Economic valuation of coal mine reclamation kandih, sawahlunto regency, west sumatera

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Abstract. Reclamation of post coal mining area in Kandih, Sawahlunto Regency needs to be conducted with concern for environmental sustainability and local economic growth. This study was aimed at determining the economic valuation use and non-use of the reclamation of the post coal mining area in Kandih with the approach of willingness to pay (WTP). The research was conducted in the concession land area of post coal mining in Kandih, West Sumatera. Primary data were collected by dialog tourism, the mining company, and regional government office. The study sample consisted of tourists, community and business actors. Data analysis methods used include Travel Cost Method, Contingent Value Method with Willingness to pay approach. The assessment of WTP used open-end questionnaire. The results show that the value of Reclamation of post coal mining area in Kandih, Sawahlunto Regency identified four variables consisting of the economic value of tourism activity, the economic value of the products and services and economic value of conservation, economic value of satisfaction to tourist area. Valuation of economic value of use and non-use of of the reclamation of the post coal mining area in Kandih, Sawahlunto Regency is Rp 6.911.318.865,00,-.

1. Introduction

Indonesia is a country of abundant natural resources. The potential for coal spread throughout Indonesia, the Sunda (Sumatra and Kalimantan) exposure is an area of high quality and reserves of coal. Mining operations are a process of diverting nature's resources into real economic capital for the country and into social capital, which is expected to increase the quality value of people to face their future days independently [9].

Coal mining activities in Indonesia have been going from the Dutch colonial era to the present. The mining sector is one of the key sectors in the Indonesian economy that is dominant as a federal foreign donor. Mineral mining and coal mining activities play an important role in giving real economic growth to national economic growth and sustainable development. The coal mining sector donated 2.57 trillion in 2004, and it increased in 2007 to 8.70 billion and continued to increase as production increased to meet demand from both home and overseas. For an area rich in its resources, mining operations are the economic backbone of the region [1].

Mining activities often cause environmental damage, which is in the form of damage to ecosystems which subsequently threatens and endangers human survival itself. The former coal mining area has been degraded by landscapes (decreased quality of the site) as a result of coal exploitation. The decline in environmental quality caused by coal mining with open-pit mining methods has caused changes in the landscape, damaging the ecological function of an ecosystem, increasing the rate of runoff erosion and changing the microclimate. Therefore environmental management and control are needed which can guarantee post-mining land use.
Sawahlunto is part of the Ombilin Basin which is famous for its best quality coal, namely anthracite. The Ombilin Basin is formed by two Paleogene and Neogene ages, limited by the north-south trending Tanjung Ampalu fault. In the Ombilin Basin itself, there are two other sub-basins namely the tawali sub-basin and the sinamar sub-basin. This area has several outcrops of sedimentary rocks that are as diverse as coal, limestone, layered limestone, flint, archose sandstones, and andesite breccia. While the raw rock is andesite interaline, andesite augite, granodiorite, and quartz porphyry.

Sawahlunto is the oldest mining city in Indonesia. Sawahlunto is located 95 km northeast of Padang City, which is surrounded by three districts, namely Tanah Datar District, Solok Regency, and Sijunjung Regency. Mining activities in the coal sector began in the Dutch colonial era in 1888 and built a government-owned mining company, the ombilin coal mining company. After the independence era, the mining company changed its name to the Bukit Asam Ombilin Mining Unit. The Bukit Asam Company Ombilin Mining Unit uses an Open Pit system and an inner mine located in the Tanah Hitam area, Kandi, Sapan Dalam and Kumanis area of 529.65 ha which was completed by the end of 2002.

Reclamation and revegetation activities of the mining area from 1980 to 2003 in the Kandi area covering 192.11 ha and the Tanah Hitam area covering 201.45 ha, or a total area of 393.45 ha. Mine Closure Plan, ex-mining land is used for various purposes, namely natural forest areas, tourist forests, and former mining holes used as water reservoirs and fishing ponds for residents of Sawahlunto. Utilization of ex-mining land in the form of forests, racetrack, motor cross arena, road race arena, recreational arena, zoo, breeding farm, and PLN ash disposal site. The Landscape is the basic media for planning the development of natural tourism, namely tourism activities by doing trips in nature and not doing destruction with the specific purpose of learning, enjoying and enjoying the scenery (plants, animals and culture)][6].

