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Effectiveness of the Operation and Maintenance of Natural Tourism Assets in Sumedang Regency (Case Study of Cipadayungan, Cigorobog, and Ciputrawangi Tourism)

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ABSTRACT

The natural attractions of Curug Cipadayungan, Curug Cigorobog, and Curug Ciputrawangi are natural attractions in Sumedang Regency. However, the ineffective performance of operations and maintenance of tourism facilities causes existing facilities to experience problematic phenomena. Problem phenomena such as tourist attractions in the playground area that have been damaged and gazebos and seating that have been broken. Apart from that, it is difficult for visitors to reach tourist areas because the roads are potholed and there are no public transportation services. This research aims to measure the effectiveness of the operation and maintenance performance of natural tourism in Sumedang Regency based on indicators of assets, operations and maintenance, health, safety & environment, officer training & development, accessibility, officer satisfaction and user satisfaction. This research uses descriptive research methods with quantitative and qualitative approaches, and data collection techniques are done through observation, interviews, questionnaires and documentation studies. Based on the measurement results, the tourism measured on each indicator shows that the results are not good.

Keywords: Facilities, Natural Tourism Operation and Maintenance Performance

1. Introduction

Asset management encompasses a lifecycle approach that carries out an organization's activities to achieve its goals with operational and maintenance activities as a success factor in the asset lifecycle (Lei et al., 2012). Tourism assets are one of the main keys of the country in encouraging national development as the largest foreign exchange contributor (Putri et al., 2021). That way, facilities and infrastructure, tourist attractions, transportation, and other supporting facilities are tangible assets that can affect the attraction for tourists (Fadjarwati & Fadillah, 2022). Cipadayungan Tourism is located in Padasari Village, Cimalaka, southwest of the foot of Mount Tampomas. The attraction of this Cipadayungan Tourism is that it has a waterfall, Camping Ground, springs, and other tourist attractions. Tourism that has a wide range of ± these 3.5 hectares managed by tourism managers under the auspices of Perum Perhutani KPH Sumedang. Cigorobog Waterfall Tourism is located in Citengah, South Sumedang District. This tour has the main attraction, which is that it has three levels of waterfalls that are different from other waterfalls. Wide range of tourism ± 5 hectares is managed by Kompepar under the auspices of the Sumedang Regency Tourism Office. Ciputrawangi Waterfall Tourism is located in east of the foot of Mount Tampomas, precisely in Narimbang Village, Conggeang, Sumedang. Wide range of tourism ± 2.5 hectares is managed by a tourism manager under the auspices of LMDH Perum Perhutani KPH Sumedang. Good operation and maintenance of assets need to be carried out to evaluate, predict, and improve asset performance (Telli, 2012). The success of maintenance in an organization will determine the effectiveness and efficiency to meet the company's goals (Lei et al., 2012). Based on the phenomenon of problems, tourists find it difficult to get to tourist attractions because the roads are damaged, potholes, and rocks. In addition, the availability of physical assets in natural tourism is not fully adequate, such as the condition of toilets filled with moss, the availability of gazebos is still small and the condition is fragile, the availability of food and beverage services is still small, the

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condition of recreational facilities that are fragile and obsolete.

Based on this, to overcome this, it is necessary to find a solution using multi-criteria indicators according to (Van Der Lei et al., 2012) with the results of blending theory according to Gu et al (2022), Marzuki et al (2017), Ruano et al (2023), Sobhani et al (2022) and adding additional indicators, namely accessibility to know access to tourist attractions. "Effectiveness of the Performance of the Operating System and Maintenance of Natural Tourism Assets in Sumedang Regency."

2. Literature Review

2.1 Asset Management

Asset management is a lifecycle approach that includes the activities that an organization undertakes to achieve its goals with operational and maintenance activities as factors in the success of the asset lifecycle (Van Der Lei et al., 2012). The purpose of asset management in particular is to generate maximum profits and achieve optimal use and utilization of assets by minimizing the cost of living with the life of the asset in question (Sugiama, 2013).

