EMERGING TRENDS IN TOURISM: A SUSTAINABLE DEVELOPMENT AND CONSERVATION OF GEOTOURISM, GEOPARK, AND GEO-HERITAGE IN INDIA

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Abstract
Background of the study:
An emerging sustainable tourism sector with global growth is Geotourism (GT). GT is very much beneficial in this context. It can conserve geosites and impart education to visitors, and at the same time, it can improve the local economy. Only little research has been done in this field though tourism promotion has a huge scope.
Aim: *Geological tourism, which has recently adopted natural and cultural geoheritage, has been understood to be more 'geographical'. This connection betwixt GT along with cultural heritage is largely unexplored. Yet, it signifies an opportunity to offer socio-cultural and economic benefits as GT supports cultural values and interests. Thus, this study examines India's emerging form of Sustainable Development (SD) and conservation of GT, geopark, and geoheritage.*
Methods: *Data has been taken from 322 respondents from various geoparks in India by using a descriptive positivist approach and quantitative technique.*
Results: *As per the findings, in response to visitors' perceptions, the government focuses on conserving geoheritage resources, promoting products, and collaborating with experts and community representatives for culturally sensitive development.*
Conclusions: *By presenting local perspectives along with recommending strategies that align community aspirations with Tourism Development (TD) goals, the study enriches the sustainable tourism discourse. This would assist the general public along with geoscientific fraternity for recognizing geoheritage importance by employing Indigenous geo-resources via GT for India's sustainable economic development.*

Keywords: *Geotourism, Geoheritage, Geopark, Sustainable development, India.*

JEL Classification: *L83, I10, I31, Z32*

1. INTRODUCTION

The tourism sector has exponentially grown in the present century. Tourism resulted in the appearance of new tourism types in a wide range, depending on the objective and the experience of people [1]. Various physical attributes, a rich cultural heritage, as well as an eventful ancient history, are included in India. Tourism serves as a key medium for presenting this remarkable nation to the global audience. Recently, substantial efforts have been made to boost tourism even in the country's most remote areas. In India, the interest in geoheritage and geology focused on GT has increased rapidly, especially in less developed areas as the new label of UNESCO Global Geopark was ratified in 2015. In several rural areas, GT is emerging as a vital source of income [2]. Therefore, geoparks, which play an important role in the development of GT, are an innovation for the conservation of geoheritage. In geologically and geographically sensitive tourist environments, for minimizing mass tourism's negative impacts, GT has partially evolved [3]. Similarly, there is an increasing acknowledgment of the cultural and aesthetic significance of geoheritage, particularly in relation to the growth of GT. Geoheritage's purpose is to reinforce the geosites in knowledge's fundamental dissemination of geological processes in connection with GT [4]. A geopark seeks to conserve key geological features as well as explore and validate techniques for excellence in conservation via geoconservation. Conservation of Geological Heritage uses numerous conceptual relations in the preservation of characteristics that are significant for geosciences like (i) landforms, (ii) geological outcrops, and (iii) main traits [5]. The geological heritage or else geoheritage extends its focus towards geologic features as landforms and landscapes, comprising (i) diversity of minerals, (ii) rocks, as well as (iii) fossils with a range of values like (i) scientific, (ii) educational, (iii) aesthetic, (iv) recreational, together with (v) cultural [6]. Geo-conservation has become globally important in recognizing the earth's systems by providing the resources for development with historical, cultural, aesthetic, and religious values [7]. In Figure 1, the concepts of GT are depicted.

