

Economic valuation of the orangutan conservation tourism in Bukit Lawang Langkat District, North Sumatera

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Abstract. Orangutan Conservation Tourism in Bukit Lawang (OCTB) is a national conservation area located in the GLPN protected forest area in Langkat Regency, North Sumatra Province, in which this conservation area has special characteristics, that is, it is inhabited by Sumatran orangutans (*Pongo abelii*). This study aimed to 1) analyze the costs that must be spent to maintain and preserve species, ecosystems and management at OCTB; 2) analyze the economic value of OCTB through economic valuation. The economic valuation in this study used the Travel Cost Method (TCM) approach, namely Individual Travel Cost Method (ITCM) for visitors at OCTB in October 2018. TCM calculations were factors influencing the frequency of tourist to visit OCTB by using a linear regression analysis approach, while the Cost Benefit Analysis used the Net Present Value (NPV), Internal Rate of Return (IRR) and Benefit Cost Ratio (BCR). Cost incurred to maintain and preserve species, ecosystems, and management at OCTB was Rp. 5,653,979,610.00, while the largest cost was the initial investment cost, that is, Rp 3,973,763,610.00 (70.28%). The economic valuation (VE) was about 7.375.06.959.75. The benefit of OCTB tour is Rp. 1.721.082.350 per year. The result of cost-benefit analysis of OCTB was that it was a feasible business calculation when viewed in terms of benefits for the local community, especially the economy and nature conservation particularly in Bukit Lawang. This was based on OCTB's economic valuation that was very feasible and beneficial for all parties, especially for ecosystem sustainability.

Key Words: Bukit Lawang, orangutan ecotourism, economic valuation, TCM.

Introduction. The existence of orangutan as one of the rare primates in the world makes it a special attraction for tourists, especially tourists at Gunung Leuser National Park Area, North Sumatra Province. The Sumatran orangutan (*Pongo abelii*) (Figure 1) lives in the Gunung Leuser National Park area (GLNP), precisely at Bukit Lawang, Langkat Regency, North Sumatra Province. This primate is one of the most famous tourism conservations or ecotourism sites in North Sumatra. There is a tendency that people like to visit a new place that is different from their environment, where they usually live in. This makes tourism in GLNP area more interesting for the community (Hermawan 2017).



Figure 1. An individual of Sumatran orangutan (*Pongo abelii*) (Source: https://commons.wikimedia.org/wiki/File:Sumatra-Orang-Utan_im_Pongoland.jpg).



Figure 3. Details from Bukit Lawang area (Source: authors photo collection, 2018).

National Park Management Section (NPMS) of Region VI Besitang in GLNP area has 126.000 ha, divided into 6 (six) Resort working areas, namely Resort Trenggulun, Sei Betung, Sekoci, Sei Lapan, Cinta Raja, and Tangkahan. The management of Gunung Leuser National Park (GLNP) area in NPMS of Region VI Besitang faces very complex problems starting from the damage of GLNP area (Ismail 2011). Damage of GLNP area is allegedly caused by economic activities, so it requires a research study to create sustainable development (Ginting et al 2010). However, it is important to know how much the economic value should be obtained from GLNP; therefore, it needs an economic valuation. According to research study conducted by Sismudjito & Daulay (2018), the economic growth of Bukit Lawang in Langkat Regency, North Sumatra has been developed through society based on tourism sector. Through retribution paid by tourists, it can be used to support habitat preservation and conservation areas (Sismudjito & Daulay 2018).

One of the ways to find out the economic value of OCTB area is by carrying out the economic valuations. Regarding on economic valuation Krause et al (2017) has assessed economic ecosystem services based on the perceptions of rural communities in Ethiopia concluding that there are significant changes in land use time by time due to the main source of livelihood in the partnership community. In this study, the approach will use Cost Benefit Analysis, which is an approach with a systematic and analytical process by comparing the benefit and cost of evaluating the will of a social project or program. Benefit cost analysis (BCA) is used to calculate economic valuations in OCTB. Economic valuation is carried out on two sides, namely economic valuation of existing condition and on condition after doing OCTB alternate analysis management solutions.

Material and Method

Description of the study sites. Research was conducted at National Park Management Section (NPMS) V Bukit Lawang, Greater Hall of Gunung Leuser National Park (GHGLNP), Langkat Regency, North Sumatra Province. The strategy of data collection with survey methods was done by using structured record review and structured observation to gather information about data collection in the calculation of Ecosystem Economic Evaluation of OCTB (Suharjito 2013).