2.2 Asset Operation and Maintenance Performance

According to Van der Lei et.al., (2012), asset management performance is a multi-disciplinary management process, which provides essential support for heavy and capital-intensive industries by keeping assets such as machinery and equipment in safe operating conditions. Operational activities are a series of organizational activities that produce value in the form of goods and services with a transformation process from input (Input) to output (Output) (Heizer & Barry, 2015). According to Campbell (2011), maintenance is focused on maintaining and maximizing the ability of assets to produce quality output.

2.2.1 Asset Indicators

Availability of facilities is adjusted to the standard of results blending theory according to Gu et al (2022), Marzuki et al (2017), Ruano et al (2023), Sobhani et al (2022). The following is an explanation of the facilities that must be available in the tour.

1. Recreational Facilities

   According to Gu et al (2022), recreational facilities are the basic requirement for nature-based tourist destinations to successfully attract the attention of visitors with attractive scenery, magnificent beauty, and supporting facilities.

2. Food and Beverage Service Facilities
   According to Permenpar No.7/2020, food and

   beverage services are facilities for buying and selling food and beverages in tourist areas.

3. Accommodation

   Accommodation is a component of the tourism industry because accommodation can be a place to rest and enjoy the services and entertainment available (Ginting & Sasmita, 2018).

4. Toilet

   Toilets are a basic need of every human being, besides that toilets are also one of the attributes in determining the level of public health (Sunarsa and Andini, 2019).

5. Trash Can

   Trash cans include facilities that must be available in green open spaces (Gidlow et al., 2012).

6. Information Center

   The provision of information and security services plays an important role in encouraging visitors to visit certain natural attractions as well as take part in the recreational experience (Gu et al., 2022).

7. Gazebo/Seating

   Gazebo is a facility that must be available in tourist attractions as a temporary place to rest as well as a place to shelter from the hot sun or rain for tourists (Rahmawati & Purwihartuti, 2022).

8. Information Board

   The explanations given on the signs of accurate and humane interpretation so that tourists can enrich themselves and expand their knowledge when visiting tourist attractions (Gu et al., 2022).

9. Road Signs

   Road signs must be concise and clear, which will facilitate access to tourist areas (Gu et al., 2022).

10. Places of Worship

    The existence of places of worship is important in the development of tourism facilities because places of worship are places where religious people gather in congregation to meet spiritual needs (Ginting & Sasmita, 2018).

11. Parking Lot

    The provision of parking lots aims to increase the safety and comfort of vehicles used by tourists when traveling (Ginting & Sasmita, 2018).

12. Security Post

    Security and safety management at tourist destinations must be carried out consistently and all parties have the same commitment to

2.2.2 Operation and Maintenance

According to Telli (2012), the measurement of the performance of the operating system and asset maintenance can be assessed based on the frequency of failures/damages in the unit, the frequency of preventive and corrective repairs or maintenance, the level of damage and the time needed to carry out maintenance, the transition from a stopped condition to a running condition, and the time needed to perform maintenance tasks after it is reported by operations or production personnel.

2.2.3 Health, Safety, and Environment

Safety and environmental performance measurements can be assessed based on the number of accidents or casualties, the number of legal cases, the number of compensation cases, and the number of complaints (Van Der Lei et al., 2012).

2.2.4 Training and Development

Measurement of learning and growth performance can be assessed based on the number of new ideas and the development or training of skills and competencies (Van Der Lei et al., 2012).

2.2.5 User Satisfaction

Measurement of customer satisfaction performance can be assessed based on calculating product complaints and customer surveys, the quantity of products returned to the manufacturer, the number of customers who retain and the number of new customers (Van Der Lei et al., 2012).

2.2.6 Employee Satisfaction

Employee satisfaction performance measurement can be assessed based on the frequency of complaints given by employees and how large the level of employee satisfaction is (Van Der Lei et al., 2012).

2.2.7 Accessibility

According to Suanmali (2014) accessibility is defined as the ability to provide access for tourists to their destinations such as transportation, roads, and other entrances.

3. Research Method

3.1 Types and Techniques of Data Collection

The type of research method used is a descriptive research method. The types of research approaches used are qualitative and quantitative approaches. Data collection uses observations, interviews, questionnaires, and documentation studies.