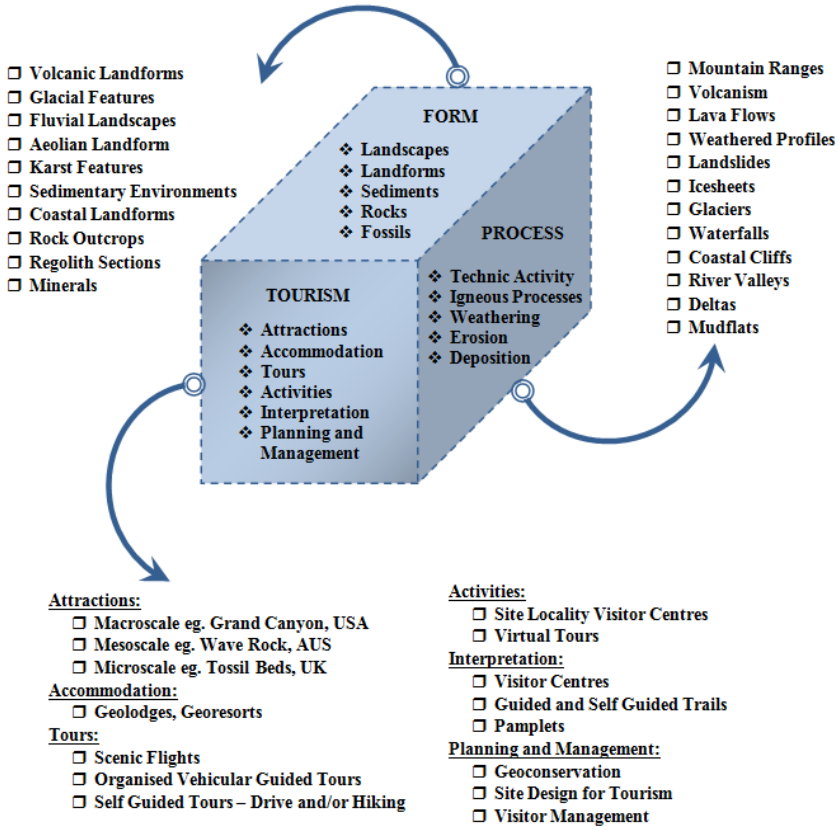

Figure 1: Scope and nature of geotourism

Statement of the problem

Geoheritage and geodiversity play a vital role in providing cultural ecosystem services and benefits. Moreover, the anticipated expansion of tourism and its emerging trends can enhance the sustainability of protected areas while fostering the development potential of their surrounding regions and local communities. In recent decades, geoconservation efforts, especially in Europe, have been primarily aimed at protecting geosites for scientific and educational purposes [8, 9, and 10]. Till now, in GT and geoheritage, various international studies have been done. Numerous studies have emphasized the importance of destination planning, SD, and efficient governance in attaining long-term sustainability within the tourism sector. However, limited research has been conducted to examine the SD and conservation of GT, Geopark, and Geoheritage in India. Moreover, some existing studies showed that the moderator of choice tourists' perception was an interaction under study to recognize hosts' attitude effectiveness towards raising a tourism product along with conserving a geological feature. The study is novel in its theme as very little research is done in this area. Thus, investigating the SD and conservation of GT, Geopark, and Geoheritage in India is the study's aim. Moreover, this study helps to reveal the benefits of tourism, thus informing stakeholders to contribute to sustainable TD practices.

Research questions

Determining the understanding of visitors regarding geoheritage along with GT's potential of developing sustainable practices is the research's key purpose. '2' key research questions are possessed,

- ✓ What are the impacting measures of SD of GT in India?
- ✓ What is the role of government, private, and community in the development and conservation of GT, geopark, and geoheritage in India?

Research objectives

Filling the gap in research on the conservation of GT, Geopark, and Geoheritage is the research objective.

- To scrutinize the SD measures in GT in India.
- To investigate the role of government, private, and community in the development and conservation of GT, geopark, and geoheritage in India.

The remaining part is arranged as: the existing related works that have been studied are specified in Section 2, the research methodology is implied in Section 3, and the result as well as a discussion of the analysis is elucidated in Section 4. Lastly, the conclusion of the paper and its implication and recommendation potential zones for future study were explained in Section 5.

2. RELATED LITERATURE REVIEW

Avijit Ghosh *et al.* [11] examined a geoconservation of vital geological along with geomorphological sites in the Puruliya district. To appraise the geoheritage values and GT's potential, '9' geomorphological sites were chosen. For this, Kubalikova (modified model) was adopted. The economic values were indirectly associated with specific site development as a GT destination. Moreover, the conservation of the geoheritage in GT would foster the Puruliya district's economic development. Nevertheless, the study only focused on a particular district in a region of West Bengal.

