Research article

Localising Global Standards in Toba, Indonesia Through a Tourist-Centric Perspective of UNESCO Guidelines

Rachmat Mulyana[1], I Wayan Koko Suryawan[2,*], Iva Yenis Septiariva[3], Sapta Suhardono[4], Mega Mutiara Sari[2], Nova Ulhasanah[2], Nur Novilina Arifianningsih[5], Wisnu Prayogo[6], Dwinto Martri Aji Buana[7]

[1] Department of Building Engineering Education, Universitas Negeri Medan, Medan 20221, Indonesia
[2] Department of Environmental Engineering, Faculty of Infrastructure Planning, Universitas Pertamina, Jakarta 12220, Indonesia
[3] Department of Civil Engineering, Faculty of Engineering, Universitas Sebelas Maret, Surakarta 57126, Indonesia
[4] Department of Environmental Sciences, Faculty of Mathematics and Natural Sciences, Universitas Sebelas Maret, Surakarta 57126, Indonesia
[5] Department of Environmental Engineering, Faculty of Civil and Environmental Engineering, Institut Teknologi Bandung, Bandung 40116, Indonesia
[6] Department of Civil Engineering, Universitas Negeri Medan, Medan 20221, Indonesia
[7] Department of Management, Faculty of Business and Economics, Widyatama University, Bandung 40125, Indonesia

[*] Correspondence: i.suryawan@universitaspertamina.ac.id

Abstract

This study examines the response to and support of the UNESCO recommendations on behalf of geo-tourism using the actual perspectives of tourists visiting the Toba region. The study employed a detailed map of Toba Geo-tourism in the Sumatra Utara Province, Indonesia, to provide a comprehensive understanding. The research was underpinned by a random sampling approach, gathering responses from a broad spectrum of tourists. The results captured an optimistic landscape, demonstrating a clear synergy between the UNESCO recommendations and the sentiments of the tourists. Not only did the guidelines resonate, but there was also a palpable feeling among tourists to either extend their stay or make a subsequent visit, provided the recommendations were implemented holistically. This study stresses the value of adopting and localising global sustainable tourism standards to suit a region such as Toba's unique attributes and tourist expectations. By means of this research, we aim to amplify that dialogue, charting a path for Toba and similar regions to embrace a future that is both ecologically sensitive and visitor centric.

Keywords: geo-tourism; UNESCO recommendations; sustainable tourism development; tourist feedback; Toba geo-tourism.

1. Introduction

For centuries, the rich tapestry of cultural heritage, natural wonders and unique geographies has made regions like Toba in the Sumatra Utara Province of Indonesia a focal point for tourists, historians and geographers alike. As modern tourism evolves, so does the understanding of its positive and negative impacts on local communities, environments and economies (Iliev, 2020; Saarinen, 2019). With its mandate to promote peace and security (Javed & Chattu, 2020) through international cooperation in education, science and culture, UNESCO has been a key player in steering the narrative towards sustainable and responsible tourism. The Toba Caldera in Indonesia, renowned for its catastrophic eruption approximately 74,000 years ago, is one of the most significant geological features on the planet (Chesner, 2020). This eruption, the largest in the Quaternary period, formed Lake Toba's largest volcanic lake (Chesner, 2020). The magnitude of the eruption triggered a profound impact, including a substantial deposit of ash across Southeast Asia and possibly significant global climatic impacts. The Toba Caldera has been the subject of extensive geological research for over a century (Chesner, 2020). This potential status as a UNESCO-recognised site generates opportunities and challenges. It promises increased visibility, a potential influx of tourists and a focus on preservation. Simultaneously, it also necessitates structured management, adept handling of socio-cultural dynamics and an unwavering commitment to sustainability.

In recent years, there has been increasing interest in understanding how global recommendations, similar to those from UNESCO, resonate with local communities and visitors (Mahadevan & Zhang, 2022; Mustafa *et al.,* 2023; Phakdee Auksorn *et al.,* 2022). Their perceptions, support, or concerns are fundamental in implementing these recommendations. This study, therefore, embarks on a journey to bridge this knowledge gap. We seek to capture a comprehensive picture via a detailed survey aimed at capturing the binary viewpoints of tourists on the importance of the UNESCO recommendations and their subsequent willingness to visit or revisit after these recommendations are established. The respondents, randomly sampled from residents of the main

Indonesian islands of Java and Sumatra, provide a broad spectrum of perspectives that are instrumental in shaping the future of sustainable tourism in the Toba region.