3.2 Population and Sample

The population of this study is natural waterfall tourism in Sumedang Regency and the sample is Cipadayungan Waterfall Tourism, Cigorobog Waterfall Tourism, and Ciputrawangi Waterfall Tourism. The sample technique used in this study is a non-probability sampling technique with the judgement/purposive sampling method. The respondents in this study were 120 people, as key respondents from the community who had visited natural tourism with details of 43 respondents for Cipadayungan Waterfall, 37 respondents for Cigorobog Waterfall, and 40 respondents for Ciputrawangi Waterfall.

3.3 Data Analysis Techniques

3.3.1 Qualitative Data Analysis Techniques

Qualitative data analysis techniques use data reduction, data presentation, and conclusion drawn. Conclusions are drawn based on the results of the categorization percentage. The following is the length of the interval for categorizing the effectiveness of the performance of operations and maintenance of assets.

Table 1. Interval Length

Percentage Results	Interpretation
100%-66,67%	Good/Adequate
66,66%-33,34%	Enough
33,33%-0%	Lacking/Inadequate

3.3.2 Quantitative Data Analysis Techniques

The Quantitative Data Analysis technique uses IBM SPSS software using mean values and standard deviations. The data obtained from the results of the questionnaire distribution then needs to be calculated the average value so that conclusions can be drawn according to the scale used.

1. Mean

   After that, the interval is calculated to define the interpretation of the respondents. The following are the results of the scale interpretation based on the scale range according to Sugiyono (2013).

   Table 2. Scale Range

Range	Interpretation
<2.33	Poor/Inadequate
2,34-3,66	Enough
3,67-5,00	Good/adequate

   Source: Sugiyono (2013)

2. Standard Deviation

   According to Sugiyono (2013), the standard deviation value can be obtained by the formula:

$$S = \sqrt{\frac{\Sigma(xi - \bar{x})^2}{(n-1)}}$$

   Keterangan:

   S = Standar deviasi

   xi = Nilai x ke 1 sampai ke n

   $\bar{x}$ = Nilai rata-rata

   n = Jumlah sampel

   The standard deviation value that has been calculated and greater than the mean value indicates that the obtained mean value is a poor representative of the overall data.

   The results of the analysis were analyzed using validity and reliability tests. Validity tests are used to measure the validity or validity of a questionnaire, while reliability tests are used to measure the reliability of questionnaires.

4. Results and Discussion

4.1 Effectiveness of Operation and Maintenance Performance

Performance measurement was carried out to measure the Effectiveness of the Performance of Operation and Maintenance of Natural Tourism Assets in Sumedang Regency based on indicators of assets, operation and maintenance, health, safety and environment, training and development, accessibility, asset user satisfaction, and employee satisfaction.

4.1.1 Asset Indicators

This indicator measures the availability, condition and completeness of natural tourism assets consisting of recreational facilities, accommodation, food and beverage services,

toilets, garbage cans, information centers, gazebos, seating, information boards, road signs, places of worship, parking lots, and security posts.

