Optimizing tourism industry performance strategy selection: an analytical hierarchy process perspective

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Abstract. The tourism industry has an important role in a region's economic growth and development. However, the success of the tourism industry is highly dependent on the strategic policies adopted to increase optimal performance. One way to increase the optimal performance of the tourism industry is to maximize support system facilities. Therefore, this study aims to optimize the performance of the tourism industry by selecting the right strategy based on the support system facilities variable. Support system facilities include telecommunication, power sources, transportation, waste management, location, clean water sources, supporting industries, spatial, hospitality, safety, and security. The Analytical Hierarchy Process (AHP) method selects strategies based on support system facilities. Data is collected through a survey of tourism industry experts and related stakeholders. The results of this study indicate that indicators with high-ranking weights are telecommunication, spatial, and waste management, respectively. Each indicator is calculated for each sub-indicator to find out more in detail about producing the relative priority of the strategy. The analysis shows the importance of each factor in influencing the tourism industry's performance to assist decision-makers in planning and implementing effective strategies. Alternative strategies are prepared based on calculating the weighting of the criteria and sub-criteria. By considering support system facilities as an important factor, strategic decisions can be taken based on clear and measurable preferences.

Keywords: strategy selection, analytic hierarchy process, support system facilities, tourism industry performance.

1. Introduction

The tourism industry plays an important role in the global economy, contributing significantly to job creation, increased income, and overall economic development (Bazargani & Kiliç, 2021; Yanes et al., 2019; Croes et al., 2021). The tourism industry is one of the industries that play a major role in increasing regional and national foreign exchange (Lu et al., 2019; Vărzaru et al., 2021). In today's competitive landscape, tourism industry objectives and organizations are trying to improve their performance and achieve a sustainable industry. Sustainability has become a global development policy, including in the industrial sector. Sustainability is meeting the needs of organizations and stakeholders to achieve profits for economic growth, social welfare, and environmental sustainability in an integrated manner (Jones et al., 2017; Naciti, 2019; Asmelash & Kumar, 2019). To achieve this, selecting an effective strategy is essential (Peng et al., 2019). However, the complexity of the tourism industry, coupled with the wide variety of factors that affect performance, makes decision-making a challenging task.

The tourism industry is an industry that can provide rapid economic growth by providing jobs, income, and living costs, as well as increasing other production sectors in a country (Achmad et al., 2023; Lohmann et al., 2016; Theobald, 2005). The main objective of the tourism industry is to promote and manage tourist destinations and provide pleasant experiences for tourists. The performance of the tourism industry refers to the performance and growth of this sector in achieving set economic, social, and environmental goals. The tourism industry involves various stakeholders, such as travel service providers, accommodations, restaurants, tourist attractions, airlines, travel agents, and many more. The tourism industry has performance that is measured through financial and operational indicators (Geng et al., 2021; Uyar et al., 2020; Rumanti et al., 2023; Rumanti et al., 2022). In financial terms, these indicators include tourism income, tourist spending, tourism's contribution to Gross Domestic Product (GDP), and government spending on

tourism development (Theodoulidis et al., 2017). Regarding operations, tourism industry performance indicators include the number of tourist visits, accommodation occupancy rates, the average length of stay of tourists, the level of tourist satisfaction, and the development of tourism products. In improving the tourism industry's performance, choosing the right strategy plays an important role (Altin et al., 2018). By implementing strategies chosen based on the AHP, the tourism sector can increase the attractiveness of destinations, meet tourist expectations, increase tourism revenues, and drive the sector's growth. By monitoring these financial and operational indicators, a better understanding of the tourism industry's performance can be gained (Theodoulidis et al., 2017; Altin et al., 2018). Data and analysis related to this indicator enable stakeholders, such as governments, industry players, and tourism organizations, to identify the strengths and weaknesses of this sector and plan development strategies accordingly.