Data collection. Research data included a primary data and a secondary data. Primary data were obtained based on interviews with foreign and local tourists by using

convenient sampling way as many as 16 people and then, secondary data were in the form of visit data, expenditure data (costs) and income from ticket sales taken from NPMS V Bukit Lawang Recapitulation/Reports and GHGLNP.

Economic valuation. Economic valuation in this study used the revealed preference (RP) approach, namely Travel Cost Method (TCM). TCM was a revealed assessment method used to assess non-use benefits based on observed behavior, individual expenses for travel. TCM approach used in this study was the Individual Travel Cost Method (ITCM) (Fauzi 2014) conducted by using survey of visitors at OCTB object in October 2018. Calculation of factors influencing the frequency of tourist visits to OCTB used linear regression analysis approach, while the cost benefit analysis used three financial statements, such as the Net Present Value (NPV), Internal Rate of Return (IRR) and Benefit Cost Ratio (BCR).

Results. From the valuation result carried out in this study, it is known that the total value of benefits from orangutan conservation tourism was Rp. 1,721,082,350,- per year during 2018. The biggest benefit of conservation tourism was obtained from the benefits of direct use that were non-extractive in the amount of Rp. 1,721,082,350,- per year (see Table 1). This acquisition was based on the receipt of entrance fees (tickets), either visitors or foreign/domestic tourists based on the price of the entrance ticket. The price of ticket for foreign was Rp 150,000 while domestic was Rp 5,000. Actually OCTB's source of income was quite a lot, such as parking, hotels/homestays/resorts, restaurants/stalls, rent on infrastructure facilities, photos, and so on not to mention the ticket, but the data were difficult to record properly.

Table 1
The benefit valuation of orangutan conservation tourism in Bukit Lawang in 2017

No.	Type of benefit	Valuation/year (in Rp.)
1	Extractive direct benefit	-
2	Non-extractive direct benefit (tourism)	1,221,082,350
3	Alternate benefit	-
4	Multiflier effect	500,000,000
Total		1,721,082,350

Source: NPMS V Bukit Lawang, 2018.

This study only examined conservation tourism benefits (non-extractive direct benefit), extractive direct benefit, such as timber and non-timber forest product, and the data on alternate benefit can not be obtained because the focus of this research was more on ecotourism. In fact, this greatly affected people living in Bukit Lawang and gave benefit for community around OCTB. This can be seen from the large influence of OCTB's existence on socio-economic conditions and the existence of local community.

Based on direct interview with the community and local community leaders/figure, both innkeepers (especially homestays and hotels), restaurants, tour guides and traders and communities were directly related to tourism businesses and other communities. The existence of OCTB was very beneficial for the economy of the community. By the existence of OCTB, automatically the condition of forest and GLNP could be well maintained because people were aware of the presence of forests and animals, especially orangutan, so tourists will arrive at Bukit Lawang. If Bukit Lawang ecotourism is stopped, the community will automatically explore the forest to cut down trees and hunt animals. This means that OCTB provides sufficient economic benefits with the existence of forests, animals, and the ecosystem in Bukit Lawang particularly to be well maintained.

Non-extractive direct benefit (tourism). Non-extractive indirect benefit at NPMS V Bukit Lawang, GHGLNP Region III Stabat is an orangutan conservation tourism. Data of visit to orangutan conservation tourism were based on data obtained from NPMS V Bukit Lawang, from 1985 to 2017 and monthly data from October 2018. This showed the

interest in orangutan conservation tourism dominated by tourists from foreign countries/foreigners. In 1985 when it was just opened, the number of foreign tourists reached 2,280 people in one year. The number of foreign tourist visit continued to increase significantly until 1995, reaching a peak of 21,577 people a year. Since the global economic crisis and Indonesian crisis in 1997-1998, there had been a decline, it became only 6,971 people to visit. The peak of the decline was very huge. It happened after Bahorok River got a flash flood in 2003, and in 2004 only 1,051 people came to visit, even there were hardly local tourists found because all tours on the banks of Bahorok River and residential areas were severely damaged. This only left few structures/building, among its 'historical witness', there was mosque on the banks of Bahorok River.

On the other hand, domestic or local tourists had only little interest. It was recorded in 1990. This happened because local people were used to seeing forests and wildlife, so conservation tourism was not an interesting thing for them. In addition, the interest and need for the importance of tourism for Indonesians in the 1990s was still relatively low. In 2008-2011 it began to stretch and there was an increasing number again, but from 2013 to 2016, at the beginning there were around 7,800 foreign tourists. This dropped into 3,325 tourists in 2016. In 2017, it began to increase again. This was because the information, documentation and promotion of Bukit Lawang Orangutan conservation tourism started to flourish on social media and on the Internet (Table 2).

