psychology*, 9, 2686. <https://doi.org/10.3389/fpsyg.2018.02686>
- Moradi, S., Mahdizadeh, H., Šarić, T., Kim, J., Harati, J., Shahsavarani, H., Greber, B., & Moore, J. B. (2019). Research and therapy with induced pluripotent stem cells (iPSCs): Social, legal, and ethical considerations. *Stem Cell Research & Therapy*, 10(1), 1–13. <https://doi.org/10.1186/s13287-019-1274-0>
- Pandey, P., & Pandey, M. M. (2021). *Research methodology tools and techniques*. Bridge Center.
- Patton, M. Q. (2023). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). Sage Publications.

Ramli, M. F., Rahman, M. A., & Ling, O. M. (2020). Do motivation and destination image affect tourist revisit intention to UNESCO Kinabalu Global Geopark national park during COVID-19 pandemic recovery phase. *European Journal of Molecular & Clinical Medicine*, 7(6), 1624–1635.

Rasoolimanesh, S. M., Jaafar, M., & Tangit, T. M. (2018). Community involvement in rural tourism: A case of UNESCO Kinabalu Geopark National Park, Malaysia. *Anatolia*, 29(3), 337–350. <https://doi.org/10.1080/13032917.2018.1441877>

Saldana, J. (2018). *Writing qualitatively: The selected works of Johnny Saldaña*. Routledge.

Vlachopoulos, N., & Voudouris, P. (2022). Preservation of the geoheritage and mining heritage of Serifos Island, Greece: Geotourism perspectives in a potential new global UNESCO geopark. *Geosciences*, 12(3), 127. <https://doi.org/10.3390/geosciences12030127>

Wan Nur Syazana, W. M. A. (2018). *The effectiveness of environmental interpretation in ecotourism destination: The case of UNESCO Kinabalu Geopark Park* (Doctoral dissertation, University of Malaya).

Wang, J., Liu, S., Li, X., Xiao, Y., Scheuer, B., & Zhao, P. (2022). Analysis on temporal and spatial evolution of UNESCO Global Geoparks and impact factors. *Geoheritage*, 14(4), 105. <https://doi.org/10.1007/s12371-022-00710-7>

Yang, S. L., Ibrahim, N. A. F., Jenarun, G., & Liew, H. B. (2020). Incidence and determinants of acute mountain sickness in Mount UNESCO Kinabalu Geopark, Malaysia. *High Altitude Medicine & Biology*, 21(3), 265–272. <https://doi.org/10.1089/ham.2019.0153>

Yusof, M. F. M., Kamarudin, L. M., Patwary, A. K., & Mohamed, A. E. (2021). Measuring revisit intention of domestic tourists in Langkawi UNESCO Global Geopark, Malaysia: A road to sustainable tourism. *Journal of Environmental Management & Tourism*, 12(4), 1052–1063. [https://doi.org/10.14505/jemt.v12.4\(48\).20](https://doi.org/10.14505/jemt.v12.4(48).20)

Yusof, N. M., Er, A. C., Halim, U., Misha, N., Halimin, H., Othman, M. Z., Tambi, N., & Nawi, N. F. M. (2021). Heritage tourism and its impact on the local communities: A case study in Ranau, Sabah. *International Journal of Academic Research in Business and Social Sciences*, 11(12), 1805–1830. <https://doi.org/10.6007/IJARBS/v11-i12/11546>

Zhang, Y. (2022). Research methodology. In *Assessing literacy in a digital world* (pp. 51–71). Springer, Singapore. https://doi.org/10.1007/978-981-16-5411-9_4

Zhao, H., McLoughlin, L., Adzhiev, V., & Pasko, A. (2019). Why do we not buy mass customised products? – An investigation of consumer purchase intention of mass customised products. *International Journal of Industrial Engineering and Management*, 10(2), 181–190.

Zhao, S., Pudasainee, D., Duan, Y., Gupta, R., Liu, M., & Lu, J. (2019). A review on mercury in coal combustion process: Content and occurrence forms in coal, transformation, sampling methods, emission and control technologies. *Progress in Energy and Combustion Science*, 73, 26–64. <https://doi.org/10.1016/j.pecs.2019.02.001>

Zhou, Y., Li, H., & Sun, H. (2022). Metalloproteomics for biomedical research: Methodology and applications. *Annual Review of Biochemistry*, 91, 449–473. <https://doi.org/10.1146/annurev-biochem-042320-094647>

Zimmermann, J., Kerber, A., Rek, K., Hopwood, C. J., & Krueger, R. F. (2019). A brief but comprehensive review of research on the alternative DSM-5 model for personality disorders. *Current Psychiatry Reports*, 21(9), 1–11. <https://doi.org/10.1007/s11920-019-1074-3>

Copyright Disclaimer

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).