Indonesia is one of the countries starting to look to develop the tourism industrial area as one of the leading sectors in boosting the economy (Nusantara et al., 2021; Sumarsono et al., 2020; Adam, 2021). Indonesia has abundant tourism potential to be developed. With its natural, cultural, historical, and social diversity, Indonesia offers a unique and amazing travel experience for domestic and international tourists. An area in Indonesia with many tourism potentials, such as nature, culture, history, and social diversity, is Rembang Regency, Central Java, Indonesia (Achmad et al., 2023; Astuti et al., 2019). Rembang Regency, which is located in Central Java Province, is an area that has a lot of tourism potential that supports tourism industry activities (Achmad et al., 2023; Astuti et al., 2019; Rumanti et al., 2021; Rumanti et al., 2020). The location of Rembang Regency, Central Java, Indonesia, is explained in Figure 1. With its natural beauty, historical sites, and rich culture, Rembang Regency, Central Java, Indonesia, offers a wide choice of attractive tourist destinations.

Figure 1 Rembang regency map, Central Java.

The government of Rembang Regency, Central Java, Indonesia, has tried to maximize its tourism potential through the Rembang Regency Regional Regulation Number 12 of 2019 concerning the Rembang Regency Tourism Development Master Plan for 2019-2025. This regulation aims to regulate and direct tourism development in Rembang Regency so that it runs in a planned, sustainable manner and can provide maximum benefits for the local community (Rembang Regency Regional Regulation Number 12 of 2019). The regulations also cover various important aspects of tourism development, such as environmental management, preservation of cultural heritage, development of supporting infrastructure, improvement of the quality of human resources in the tourism sector, development of tourism products, marketing and promotion of tourism in Rembang Regency both at the national and international levels. To support the activities of the Rembang Regency Tourism Development Master Plan, we are trying to optimize the selection of strategies based on aspects that affect the tourism industry's performance.

One factor that significantly affects the performance of the tourism industry is support system facilities (Achmad et al., 2023; Tursunalievich et al., 2021; Petrova et al., 2018). Support system facilities refer to facilities and services that can be developed directly or indirectly to support the

potential development of the tourism industry (Achmad et al., 2023). Support system facilities include various infrastructure, technology, and logistics components that enable tourism services' smooth operation and delivery. These facilities include telecommunication, power sources, transportation, waste management, location, clean water sources, supporting industries, spatial, hospitality, safety, and security (Achmad et al., 2023). The quality, availability, and efficiency of support system facilities directly affect the performance of an organization in the tourism industry. Selection of the most appropriate strategy for improving the tourism industry's performance requires a comprehensive understanding of the various factors that influence its success (Seshadri et al., 2023).

Support system facilities are an important element in the tourism industry that supports tourist experience and satisfaction. Tourism development needs to be supported by support system facilities needed by tourists to meet their needs (Achmad et al., 2023). Support system facilities refer to services that are directly or indirectly developed to support and encourage tourism potential in an area (Achmad et al., 2023). Support system facilities include a variety of infrastructure and services designed to facilitate travel and accommodate tourist needs. According to (Achmad et al., 2023), support system facilities include telecommunication, power sources, transportation, waste management, location, clean water sources, supporting industries, spatial, hospitality, safety, and security. Research on support system facilities that support the performance of the tourism industry focuses on evaluating and developing infrastructure and facilities that provide important support for the tourism industry (Adeola et al., 2020). This research on support system facilities provides a better understanding of the factors that influence the tourism industry's performance (Andrades et al., 2017). By understanding the needs and deficiencies of this infrastructure and facilities, stakeholders can plan and develop appropriate strategies to increase the attractiveness, convenience, and satisfaction of tourists, as well as promote the growth of the tourism industry as a whole (Achmad et al., 2023; Andrades et al., 2017).