"In September 2015, the United Nations (UN) introduced the 17 Sustainable Development Goals (SDGs) with the aim of enhancing our world by 2030 (Băbăț *et al.,* 2023). The development of sustainable tourism is a prerequisite for the successful implementation of the medium-term (2030) and long-term (2050) SDGs (Mazilu *et al.,* 2023). While a commonly discussed topic, sustainable tourism regularly focuses on key strategies and policies (Aall & Koens, 2019; Li *et al.,* 2020; Wanner *et al.,* 2020). Tourist attractions are crucial to support the development of sustainable tourism because they are the basic elements of the geo-tourism products of any global tourist destination (Berc Radisic & Basan, 2007; Drăguleasa *et al.,* 2023; Ellerbrock & Hite, 1980; Rosentraub & Joo, 2009). A missing piece of the puzzle in regard to the literature pertains to the specific perspective of the tourists, notably regarding implementing global guidelines, for instance, those introduced by UNESCO (Katelieva *et al.,* 2020; Mousazadeh *et al.,* 2023; Stolz & Megerle, 2022). The distinctive geo-tourism attributes of Toba magnify this gap, as there has been limited research on how tourists perceive and accept the recommendations made by UNESCO tailored for such unique regions. This study seeks to bridge this knowledge gap by concentrating on the binary viewpoints of tourists regarding the UNESCO guidelines pertaining to geo-tourism in Toba. The research clarifies which recommendations resonate with tourists and which might require further consideration by simplifying the evaluation metric to a binary acceptance scale.
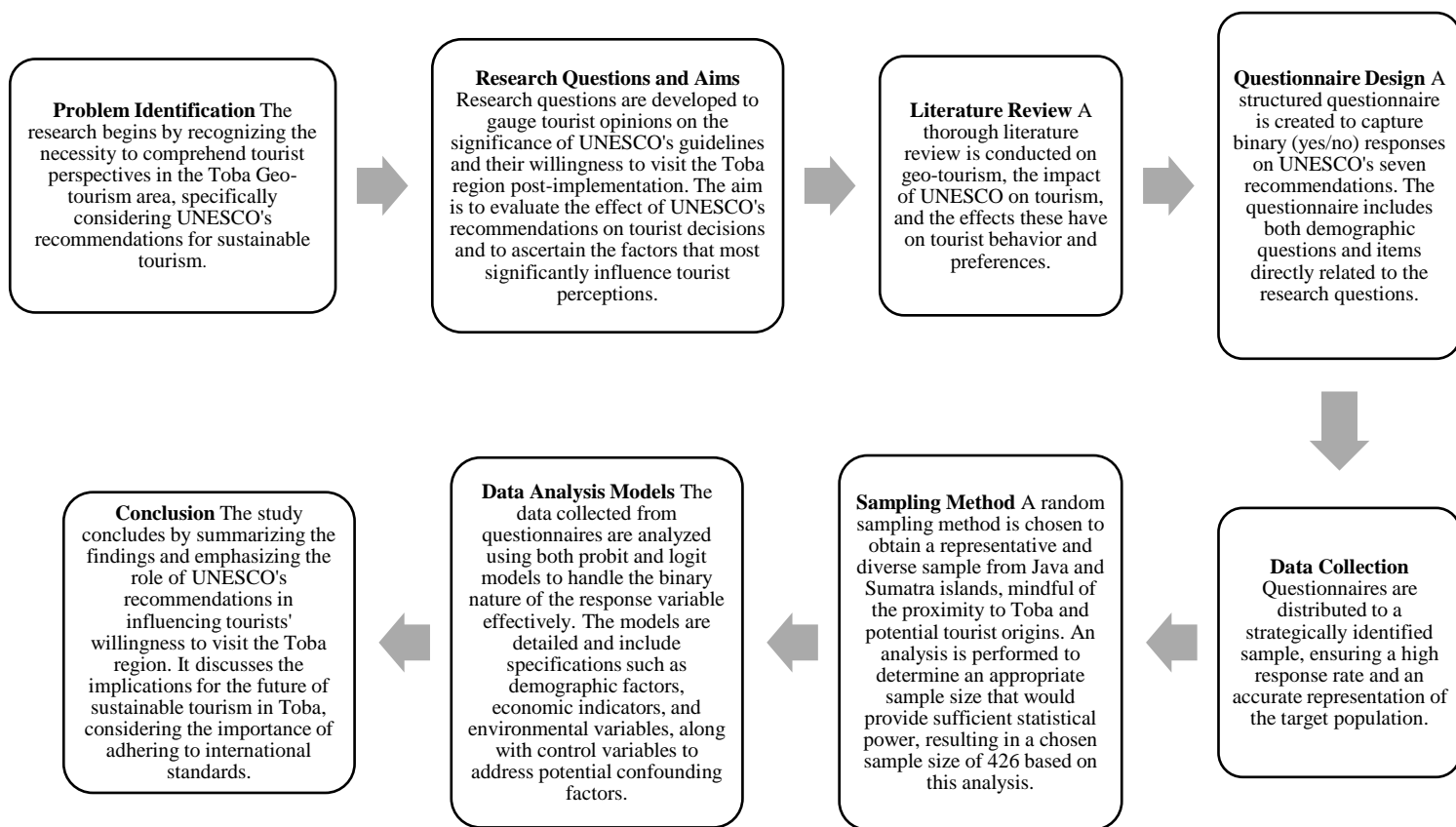
Problem Identification The research begins by recognizing the necessity to comprehend tourist perspectives in the Toba Geo-tourism area, specifically considering UNESCO's recommendations for sustainable tourism.

Research Questions and Aims Research questions are developed to gauge tourist opinions on the significance of UNESCO's guidelines and their willingness to visit the Toba region post-implementation. The aim is to evaluate the effect of UNESCO's recommendations on tourist decisions and to ascertain the factors that most significantly influence tourist perceptions.

Literature Review A thorough literature review is conducted on geo-tourism, the impact of UNESCO on tourism, and the effects these have on tourist behavior and preferences.

Questionnaire Design A structured questionnaire is created to capture binary (yes/no) responses on UNESCO's seven recommendations. The questionnaire includes both demographic questions and items directly related to the research questions.

Conclusion The study concludes by summarizing the findings and emphasizing the role of UNESCO's recommendations in influencing tourists' willingness to visit the Toba region. It discusses the implications for the future of sustainable tourism in Toba, considering the importance of adhering to international standards.

Data Analysis Models The data collected from questionnaires are analyzed using both probit and logit models to handle the binary nature of the response variable effectively. The models are detailed and include specifications such as demographic factors, economic indicators, and environmental variables, along with control variables to address potential confounding factors.

Sampling Method A random sampling method is chosen to obtain a representative and diverse sample from Java and Sumatra islands, mindful of the proximity to Toba and potential tourist origins. An analysis is performed to determine an appropriate sample size that would provide sufficient statistical power, resulting in a chosen sample size of 426 based on this analysis.

Data Collection Questionnaires are distributed to a strategically identified sample, ensuring a high response rate and an accurate representation of the target population.

Figure 1. Research framework.