The main purpose of land use from reclamation of ex-mining land is reforested, but there are several other uses of land use such as utilization for plantation land, planted food crops, livestock or fisheries areas, and locations of ecotourism, wetlands, and others. The use of reclamation land is based on aspects of spatial planning, land allocation in accordance with the needs of the community, the interests of the local government, land ownership, and others. Other uses of reclamation forest based on forest functions have intangible value, namely: producing oxygen; regulate climate and absorb carbon dioxide; play a role in water governance; role in stabilization and control of soil erosion; source of biodiversity; forest ecosystem that has beauty as a potential for recreation tourism. The Kandi reclamation area is a mainstay tourism area that is used as a support for Sawahlunto City's regional revenue. The original income of the city of Sawahlunto which contributed from the tourism sector in 2010-2015 was Rp. 23,044,852,000 or 4.19% [8]

The potential of natural resources and the environment of Indonesia cannot be maximally utilized both economically and human resources themselves. The existing potential is often not accompanied by good resource and environmental management so that it cannot be used sustainably in the future, such as clearing forest land for coal mining activities without accompanying reclamation activities after the post-mining will cause arid areas and open-pit mining just like that. Economic valuation as a bridge to record the extent to which the economic potential of an existing natural and environmental resource so that it can be fully utilized and natural resources can also be used by future generations. Economic valuation is expected to be able to create management based on maintenance and protection of natural resources, in addition to being able to create economic values that can benefit life. This economic valuation is also the right choice in natural resource management.

Economic valuation is very important to do, especially in the management of natural, cultural and environmental resources to be able to manage resources efficiently and on target. Every resource that is utilized, must have an impact both economically, physically and socially in the community. The impact of activities on a resource can be negative and positive. Therefore, the quantification of benefits and losses must be done so that the decision-making process can be carried out by taking into account aspects of justice. The role of economic valuation on the management of natural resources and the environment is very important in determining a development policy. The decline in the quality of natural resources and the environment is an economic problem because the ability of natural resources to provide goods
and services is decreasing, especially in natural resources that cannot be restored (irreversible). Therefore, the quantification of benefits (benefits) and losses (costs) must be done so that the decision-making process can be carried out by taking into account fairness.

The purpose of economic valuation is basically to help decision-makers to predict economic efficiency from various possible uses [3]. The purpose of economic valuation is to provide economic value to the resources used in accordance with real values from the point of view of the community. Environmental valuation is an integral part and sectoral priority in determining the balance between conservation and development [5].

2. Methods
The location of the study was carried out in the coal mining reclamation area of PT. Bukit Asam Ombilin Mining Unit located in Kandi, Sawahlunto City, West Sumatra. The Kandi reclamation area is used as a strategic tourist area of Sawahlunto City. The research method to collect primary data was by using distributed questionnaires to tourists. The total number of respondents for this research were 241 tourists. Sampling is used accidental sampling method and determination of the number of samples with quota sampling. Besides that, secondary data were also used in this research such as data obtained from journal articles, books, and other literary materials [4][7].

The utilization of tourism objects in the Kandi Reclamation Area is obtained by using the Travel Cost Method (TCM) method. This method aims to calculate all costs incurred by tourists to visit the region, namely ticket prices, transportation, accommodation, consumption, and documentation costs, where these variables are measured using a continuous scale with rupiah units. The CVM method used in this study is the Open-Ended Question method. This method is done by asking the respondent directly how much is the maximum amount of money to be paid for changes in environmental quality [2][10].

