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Public Perception on the Implementation of PON XXI Event North Sumatera-Aceh at Situngkir Panguruan Beach in 2024

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ABSTRACT

The purpose of the study. This study aimed to evaluate public perception regarding the implementation of PON XXI Event North Sumatra-Aceh at Situngkir Panguruan Beach in 2024, focusing on economic impact, infrastructure development, environmental considerations, and cultural integration. The research examined community attitudes toward event implementation and its implications for local development.

Materials and methods. A cross-sectional descriptive study was conducted using a structured questionnaire administered to 100 residents of Situngkir Village, selected through stratified random sampling. Data collection employed a 45-item questionnaire covering five dimensions, utilizing a 5-point Likert scale. Analysis included descriptive statistics, factor analysis, and multiple regression analysis using SPSS version 26.0.

Results. The study revealed predominantly positive perceptions of PON XXI Event implementation, with 82.5% reporting positive business opportunity expectations and 95% satisfaction with infrastructure development. Multiple regression analysis identified economic benefits ($\beta = 0.445$, $p < 0.001$), infrastructure development ($\beta = 0.376$, $p < 0.001$), and environmental management ($\beta = 0.315$, $p = 0.002$) as significant predictors of overall satisfaction. The model explained 78.4% of variance in community satisfaction (adjusted $R^2 = 0.784$, $p < 0.001$).

Conclusions. The implementation of PON XXI Event at Situngkir Panguruan Beach demonstrated successful integration of event requirements with community needs, particularly in economic opportunities and infrastructure development. However, environmental management requires additional attention, particularly in waste management and beach conservation. The findings provide valuable insights for future sport-tourism event planning and regional development strategies.

Keywords: PON XXI; community perception; sport tourism; event management; environmental sustainability; Lake Toba; Indonesia.

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INTRODUCTION

The National Sports Week is Indonesia's premier multi-sport event, showcasing athletic prowess and driving regional development since its inception in 1948 (Siregar et al., 2023; Sofiah, 2021). The 21st edition, co-hosted by North Sumatra and Aceh provinces in 2024, marks a significant milestone as the first time these two regions have collaborated to organize this prestigious national competition (Siregar et al., 2023). This partnership exemplifies the government's commitment to fostering regional cooperation and promoting balanced development across Indonesia's diverse geographical landscape (Handayati, 2015). Situngkir Panguruan Beach, situated along the shores of Lake Toba in North Sumatra, was strategically selected as a venue for water sports competitions. This selection aligns with the government's broader initiative to develop Lake Toba as one of Indonesia's premier tourist destinations, as outlined in the National Tourism Strategic Plan 2020-2024. The integration of major sporting events with tourism development has been widely recognized as a catalyst for regional economic growth and social transformation (Tangkudung & Tangkudung, 2021).

Prior research has demonstrated that mega-sporting events can significantly impact host communities across multiple dimensions (Zagnoli & Radicchi, 2009; He et al., 2020). Studies conducted in the context of Indonesian regional sporting events by Rahman and Putri revealed both positive outcomes, such as improved infrastructure and economic opportunities, as well as challenges, including environmental concerns and social disruption.Likewise, extant research at the international level underscores the pivotal role of comprehending local community perceptions in cultivating a sustainable legacy for major sporting events(Giango et al., 2022)(Scott & Chhabra, 2017). The transformation of Situngkir Panguruan Beach into a PON XXI venue presents a unique

[abcde]Authors'Contribution: a-Study design; b-Data collection; c-Statistical analysis; d-Manuscript preparation; e-Funds collection.
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opportunity to investigate the complex interplay between national sporting events and local community dynamics within the context of an emerging tourist destination. This intersection is particularly relevant given Indonesia's growing emphasis on sports tourism as a development strategy and the increasing recognition of community stakeholders' roles in sustainable tourism development (Dewi et al., 2019).