What sets this research apart is its inclusivity. Unlike prior studies focusing solely on tourists, this study offers a more comprehensive perspective, including insights from local communities, governmental bodies and NGOs. This approach provides a holistic understanding of how various local tourists perceive the proposed recommendations, offering a richer context concerning their acceptance or potential challenges. A significant novelty introduced in this study is its progressive approach to tourist behaviour. Exploring the willingness of tourists to revisit Toba after implementing the UNESCO recommendations provides insights into the long-term impact and efficacy of these guidelines. This perspective is crucial to ensure sustainable tourist involvement in the future. Geographically, the distinctiveness of targeting respondents from Java and Sumatra lends further depth to the study. Recognising these cultural and regional nuances ensures the findings are relevant and contextually grounded. This research balances global recommendations and their

on-the-ground implications in unique geo-tourism centres, for instance Toba. The insights from this study present actionable strategies for Toba and can serve as a blueprint for other global geo-tourism regions.

2. Research Methods

Figure 1 presents a detailed description of the methodological approach adopted in our study, which is methodically structured from the initial stages of identifying the research problem to reaching the concluding remarks. The initial step involves identifying the research problem, where the need for a comprehensive understanding of tourists' perceptions considering the UNESCO sustainable tourism guidelines within the Toba Geo-tourism area is recognised. Subsequently, the research questions and objectives are meticulously produced to evaluate tourists' attitudes towards the significance of the UNESCO guidelines and their potential impact on tourists' willingness to visit the Toba region. A comprehensive literature review lays the foundation for the study, offering insights into the influence of UNESCO on tourism and the existing tourist behaviours. The research methodology is consequently articulated through the design of a structured questionnaire, tailored to elicit responses directly relevant to the research queries. To ensure a diverse and representative demographic, the sampling method involves the random selection of participants from Java and Sumatra. The subsequent data collection phase is achieved via the systematic distribution of the questionnaires. The gathered data is analyzed using probit and logit models, which are adept at interpreting the binary nature of the response variables. The study concludes with a blend of the findings, highlighting the role of the UNESCO recommendations in shaping the future of tourism in the Toba region, while also acknowledging the study's limitations and the extent of its applicability.
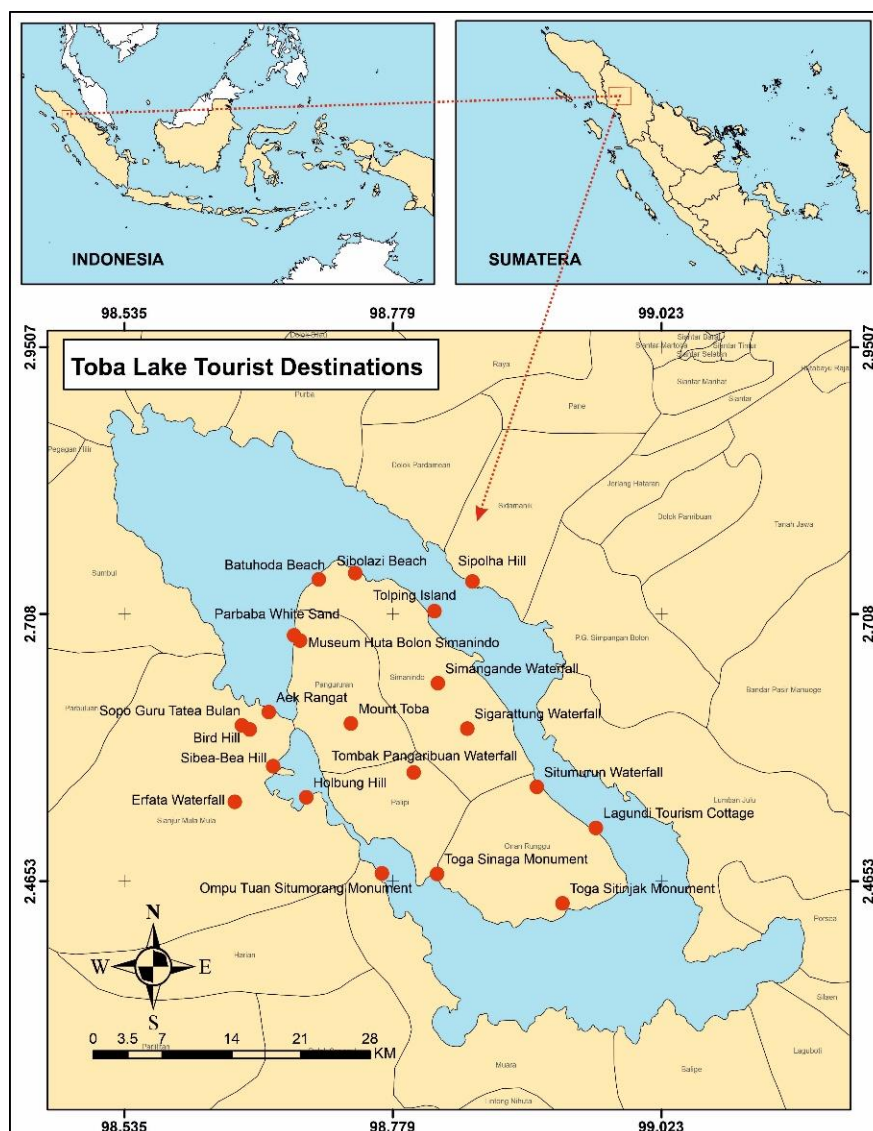

Figure 2. Distribution of the Toba Geo-tourism Area in North Sumatra Province and the Origins of Respondents in Java and Sumatra using ArcGIS software.

The mapping presented in Figure 2 visualises the Toba Geo-tourism area in Indonesia's North Sumatra (Sumatra Utara) province. It highlights the extent and origin of the study's respondents. A random sampling method was employed to select respondents to ensure a diverse and representative sample for the study. Inhabitants of two of Indonesia's most populous islands, Java and Sumatra, were chosen to provide their valuable observations and opinions. With its bustling cities and significant population, Java offers the perspectives of potential visitors in relation to Toba. Simultaneously, the respondents from Sumatra provide insights closer to home, given the proximity of the Toba region.

