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PARIPEDAS: A Smart Rural Tourism Model Using SEM Analysis Through The Coastal Village Community Empowerment

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***Abstract*— Tourists turn to rural tourism because of its distinctiveness in relation to nature, the hospitality of the locals, and its unique food. However, Central Tapanuli Regency's tourism growth remains uneven due to a lack of infrastructure, knowledge, and policies that prioritize urban regions. The Central Tapanuli Regency Government has to create a tourist strategy that takes coastal rural development into account. In Central Tapanuli Regency, the Smart Rural Tourism Model (PARIPEDAS) encourages the growth of tourism by utilizing village potential, community engagement, natural preservation, and local knowledge. The study employs a mixed methodological approach to ascertain policymakers' perspectives, assess the function of rural communities, and develop a PARIPEDAS model using Structural Equation Modeling (SEM) analysis based on Central Tapanuli Regency's coastline potential. While the PARIPEDAS model requires more research to be in line with regional development plans, the research determined that the ideal approach was to empower and include coastal communities in the implementation of tourism and development, concentrating on the distinctive value of tourist attractions and protection of natural assets.**

Keywords—Coastal Village**,** Community Based, Smart Village, Structural Equation Modeling, Tourism.

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I. INTRODUCTION

Tourists look forward to the distinctiveness of rural tourism sites, which includes their natural beauty, the friendliness of the locals, and the availability of regional food. Rural locations, however, are less well-liked as major tourist destinations due to a lack of infrastructure and restricted access to information. Marine tourism and fishing capture are the two main industries of Tapanuli Tengah Regency [1]. However, the tourism development policies of Central Tapanuli Regency continue to prioritize metropolitan regions. Consequently, it appears that the growth of the tourism industry in Central Tapanuli Regency is not uniform [2].

The government of Tapanuli Tengah Regency needs to establish a plan for future tourism development that takes into account rural coastal areas.The Smart Rural Tourism Model (PARIPEDAS) provides a concept for rural development that takes into account the community's potential [3] and roles while protecting the environment and upholding the values of local wisdom in the growth of tourism in Central Tapanuli Regency. Determining how policymakers view sustainable tourism development plans in Central Tapanuli Regency, figuring out how community involvement in villages can be implemented, and developing a PARIPEDAS construction model that takes into account the potential and features of coastal village communities in Central Tapanuli Regency are the main goals of the study.

Study was carried out in Central Tapanuli Regency, North Sumatra Province, at two selected sites: Jago-Jago Village in Badiri District and Lubuk Tuko Baru Village in Pandan District. The two sites were selected due to their regional potential and currently serve as focal points for development in the Central Tapanuli District Government. Jago-jago Village possesses distinctive physical features, including a coastal estuary that flows into Tapian Nauli Bay, rendering it a favored tourism attraction for both the local populace of Central Tapanuli Regency and external visitors.

Jago-Jago Village features a historical site known as Situs Bongal, which provides historical insights into the civilization that traversed Central Tapanuli via maritime channels. The Bongal site[4] has been established as a museum along the periphery of Jago-Jago Village Beach. This site is undoubtedly a valuable resource that requires ongoing development and effective management to ensure its influence is experienced by the local community [5].

The second place is Lubuk Tuko Baru Village, a coastal estuary region including numerous eateries that offer traditional Central Tapanuli food [6]. This renders the area a favored tourism locale for both domestic and foreign travelers visiting Central Tapanuli. According to

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the pre-research observations and information from the Head of Lubuk Tuko Baru Village, this region is designated as a priority development site in Central Tapanuli Regency. In the future, road access will be enhanced to facilitate tourist access to the area from both the primary road and inter-district routes.

Lubuk Tuko Baru Village has proposed the establishment of visitor accommodations under a homestay model, utilizing the residences of local inhabitants. Consequently, these two sites were selected as the research locus. Considering the diverse potential, the PARIPEDAS idea is deemed appropriate for further investigation at both sites.

II. METHOD

A. Methodological Approach

To determine a suitable construction model for implementing the PARIPEDAS model, this study used a mixed methodology that blends qualitative and quantitative data. To construct the PARIPEDAS model and evaluate its accuracy, quantitative analysis[7] was employed. This study employed qualitative analysis [8] to investigate suitable empowerment patterns for rural coastal populations in Central Tapanuli Regency.

B. Assessing the Use of the Research Time and Place

The research spans six months, starting in the middle of the year and concluding at the end of 2025. Pandan and Badiri are the two subdistricts that make up the study setting. Based on the idea of regional representation and the distinctiveness [9] of the tourist attractions, the research site was chosen.