The Analytical Hierarchy Process (AHP) methodology allows decision-makers to systematically analyze the variable indicators of support system facilities, assign weights based on their relative importance, and evaluate alternative strategies against this criterion (Brunelli, 2014; Dos Santos et al., 2019). By leveraging AHP, decision-makers can assess multiple criteria and sub-criteria, consider their interdependence, and obtain meaningful comparisons between different options. Applying AHP to the selection of the performance strategy of the tourism industry allows decision-makers to systematically analyze the importance and effectiveness of support system facilities in achieving the desired performance results. Previous research has successfully implemented methods in selecting strategies based on facilities for developing tourism (Joshi et al., 2020; Acharya et al., 2022; Rizaldi et al., 2022; Saha et al., 2021). Although AHP has been used in various decision-making contexts in the tourism sector, the emphasis on weighting support system facilities indicators is still limited. In fact, support system facilities, such as telecommunication, power sources, transportation, waste management, location, clean water sources, supporting industries, spatial, hospitality, safety, and security, have a significant role and have been proven empirically in the performance of the tourism industry (Achmad et al., 2023).

Seeing the existence of this research gap, this study aims to optimize the selection of tourism industry performance strategies with a special focus on weighting the support system facilities variable. Using the AHP perspective, decision-makers can assign weights to each indicator based on relative importance. This research contributes to existing knowledge in improving the tourism industry's performance by providing insight into the importance of support system facilities in selecting and optimizing strategies. The findings of this study have practical implications for industry practitioners, policymakers, and tourism planners, as they can use the AHP methodology to make data-driven decisions and prioritize strategies that effectively use support system facilities.

2. Method

This chapter presents the methodology used in optimizing the performance of the tourism industry through selecting the right strategy based on support system facilities variables using the Analytical Hierarchy Process (AHP) perspective. Support system facilities include telecommunication, power sources, transportation, waste management, location, clean water sources, supporting industries,

spatial, hospitality, safety, and security (Achmad et al., 2023). Figure 2 provides an explanation of the stages in this study.

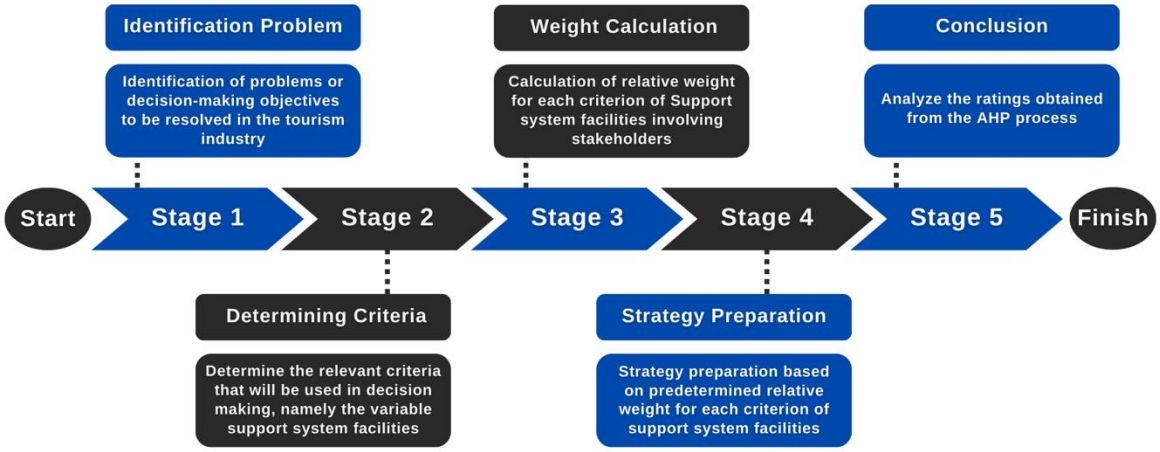

Figure 2 Research Stages.

Identification Problem
This stage involves identifying the problem or decision-making goals to be resolved. In the context of the tourism industry in Rembang Regency, Central Java, Indonesia, this problem relates to the selection of strategies to improve the tourism industry's performance. Identifying clear and specific problems is important to determine the research direction. The research design used in this study is quantitative, focusing on applying the AHP methodology for strategy selection. This study evaluates and prioritizes different strategic options based on variable criteria and sub-criteria for support system facilities. A structured questionnaire survey was conducted to collect data from relevant stakeholders, namely tourism coordinators, and academics.