In Figure 2, one might imagine dots or markers that indicate the general areas in Java and Sumatra where respondents were sampled. These markers give readers a spatial understanding of the distribution of participants in the study, emphasising the comprehensive and diverse nature of the sampling strategy. Random sampling ensures an unbiased representation, providing a holistic view of the sentiments, preferences, and attitudes of potential and actual visitors towards the UNESCO recommendations and the potential for tourism in the Toba region. This methodological approach, juxtaposed against the geographical backdrop of Figure 1, emphasises the commitment to capturing a wide array of voices in shaping the future of Toba's sustainable tourism framework.

Table 1 provides an informative overview of tourist perspectives regarding the seven recommendations made by UNESCO. Employing a binary option marking the recommendations as essential or not provides a clear window into what tourists value the most when considering their travel plans. A fundamental outcome of this investigation is the correlation between tourists' acknowledgment of these recommendations and their willingness to visit or revisit the Toba region once it adheres to the UNESCO recommendations. This connection underlines the magnitude of international standards in influencing modern travel decisions. It reiterates that today's global tourist is more discerning, seeking destinations that are in keeping with international sustainability and heritage conservation standards.

Table 1. Indicators assessing tourist perspectives on the UNESCO recommendations.

Indicator	Explanation	Objective
Selection of Outcrops (Akbulut *et al.,* 2023; de la Hera-Portillo et al., 2023; Migoń, 2021)	Outcrops are areas where bedrock appears on the Earth's surface. Identifying and promoting these outcrops makes it easier for tourists and researchers to understand the area's geological history. Clear, informational boards are also vital for public education.	The goal is to showcase the bedrock from the four significant eruptions that formed the Toba Caldera region.
Identification of Heritage (Cameron, 2020; Settimini, 2021)	By identifying and documenting natural, cultural and intangible heritage, managers and tourists can understand the value of conserving the area.	Recognise and understand the wealth present in the Toba Caldera Geopark.
Manager Training (de Oliveira *et al.,* 2022; Vu *et al.,* 2022)	Improve the capability of the Toba Caldera site managers.	Training will enable managers to understand international standards, best practice and policies related to geopark management.
Communication with UNESCO (Citaristi, 2022; Kenterelidou & Galatsopoulou, 2021)	A strong relationship with the UNESCO ensures that the Toba Caldera Geopark is always in accordance with international standards and policies.	Remain informed about the latest information and policies regarding geopark management.
Increasing Exposure of Toba Caldera (Chesner *et al.,* 2020; Muzambiq *et al.,* 2021)	By increasing promotion, social media content and the website, more people will learn about and visit the geopark. A detailed English language website ensures a global understanding of the geopark.	Attract more tourists and raise awareness of the geopark.
Use of Logo (Rodrigues et al., 2021; Stolz & Megerle, 2022)	These logos facilitate the recognition and authentication of the geopark. Moreover, accurate content together with appropriate translations regarding all promotional materials ensure that the public receives correct information.	Boost the identity and global recognition of the geopark.
Branding Policy (dos Santos, 2021; Sigala, 2019; Werther, 2022)	Using clear policies on branding and partnership, both parties can understand their rights and obligations, guaranteeing a relationship that is beneficial for all parties.	Create a win-win relationship between the Toba Caldera Geopark and its partners.

We utilised both probit and logit models to analyse our data. These models were chosen for their ability to handle binary dependent variables effectively. The probit model assumes a normal distribution of the error terms, while the logit model assumes a logistic distribution. We specified that both models should include variables such as demographic factors, economic indicators, and environmental variables. Additionally, we incorporated control variables to account for potential confounding factors. For each model, we provided a detailed list of coefficients along with their respective standard errors, significance levels and confidence intervals. These coefficients were interpreted in the context of their impact on the likelihood of the dependent variable. We also discussed the assumptions inherent in each model and how they influenced our analysis. We

reported P-values, confidence intervals, and effect sizes for each significant coefficient in our models. This approach provided a robust statistical framework to evaluate our findings' significance and practical relevance. The Goodness of Fit for each model was assessed using the Akaike Information Criterion (AIC) and log-likelihood values. We provided a transparent interpretation of these statistics, explaining their significance in the context of model comparison. The data analysis was conducted using NLOGIT. We outlined the variable selection criteria, detailing the rationale behind the inclusion of each variable in our models. We also described any data transformations we applied, such as normalisation or logtransformation, to meet the assumptions of our analysis methods.

We selected a P-value threshold of 1% for statistical significance, a decision informed by prior research utilising probit and logit models to assess willingness to participate (Nguyen *et al.,* 2022). This threshold is in keeping with standard practices in similar studies (Nguyen *et al.,* 2022), ensuring the consistency and comparability of our results. In conjunction with this, we provided confidence intervals for all relevant model coefficients, offering a range within which we can expect the true values of these coefficients to lie with a high degree of certainty. Additionally, we reported effect sizes for each significant variable in our models. This inclusion not only emphasises the magnitude of these variables' impact but also facilitates the practical interpretation of our findings, allowing for a more nuanced understanding of the data beyond mere statistical significance.

We calculated the sample size for our study by considering the population sizes of Java and Sumatra to achieve a sample that accurately represents these populations. A power analysis was conducted to determine the optimal sample size. Based on this analysis, we chose a sample size of 426, which we determined to be sufficient to detect significant effects in our analysis, balancing resource and time constraints. For the random sampling, we implemented specific selection criteria. Our focus was on individuals aged 18 and above from urban and rural Java and Sumatra areas. We employed stratified sampling to ensure that our sample was representative across various demographic segments, including age, gender, and socio-economic status. This approach was crucial in minimising selection bias and capturing a broad range of perspectives relevant to our study.