C. The Sampling Procedure

Questionnaires and interview guidelines were distributed to multiple sample clusters, including visitors/tourists, policymakers, local communities, and tourism company operators, as part of a sampling technique used to collect data. Slovin's formula[10] is used to determine the number of informants or responders. The following formula was used to get the study's sample size:

$$n = \frac{N}{1 + Ne^2}$$

Notes:
n : Sample Size
N : Population Size
E : Margin of error (amount of error) for the population size

The researcher used a 10% margin of error in this research. Considering the given formula, the sample computation for this research looks like this:

$$n = \frac{800}{800\ x\ 0{,}1^2 + 1} = 88{,}88 = 90 \text{ (is rounded to)}$$

The sample size obtained was then divided into 4 (four) predetermined clusters as follows:
1) Visitors/Tourists (35 people)
2) Local Community (20 people)
3) Tourism Business Operators (25 people)
4) Stakeholder or Policymakers (10 people)

D. Indicators and Variables

This study's variables and indicators include:

TABLE 1.
INDICATORS AND VARIABLES

Variables	Indicators
Perceptions (PS)	
1. Interest in Visiting	a. Tourism motivation b. Steadfastness in Visiting c. Visit Satisfaction
2. Usefulness	d. Tourist Attractions e. Tourist Activities
3. Convenience	f. Accommodation g. Accessibility h. Amenities
4. Risk	i. Human Resources Risk j. System Risk k. Market Risk l. External Risk m. Financial Risk n. Reputational Risk o. Operational Risk
Role (PR)	
Social Capital	**1. Trusting Relationship** a. Honesty b. Fairness c. Egalitarian Attitude d. Tolerance e. Generosity
	2. Networking a. Participation b. Reciprocity c. Solidarity d. Cooperation e. Justice
	3. Norms a. Shared Values b. Sanctions c. Moral Rules
Empowerment (PM)	
1. Local Community Welfare 2. Preservation of Cultural Heritage 3. Active Community Participation 4. Tourist Safety and Security 5. Economic Impact 6. Protection of Natural Assets 7. Management of Scarce Resources 8. Minimizing Negative Impacts 9. Development Planning and Control 10. Resource Potential 11. Uniqueness/Selling Point of Tourism 12. According to Development Actors	

The indicators above are part of the three variables tested in the study. These indicators then became measurement tools that were incorporated into statements in the questionnaire. There are at least 41 questions in the questionnaire, which are tailored to the intended respondents. Various questions were then also asked, referring to these indicators.

Next, responses from each respondent were collected and further analysed using the SEM analysis method[11]. SEM analysis is useful for building a model to examine both the direct and indirect effects of the tested variables. The results of the SEM analysis will provide a decision formulation[12] to support the development of the PARIPEDAS model, which can be applied to tourism activities in Central Tapanuli Regency.

E. Procedures for Data Analysis and Processing

The collected data was then analyzed using the Structural Equation Modeling (SEM) analysis tool[13]. SEM analysis is a statistical method used to test and model complex relationships between variables within a conceptual framework. This analysis was conducted using a quantitative approach with the Smart PLS3 application as the tool.

In multivariate data analysis, partial least squares structural equation modelling (PLS-SEM) is one of the most popular techniques[14]. While prior studies have

examined many facets of PLS-SEM, there has been less effort to elucidate the characteristics of its diverse statistical applications.

One of the factors contributing to PLS-SEM's widespread use is its user-friendly visual interface, which allows researchers to conduct multiple robustness tests and concurrently examine relationships between observed and latent variables in a complex model while taking into account the measurement error that comes with evaluating abstract concepts.

III. Results and Discussion

A. Respondent Characteristics

1) Respondent's Age

Three primary clusters comprise the research sample: local communities, business operators, and tourists. At both research sites, policymakers—that is, village and urban officials—as well as organisations and organisations within the Central Tapanuli Regency local government participated in the data collection process. All three of the 80 respondents in the primary respondent cluster are thought to offer reliable information on the study's suggested notion. Respondents from the Policy Stakeholder cluster, meanwhile, are pertinent parties involved in the creation of the implementation strategy for the suggested concept.

TABLE 2.
. AGE DISTRIBUTION OF RESPONDENTS

Cluster /Group	By Age (Years Old) <25	25-34	35-44	>45	Total
Tourist	24	4	3	4	35
Tourism Business Operators	1	7	9	8	25
Local Community	4	5	1	10	20

It is evident from the respondents' age group statistics in the above table that most visitors to both destinations are under 25 years old. This demonstrates how young individuals who like leisure activities predominate at tourism destinations. Younger generations typically come in groups for a single visit and are more likely to congregate in search of a rejuvenating atmosphere[15]. Additionally, they frequently post about their activities on social media. This is undoubtedly a good step towards boosting travel-related activities[16].