Mathur Saurabh *et al.* [12] demonstrated geoheritage's qualitative assessment for GT promotion in Rajasthan. From the Mehrangarh Ridge (MGR) of Jodhpur in the northwestern part of India, the study data was collected. The samples in the study were analyzed by qualitative methods. The data directly influenced the areas by enhancing human living conditions and supporting rural development. Also, the historical along with cultural geo-monumental heritages for tourism enhanced from the medieval period. Moreover, the study found that there was more balance amongst geoheritage, public education, conservation, tourism, along with socioeconomic development of the region.

Vidhi Saluja *et al.* [13] elucidated TD's as well as sustainable strategies' perceived impact on residents in South India. Data for the study was collected from 100 households through semi-structured interviews. By employing correlation along with regression analysis, gathered data was analysed. Tourism had a positive impact on Varkala's livelihoods. Moreover, cumulative tourism was positively linked with augmenting local income levels. The limitation of the study showed the sample's small size might affect the findings' generalizability.

Azadeh Arbabi Sabzevari and Anoush Karami Mirazizi [14] explored the GT potential in the local along with SD of tourism. The data in the study was collected by descriptive-analytical methods from Sahneh town. As per the findings, regarding (i) ancient geography, (ii) representativeness, (iii) vulnerability, (iv) accessibility, (v) landscape, along with (vi) ecological effect, mirage had a lot of potential. Nevertheless, there were limitations because of (A) area's non-intactness, (B) higher sensitivity, (C) cultural values' weakness, and (D) administrative protection.

Canan Cengiz *et al.* [15] elucidated the evaluation of coastal GT and geoheritage potential centered on sustainable regions. The study data was collected from the survey measurement in the region of Turkey. The data was analyzed by chi-square test along with Strength, Weakness, Opportunity, and Threat (SWOT). Significant awareness was provided among the visitors and Guzelcehisar Basalt Columns (GBCs), which was one among the rare geological formations globally. Besides, the study findings provide explanations in a broader interpretation of the perceptions along with expectations of visitors concerning SD than GT.

Ganesh Prasad Muduli *et al.* [16] envisioned to analyze the valuation of potential geoheritage sites, the promotion of GT, along with geoconservation. The study samples were collected from the geoheritage sites in the Kachchh district of Gujarat. The samples' potential was analyzed by different assessments. As per the outcome, by fencing and government regulation, geodiversity sites with sensitive geo-elements must be sheltered. The majority of geodiversity sites possess unique potential, warranting their recognition as geoheritage sites.

Tamas Telbisz *et al.* [17] intended to conduct an empirical study on tourists' motivation and perception, as well as the connection between tourism and natural resources. The data was collected through a questionnaire from 418 respondents. By employing a convenience sampling methodology, the data was analysed. There was a noteworthy difference betwixt the visitors who were visiting the destination for the first time as well as the visitors repeatedly coming back. The study findings focused only on the national park in Romania rather than GT, which was considered the major limitation of the study.

Shubhendu Shekhar *et al.* [18] studied the conservation and SD of geoheritage, geopark, as well as GT. Also, this study examined raising local awareness about sustainable mining and the relentless pursuit of wealth that endangered ecologically significant sites. A case study was conducted on the Cenozoic successions of Western Kutch, India. The fundamental methodologies of UNESCO along with their extent of applicability in the Indian context were deployed in the study. The study concluded that they created employment opportunities for local youth. Moreover, it also enhanced the local economy through (A) infrastructure development, (B) health, along with (C) educational pursuits in the village-level society.

Bhanwar Vishvendra Raj Singh *et al.* [19] established the potential along with limitations meant for geo-diversity in the Jhamarkotra area, Udaipur. The result of the study was analysed centered on the mixed-methodology approach of quantitative and qualitative methods. Both the primary and secondary databases were taken for the analysis. For acquiring more reliable along with scientific research outcomes, the SWOT was employed. The Jhamarkotra area exhibited the highest potential due to its favorable physical and cultural characteristics. But, it faced a few minor issues, including marginalized communities along with a lack of knowledge on developing geoheritage sites meant for geotourism activities. Certain limitations were obtained in this study; first, there was a lack of data collection methods at small tourist sites. Second, the study used

the satellite dataset, which was inconsistent due to the limited availability.