Table 2 describes the respondents' socio-demographic attributes. This data explains who the respondents are and reveals why they might possess certain opinions or preferences pertaining to the UNESCO recommendations. The dataset denotes a slightly higher rate of female participation. Of the respondents, 236 or 55.40% are females, while the number of males amounts to 190, which is 44.60%. This gender distribution presents a comprehensive viewpoint, combining both the male and female perspectives regarding the UNESCO recommendations. In higher education, a significant number of respondents, 269 or 63.15%, have completed their bachelor's degree. This is followed by 123 respondents, accounting for 28.87%, who have attained education up to high school. The portion representing those with a masters or higher qualifications consists of the smallest segment, comprising only 34 participants or 7.98%. This distribution might imply that most respondents have experience of higher education, which could influence their awareness and viewpoints with respect to sustain-able tourism and conservation. Age-wise, the younger demographic (aged 20-29) is the most represented group, with 218 respondents, making up 51.17%. The next age group, those between 30-39 years, constitutes 181 respondents or 42.49%. The respondents aged 39 and above are the fewest in number, with only 27 participants, equivalent to 24.70%. This intimates that the responses are predominantly from younger to middle-aged respondents, possibly indicating the current trend in tourism dynamics. Concerning income, 203 respondents, representing 47.65%, fall under the bracket earning less than or equal to IDR 5,000,000. The subsequent group, those earning between IDR 5,000,000 to IDR 10,000,000, consists of 94 respondents or 22.07%. Those earning between IDR 10,000,001 to IDR 15,000,000 amount to 72 or 16.90%. Lastly, the highest income category, those earning above IDR 15,000,000, comprises 57 respondents, which is 13.38% of the total. This diverse income representation ensures that the responses obtained are inclusive and address a broad economic spectrum.

The limitations of our study are significant and warrant careful consideration. Initially, there is a geographical constraint. Our research was primarily focused on Java and Sumatra. While these regions are significant in their own right, they may not fully represent the diverse range of cultural and socio-economic backgrounds across Indonesia's broader expanse. Consequently, the applicability of our findings may be limited when considering other areas of the country. Likewise, despite our diligent attempts to secure a representative sample by way of random sampling, the possibility of sampling error remains a factor that cannot be eliminated entirely. Random sampling is effective in reducing biases, but it is not infallible. There may be overlooked

variables, such as regional differences in attitudes and perceptions, that could influence participant responses. These unaccounted factors might affect the outcomes of our study, adding an element of uncertainty to our conclusions.

Table 2. Respondents' socio-demographic profile.

Attribute		Frequency	Percentage
Gender	Male	190	44.60%
	Female	236	55.40%
Higher education	High school and below	123	28.87%
	Bachelor's degree	269	63.15%
	Masters and above	34	7.98%
Age	20-29	218	51.17%
	30-39	181	42.49%
	>39	27	24.70%
Income	≤ IDR 5,000,000	203	47.65%
	IDR 5,000,000 – IDR 10,000,000	94	22.07%
	IDR 10,000,001 - IDR 15,000,000	72	16.90%
	> IDR 15,000,000	57	13.38%

3. Results and Discussion

3.1. Result

Figure 3 provides a valuable perspective concerning the acceptance of the UNESCO heritage from the tourists' standpoint. Interestingly, the official use and recognition of the logo emerged as the most influential factor in guiding tourist acceptance, with a score of 0.582. This underlines the importance of visual identifiers and the trust and recognition associated with the UNESCO brand. Conversely, selecting outcrops, with a score of 0.157, is the least influential factor. This suggests that tourists either lack an understanding or appreciation of the significance of outcrops, or it may not be a primary consideration in their overall acceptance of the UNESCO heritage.
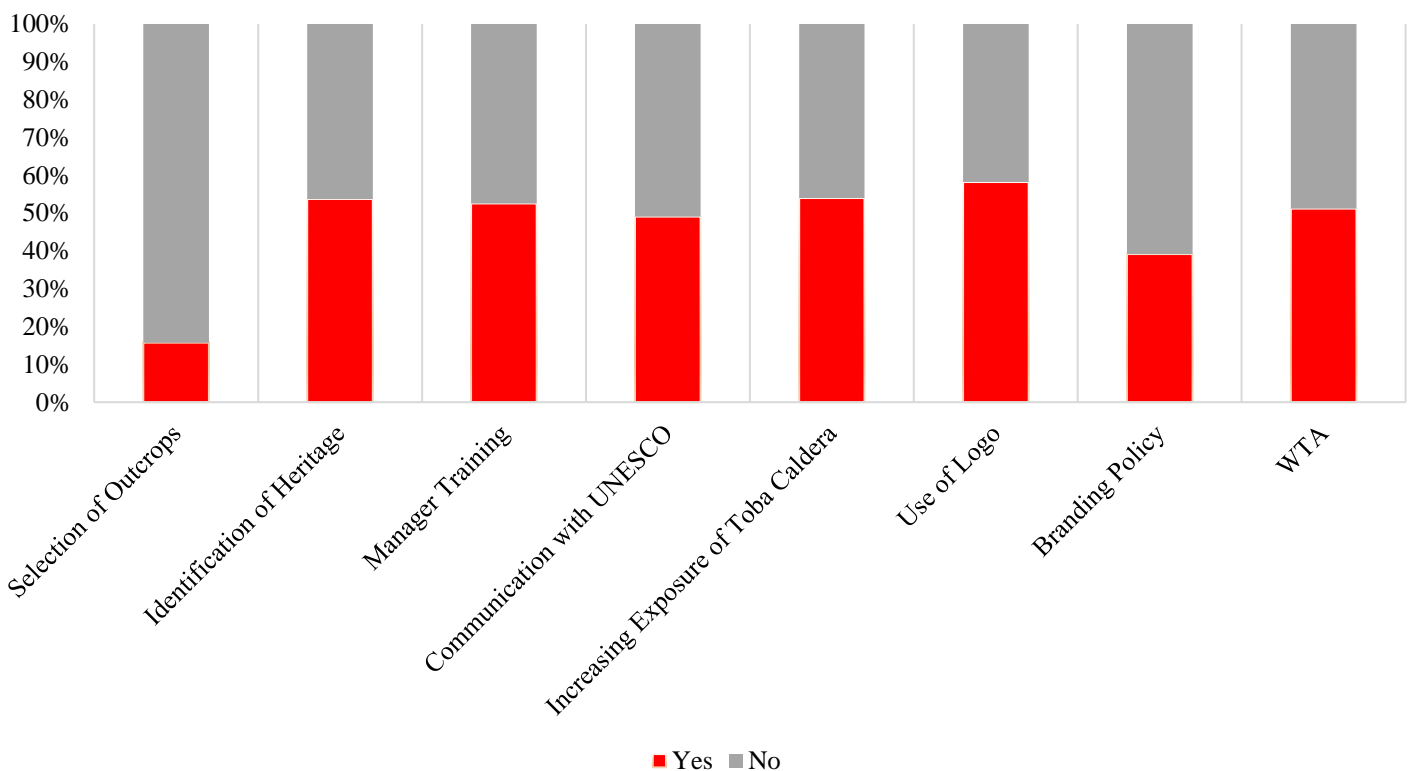