The researcher spoke with 35–45-year-old business owners, who noted that the community oversees the tourism destination. This shows that experienced business owners are responsible for running the tourist destination, guaranteeing that the products and services provided will satisfy guests.

Typically, those over 35 who own their own enterprises are financially well-established and have sufficient funds to operate them[17]. The sustainability of tourism-related activities can undoubtedly benefit from this.The local inhabitants we encountered were actively involved in their everyday activities around the tourist destination. People over 45 constituted the majority of the local population that was encountered.

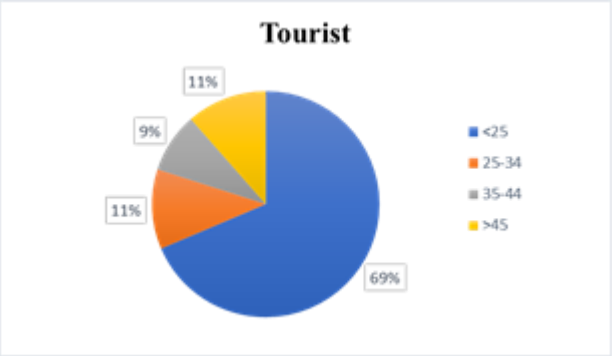

Figure. 1. Age Distribution of Respondent Tourists by Percent

This disparity is due to the fact that a large number of young people in both study locations were observed moving to other places in search of employment, such as Medan, Pekanbaru, and Jakarta. It is feasible to ensure a smooth information distribution process and a truly substantial impact on the research by interacting with the community within that age group[18].

TABLE 3.
EDUCATIONAL LEVEL DISTRIBUTION OF RESPONDENTS

Cluster /Group	Educations Level Elementary	JHS	SHS	Bachelor	Total
Tourist	5	3	22	5	35
Tourism Business Operators	4	9	12	0	25
Local Community	8	3	8	1	20

2) Respondent's Education

Interest in tourism and the capacity of tourism service providers to offer the best possible service in accordance with the needs of travellers are reflected in the level of education[19]. The highest degree of education among tourists is high school, with 22 respondents, or 62.8% of the total, according to the statistics in the above table. In a similar vein, high school is the greatest level of education attained by local community responders and business owners, who have respective percentages of 40% and 48%.

This suggests that most members of the community, who have a comparatively high degree of education, support the development of tourism[20] in Central Tapanuli Regency. A society's awareness and care for generating ideal and pleasurable tourist conditions increases with the level of education in that society.

B. The Impact Of Visitation Frequency

The total number of people who travel for various reasons, including to have enjoyable experiences at tourist destinations, find peace and quiet, visit family, attend meetings, acquire new knowledge, and comprehend the local culture and natural resources, is referred to as the number of tourist visits[21]. If a person or group of individuals has spent more than a day and no more than a year at a tourist destination[22], they might be considered tourists.

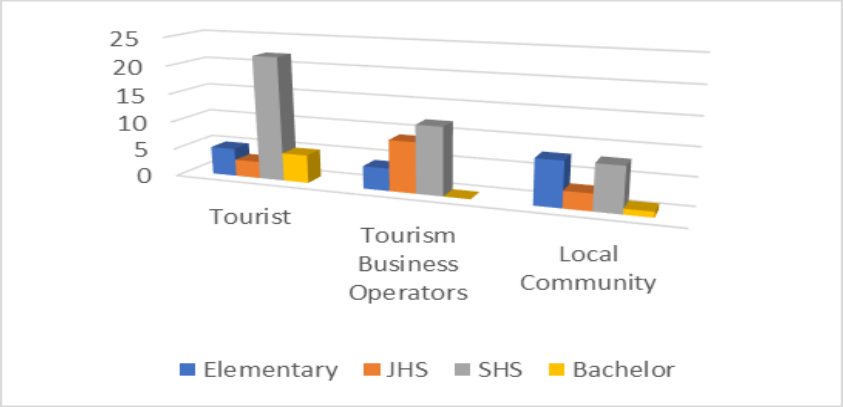

Figure. 2. The Distribution of Respondent Tourists by Educational Level

It is evident from the aforementioned data that the maximum number of visitors in a single visit is 4-8 peoples. This figure is consistent with the conclusion that young people constitute the majority of tourists and that they choose to visit tourist destinations in a particular demographic. The number of visitors will positively impact the growth of a tourism destination[23]. Typically, the best tourism marketing starts with testimonials and recommendations from close friends and family, which are a direct result of the destination.