Rajinder Kumar [20] scrutinized the Ladakh-GT destination development attributes from the perspective of geoscholars. For exploring the requisite parameters for Ladakh development as a GT destination, a mixed-method approach was utilized. A questionnaire sample of data was collected from geoscientists' perceptions through non-purposive sampling. Next, for determining the relationship between the indicators, the Partial Least Squares Structural Equation Modeling (PLS-SEM) was implemented. The GT Services (GS) ($\beta = .267$, $t = 4.026$, $p = .013$) and legal requirements ($\beta = .284$, $t = 5.007$, $p = .025$) significantly and positively affected Ladakh development as a GT destination. As per the IPMA results, the GS construct fell in the High Importance-High Performance quadrant. The study was limited to Ladakh, whereas the same result didn't apply to other geographical regions or countries.

Nurlisa Ginting *et al.* [21] calculated GT development in Bakkara tourist destinations. In the Bakkara tourist area, by describing current observations, data was collected. The qualitative technique was deployed and it was applied via observation along with focus group discussion. For GT development, public facilities were applied, yet had not considerably affected tourism as well as required a few improvements. From an economic perspective, both locals and the local government actively contributed to establishing numerous eateries and homestays, recognizing Bakkara's potential to accelerate GT development.

Alamah Misni *et al.* [22] aimed at the local community's participation in appreciating Kinta Valley Geosites' Heritage Value (HV). A questionnaire survey of data was collected from 60 thousand hours/families in the local community in the Kinta Valley area. A quantitative survey was wielded centered on questionnaires by employing the Likert scale. The local community understood as well as indirectly appreciated the heritage geosites' HVs. They lived in a place with heritage geosites circuitously attached to their average environment. This indicates that the majority of respondents have a clear understanding of the HVs associated with heritage geosites.

Zehui Zhu *et al.* [23] aimed to evaluate the scientific tourism of geoheritage to ensure operability, authenticity, and scientific rigor. A study was conducted at the Fangshan Global Geopark in Beijing. To identify the study's findings, qualitative as well as quantitative methods were employed. Also, for constructing the index system's evaluation, (A) analytic hierarchy process, (B) expert consultation, along with (C) fuzzy mathematical evaluation were utilized. Key factors were effectively captured by the constructed evaluation, which influenced ScT's exploration of geoheritage. An overreliance on expert evaluations along with questionnaires may present certain biases in the findings regarding weight allocation as well as subjective assessment. Then, this research selected only Fangshan Global Geopark as a case study to assess preliminarily, whereas the same result did not apply to other geographical areas.

Sandeep Kumar Dey *et al.* [24] elucidated the residents' perception of geoheritage conservation along with TD in and around Meharangarh Fort. Social Exchange Theory (SET) along with Weber's theory of substantive and formal rationality (WTSFR) were used for identifying the interposing as well as moderating role of residents' perception of the association betwixt influencing factors along with support for geo-heritage conservation. 200 samples were estimated in the residents of Old City, Jodhpur during January 2021 and March 2021 using a randomized sampling technique. SEM's PLS evaluation revealed resident perception's substantial capacity for predicting support for conservation along with TD. Furthermore, the moderating interactions affected the theoretical framework's predictive capacity used. Nevertheless, the sample size in this study was very low, which might affect the findings' generalizability.

Aelisa Awing Louis *et al.* [25] discovered the perceived benefits of geoparks among the Kota Belud community using a mixed-method approach. A total of 225 respondents from the community of Kota Belud and the quantitative data were triangulated with the data from in-depth interviews with eight community representatives. Moreover, the in-depth interviews with eight representatives provided qualitative insights for augmenting the findings' robustness. Using a 5-point Likert scale, the survey comprised 31 items based on the UNWTO conceptual framework of the '3' pillars of sustainable TD: economy, social, and environment. Survey results indicated that there was a strong agreement on the benefits of geoparks in enhancing local economies (mean = 4.36), fostering social cohesion (mean = 4.28), and promoting environmental conservation (mean = 4.24). However, some perspectives or experiences might be underrepresented, potentially affecting the findings' comprehensiveness.