Table 3. Qualitative Results of Asset Indicators

Items	Unit of Analysis	Existing
Recreational Facilities	Cipadayung an Waterfall	There are play-ground, outbound, and camping are-as. Facilities in the playground are damaged, outbound is dam-aged, and the camping area has uneven areas.
	Waterfall Cigorobog	There are no play-grounds, out-bounds, and camp-ing areas yet. Only hanging swings are available in damaged condition.
	Waterfall Ciputra-fragrant	There are already playground areas with damaged game conditions and camping areas with uneven ground conditions. Outbound is not yet available.
Facilities Service Food and Drink	Cipadayung an Waterfall	There are 2 stalls with damaged conditions. The stalls are not var-ied.
	Waterfall Cigorobog	There is 1 stall with damage and no vari-ation.
	Waterfall Ciputra-fragrant	There are 4 stalls with damaged and quite vativistic conditions.
Accommoda tion	Cipadayung an Waterfall	No accommodation available
	Waterfall Cigorobog	
	Waterfall Ciputra-fragrant	
Toilet	Cipadayung an Waterfall	The toilet condition is smelly, dirty, and slippery. There is no separation be-tween men and women. Toilet equipment has not been fulfilled
	Waterfall Cigorobog	
	Waterfall Ciputra-fragrant	
Trash Can	Cipadayung an Waterfall	The trash cans have not been evenly distributed with the condition of the plasting material that is easy to leak.
	Waterfall Cigorobog	The garbage cans have not been evenly distributed. The condition of the paint of the garbage can has peeled off and holes.
	Waterfall Ciputra-fragrant	The garbage cans have not been evenly distributed. The condition of the paint of the garbage can has peeled off and is hol-low
Information Center	Cipadayung an Waterfall	The walls and roof are not sturdy due to the zinc material. The floor has not been paved
	Waterfall Cigorobog	The walls and roof are in a dirty condi-tion. The floor has been paved but there are several parts of the floor broken.
	Waterfall Ciputra-fragrant	The condition of the roof has broken parts, the walls are still sturdy. The floor has not been paved.
Gazebo	Cipadayung an Waterfall	The condition of the gazebo is dirty and difficult to ob-tain.
	Waterfall Cigorobog	Dirty and fragile condition. Gazebo is difficult to obtain
	Waterfall Ciputra-fragrant	Fragile and hard-to-obtain conditions
Seating	Cipadayung an Waterfall	The condition of the seats has been weathered and collapsed. Not evenly distributed.
	Waterfall Cigorobog	
	Waterfall Ciputra-fragrant	
Information Board	Cipadayung an Waterfall	No information board
	Waterfall Cigorobog	
	Waterfall	

Items	Unit of Analysis	Existing
	Ciputra-fragrant	
Road signs	Cipadayungan Waterfall	No road signs available
	Waterfall Cigorobog	
	Waterfall Ciputra-fragrant	Signs only show tourist attractions, there are no directions for facilities yet.
Places of Worship	Cipadayungan Waterfall	The condition is not sturdy. There are no ablution places and prayer tools available.
	Waterfall Cigorobog	The condition was damaged and there were no prayer tools
	Waterfall Ciputra-fragrant	The condition was damaged and there were no prayer tools
Security Post	Cipadayungan Waterfall	There is no security post
	Waterfall Cigorobog	
	Waterfall Ciputra-fragrant	
Performance Effectiveness		**Bad**

Based on the table above, it can be concluded that the Effectiveness, Performance, Availability and Asset Condition are Poor. In addition to qualitative performance measurements, the following are the conclusions of quantitative performance measurements on asset indicators.

Table 4. Quantitative Results of Asset Indicators

Items	Mean		
	Cipadayungan Waterfall	Cigorobog Waterfall	Ciputra Waterfall-fragrant
Recreational Facilities	2,320	2,138	2,297
Food and Beverage Service Facilities	2,235	2,256	2,308
Accommodation	1,783	2,038	1,317
Toilet	2,125	2,102	2,102
Trash Can	2,315	2,232	2,205
Information Center	2,299	2,285	2,285
Gazebo	2,241	2,329	1,860
Seating	2,242	2,278	2,132
Information Board	1,686	1,729	2,079
Road Signs	1,768	1,961	2,266
Places of Worship	2,290	2,220	2,228
Parking Area	1,960	2,273	1,972
Security Post	1,837	2,094	1,658
Average performance	**2,085**	**2,149**	**2,062**
	2,099		
Interpretation	**Bad**		

Based on the collection of observation data, interviews, and questionnaires, the calculation of performance effectiveness on asset indicators has not met the criteria.

4.1.2 Operation and Maintenance

Operation and maintenance activities that occur in natural tourism areas are marked by the fact that all available facilities operate in accordance with their main duties and functions.

Table 5. Qualitative Results of Operation and Maintenance Indicators

Items	Unit of Analysis	Existing
Operation	Cipadayungan Waterfall	1. Tours operate every day. Tourism can be used by all groups ranging from children to adults. However, there are no facilities for people with disabilities. 2. Operation of leisure facilities, food and beverage services, toilets, information centers, places of worship, parking lots, gazebos, and poor seating.
	Waterfall Cigorobog	
	Waterfall Ciputra-fragrant	
Maintenance	Cipadayungan Waterfall	1. The facilities available on tours are still dirty and unmaintained 2. Repairs have not been made to the damaged facilities 3. Doesn't have a periodic schedule for maintenance yet
	Waterfall Cigorobog	
	Waterfall Ciputra-fragrant	
Performance Effectiveness		**Bad**

In addition to qualitative performance measurements, the following are the conclusions of quantitative performance measurements on Operation and Maintenance Indicators that can be discussed in the following table.