Figure 3. Average acceptance of the UNESCO heritage recommendations from visitors' perspectives.

However, the identification of heritage (Cameron, 2020; Settimini, 2021), managerial training (de Oliveira *et al.,* 2022; Vu *et al.,* 2022), besides the increasing exposure (Chesner *et al.,* 2020; Muzambiq *et al.,* 2021) of Toba Caldera all exhibit moderate scores, hovering around the mid-point range. This indicates that these factors are crucial in determining tourists' perceptions. The identification of heritage, with a score of 0.538, highlights the significance of recognising and displaying significant sites. Managerial training, registering at 0.526, reiterates the value of informed and well-trained personnel in influencing positive tourist experiences. Furthermore, the emphasis on promoting Toba Caldera, which scored 0.540, underlines its potential attraction to tourists. Communication efforts with UNESCO (Citaristi, 2022; Kenterelidou & Galatsopoulou, 2021), represented by a score of 0.491, while not the highest, still signify a moderate importance. Effective communication bridges the gap between organisations and tourists, ensuring the latter remains informed and engaged. Similarly, the willingness among tourists to accept and endorse the UNESCO recommendations, with a score of 0.512, exhibits a balanced viewpoint. Branding policy, with a score of 0.392, does not emerge as a dominant factor, although its relevance cannot be dismissed outright. While not as compelling as the logo or heritage identification, it is paramount to have cohesive branding to resonate with and attract tourists (Rodrigues et al., 2021; Stolz & Megerle, 2022).

Table 3 shows a greater understanding based on Goodness of Fit metrics for probit and logit models. The log-likelihood function values measure how well the models fit the observed data. In this case, the probit model has a log-likelihood value of -65.195, while the logit model has a slightly better fit with a value of -61.990. When comparing these two values, the logit model fits the observed data better than the probit model. The log-likelihood ratios for the probit and logit models are 459.937 and 466.347, respectively. Both these values are considerably higher than the chi-squared critical value of 18.475 (with df=7, 1%). This denotes that both models are statistically significant and fit the data better than those without predictors (Suryawan & Lee, 2023; Sutrisno *et al.,* 2023). Among the two, the logit model, with its log-likelihood ratio of 466.347, has a marginally better fit than the probit model's 459.937.

The McFadden Pseudo R-squared values help to understand the explanatory power of the models. In this case, the probit model has an R-squared value of 0.779, while the logit model performs slightly better with an R-squared value of 0.790. The McFadden Pseudo R-squared metric varies between 0 and just under 1, with values nearing 0 implying a lack (Liu *et al.,* 2020). These high R-squared values indicate that the models' independent variables capture significant variability in the dependent variable, with the logit model capturing slightly more. Lastly, per observation, the Akaike Information Criterion (AIC) provides a comparative measure of the information lost by the models. The probit model has an AIC per observation of 0.344, while the logit model performs marginally better with an AIC of 0.329. A lower AIC value signifies a better model fit, indicating that the logit model might be preferable based on this criterion.

Table 3. Probit and logit models.

Attribute	Probit		Logit	
	Coefficient	S.E	Coefficient	S.E
Constant	-3.425**	0.365	-7.273**	0.951
Selection of Outcrops (1= Yes importance, otherwise = 0)	0.855*	0.348	1.826**	0.663
Identification of Heritage (1= Yes importance, otherwise = 0)	0.828**	0.287	1.881**	0.566
Manager Training (1= Yes importance, otherwise = 0)	1.303**	0.285	2.570**	0.566
Communication with the UNESCO (1= Yes importance, otherwise = 0)	1.828**	0.268	3.413**	0.540
Increasing Exposure of Toba Caldera (1= Yes importance, otherwise = 0)	1.202**	0.254	2.567**	0.537
Use of Logo (1= Yes importance, otherwise = 0)	0.596*	0.263	1.448**	0.539
Branding Policy (1= Yes importance, otherwise = 0)	1.332**	0.300	2.710**	0.619
Goodness of Fit				
Log-likelihood function	-65.195		-61.990	
Log likelihood ratio	459.937		466.347	
McFadden Pseudo R-squared	0.779		0.790	
AIC/N	0.344		0.329	
Chi square value (df=7, 1%)	18.475			

In Table 3, a comparison between the probit and logit regression models reveals differences in the influence of various attributes on the dependent variable. For the probit model, the attribute'

Communication with the UNESCO,' which holds the highest coefficient value of 1.828, implies it has the strongest impact on the outcome. This is followed closely by 'Branding Policy' with a coefficient of 1.332. On the lower end, 'Use of Logo' is observed to have the least influence among the considered attributes, with the lowest non-constant coefficient value of 0.596. Comparatively, the logit model reveals a similar pattern where 'Communication with the UNESCO' has the highest coefficient value at 3.413, indicating an even greater influence within this model than in the probit model. Conversely, 'Use of Logo' remains the attribute with the lowest impact, having a coefficient value of 1.448 in the logit model, which is substantially higher than its counterpart in the probit model.