Determining Criteria
This stage involves determining the relevant criteria that will be used in decision-making. This criterion reflects the aspects that will be assessed in selecting strategies. This study used the criteria for the variable support system facilities (Achmad et al., 2023). According to Achmad et al. (2023), the support system variables consist of telecommunication, power sources, transportation, waste management, location, clean water sources, supporting industries, spatial, hospitality, safety, and security. The support system facilities variable has a significant role and has been proven empirically to improve the tourism industry's performance (Achmad et al., 2023). Defining precise criteria helps in evaluating the strategic options to be considered.

Weight Calculation
This stage involves calculating the relative weights for each support system facility's variable criteria. This weight describes the relative importance of each criterion in the context of decision-making. The weight can be determined through a selection technique involving expert respondents and stakeholders in the tourism industry. Accurate weight determination is important to obtain consistent and measurable preferences in decision-making.

Strategy Preparation
This stage involves preparing a strategy based on the relative weights that have been determined for each criterion of support system facilities. Based on preferences that have been calculated using AHP, strategies can be designed and prepared to optimize the performance of the tourism industry. This strategy must focus on the objectives and problems identified at the initial stage.

Conclusion
The last stage in this research is the conclusion of the AHP method. The conclusions reflect the analysis results and ratings obtained from the AHP process. This can be used to support decision-making and provide guidance in choosing the right strategy for improving the tourism industry in Rembang Regency, Central Java, Indonesia.

3. Result and Discussion

This section describes the results and discussion of studies on optimizing the selection of tourism industry performance strategies using the Analytical Hierarchy Process (AHP) perspective. The findings and analysis provide insight into prioritizing and selecting strategies to improve the tourism industry's performance based on support system facilities variables. To achieve this, the following steps were taken in this study.

Identification Problem

Problems that occur in the tourism industry related to strategies for improving the performance of the tourism industry include several important aspects. First, there are challenges in identifying the right strategies to increase the attractiveness of tourism industry destinations. Each destination has unique characteristics and high competition, so determining a strategy that can differentiate a destination from the others becomes critical. Second, the development of adequate tourism infrastructure is often an obstacle. Transportation facilities, accommodation, and other supporting facilities must be improved and developed to provide a good experience for tourists. Third, environmental sustainability and cultural preservation are also serious problems. Management of tourism responsible for the environment and local culture is key to maintaining the sustainability of the tourism industry. Solving these problems requires a comprehensive approach and a measurable strategy to improve the tourism industry's performance.

Determining Criteria

In the Analytical Hierarchy Process (AHP) method, determining criteria is important in selecting a strategy based on support system facilities variables in the tourism industry. These criteria reflect aspects that affect the effectiveness and performance of supporting facilities in the tourism industry (Achmad et al., 2023). In this context, several relevant criteria include telecommunication, power sources, transportation, waste management, location, clean water sources, supporting industries, spatial, hospitality, safety, and security (Achmad et al., 2023). Table 1 explains each indicator definition used in this study (Achmad et al., 2023).

Table 1 Definition variable support system facilities

Indicator		Definition
Telecommunication	(TL)	Network availability factor somewhere to facilitate communication and information delivery
Power sources	(PS)	The factor of the availability of electricity sources around the tourism industrial area to support all activities and activities.
Transportation	(TP)	Mobility availability and accessibility factors in tourism industry activities.
Waste management	(WM)	The availability factor of waste treatment around the tourism industry.
Location	(LT)	The layout factor or position of a place that is used to support all tourism industry activities.
Clean water sources	(CW)	The availability and operational factors of clean water around tourist areas.
Supporting industries	(SI)	Industries around the tourist area that are related to supporting all activities and activities.
Spatial	(ST)	The factors of space and time elements that identify geographical location as a guide for managers of tourism industry activities.
Hospitality	(HT)	The availability factor of hotels around the tourism industry area.
Safety and security	(SS)	Factors of safety and security of all activities and activities around the tourism industry from all threats.