The number of visitors significantly impacts the tourism industry's earnings. This suggests that the tourism industry has the potential to produce more cash the more tourists arrive. Nevertheless, the study's findings also demonstrate that total economic growth is not always significantly impacted by the quantity of tourists[24]. This demonstrates that while examining the influence of tourist numbers on tourism, additional considerations must be taken into account.

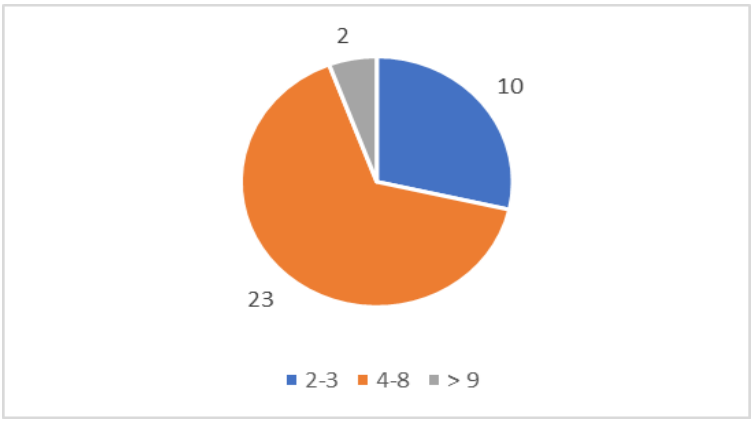

Figure. 3. Number of Visitors in the Group at a time.

The number of visitors has a positive effect on the growth of the tourism sector and economic expansion, drawing both domestic and foreign travellers[25]. The yearly budgetary contribution from the government helps the tourism industry grow into a popular travel destination. Because of its large visitor base, the tourism industry can spur economic expansion. This increase in visitor numbers positively impacts economic growth.

C. SEM Analysis Findings

It can be concluded that all indicators are convergently valid for constructing their respective variables, as the aforementioned results show that the Average Variance Extracted (AVE) value for all variables exceeds 0.5. This hypothesis is supported by the observation that all variables have Cronbach's Alpha and CR values greater than 0.6. All of the variables and items used in this study thus satisfy the validity and reliability standards for variable measurement.

TABLE 4.
LOADING FACTORS RESULT: CONSTRUCT RELIABILITY AND VALIDITY

Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
0,920	0,921	0,933	0,582
0,846	0,843	0,909	0,771
0,778	0,778	0,857	0,600

TABLE 5.
DETERMINANT COEFFICIENT

Indicator	f-Square	R-Square	R-Square Adjusted
Empowerment		0,962	0,970
Role	0,103		
Perception	0,666	0,748	0,745

TABLE 6.
MODEL FIT

	Saturated Model	Estimated Model
SRMR	0,073	0,113
d_ULS	0,394	0,997
d_G	0,207	0,228
Chi-Square	387,145	415,084
NFI	0,746	0,728

Determination Coefficient The coefficient of determination is then computed by examining the R-square statistic for each variable association to ascertain the degree to which the independent variables contribute to their relationship with the dependent variable.

The empowerment variable's R-square statistical value is 0.962, according to observations. According to this finding, the empowerment variable contributes positively to roles and perceptions by 9.6%, with other variables outside the model accounting for the remaining 90.4%.

Model fit was assessed using several statistical indicators, including the Standardised Root Mean Square Residual (SRMR), Normed Fit Index (NFI), and RMS_theta. To obtain a suitable model, these indicators must meet certain values:SRMS < 0.08; NFI > 0.90; RMS_theta approaching zero.