The constant terms in both models exhibit negative values, with the probit model at -3.425 and the logit model at a lower -7.273, implying a baseline propensity against the outcome being studied when all other variables are at zero. The consistency of 'Communication with UNESCO' as the most effective attribute and 'Use of Logo' as the least effective (excluding the constant term) across both models stresses the relative importance of these attributes in influencing the dependent variable. However, it is notable that all coefficient values are higher in the logit model than in the probit model, which may be attributed to the inherent differences in how each model scales the relationship between independent variables and the log odds of the outcome.

3.2. Discussion

A more comprehensive understanding of the acceptance and endorsement of the UNESCO recommendations emerges from applying probit and logit models to assess tourists' viewpoints. Using the binary choice theory, underpinned by the logistic regression model, presents a robust approach in this context. By applying these models, we can derive how the overall view on recommendations correlates with tourists' willingness to accept and endorse the UNESCO guidelines. This analysis confirms that virtually all the attributes are key in influencing the tourists' acceptance. This conclusion is supported by these attributes exhibiting a statistical significance level of less than 1%. Such a high level of significance suggests that these factors are not merely by chance but have a genuine influence on the perceptions and behaviours of the tourists. However, two particular attributes, the Selection of Outcrops and the Use of Logo, deviate from this trend in the probit model. They exhibit a slightly reduced, yet still notable, significant level of less than 5%. While they remain relevant, this reduced significance in the probit model ex-plains that, compared to other attributes, these two factors have a slightly lesser direct influence on tourists' acceptance and endorsement behaviours. The distinction in significance levels be-tween most attributes and these two particular factors in the probit model offers an intriguing perspective. It highlights the nuances in tourist behaviours and their multifaceted relationship with various factors. The overarching takeaway remains consistent: while specific attributes might be more influential than others, collectively, they all shape the tourists' acceptance and backing for the UNESCO recommendations.

Table 4 provides information into how a diverse range of stakeholders, spanning from the local community and tourists to administrative bodies like the local government, ministry and non-governmental organisations (NGOs), perceive and support the recommendations set forth by the UNESCO. The perspectives of the local community are valuable, as any initiatives or changes directly impact their lives (Chen *et al.,* 2021; Nguyen *et al.,* 2022; Pasanchay & Schott, 2021). Their viewpoint reveals the pulse of the ground, capturing the sentiments of those who reside and have ancestral ties to the heritage sites. Conversely, the tourists, whether they come for leisure, research or educational purposes, provide a gauge of how these recommendations resonate with those experiencing the sites temporarily (Lopez & Sène-Harper, 2023; Wong *et al.,* 2023). Their feedback can offer invaluable insights into the attractiveness and practicality of the recommendations (Rehman Khan *et al.,* 2021; Shasha *et al.,* 2020; Sutrisno *et al.,* 2023).

Simultaneously, the viewpoints from the local government are a testament to the administrative feasibility of these recommendations. Being the immediate governing bodies, their approval or uncertainty can influence the trajectory of the recommendation's execution. A level above, the ministry's stance is paramount. Representing broader national agendas, their view-point illustrates how the recommendations intersect with overarching national policies and strategic goals. Their backing ensures the alignment of the UNESCO recommendations with the nation's objectives. Often regarded as the bridge between grassroots and macro policies, NGOs help to balance view-points. Their feedback, representing the local community's interests and a more extensive, some-times global, perspective on heritage conservation, is vital (Chen *et al.,* 2021; Li *et al.,* 2020; Nguyen *et al.,* 2022). They regularly clarify the social, environmental and economic implications that might be disregarded.

Among the myriad recommendations the UNESCO put forward, several are prominent. The emphasis on the selection of outcrops emphasises the need to preserve unique geological formations. The focus on heritage identification highlights the importance of recognising and cataloguing the region's multifaceted assets for posterity. Likewise, there is also an undeniable emphasis on capacitating local managers through training, ensuring they are well equipped to manage these world-renowned sites. Additionally, promoting a robust line of communication with the UNESCO is highlighted, guaranteeing adherence to global best practice. Promotion also emerges as a recurring theme. The call to increase exposure, specifically of the Toba Caldera, is consistent with aspirations to bolster local economies via tourism. The importance of consistent branding, through logos and a unified branding policy, is accentuated to achieve this.

Table 4. Stakeholder recommendations concerning the UNESCO guidelines for Toba's sustainable tourism.

Indicator	Stakeholder				
	Local community	Tourist	Local Government	Ministry	NGO
Selection of Outcrops	Those knowledgeable about outcrops can act as local guides for tourists.	By visiting recommended outcrop sites, tourists show interest and support conservation efforts.	Identify potential locations, allocate budget for infrastructure development and protect the area from commercial development.	Provide funding, expertise and research tools for the identification and study of outcrops. Set standards for promotion and preservation.	Conduct educational activities, train local communities to maintain and promote outcrops as tourist destinations and educate the public on the importance of preservation.
Identification of Heritage	Engage in conservation or restoration activities for heritage sites.	When visiting heritage sites, learn about and value that particular heritage.	Organise data collection with local communities and provide a platform for documentation.	Provide guidelines and standards for data collection and coordinate preservation efforts at the national level.	Raise funds and resources, educate the public and involve local communities in data collection and preservation.
Manager Training	Community members can attend training sessions organised by geopark managers to enhance their knowledge and skills.	Ask questions and show appreciation for their knowledge concerning the geopark.	Prepare a budget and ensure that employees are trained.	Coordinate the schedule, curriculum and national or international training facilitators.	Help to conduct training and bring in international facilitators.
Communication with UNESCO	The community can support programmes and initiatives held or backed by the UNESCO.	Follow updates from the UNESCO and the geopark through social media or official websites.	Form a specialised team to communicate with the UNESCO and provide regular progress reports.	Operate as the official communication bridge with the UNESCO, hold regular meetings and ensure up-to-date information is conveyed to all stakeholders.	Convey feedback from civil society, submit proposals, and ensure compliance with the UNESCO standards.
Increasing Exposure of Toba Caldera	Share local stories and legends with tourists to enrich their experience.	Share photos, stories or videos from your visit to Toba Caldera on social media.	Develop tourism promotion programmes and provide incentives for investors to support infrastructure development.	Allocate a budget for national and international marketing campaigns and develop cooperation with other countries.	Organise events, festivals and educational activities in the Toba Caldera region.
Use of Logo	If running a business, ensure the use of the geopark logo officially and follow guidelines.	Recognising official logos helps in identifying official and credible information.	Ensure logos are used according to standards on all local promotional materials.	Issue regulations and provide guidelines on logo use for stakeholders.	Socialise logo use and its meaning to the public.
Branding Policy	Community members can support and attend events held by the geopark to increase awareness and branding.	Using services or products from official geopark partners ensures quality and supports branding policies.	Develop local branding policies and identify potential partnership opportunities.	Formulate a national partnership framework and guide regions in establishing partnership agreements.	Advocate for policies benefiting local communities and bridge communication between the government and the community.