In determining the AHP criteria, it is important to consider the relevance and impact of each criterion on the performance and development of the tourism industry. These criteria will be used as a basis for comparison and evaluation of alternative strategies for optimal selection. Figure 3 is a hierarchical model of support system facilities indicators.

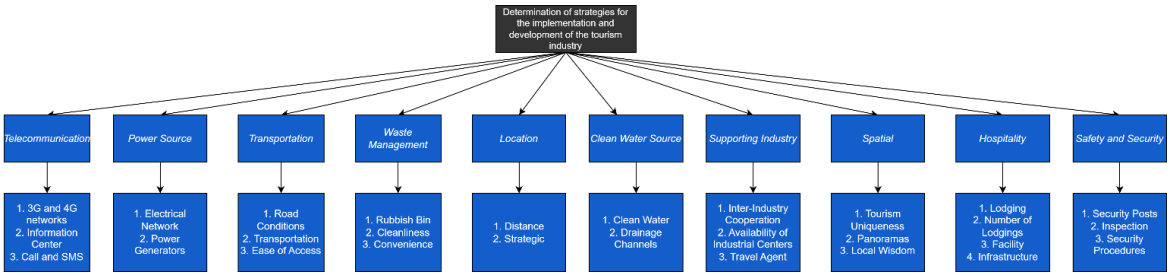

Figure 3 Hierarchy Model of Support System Facilities Indicators

Determining Criteria

The weighting calculation will be carried out using the AHP method. The weighting is done by making a pairwise comparison matrix table for each telecommunication, power source, transportation, waste management, location, clean water source, supporting industries, spatial, hospitality, safety, and security indicators, as shown in Table 2. The Pairwise Comparison Matrix is one of the main components in the Analytical Hierarchy Process (AHP) method. This matrix compares the relative importance or preference between existing criteria or alternatives in decision-making. A Pairwise Comparison Matrix is formed by comparing each criterion or alternative with each other criterion or alternative. Each element in the matrix represents the judgment or preference of the decision maker regarding the level of importance or relative preference between the elements being compared. Comparisons are made using a numerical scale that reflects the level of importance or preference, usually ranging from 1 to 9 (Mu et al., 2017; Sriwana et al., 2014). After doing the Pairwise Comparison Matrix, the normalization matrix is calculated, which is obtained from the results of the Pairwise Comparison Matrix for each indicator divided by the number of each indicator column. The results of the normalization matrix can be seen in Table 3. The next step is to calculate the weight obtained from each row of indicators divided by the number of indicators, namely 10. The results of calculating the weight of each indicator can be seen in Table 4.

Table 2 Pairwise comparison matrix

Indicator	TL	PS	TP	WM	LT	CW	SI	ST	HT	SS
TL	1.00	5.00	3.00	3.00	3.00	5.00	7.00	5.00	7.00	3.00
PS	0.20	1.00	3.00	0.33	0.33	3.00	3.00	0.33	3.00	0.33
TP	0.33	0.33	1.00	0.33	0.33	3.00	3.00	0.33	3.00	0.33
WM	0.33	3.00	3.00	1.00	3.00	3.00	3.00	0.33	5.00	5.00
LT	0.33	3.00	3.00	0.33	1.00	3.00	3.00	0.33	5.00	0.33
CW	0.20	0.33	0.33	0.33	0.33	1.00	0.33	0.20	3.00	0.33
SI	0.14	0.33	0.33	0.33	0.33	3.00	1.00	0.20	3.00	0.33
ST	0.20	3.00	3.00	3.00	3.00	5.00	5.00	1.00	7.00	3.00
HT	0.14	0.33	0.33	0.20	0.20	0.33	0.14	0.14	1.00	0.20
SS	0.33	3.00	3.00	0.20	3.00	3.00	3.00	0.33	5.00	1.00