Khodani Matshusa *et al.* [26] scrutinized the enhancement of the GT development scale for measuring influential factors toward GT development. From 105 volunteering respondents in a South African national park, quantitative data were collected for recognizing influential factors' perception in the GT context. Next, for determining factors, a statistical analysis deploying exploratory factor analysis was done for establishing a measurement scale for GT development. Visitors' attitudes toward the well-being of local communities were found to be influenced by local social sustainability benefits along with local economic/business development. However, several potential challenges, including limited public participation and the absence of a comprehensive

inventory of geoheritage sites, could impede the development of GT at KNP.

Hadis Shahhoseini *et al.* [27] examined the factors influencing local people's attitude toward GT development in Qeshm National Geopark, Iran. By employing qualitative and quantitative techniques, 20 interviews were done with Qeshm residents. About 58% of Qeshm Island people had a positive view of GT. Euphoria was more pronounced among individuals with higher socioeconomic status, greater cultural capital, together with increased interaction with tourists. The study also demonstrated that promoting and developing GT in Qeshm necessitated more structured programs and greater involvement from local communities.

3. RESEARCH METHODOLOGY

Here, the research's methodological insights are provided. It elucidated how the study was conducted for fulfilling the research purpose. Here, the research design, approach, sample size, and strategy used are provided. Initially, for collecting the primary data, the researcher employed a sampling technique. Then, data's secondary sources were also collected. Then, the researchers developed both the dependent and independent variables. Therefore, the author provided a comprehensive understanding of the conceptual framework. Next, the researchers collected and analyzed the data using various techniques and tools. The author focused on providing a brief understanding of measures of SD in GT, geoheritage, and geoparks. Based on a 5-point Likert scale, the SD measures were explained.

3.1. Research design

It is the research strategy, which lays out the research methodology's principles for the given study. This study employed a descriptive positivist approach and quantitative technique to gather data, aiming to define the attributes or features of individuals, events, or issues. Working with this approach may render several benefits for the study. It may provide more data to understand the phenomena and address a broader set of research questions. Furthermore, structuring the research design and investigating the questions are parts of formal studies. The questionnaire is structured to address the objectives of the research. The questions are designed to obtain information on the role of government, private, and community in the SD of GT. Therefore, the pictorial representation of the research design is illustrated in Figure 2.