Table 6. Quantitative Results of Operation and Maintenance Indicators

Items	Mean		
	Cipadayungan Waterfall	Cigorobog Waterfall	Ciputra Waterfall-fragrant
Operation	2,290		
Maintenance	2,278		
Average performance	**2,284**		
Interpretation	**Bad**		

Based on the results of collecting observation data, interviews, and questionnaires, the calculation of the effectiveness of the performance of the Operation and Maintenance indicators, including the operation of facilities and the maintenance of facilities, has not met the criteria.

4.1.3 Health, Safety, and Environment

Health, safety, and environmental performance measurement. Here is the explanation.

Table 7. Qualitative Results of MPA Indicators

Items	Unit of Analysis	Existing
Health	Cipadayungan Waterfall Waterfall Cigorobog Waterfall Ciputra-fragrant	1. The condition of the water is clear but there is an odor and taste 2. There is no waste management schedule 3. The lighting system is good but the air conditioning is not like in the toilet
Salvation	Cipadayungan Waterfall Waterfall Cigorobog Waterfall Ciputra-fragrant	1. There is already an evacuation route 2. There are no fire extinguishers, CCTV 3. There is already a water network but there is no electricity network 4. There is a possibility of accidents due to damage to facilities 5. There are no special security guards yet
Milieu	Cipadayungan Waterfall Waterfall Cigorobog Waterfall Ciputra-fragrant	1. There is pollution due to incompact soil 2. No noise source 3. There are no trash cans according to the type of garbage 4. There are no special activities for environmental conservation 5. There are no written regulations for the protection of nature
Performance Effectiveness		**Bad**

In addition to qualitative performance measurements, the following are the conclusions of quantitative performance measurements on health, safety, and environmental indicators that can be discussed in the following table.

Table 8. Quantitative Results of MPA Indicators

Items	Mean		
	Cipadayungan Waterfall	Cigorobog Waterfall	Ciputra Waterfall-fragrant
Health	2,293		
Salvation	2,277		
Milieu	2,008		
Average performance	**2,193**		
Interpretation	**Bad**		

Based on the results of collecting observation data, interviews, and questionnaires, the calculation of the effectiveness of the performance of Health, Safety, and Environment indicators has not met the criteria.

4.1.4 Training and Development

The items in this indicator are regarding training and development of facilities in tourist areas.

Table 9 Qualitative Results of Training and Development

Items	Unit of Analysis	Existing
Training	Cipadayungan Waterfall Waterfall Cigorobog Waterfall Ciputra-fragrant	Have participated in training, but have not implemented it optimally.
Development	Cipadayungan Waterfall Waterfall Cigorobog Waterfall Ciputra-fragrant	1. There is no development in tourist areas 2. There are no new innovations yet
Performance Effectiveness		**Bad**

Based on the table, it can be concluded that the Effectiveness of Training and Development is poor. This is because training for officers and development of facilities are not carried out in accordance with the criteria. In addition to qualitative performance measurement, the following is the conclusion of quantitative performance measurement on Training and Development Indicators has an average performance of Training and Development indicators, which is 1.977 with a Poor interpretation. It can be inferred from the training and development indicators of the three tourism, namely Bad.

4.1.5 Accessibility

Items in accessibility are access and quality of roads, access to various modes of transportation, and access to public transportation. Here's the explanation.

Table 10. Qualitative Results of Accessibility Indicators

Items	Unit of Analysis	Existing
Road Access and Quality	Cipadayungan Waterfall Waterfall Cigorobog Waterfall Ciputra-fragrant	1. The physical condition of the road is potholes, many rocks, and dirty 2. There are no road signs
Access to various modes of transportation	Cipadayungan Waterfall Waterfall Cigorobog Waterfall Ciputra-fragrant	1. Accessible to two- and four-wheeled vehicles 2. There is no special lane for cyclists 3. There is no pathway for people with disabilities
Access public transportation services	Cipadayungan Waterfall Waterfall Cigorobog Waterfall Ciputra-fragrant	Public transportation service is not yet available
PerformanceEffectiveness		**Bad**

In addition to qualitative performance measurements, the following are the conclusions of quantitative performance measurements on accessibility indicators that can be referenced in the following table.