This study aims to critically examine public perception regarding the implementation of PON XXI at Situngkir Panguruan Beach, with a particular focus on understanding the multifaceted impacts on the local community. Specifically, the research addresses several key objectives: to assess the economic implications of the event on local businesses and employment opportunities (Jalani, 2012); to evaluate the community's perception of infrastructure developments and their long-term utility (Ewing et al., 2005); to investigate environmental concerns and sustainability considerations (Gilbert et al., 2015); to analyze the event's influence on cultural preservation and local identity (Deverman, 2003) and to examine the perceived potential for sustainable tourism development (Lin et al., 2021).

Comprehending these perceptions is crucial for several reasons. First, it provides valuable insights for policymakers and event organizers in optimizing the positive impacts of such events while mitigating potential negative consequences. Second, it contributes to the growing body of literature on the relationship between sporting events and community development in emerging economies. Finally, it offers practical implications for the future hosting of similar events in comparable settings, particularly within the unique socio-cultural context of the Indonesian archipelago.

MATERIALS AND METHODS

Study Participants

The study population consisted of permanent residents of Situngkir Village, with a total population of approximately 2,500 inhabitants (Local Government Census, 2023). Sample size determination followed the formula proposed by Yamane (1967) with a 95% confidence level and 5% margin of error, yielding a minimum required sample of 96 participants. To account for potential non-responses, the target sample size was set at 100 participants. Participant selection employed a stratified random sampling technique based on three key demographic variables, as shown in Tables 1-3:

Table 1. Geographical Zone Distribution of Study Participants

Zone Location	Population (%)	Sample Size (n)	Actual Participants (n)
Lakeside Area	45%	45	47
Central Area	35%	35	34
Highland Area	20%	20	19
Total	100%	100	100

Table 2. Age Group Distribution of Study Participants

Age Group (years)	Population (%)	Sample Size (n)	Actual Participants (n)
18-30	30%	30	32
31-45	35%	35	33
46-60	25%	25	26
>60	10%	10	9
Total	100%	100	100

Table 3. Occupational Category Distribution of Study Participants

Occupational Category	Population (%)	Sample Size (n)	Actual Participants (n)
Tourism-related	40%	40	42
Agriculture/Fishing	30%	30	28
Public Service	15%	15	16
Private Sector (non-tourism)	10%	10	9
Others	5%	5	5
Total	100%	100	100

The stratification ensured proportional representation across different community segments, for community perception studies in tourism-impacted areas. The slight variations between planned and actual participant numbers reflect the real-world challenges of field research, while maintaining the overall target sample size of 100 participants.

Study Organization

The research utilized a cross-sectional descriptive study design, conducted between January and February 2024 in Situngkir Village, Pangururan. This timeframe was strategically chosen to capture community perceptions during the final preparation phase of PON XXI, allowing for assessment of both immediate impacts and anticipated outcomes. The study setting, Situngkir Village, was selected due to its proximity to the PON XXI venue and its representation of traditional Lake Toba communities, as documented in regional demographic studies.

Data Collection Instruments and Procedures

Primary data collection utilized a structured questionnaire administered through Google Forms, supplemented by face-to-face interviews for elderly participants or those with limited digital access. The questionnaire development process involved multiple stages of validation and testing, as detailed in Table 4.

Table 4. Questionnaire Development and Validation Process

Stage	Process	Duration	Participants/Experts	Outcome
Initial Design	Literature review and scale adaptation	3 weeks	Research team (n=4)	Draft instrument
Expert Review	Content and face validity assessment	2 weeks	Expert panel (n=5)	Content Validity Index = 0.89
Cultural Adaptation	Language and context verification	1 week	Local leaders (n=3)	Culturally adapted version
Pilot Testing	Preliminary implementation	2 weeks	Community members (n=30)	Reliability coefficient = 0.87
Final Revision	Integration of feedback	1 week	Research team (n=4)	Final instrument

The final questionnaire structure and reliability measures are presented in Table 5:

Table 5. Questionnaire Structure and Reliability Analysis

Section	Number of Items	Scale Type	Cronbach's Alpha	Sample Question
Demographic Information	8	Multiple choice	N/A	"What is your primary occupation?"
Economic Impact Perception	10	5-point Likert	0.88	"PON XXI has created new job opportunities in our area"
Infrastructure Development	9	5-point Likert	0.85	"Road access has improved due to PON XXI preparations"
Environmental Impact	10	5-point Likert	0.89	"Environmental protection measures are adequate"
Cultural & Tourism Impact	8	5-point Likert	0.82	"Local cultural values are well-preserved in event planning"

Table 6. Data Collection Implementation Protocol

Phase	Activities	Duration	Personnel Required	Quality Control Measures
Preparation	Team training and briefing	3 days	All team members (n=6)	Knowledge assessment test
Community Entry	Stakeholder meetings and permissions	1 week	Team leaders (n=2)	Documentation of agreements
Primary Data Collection	Questionnaire administration	4 weeks	Field team (n=6)	Daily data verification
Digital Data Entry	Google Forms input and verification	Ongoing	Data entry team (n=2)	Double-entry verification
Follow-up	Missing data collection	1 week	Field team (n=3)	Completeness check

Table 7. Response Rate Analysis

Contact Method	Attempts (n)	Successful (n)	Response Rate (%)	Notes
Digital (Google Forms)	85	72	84.7%	Primary method
Face-to-face Interview	25	23	92.0%	Elderly participants
Follow-up Contact	15	5	33.3%	Non-respondents
Total	125	100	80.0%	Overall rate

The implementation of the data collection process followed standardized procedures to ensure consistency and data quality. Research assistants were trained in both technical and cultural aspects of data collection, with particular emphasis on:1) Ethical considerations and informed consent procedures, 2) Cultural sensitivity and local customs, 3) Digital tool usage and troubleshooting, 4) Quality control measures and data verification protocols.

Response validity was enhanced through immediate data verification and quality checks, with follow-up visits conducted for incomplete responses. The overall response rate of 80.0% exceeded the minimum acceptable threshold of 70% for community-based research.

Data Collection Process

Data collection was conducted by a team of six trained research assistants, all fluent in both Indonesian and local Batak language. The process followed a standardized protocol: 1) Initial community engagement through village leaders and local organizations, 2) Door-to-door visits following predetermined sampling routes, 3) Digital questionnaire administration with tablet devices, 4) Immediate data verification and quality checks, 5) Follow-up visits for incomplete responses.

To maximize response rates and data quality, the research team employed strategies, including flexible scheduling, multilingual support, and cultural sensitivity training.

Statistical Analysis

Data analysis was performed using SPSS version 26.0, following a comprehensive analytical framework: 1) Preliminary analysis: Data cleaning and normality testing; Missing data analysis using Little's MCAR test; Descriptive statistics for demographic variables. 2) Primary Analysis: Frequency distributions and central tendency measures for Likert-scale items; Cross-tabulation analysis with Chi-square tests for demographic associations; Factor analysis for dimension reduction (Principal Component Analysis with Varimax rotation); Reliability analysis using Cronbach's alpha and item-total correlations. 3) Advanced Analysis: Multiple regression analysis for key perception indicators; ANOVA tests for group comparisons; Effect size calculations using Cohen's d.

Statistical significance was set at $p < 0.05$, with confidence intervals calculated at 95%. Effect sizes were interpreted, with additional consideration for context-specific factors.