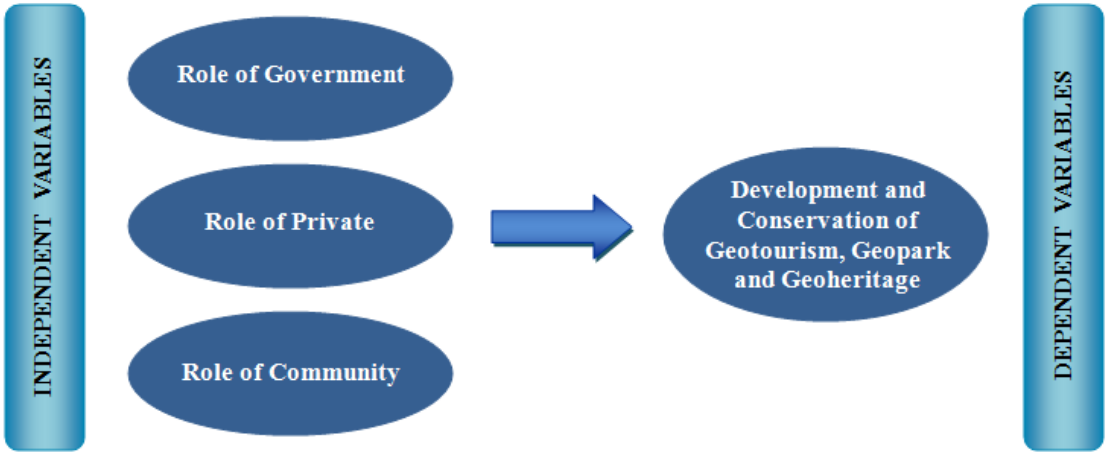

Figure 2: Conceptual framework for research design

3.2. Study population and data collection

The population is the sum of all individuals that form the base that the researcher selects his or her sample from. Here, the population included residents' perceptions with a non-random sampling method utilized to select participants [28]. A total of 450 respondents were considered from major geoparks and geo-tourist places in India. Among these, a sample size of 322 was considered sufficient for a population of 450 respondents, ensuring a confidence level of 95%. The remaining 47 respondents were considered unfit, invalid, and unsuitable for the structured questionnaire; therefore, they were excluded from this research. Non-random sampling was preferred to obtain the basic data along with trends concerning the presented research. Regarding time, effort, together with money spent on data collection, this was effectual. Also, choosing participants from various domains guarantees that the study encompasses a broad spectrum of perspectives and experiences. Moreover, basic demographic information, such as the total population size, gender distribution, age, education, and occupation were considered. The population was settled upon because it was considered ideal for helping the researcher get

representative answers to the research questions formulated.

3.3. Study instruments

Measures related to SD in GT were appraised regarding the quantitative study's findings conducted. Centered on those measures, questions were developed [29]. Prior to administering the questionnaire, the researcher thoroughly explained the study details and obtained verbal informed consent from each participant. To prevent the respondents from becoming self-conscious, the interviews were not recorded, which often happens among patients who have an inherent mistrust of research. Prior to data collection, it was imperative to validate the research instruments, namely the respondents' questionnaires, to ensure their effectiveness in measuring the intended variables.

3.4. Data source

The study relied on primary data gathered through self-administered interviews that included closed-ended questions. The questionnaire was structured employing a 5-point Likert scale. The questionnaire is regarded as the preferred data collection tool, as it is simple to design and administer for research analysis. It also offers a relatively easy and direct method for examining attitudes, values, beliefs, and motivations. Information gathered firsthand by the researcher meant for a specific research purpose is termed primary data. It is gathered centered on the questionnaire survey. From several (i) books, (ii) Journals, (iii) Thesis, and (iv) websites related to the SD of GT, secondary data source is taken.

3.5. Variables used

Here, the independent variables of the role of government, private, and community and the dependent variable development of GT, geoparks, and geoheritage are used.

3.6. Data Analysis

For ensuring that the questions are clear as well as easy to understand, the questionnaire is pre-tested. This study allows the researcher to gather data that is both precise and pertinent to the research goals. Descriptive statistical methods were utilized to summarize the significant concerns of development measures of GT, followed by regression analysis using a bivariate linear regression model. The researcher conducted a Cronbach's alpha reliability test for assessing survey items' internal consistency. Scores of 0.7 or higher were obtained, indicating acceptable results for exploratory research. Thus, the survey items were retained, suggesting convergent consistency within the construct.

3.7. Ethical considerations

During data collection, prospective participants received informative letters, detailing the research procedures, potential risks, and benefits of participation and emphasized the voluntary nature of their engagement. From the participants, Informed consent was attained after they gave detailed information on the study. This was accepted by the ethics committee. Every technique is done regarding relevant guidelines and regulations. Likewise, information's strict privacy and confidentially were continued throughout the study.

4. RESULT AND DISCUSSION

Here, the research findings are presented. Here, the SD measures in GT are examined. Then, the government role, private role, and community role in SD and the conservation of GT are explored. Finally, the significant measures have been explored and discussed in this section by implementing a regression analysis.

4.1. Measures of sustainable development in geotourism, geoheritage, and geoparks

This questionnaire aimed at understanding the level of perception of tourist' exposure and their perception of GT development. For each of the statements, respondents are asked to indicate the extent of their agreement or else disagreement on a scale, with 1 being 'strongly disagree' and 5 as 'strongly agree', which is illustrated in below Table 1.