Table 3 Normalization matrix

Indicator	TL	PS	TP	WM	LT	CW	SI	ST	HT	SS	sum
TL	0.31	0.26	0.15	0.33	0.21	0.17	0.25	0.61	0.17	0.22	2.665
PS	0.06	0.05	0.15	0.04	0.02	0.10	0.11	0.04	0.07	0.02	0.667
TP	0.10	0.02	0.05	0.04	0.02	0.10	0.11	0.04	0.07	0.02	0.574
WM	0.10	0.16	0.15	0.11	0.21	0.10	0.11	0.04	0.12	0.36	1.453
LT	0.10	0.16	0.15	0.04	0.07	0.10	0.11	0.04	0.12	0.02	0.906
CW	0.06	0.02	0.02	0.04	0.02	0.03	0.01	0.02	0.07	0.02	0.321
SI	0.04	0.02	0.02	0.04	0.02	0.10	0.04	0.02	0.07	0.02	0.395
ST	0.06	0.16	0.15	0.33	0.21	0.17	0.18	0.12	0.17	0.22	1.755
HT	0.04	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.186
SS	0.10	0.16	0.15	0.02	0.21	0.10	0.11	0.04	0.12	0.07	1.077

The final step is to calculate the consistency value. In calculating the Analytical Hierarchy Process (AHP), several concepts are used to measure the consistency of the Pairwise Comparison Matrix. Three important concepts in this regard are λ_{max} (maximum eigenvalue), Consistency Index (CI), Random Index (RI), and Consistency Ratio (CR). The λ_{max} value describes the size of the dominance or relative influence of the largest eigenvalue in the Pairwise Comparison Matrix. The

λ_{max} value is used to calculate the Consistency Index and Consistency Ratio. The greater the λ_{max} value, the greater the effect of the largest eigenvalue on the Pairwise Comparison Matrix.

Table 4 Weighting indicator

Indicator	Code	Weight	Ranking
Telecommunication	TL	0.266	1
Spatial	ST	0.176	2
Waste management	WM	0.145	3
Safety and security	SS	0.108	4
Location	LT	0.091	5
Power sources	PS	0.067	6
Transportation	TP	0.057	7
Supporting industries	SI	0.040	8
Clean water sources	CW	0.032	9
Hospitality	HT	0.019	10

CI value is used to evaluate the consistency of the Pairwise Comparison Matrix. CI is calculated by dividing the difference between λ_{max} by the number of criteria or alternatives minus one, then dividing by the number of criteria or alternatives minus one. CI indicates the level of consistency of the Pairwise Comparison Matrix, and the lower the value, the better the level of consistency. The RI value is a random reference for comparing the calculated CI. RI depends on the size of the Pairwise Comparison Matrix, namely the number of criteria or alternatives being compared. The RI value has been predetermined through certain tables or calculations. RI is used to compare CI calculated with random values to estimate the consistency level from the Pairwise Comparison Matrix. At the same time, the CR value combines CI with RI to measure the consistency level of the Pairwise Comparison Matrix. CR is calculated by dividing CI by RI. The lower the CR value, the more consistent the Pairwise Comparison Matrix will be. Usually, if the CR value ≤ 0.1, the Pairwise Comparison Matrix is usually considered consistent. In the calculation of Table 5, the consistency value is 0.100 ≤ 0.1, so the calculation is said to be consistent. After weighing each indicator, the weighting calculation for each sub-indicator is carried out in the same stages as the indicator calculation in Table 6. The weighting results for each indicator and sub-indicator are obtained.