Table 11 Quantitative Results of Accessibility Indicators

Items	Mean		
	Cipada-yungan Waterfall	**Cigo-robog Waterfall**	**Ciputra Waterfall-fragrant**
Road access and quality	2,089		
Access to various modes of transporta-tion	2,268		
Access public transportation services	1,617		
Average perfor-mance	**1,991**		
Interpretation	**Bad**		

It can be inferred from the Accessibility indicators of the three tourism, namely Bad.

4.1.6 User Satisfaction

This measurement was carried out to determine the satisfaction of asset users, namely tourists in assessing tourism with satisfaction items, making return visits, and recommending to others. It is known based on the perception of asset users with a mean value of 2.297 with the interpretation of "Not Good", it means that asset users feel dissatisfied with the three tours.

4.1.7 Employee Satisfaction

This measurement is carried out to determine employee satisfaction based on the perception of asset users, namely tourists. It is known that based on the perception of asset users with a mean value of 2.323 with the interpretation of "Not Good", it means that asset users feel dissatisfied with the employees of the three tours.

4.2 Problem Definition and Troubleshooting Method Recommendations

Based on the problems identified in the facility assets in Cipadayungan, Cigorobog, and Ciputrawangi Tourism, planning is needed for actions that can improve the effectiveness of the operation and maintenance of natural tourism assets in Sumedang Regency. There are recommendations for solving problems based on the problems found, namely the Planning of the Operating System and Maintenance of Nature Tourism in Sumedang Regency.

5. Conclusions

Based on the results of the discussion that has been presented regarding performance measurement, it can be concluded that:

1. Asset indicators met nine out of thirteen facilities and the condition of the nine available facilities shows poor
2. Operation and maintenance indicators show that the operation is not optimal because it is in a damaged condition, and maintenance has not been effective preventively and correctively and has not been carried out regularly.
3. Health, safety, and environmental indicators show that health is in poor condition because water and air conditioning conditions are not good, safety shows poor with the unavailability of fire extinguishers and CCTV and there is a possibility of accidents due to damage to facilities, and there are no special security officers, and the environment shows bad because there is pollution, poor waste management, and there are no environmental conservation activities.
4. Training and development indicators show poor because training is not implemented and there is no development and innovation in tourism areas.
5. Accessibility indicators show poor because the physical condition of the road is damaged, accessible to two- and four-wheeled vehicles, but there are no lanes for cyclists and people with disabilities and there is no public transportation service.
6. The asset user satisfaction indicator shows poor because asset users feel dissatisfied with the attractions, facilities, and services provided by the officers.
7. Employee satisfaction indicators show poor because the service provided is not good.

6. Recomendation

There are recommendation for managers as follows:

1. Make repairs to recreational facilities, food and beverage services, toilets, information centers, gazebos, garbage cans, seating, places of worship, and parking lots. Also, procuring facilities that are not yet available in tourist areas such as accommodation, information boards, road signs, and security posts.
2. Perform routine maintenance on available facilities. Also, make a schedule for preventive maintenance of available facilities.
3. Procurement for safety, namely fire extinguishers, CCTV, garbage cans according to the type of garbage and providing special security officers.
4. Optimizing training for tourism officers to develop and innovate facilities and land that have not been developed.
5. Creating access for cyclist paths and paths for people with disabilities.
6. Develop and innovate facilities in tourist areas by adding facilities that are not yet available and replacing those that have been damaged.
7. Conduct training for officers to improve the services provided.

In addition to suggestions for managers, there are academic suggestions for further research as follows

1. Further research is expected to be based on probability sampling to be more representative of a population.
2. Further research is expected to expand the selected objects and is not limited to the

waterfall natural tourism sector but other natural tourism sectors.

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