Table 1: Sustainable development measures of geotourism, geoheritage, and geoparks

Measures	Strongly agree (%)	Agree (%)	Moderately agree (%)	Disagree (%)	Strongly disagree (%)
More jobs are being created	23.91	26.39	18.60	17.08	13.97
Less poverty in the community	23.29	26.08	27.95	12.42	10.24
An opportunity to learn about other cultures	22.98	24.84	22.67	17.08	12.42
More income for community members	21.73	25.77	27.32	15.83	9.31
The protection of animals and plants	21.11	24.53	29.50	13.66	11.18
More financial support for small businesses	20.18	23.29	26.39	15.52	14.59
Government benefitting from more tax income	19.87	22.98	26.08	14.59	16.45

The majority of respondents positively perceived and 'strongly agree(d)' that if geoheritage tourism was developed, it would lead to job creation (23.91%), while 23.29% 'strongly agree(d)' that it would reduce poverty in the community, which is depicted in Table 1. Besides, respondents agree(d)' that it would be an opportunity to learn about other cultures at 24.84%. Furthermore, the majority of the respondents moderately agreed with "The protection of animals and plants" (29.50) and created more financial support for small businesses at 26.39% [24]. In Figure 3, a graphical representation of SD measures is shown.

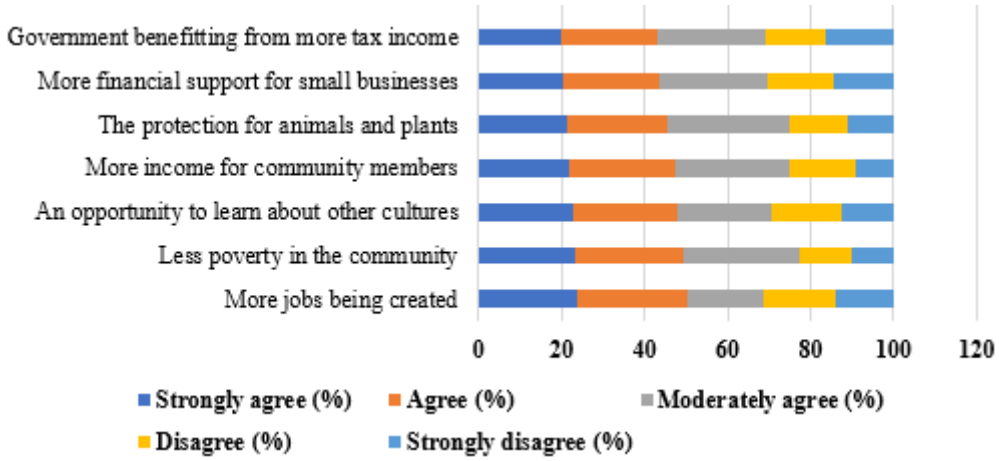

Figure 3: Development measures in geotourism, geoheritage, and geoparks

4.2. Role of government, private sector, and community in geotourism development

The focus of the following table is to explore the role of government, private sectors, along with the community in geoheritage and GT development as seen in Table 2.

Table 2: Role of government, private sector, and community in sustainable development

Role of development	Government		Private sector		Community	
	M	SD	M	SD	M	SD
Develop geoheritage tourism product	4.56	0.93	4.44	0.88	4.36	0.83
Facilitate tourism training and create jobs	4.98	0.95	4.85	0.87	4.67	0.91
Participate in geoheritage tourism development	5.05	1.03	5.00	0.99	4.75	0.98
Look after heritage resources and manage exploitation	4.36	0.90	4.29	0.97	4.21	0.86
Consult with communities regarding geoheritage tourism	4.33	0.92	4.02	0.95	4.13	0.87

As per the findings, the government should engage with local communities about heritage tourism, provide tourism-related training and job opportunities, and invest in community infrastructure development. The development of "Participate in geoheritage TD " attained the highest mean in all roles of the sector. The respondents also believed that the private sector must consult with communities concerning geoheritage tourism and must facilitate local community members' participation in geoheritage tourism. Thus, the respondents from the community wanted to work in partnership with the private sector for their mutual benefit.

4.3. Bivariate regression model

It is a statistical methodology, which analyzes the relation betwixt '2' variables, namely one independent and one dependent, to determine how they change together. It's also known as simple linear regression or ordinary least-squares regression. To identify the relationship between the dependent variable (GT) and different predictors (Government,

private sector, and community), the study uses '3' regression models, such as Model 1, Model 2, and Model 3, which are depicted in Table 3.