Table 5 Consistency Results

Consistency Results	Value
λ_{max}	11.34
Consistency Index (CI)	0.15
Random Index (RI)	1.49
Consistency Ratio (CR)	0.100

Table 6 Consistency Results

Indicator	Code	Weight	Sub Indicator	Weight
Telecommunication	TL	0.27	3G and 4G networks	0.28
			Information Centre	0.07
			Call and SMS	0.64
Power Source	PS	0.07	Electrical Network	0.83
			Power Generator	0.17
Transportation	TP	0.06	Road Conditions	0.63
			Transportations	0.26
			Ease of Access	0.11
Waste management	WM	0.15	Rubbish Bin	0.26
			Cleanliness	0.63
			Convenience	0.11
Location	LT	0.09	Distance	0.75
			Strategic	0.25
Clean water source	CW	0.03	Clean Water	0.17
			Drainage Channel	0.83
Supporting industry	SI	0.04	Inter-Industry Cooperation	0.24
			Availability of Industrial Centres	0.09
			Travel Agent	0.67

Indicator	Code	Weight	Sub Indicator	Weight
Spatial	ST	0.18	Tourism Uniqueness	0.63
			Panoramas	0.11
			Local Wisdom	0.26
Hospitality	HT	0.02	Lodging	0.13
			Number of Lodgings	0.07
			Facility	0.53
			Infrastructure	0.27
Safety and security	SS	0.11	Security posts	0.11
			Inspection	0.63
			Security Procedures	0.26

Based on Table 6, the sub-indicator values for telecommunication (call and SMS = 0.64), Spatial (tourism uniqueness = 0.63), and waste management (cleanliness = 0.63). From the results of the calculation of the sub-criteria weighting, several alternative strategies can be formulated to improve the tourism industry's performance. The following is an alternative strategy for improving the tourism industry's performance based on the AHP calculation and the sub-indicator values that have been carried out.

Strategy for improving the performance of the tourism industry through telecommunications:

a) Improving the range and quality of telecommunication services, including phone and SMS signals that are stable and easy to access in all tourism destinations.

b) Expand telecommunications infrastructure by building more telecommunications towers or Wi-Fi hotspots in tourist areas. Develop digital applications or platforms to facilitate communication and interaction between tourists and tourism service providers.

Strategy for improving the performance of the tourism industry through spatial:

a) Identify and promote the spatial uniqueness of a destination, such as stunning natural panoramas, historical locations, or cultural diversity, as the main attraction for tourists.

b) Improving supporting infrastructure in tourist areas, such as roads, public transportation, and accessibility, makes it easier for tourists to explore and enjoy the existing spatial potential.

c) Encouraging collaboration between the tourism sector, government, and local communities to preserve and utilize spatial potential in a sustainable manner.

Strategy for improving the performance of the tourism industry through waste management:

a) Improving waste management systems in tourism destinations, including collection, sorting, processing, and recycling of waste in an efficient and environmentally friendly manner.

b) Conduct awareness and education programs for the public, visitors, and tourism industry players about the importance of maintaining cleanliness and the environment.

c) Involve tourism stakeholders in monitoring and maintaining cleanliness, such as managing parks, beaches, and other tourist areas

Each of the above strategies was developed based on the significant sub-indicator values in the AHP calculation, namely telecommunication (call and SMS), spatial (tourism uniqueness), and waste management (cleanliness). This strategy aims to improve the tourism industry's performance through improved communication, utilization of spatial potential, and good waste management. By choosing the right strategy for the tourism industry in Rembang Regency, Central Java, Indonesia, it is hoped that it will be able to create a sustainable tourism industry.

4. Conclusion

This study identified a series of criteria and sub-criteria that greatly determine the success of the tourism industry's performance. The research results have significant implications for policymakers and industry practitioners. Prioritized strategies can guide the decision-making process in allocating resources, implementing policies, and developing action plans to improve tourism industry

performance. These findings also emphasize the need for integrated and coordinated efforts among various stakeholders to ensure sustainable development in the tourism sector.

It is very important to acknowledge the limitations of the research. The results are based on participant judgment and perceptions, which may be subject to individual bias. The specific context and sample size may limit the generalizability of the findings. Future research can explore additional criteria and sub-criteria apart from the support system facilities variable, consider different geographic locations, and incorporate the perspectives of a more diverse range of stakeholders.

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