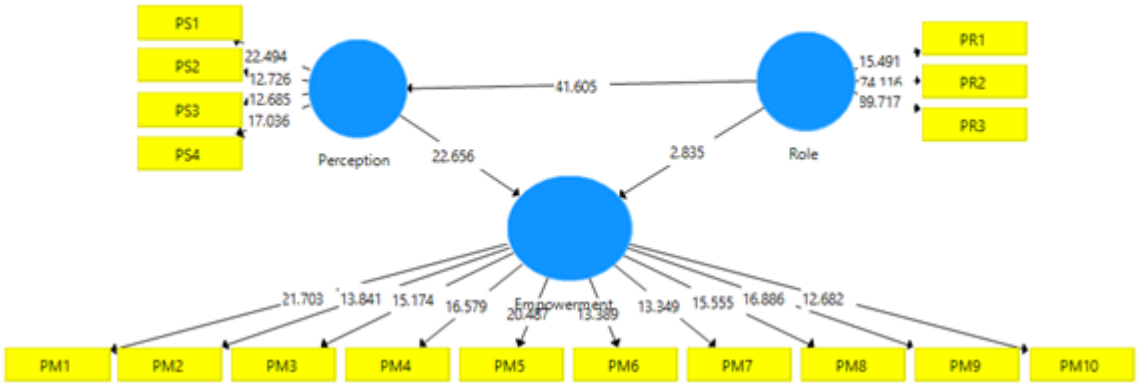

Figure. 4. Model Construction Based on SEM Analysis

Based on the output, the SRMS value is 0.073, which is less than 0.08. Additionally, the NFI value is 0.746, which is less than 0.900. The RMS_theta value is 0.247, which is close to 0. The model formed meets the suitability criteria, so it can be used and is good at describing the relationships between variables.

The results show that all direct correlations between all variables have p-values below the significance level of 0.05, indicating that they are significant. This suggests favourable outcomes for both the public's opinion of the PARIPEDAS model and the role of community involvement. Subsequently, the researchers convened an audience of policymakers to pinpoint potential implementation priorities for empowerment[26].

Through the compilation of recommendations, the study concludes that further research is necessary to align the PARIPEDAS model with regional development plans; the best course of action is to empower and involve coastal communities in tourism and development implementation, emphasising the protection of natural assets and the unique value of tourist attractions.

D. The Empowerment Model Is Applied Appropriately

Coastal tourism is crucial for promoting economic expansion, enhancing cultural identity, and maintaining environmental sustainability all at once[27]. Rich natural resources like beaches, mangroves, coral reefs, and marine biodiversity are common in coastal locations and draw tourists.

Coastal villages' wisdom, distinctive food, and local customs all add to the area's distinctive and genuine attractiveness. Since the community is the primary actor protecting and utilising this potential, it is impossible to divorce the growth of tourism in this area from its empowerment and active participation.

By giving them the room, opportunity, and ability to autonomously manage local potential, coastal communities can be empowered in the context of tourism. Skills development, financial access, management mentoring, and local institution strengthening are all part of this process.

For instance, it is possible to enable fishing communities to create marine tourism through the provision of boat rental services, educational tours of marine habitats, and fishing trips. In addition to managing homestays in residential homes, housewives

can be educated to make souvenirs using locally sourced materials.

Therefore, tourism serves as a new, sustainable source of income for the community in addition to being an external source of consumption. In coastal locations, community involvement involves active participation in all phases of tourism development, including planning, execution, and assessment, rather than just symbolic participation[28].

Village talks about the direction of tourist development must involve the community in order for the decisions made to represent the goals of the whole. Along with preventing conflicts of interest, a cooperative approach among local governments, corporate actors, and the community can increase a sense of ownership over tourism initiatives. By getting involved, the community takes centre stage and stops being merely an observer of the tourism industry's operations.

The benefit of seaside tourism is that it offers a distinct value that other areas do not. For instance, seafood-based cuisine, the distinctiveness of fishermen's culture, or customs around the water. In addition to being marketed as a significant draw, these values must be maintained in their authenticity. Products for tourists that are rooted in local values will set the location apart and increase its competitiveness. Coastal communities must thus be made aware of the significance of maintaining local identity as a priceless social and cultural resource.

Environmental sustainability and coastal tourism growth are inextricably linked. Protecting natural resources such as coral reefs, mangroves, and beaches is crucial. Without conservation initiatives, the attraction to tourists may wane or possibly vanish.

Community-based trash management initiatives, mangrove conservation programmes, or marine patrols to stop harmful fishing are a few ways the community might become involved as ecosystem stewards in this situation. Ecological consciousness combined with empowerment will guarantee tourism's viability while protecting the coastal ecosystem.

Coastal communities must be empowered and involved if sustainable tourism is to succeed. Through enhancing community capabilities, actively engaging them in all phases of development, conserving the distinctive qualities of nearby attractions, and safeguarding natural resources, coastal tourism can develop into a sector that not only benefits the economy but also preserves cultural identity and environmental sustainability.

The growth of tourism in coastal areas must be really focused on the sustainability of natural resources and the well-being of the community, which requires collaboration between the government, business players, and the community.

IV. CONCLUSION

Due to its alignment with the region's tourism development strategy, the PARIPEDAS model can be implemented in Central Tapanuli Regency. The best strategy is to empower and include coastal communities in tourism and development, emphasizing the preservation of natural resources and the special significance of tourist sites.

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