Table 3: Bivariate regression analysis

Model	Predictor	df	F-value	Prob > F	R-squared	Adj R-squared	Root MSE
Model 1	Government	1	912.05	0.000	0.986	0.985	20.08
Model 2	Private sector	1	910.11	0.000	0.980	0.979	20.67
Model 3	Community	1	888.23	0.000	0.971	0.970	21.20

A substantial proportion of the variability in GT development (R^2=0.986), indicating a strong fit is elucidated in Model 1. The adjusted R^2 (0.985) suggests that the model's explanatory power is robust. Therefore, the model reveals that the government significantly influences GT TD ($p < 0.001$). Therefore, similarly, models 2 and 3 show that the private sector and community significantly affected GT development ($p < 0.001$). These models demonstrate a high goodness of fit with an R-squared of 0.980 and 0.971, signifying its effectiveness in explaining the variance. A white test was employed to compare the observed variance of the residuals with the expected variance to check the heteroscedasticity. Then, for detecting the multicollinearity, the Variance Inflation Factor (VIF) was wielded. Multicollinearity occurred when the predictors in a regression model were linearly dependent. Multicollinearity is indicated by a correlation coefficient close to +1.0 or -1.0 between variables.

Discussion

The results of this study strongly supported recent GT research, particularly that advocated for a multi-stakeholder approach to conservation and SD. According to [29], community participation was a crucial component of GT projects to ensure that economic advantages were spread equitably and public knowledge of the significance of geoheritage was raised. The research's conclusions highlighted how crucial collaboration betwixt the public and private sectors was to the growth of GT. This study's need for integrated governance was supported by [20]. It was demonstrated that strategic interventions, such as regulatory frameworks and local stakeholder participation, were crucial for developing destinations like Ladakh. [23] also revealed that scientific tourism could be maximized by using all-inclusive evaluation frameworks. The application of regression models in the current study further proved that a targeted approach to tourism management greatly improved the results of GT development. [16] mentioned the vulnerabilities of geosites in Gujarat, which needed to be conserved immediately, and this paper focused on the protection of geodiversity for SD in the long run. Community involvement was a recurring theme, as highlighted by [24], in GT literature, with the current study being included. This indicated that conservation efforts received direct support based on training and capacity-building programs. Additionally, with regard to the Apuseni Nature Park, [17] focused visitor perceptions as the foundation of sustainable tourism, and hence, further established the present study's concept of enriching tourist experience through cultural education. Lastly, [30] recommended circuit-based GT development in Northeast India, with the importance of integrating cultural and natural resources into it. This aligned with the recommendations of the present study, which put forward the use of Indigenous georesources and promoted regional GT circuits for better balancing conservation with socio-economic benefits. These findings highlighted the significance of strategic multi-stakeholder collaborations and innovative management practices in promoting GT. This study contributed to the larger discourse on sustainable TD by integrating global best practices with localized approaches.

5. CONCLUSION

Here, the SD practices in GT in India are examined. Furthermore, this study focused on examining the role of government, private, and community in the development and conservation of GT, geopark, and geoheritage. The significant concerns of development measures of GT were summarized by using a bivariate linear regression model. Lastly, GT, geoheritage, and geoparks have a significant impact on people as well as economies. An integrated approach involving government, private sector, and community collaboration played an essential role in the success of geoheritage tourism. Effective communication channels and platforms for harmonious cooperation are pivotal. Compared to other sectors, the government's role prioritized training and employment initiatives, and responsible practices should be emphasized for tourism growth. Nevertheless, the study only focused on India with limited measures of SD. Also, this study does not focus on the mediating role of residents towards support meant for Geoheritage Tourism and Conservation in and around India. Thus, in the future, the studies will consider all these issues and concentrate more on the perception of residents on SD measures in other parts of India. This paper advocates for an approach that integrates national geosites with national geoheritages, progressing towards the creation of geoparks, while considering conservation

guidelines set by relevant international impartial organizations [30].

DATA AVAILABILITY STATEMENT

Here, the data included could be attained upon request from the corresponding author. They aren't publicly accessible owing to privacy limitations.

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