RESULTS

Demographic Profile

The study achieved a 100% response rate from the targeted sample size (N=100). Table 8 presents the comprehensive demographic characteristics of the participants:

Table 8. Demographic Characteristics of Study Participants

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	45	45.0
	Female	55	55.0
Age Group	18-30	32	32.0
	31-45	33	33.0
	46-60	26	26.0
	>60	9	9.0
Education Level	Primary	15	15.0
	Secondary	45	45.0
	Tertiary	35	35.0
	Postgraduate	5	5.0
Length of Residence	1-5 years	20	20.0
	6-10 years	25	25.0
	>10 years	55	55.0

Economic Impact Perception

Analysis of economic impact perceptions revealed significant positive expectations among respondents. Table 9 summarizes the key economic perception indicators:

Table 9. Economic Impact Perception Scores

Impact Indicator	Mean Score*	SD	Positive Response (%)	Neutral (%)	Negative Response (%)
Business Opportunities	4.2	0.8	82.5	12.5	5.0
Job Creation	3.9	0.9	75.0	15.0	10.0
Income Improvement	3.8	0.7	68.0	22.0	10.0
Tourism Growth	4.5	0.6	88.0	8.0	4.0
Local Economy Boost	4.1	0.7	78.0	15.0	7.0

*Scale: 1=Strongly Disagree to 5=Strongly Agree

Infrastructure Development Assessment

The infrastructure development analysis revealed significant improvements in various aspects, as shown in Table 10:

Table 10. Infrastructure Development Assessment Results

Infrastructure Component	Satisfaction Level*	Implementation Status (%)	User Rating**
Road Access	4.3	95.0	4.1
Public Transportation	3.8	85.0	3.7
Sports Facilities	4.6	100.0	4.4
Tourist Amenities	4.2	90.0	4.0
Public Utilities	3.9	88.0	3.8

*Scale: 1=Very Unsatisfied to 5=Very Satisfied **Scale: 1=Poor to 5=Excellent

Environmental Impact Analysis

Environmental impact assessment revealed mixed perceptions, with notable concerns in specific areas:

Table 11. Environmental Impact Assessment Results

Environmental Aspect	Concern Level*	Mitigation Effectiveness**	Priority Rating***
Waste Management	3.8	3.2	4.5
Water Quality	3.5	3.6	4.3
Noise Pollution	3.2	3.8	3.8
Beach Conservation	4.1	3.4	4.6
Green Space	3.6	3.7	4.1

*Scale: 1=No Concern to 5=High Concern **Scale: 1=Not Effective to 5=Very Effective ***Scale: 1=Low Priority to 5=High Priority

Statistical Associations

Table 12. Correlation Analysis Results

Variables	Economic Impact	Infrastructure	Environmental Concerns	Cultural Impact
Age	0.45**	0.32*	0.56**	0.41**
Education	0.38*	0.44**	0.48**	0.35*
Length of Residence	0.52**	0.47**	0.39*	0.49**
Income Level	0.43**	0.35*	0.31*	0.37*

*p < 0.05, **p < 0.01

Factor Analysis Results

Principal Component Analysis identified four major factors influencing public perception:

Table 13. Factor Analysis Results

Factor	Eigenvalue	Variance Explained (%)	Key Components
Economic Benefits	3.85	28.4	Business growth, employment

Infrastructure Development	3.42	25.1	Access, facilities
Environmental Management	2.96	21.8	Conservation, pollution
Cultural Integration	2.31	17.0	Heritage, local values
Total		92.3	

These results demonstrate strong internal consistency (KMO = 0.84) and significant relationships between variables (Bartlett's test, $p < 0.001$).

Multiple Regression Analysis

Multiple regression analysis was conducted to identify significant predictors of overall community satisfaction with PON XXI implementation. The analysis revealed several significant relationships, as detailed in the following tables:

Table 14. Multiple Regression Model Summary

Model	R	R^2	Adjusted R^2	Std. Error	F-value	p-value
1	0.892	0.796	0.784	0.325	45.32	<0.001
2*	0.901	0.812	0.798	0.312	48.65	<0.001

*Model 2 includes interaction terms Note: Dependent Variable: Overall Satisfaction Score

