Research article

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

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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, so as 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, such as Toba in the Sumatra Utara Province of Indonesia a focal point for tour-ists, 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, the 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, resulted in the formation of the planet’s largest vol-canic lake, Lake Toba (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 re-search 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 manage-ment, adept handling of socio-cultural dynamics and an unwavering commitment to sustaina-bility.

In recent years, there has been increasing interest in understanding how global recommenda-tions, similar to those from the UNESCO, resonate with local communities and visitors (Ma-hadevan & 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. Via a detailed survey aimed at capturing the binary viewpoints of tourists on the importance of the UNESCO rec-onsendations and their subsequent willingness to visit or revisit after these recommendations are established, we seek to capture a comprehensive picture. The respondents, randomly sam-pled from residents of the main Indonesian islands of Java and Sumatra, provide a broad spec-trum of perspectives that are instrumental in shaping the future of sustainable tourism in the Toba region.

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“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). 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 regards to the literature pertains to the specific perspective of the tourists, notably regarding implementing global guide-lines, for instance those introduced by the 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 the 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 evalua-tion metric to a binary acceptance scale.

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 vari-ous 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 pro-gressive 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 the cultural and regional nuances of these are-as ensures that 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.

Figure 1. Research framework.

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. Subse-quently, the research questions and objectives are meticulously produced to evaluate tourists’ attitudes towards the significance of the UNESCO guidelines and their potential impact on tour-ists'
willingness to visit the Toba region. A comprehensive literature review lays the foundation for the study, offering insights into the influence of the 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. Analysis of the gathered data is conducted 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.

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 the 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 to-day'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.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Explanation</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection of Outcrops (Akbulut et al., 2023; de la Hera-Portillo et al., 2023; Migon, 2021)</td>
<td>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. By identifying and documenting natural, cultural and intangible heritage, managers and tourists can understand the value of conserving the area.</td>
<td>The goal is to showcase the bedrock from the four significant eruptions that formed the Toba Caldera region.</td>
</tr>
<tr>
<td>Identification of Heritage (Cameron, 2020; Settimini, 2021)</td>
<td></td>
<td>Recognise and understand the wealth present in the Toba Caldera Geopark.</td>
</tr>
<tr>
<td>Manager Training (de Oliveira et al., 2022; Vu et al., 2022)</td>
<td>Improve the capability of the Toba Caldera site managers.</td>
<td>Training will enable managers to understand international standards, best practice and policies related to geopark management.</td>
</tr>
<tr>
<td>Communication with UNESCO (Citaristi, 2022; Kenterelidou &amp; Galatsopoulou, 2021)</td>
<td>A strong relationship with the UNESCO ensures that the Toba Caldera Geopark is always in accordance with international standards and policies. 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. 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.</td>
<td>Remain informed about the latest information and policies regarding geopark management.</td>
</tr>
<tr>
<td>Increasing Exposure of Toba Caldera (Chesnet et al., 2020; Muzambiq et al., 2021)</td>
<td>Boost the identity and global recognition of the geopark.</td>
<td>Attract more tourists and raise awareness of the geopark.</td>
</tr>
<tr>
<td>Use of Logo (Rodrigues et al., 2021; Stoiz &amp; Megerle, 2022)</td>
<td>Using clear policies on branding and partnership, both parties can understand their rights and obligations, guaranteeing a relationship that is beneficial for all parties.</td>
<td>Create a win-win relationship between the Toba Caldera Geopark and its partners.</td>
</tr>
</tbody>
</table>

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 both models to include variables, for example demographic factors, economic indicators, as well as 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 the significance and practical relevance of our findings. 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 varia-ble 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 log-transformation, 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 in the context of assessing 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 the impact of these variables, but it 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, with the objective of achieving 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 the considerations of resource and time constraints. For the random sampling, we implemented specific selection criteria. Our focus was on individuals aged 18 and above from both urban and rural areas in Java and Sumatra. 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 in capturing a broad range of perspectives that are relevant to our study.

Table 2 provides a description of 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. Out of the respondents, 236 or 55.40% are females, while the number of males amounts to 190, which is 44.60% of the total. This gender distribution presents a comprehensive viewpoint, combining both the male and female perspectives as regards 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 5,000,001 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, incorporating 13.38% of the total. This diverse income representation ensures that the responses obtained are inclusive and address a broad economic spectrum.

Table 2. Respondents’ socio-demographic profile.

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

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 that exist across the broader expanse of Indonesia.
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 completely eliminated. Random sampling is effective in reducing biases, but it is not infallible. There may be variables that are overlooked, for example regional differences in attitudes and perceptions, that could potentially influence participant responses. These unaccounted factors might affect the outcomes of our study, adding an element of uncertainty to our conclusions.

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](image_url)

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 midpoint 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 the 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.

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.

Table 3. Probit and logit models.

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

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 the 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 explains 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 between 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 seeing as any initiatives or changes have a direct impact on 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 & Séné-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 viewpoint 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 viewpoints. Their feedback, representing the local community’s interests and a more extensive, sometimes 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 of recommendations put forward by the UNESCO, 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.

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-
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 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.

Table 4. Stakeholder Recommendations concerning the UNESCO Guidelines for Toba’s Sustainable Tourism

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection of Outcrops</td>
<td>Local community</td>
</tr>
<tr>
<td></td>
<td>Those knowledgeable about outcrops can act as local guides for tourists.</td>
</tr>
<tr>
<td>Identification of Heritage</td>
<td>Engage in conservation or restoration activities for heritage sites.</td>
</tr>
<tr>
<td>Manager Training</td>
<td>Community members can attend training sessions organised by geopark managers to enhance their knowledge and skills.</td>
</tr>
<tr>
<td>Communication with UNESCO</td>
<td>The community can support programmes and initiatives held or backed by the UNESCO.</td>
</tr>
<tr>
<td>Increasing Exposure of Toba Caldera</td>
<td>Share local stories and legends with tourists to enrich their experience.</td>
</tr>
<tr>
<td>Use of Logo</td>
<td>If running a business, ensure the use of the geopark logo officially and follow guidelines. Community members can support and attend events held by the geopark to increase awareness and branding.</td>
</tr>
<tr>
<td>Branding Policy</td>
<td>Using services or products from official geopark partners ensures quality and supports branding policies.</td>
</tr>
</tbody>
</table>
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.

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Conflict of interest

All authors declare that they have no conflicts of interest.

Data availability

Data is available upon Request.

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