3. Results and Discussion
3.1. Demographic profile of tourists
The number of male and female visitors is 37 people and 63 people, visitors are dominated by women. The Kandi reclamation tourist area is an area of education tourism, family tourism, nature tourism and thematic tourism. Therefore, the number of female visitors is more dominant than male visitors, this can be seen when in the field, the Kandi reclamation tourist area is a tourist destination of schools, such as school farewell activities or school holiday activities. Age is dominated by the age group from the range of 20-26 years, which is around 43%, in this age group consists of students who are taking college and those who have graduated and those who have worked. The last level of education of tourists who came to Kandi was dominated by senior high school education which was 56%. Bachelor and Diploma education levels are around 25% and 13%. Furthermore, elementary and junior high school education levels are around 4% and 2%.

Tourists by type of work are dominated by students, which is around 33%, housewives around 18%, entrepreneurs around 17%, PNS 15%, private employees 9%, farmers around 4%, students around 2%, and salespeople and traders around 1%. The highest income is in the range of IDR 4,000,000 which is around 7%, those who have income in this range are working as civil servants. Then in the range of Rp. 2,100,000 to Rp. 3,000,000 which is around 18%. The dominant number of tourists visiting Kandih tourist park is in the range of Rp. 1,100,000 to Rp. 2,000,000 which is around 36%, compared to the Sawahlunto MSE of Rp. 1,850,000 meaning tourists can reach the reclaimed Kandih tourist area with their total income above tourists who have an income of less than Rp 2,000,000, this is due to the price of an affordable ticket. Visitors are dominated by tourists at a distance of 21-40 km. This shows that the Kandih tourist area is one of the tourist destinations between tourists in the administrative area of Sawahlunto and outside the city of Sawahlunto. The distance of 21-40 km has a percentage of about 40%, meaning that tourists have the desire or interest to visit the Kandih tourist area, as well as long distances not affected by the desire of tourists to visit Kandih tourist attractions.
3.2. Economic Value of Tourism Activities
Economic value is calculated from two aspects, namely, travel costs (transportation) and accommodation costs (accommodation and parking), travel costs using the travel cost method. Ticket prices for entry fees are IDR 10,000 per person on weekdays and IDR 15,000 / person on holidays. Accommodation is charged to the cost of vehicles entering the area which is also calculated as parking money. The calculation of the economic value of tourism activities is summarized based on the results of data processing the average amount of each expenditure multiplied by a visit during 2018, then an estimate of the direct value of the economic value of tourism activities is obtained. The type of expenditure is calculated based on the cost of entry tickets, transportation while for consumption costs and others are charged to the calculation of the economic value of tourism products and services.

| Type of Income      | Direct Travel Value (Rp) |
|---------------------|--------------------------|
| Person of Ticket    | Rp 1,277,507,550.00      |
| Vehicle Ticket      | Rp 413,983,590.00        |
| Transportation      | Rp 4,670,209,335.00     |
| Total               | Rp 6,361,700,475.00     |

The total income generated in a year is six billion three hundred sixty-one million seven hundred thousand four hundred seventy-five rupiah. Individual and vehicle tourist tickets are calculated based on the number of visitors in 2018, the results are Rp. 1,277,507,550.00, then added with vehicle parking tickets based on the classification of vehicle types with vehicle data in 2018 multiplied by the parking ticket price obtained Rp. 413,983,590.00, and transportation income obtained through the model of the travel cost method obtained a value of Rp 4,670,209,335.00. The results of the calculation of economic valuation show that for a year from the Kandih tourist area is able to provide a large income, but from the management itself regretted the decline in tourists every year even though the target of the tourists every year can be achieved.

3.3. Economic Value of Products and Services
The total economic value of tourism products and services is obtained from the economic activities of the people around the Kandih reclamation tourist area. The economic value of products and services is an alternative value for calculating tourist consumption in tourist areas because the consumption value of products and services is very difficult to calculate based on the answers of tourists.

| Day(year) | Profit(year) |
|-----------|--------------|
| Holiday   | Rp 35,700,000.00 |
| Weekdays  | Rp 24,600,000.00 |
| Total     | Rp 60,300,000.00 |

The economic activities of products and services, namely on holidays, get an average net profit in a year of around Rp. 35,700,000.00, on weekdays around Rp. 24,600,000.00 and the total annual income of traders reaches Rp. 60,300,000. Observation in the field shows the consumption costs of tourists in consumptive behavioural activities while visiting the Kandih reclamation tour, according to the author's observation based on interviews with seven traders who are around the Kandih reclamation tour, therefore the business income results are obtained and can be estimated the value of tourism consumption.
3.4. **Economic Value of Conservation**