Table 15. Regression Coefficients and Collinearity Statistics

Predictor Variable	β	Std. Error	Standardized β	t-value	p-value	VIF
(Constant)	1.234	0.285	-	4.329	<0.001	-
Economic Benefits	0.452	0.078	0.445	5.795	<0.001	1.85
Infrastructure Development	0.384	0.082	0.376	4.683	<0.001	1.92
Environmental Management	0.318	0.091	0.315	3.495	0.002	2.14
Cultural Integration	0.275	0.088	0.268	3.125	0.004	1.78
Tourism Development	0.246	0.095	0.235	2.589	0.012	2.05

Table 16. Hierarchical Regression Analysis Results

Step	Variable Added	R^2 Change	F Change	df	p-value
1	Economic Benefits	0.352	52.84	1,98	<0.001
2	Infrastructure Development	0.225	45.63	1,97	<0.001
3	Environmental Management	0.128	32.45	1,96	<0.001
4	Cultural Integration	0.091	25.32	1,95	<0.001
5	Tourism Development	0.016	6.74	1,94	0.012

Table 17. Model Diagnostics and Assumption Tests

Diagnostic Test	Value	Threshold	Result
Durbin-Watson	1.92	1.5-2.5	Acceptable
Maximum VIF	2.14	<5.0	No multicollinearity
Shapiro-Wilk (residuals)	0.975	>0.05	Normal distribution
Breusch-Pagan	3.24	>0.05	Homoscedasticity
RESET test	0.182	>0.05	Linear relationship

The regression model explained 78.4% of the variance in overall satisfaction (adjusted $R^2 = 0.784$, $F(4,95) = 45.32$, $p < 0.001$). The analysis identified five significant predictors, with economic benefits emerging as the strongest predictor ($\beta = 0.445$, $p < 0.001$), followed by infrastructure development ($\beta = 0.376$, $p < 0.001$) and environmental management ($\beta = 0.315$, $p = 0.002$). Cultural integration ($\beta = 0.268$, $p = 0.004$) and tourism development ($\beta = 0.235$, $p = 0.012$) also contributed significantly to the model.

Model diagnostics confirmed the validity of the regression assumptions. The Durbin-Watson statistic (1.92) indicated no significant autocorrelation, while VIF values below 2.14 suggested absence of multicollinearity. The Shapiro-Wilk test confirmed normal distribution of residuals ($p > 0.05$), and the Breusch-Pagan test indicated homoscedasticity ($p > 0.05$). The RESET test supported the linearity assumption ($p > 0.05$).

DISCUSSION

This study provides comprehensive insights into public perception regarding the implementation of PON XXI at Situngkir Panguruan Beach, revealing multifaceted implications for local community development and event management. The findings demonstrate complex interactions between economic benefits, infrastructure development, environmental concerns, and cultural preservation, aligning with previous research on mega-sporting events in developing regions.

Economic Implications and Community Development

The strong positive economic perception among the community aligns with findings from similar studies on the impact of regional sporting events in developing economies. This corresponds with Rahman and Putri's observation that well-planned sporting events can serve as catalysts for local economic development (Alam et al., 2022). The high anticipation of tourism growth supports the argument that integrating sports and tourism can create sustainable economic opportunities for host communities (Alam et al., 2022). However, the variation in economic impact perception across different demographic groups, particularly concerning age and length of residence, suggests a more nuanced understanding of the economic benefits. This finding resonates with research highlighting the importance of inclusive economic planning in event-driven development (Abay et al., 2020). The strong correlation between education levels and positive economic perception underscores the emphasis on capacity building as a crucial component of event legacy planning (Tanner et al., 2018) (Liu, 2018).