Drawing insights from Figure 3, it is evident that sustainable tourism in the Toba region necessitates a collaborative approach from various stakeholders. As the data from Figure 3 suggests, this

collaboration is a symphony of diverse perspectives, each echoing unique concerns, aspirations and recommendations. The tourist feedback loop, as depicted in Figure 3, strengthens the socio-cultural pillar of sustainable tourism. Vargas-Hernández *et al.* (2023) have often underlined the need to value local aspirations and forming tourist experiences around them. This symbiotic relationship ensures Toba's unique socio-cultural fabric remains undisturbed, even as it garners global attention.

As reflected in Figure 4, local government and ministry inputs influence the economic contours and political trajectory of Toba's sustainable tourism. Echoing the sentiments of (Chen *et al.,* 2021; Jackson & Victor, 2019; Khan *et al.,* 2022), it is evident that sustainability does not mean compromising economic growth. On the contrary, it implies balanced development, ensuring prosperity trickles down to the grassroots level. The proactive stance of the local government and ministries, as highlighted in Figure 3, heralds a structured, forward-looking growth strategy. The vocal endorsements from NGOs, a significant aspect of Figure 3, which act as a testament to the environmental tenets of sustainable tourism (Atkins *et al.,* 2023; Dessart & Standaert, 2023; Pahl-Wostl *et al.,* 2023) have long championed the role of NGOs in shaping sustainable narratives. This translates to positioning global best practice with regional sensitivities in Toba's context, specifically given the region's environmental nuances. Toba's sustainable tourism narrative emerges by embroidering the story from Figure 3 with the rich tapestry of academic literature. It is a tale of harmony, where each stakeholder's voice crafts a chapter in this evolving story, making

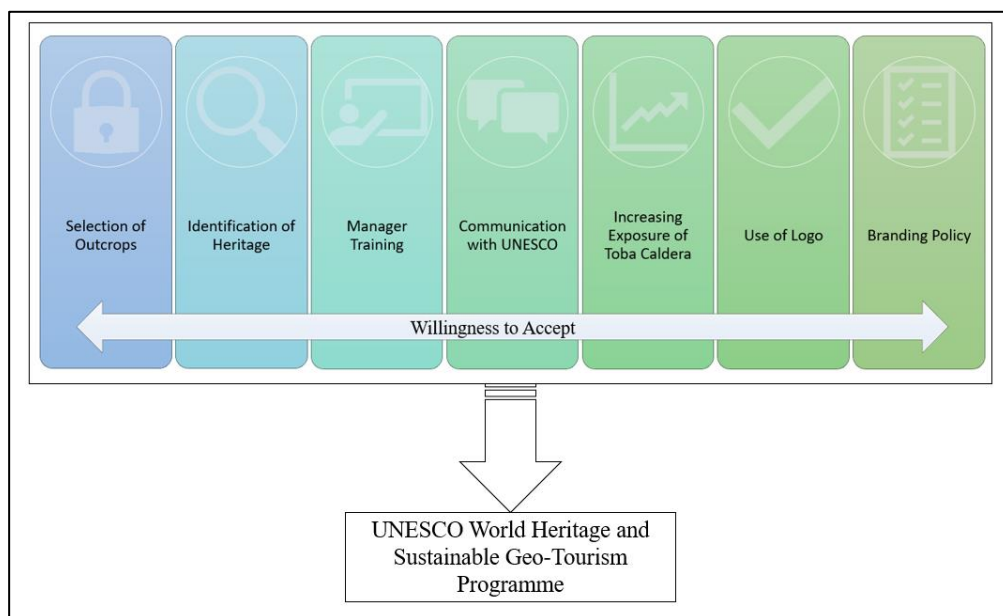Toba's journey toward sustainability both an aspiration and a reality.

Figure 4. Localising global standards with tourist-centric perspective.

4. Conclusion

The principal goal of sustainable tourism in regions of unique geological and ecological significance, such as Toba, hinges upon the synthesis of global recommendations and the nuanced perspectives of the tourists who frequent these destinations. By means of this research, the bi-nary viewpoints on the UNESCO guidelines pertaining to tourism in Toba have been brought in-to sharp focus on common acceptance and those requiring further consideration. Our findings indicate a strong agreement between the tourists' perspectives and the multifaceted UNESCO recommendations, underlining the efficacy of these guidelines in resonating with the expectations and aspirations of visitors. Moreover, the insights from stakeholders, for instance local communities, government bodies and NGOs further enrich our understanding, confirming the holistic approach required as regards the development of sustainable geo-tourism. Notably, this study emphasises the power of determining the willingness of tourists to re-engage with a destination after the implementation of recommendations, revealing a promising inclination for sustained tourist interest in Toba. By mapping out the diverse perspectives from regions, such as Java and Sumatra, this research ensures a contextual and culturally attuned set of conclusions relevant to Toba and acts as a model for other geo-tourism destinations. For geo-tourism hubs like Toba to flourish sustainably, it is imperative to constantly engage in a dialogue that prioritises global best practice and tourists' genuine experiences and expectations.

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