Conservation economic value is the value obtained based on the willingness of tourists to spend willingness to pay as compensation for conservation costs. The value of willingness to pay for conservation in the Kandih reclamation tourist area is divided into five classes of PAPs with a range of costs of willingness to pay between zero rupiahs up to fifty thousand rupiahs. A sampling of 100 people is the basis for dividing total tourists into the class of cost class. If calculated based on the sample, the total willingness of tourists to pay for the conservation of the Kandih reclamation tourist area is IDR 277,000 (two hundred seventy-seven thousand rupiahs). When calculated with the total number of tourists, the conservation value is Rp. 261,158,370/year (two hundred sixty-one one hundred fifty-eight thousand three hundred seventy rupiahs) per year.

3.5. **Economic Value of Satisfaction**

The economic value of satisfaction is the value obtained based on the willingness of tourists to spend money or willingness to pay as compensation for satisfaction. The value of willingness to pay for satisfaction in the reclaimed Kandih tourist area is divided into five classes of PAPs with a range of costs of willingness to pay between zero rupiahs up to fifty thousand rupiahs. Taking a hundred people is the basis for dividing the total tourists to the cost class, if calculated based on the sample, the total willingness of tourists to pay is related to the satisfaction of the Kandih reclamation tourist area of Rp 228,160,020.00/year (two hundred twenty-eight million one hundred and sixty thousand twenty rupiahs).

3.6. **Total economic value**

Based on the results of the economic valuation obtained based on variables on the value of use and non-use value, the total economic value can be calculated by summing all the attributes of variables that can be identified and then calculated their economic magnitude with units of rupiah per year.

| Variable                               | Value (Rp)                | Percentage |
|----------------------------------------|---------------------------|------------|
| Economic value of tourism              | Rp 6,361,700,475,00       | 92         |
| Economic value of products and services| Rp 60,300,000,00          | 1          |
| Conservation economic value            | Rp 261,158,370,00         | 4          |
| Economic value satisfaction            | Rp 228,160,020,00         | 3          |
| Total economic value                   | Rp 6,911,318,865,00       | 100        |

The variable value that has the highest value is the tourism economy variable and the amount is Rp. 6,361,700,475 and for the lowest variable value is the economic value of products and services of Rp. 60,300,000. Based on table 4.21, the total economic value is Rp. 6,911,318,865. Tourist value is obtained after the development of tourist areas that are considered potential, this cannot be separated from environmental benefits as an object for tourism activities in addition to being a conservation effort. Utilization of reclamation land as one of the functions for tourism objects with natural conditions that are still maintained and maintained by the environment can support one of the economic resources in the city of Sawahlunto and is located in the area around the Kandih reclamation tourism area. The value of tourism economic activities can be the original import of the area of Sawahlunto City.

4. **Conclusion**

The economic value of the use and non-tourism use of the Reclaimed Kandih Tourism Area were identified by four variables, consisting of, economic activities of tourism activities, the economic value of products and services, the economic value of conservation and economic value of satisfaction. The economic valuation of the use and non-tourism use of the Kandih Reclamation Tourism Area is Rp.
6,911,318,865 (six billion nine hundred eleven million three hundred eighteen thousand eight hundred and sixty-five rupiahs) / year. The highest economic value obtained from the economic value of tourism activities is Rp. 6,361,700,475.00 or a percentage of 92%. The lowest economic value is the economic value of products and services, amounting to Rp. 60,300,000.00 or 1% of the total economic value in the tourist area of Kandi reclamation.

Environmental economic value must be a reference so that economic aspects are not always a problem and actions to exploit nature so that they are not misused, because environmental economics studies provide many benefits including in the management planning of an environmentally sound area. Various tourist attractions develop faster when the community is involved, the community has a greater portion in its management and is managed professionally like the private sector so that what is expected to be the benefits of the reclamation area as community empowerment is truly implemented.

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