Infrastructure Development and Accessibility

The high satisfaction levels with infrastructure development (mean satisfaction = 4.3 for road access) reflect successful integration of event requirements with community needs. These findings align with existing research demonstrating that strategic infrastructure planning for major sporting events can serve as a catalyst for sustainable community development (Schulenkorf & Edwards, 2012). The significant improvement in sports facilities (100% implementation status) aligns with the Ministry of Tourism and Creative Economy's (2023) guidelines for sustainable tourism infrastructure development. However, the lower satisfaction with public transportation (mean = 3.8) underscores potential opportunities for enhancement, aligning with previous research on connectivity constraints in developing tourist destinations (Subedi & Bhandari, 2019; Tan & Ismail, 2020). The regression analysis revealing infrastructure development as a significant predictor of overall satisfaction ($\beta = 0.376$, $p < 0.001$) The regression analysis findings underscore the pivotal role of physical infrastructure development in influencing community reception of major events (Yankholmes, 2012; Timilsina et al., 2021)

Environmental Sustainability and Management

The mixed perceptions regarding environmental impact present important considerations for event planning and management. The high concern levels for waste management (mean concern = 3.8) and beach conservation (mean concern = 4.1) reinforce findings on environmental challenges associated with coastal tourism development (Yuan, 2013). The correlation between environmental concerns and length of residence ($r = 0.39$, $p < 0.05$) corroborates the observation that long-term community members frequently exhibit heightened environmental consciousness (Wahono et al., 2019).

The relatively lower effectiveness ratings for environmental mitigation measures (mean = 3.2 for waste management) highlight areas requiring additional attention, consistent with Wijaya et al.'s (2024) recommendations for enhanced environmental management in tourism events. The factor analysis identifying environmental management as a distinct component (explaining 21.8% of variance) aligns with current theoretical frameworks emphasizing the integration of environmental sustainability in event planning (Mihalič, 2000; Arcodia et al., 2012).

Cultural Integration and Social Cohesion

The findings regarding cultural integration reveal successful incorporation of local values into event planning, with cultural integration emerging as a significant predictor in the regression model ($\beta = 0.268$, $p < 0.004$). TThis aligns with previous research emphasizing the significance of cultural consideration in the development of sport-tourism initiatives (Mackellar & Nisbet, 2014; Liu, 2017). The positive correlation between cultural impact perception and length of residence ($r = 0.49$, $p < 0.01$) aligns with Siregar and Hutabarat's (2024) findings on the role of community attachment in event acceptance.

Policy Implications and Future Directions

The comprehensive regression model explaining 78.4% of variance in overall satisfaction provides strong evidence for the multidimensional nature of community perception. The high explanatory power of the regression model in this study exceeds that of similar research in the field, indicating that the implementation of PON XXI effectively integrated various aspects of community development (Mannarini & Fedi, 2009; Schafer et al., 2003; Ilgaz & Aşkar, 2013)

The hierarchical regression analysis revealing the sequential importance of economic benefits (R^2 change = 0.352), infrastructure development (R^2 change = 0.225), and environmental management (R^2 change = 0.128) provides valuable insights for policy prioritization. This finding supports Purba and Situmorang's (2024) framework for balanced development in tourism-sport events.

Theoretical Contributions

This study contributes to existing literature by providing empirical evidence for the interconnected nature of economic, infrastructural, environmental, and cultural factors in determining community perception of major sporting events. The identification of distinct factor loadings through principal component analysis extends current theoretical understanding of community perception formation, building on integrated event impact assessment (Viviers & Slabbert, 2012; Small, 2006; Ko et al., 2011).

CONCLUSION

This study provides substantial evidence regarding public perception of PON XXI implementation at Situngkir Panguruan Beach, offering valuable insights for both theoretical understanding and practical application in sport-tourism event management. The research reveals a predominantly positive community reception, with significant implications for future event planning and regional development strategies.

The findings demonstrate that the successful implementation of PON XXI at Situngkir Panguruan Beach was characterized by strong community support, particularly in economic and infrastructural dimensions. The high satisfaction levels with economic outcomes (82.5% positive response for business opportunities) and infrastructure development (95% implementation status for road access) suggest effective integration of event requirements with community needs. However, the research also identifies areas requiring attention, particularly in environmental management and public transportation systems.

CONFLICT OF INTEREST

The researchers conclude that their study and findings are free from any potential conflicts of interest.

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