Table 2

Data on orangutan conservation tourism visit since 1985 to 2017

No.	Year	Visitors (people)		
		Local	Foreigner	Total
1	1985	-	2.280	2.280
2	1986	-	2.836	2.836
3	1987	-	4.905	4.905
4	1988	-	6.834	6.834
5	1989	-	10.131	10.131
6	1990	6.782	13.599	20.381
7	1991	6.981	16.364	23.345
8	1992	6.494	18.299	27.193
9	1993	9.071	18.122	27.193
10	1994	7.402	18.474	25.876
11	1995	7.561	21.577	29.138
12	1996	585.	16.133	21.987
13	1997	4.819	14240	19.059
14	1998	401.	6.971	10.981
15	1999	3.855	8.507	12.362
16	2000	5.182	9.123	14.305
17	2001	3.887	8.402	12.289
18	2002	4.151	6.844	10.995
19	2003	3.648	3.342	6.990
20	2004	-	1.051	1.051
21	2005	255	1.831	2.086
22	2006	-	2.070	2.070
23	2007	141	3.442	3.583
24	2008	266	5.285	5.551
25	2009	903	8.544	9.447
26	2010	2.679	8.830	11.509
27	2011	2.058	8.629	10.687
28	2012	1.360	6.843	8.203
29	2013	3.152	7.812	10.964
30	2014	3.868	6.425	10.293
31	2015	3.762	3.485	7.247
32	2016	2.065	3.325	5.390
33	2017	5.464	11.067	16.531

Source: NPMS V Bukit Lawang October 2018.

When it was viewed from visiting data monthly, the peak visit of tourists especially foreign tourists was around July to August and November to December. Domestic tourists were in December to January. The quietest visit happened around February, June, and October for foreign tourists, while for local/domestic tourists the lowest visit was around the fasting month in the last two years, that is, June and October (Table 3).

This number was the total foreign tourists and domestic tourists in one year from 2016 to September 2018. Foreigners visiting Bukit Lawang usually carried out an observation of wild orangutans and tuberafting in the Bahorok River while Indonesian tourists preferred to explore caves, jungle tracking, rafting or river tubing and bathing under waterfalls.

Table 3
Data on orangutan conservation tourism in Bukit Lawang visit per month in 2016 to 2018

Month	2016		2017		2018	
	Domestic	International	Domestic	International	Domestic	International
January	320	148	774	1.080	800	373
February	120	99	432	783	411	541
March	238	190	636	1.012	481	427
April	106	192	537	973	771	858
May	112	136	418	680	378	631
June	35	192	56	399	908	561
July	223	424	887	1.760	577	1.547
August	82	426	463	1.723	322	1.472
September	110	270	327	1.084	327	1.060
October	18	148	251	673		
November	157	461	329	416		
December	544	639	354	484		
Total	2.065	3.325	5.464	11.067	4.975	7.470

Source: NMPS V Bukit Lawang, GHGLPN, October 2018.

There were 16 people who were successfully interviewed about costs incurred by tourists, both foreigners and domestic tourists. There were seven (7) foreigners and nine (9) domestic tourists. The variables measured in the interview were the frequency of visits (V), total costs incurred (TC), distance from the place of tourists' origin (D), per capita income (I) per year, age (A), education (P) and dependents (T). Based on the collected data from 16 tourists, economic valuation was carried out using the Individual Travel Cost Method (ITCM) approach or travel cost method per tourist/individual. TCM was a revealed assessment method used to assess non-use benefits based on observed behavior, individual expenditure for Trip. ITCM was conducted by surveying visitors at OCTB site. The results of linear regression analysis to analyze factors that can affect the frequency (often or not) of tourists visiting Bukit Lawang can be seen in Table 4.

Table 4
The non-extractive direct benefit regression coefficient of orangutan conservation tourism

	Coefficients	Standard error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
Intercept	2.888	2.327	1.241	0.243	-2.297	8.072	-2.297	8.072
Total cost (TC)	-0.444	0.180	-2.466	0.033	-0.845	-0.043	-0.845	-0.043
Distance (D)	-0.014	0.027	-0.500	0.628	-0.074	0.047	-0.074	0.047
Income (I)	0.548	0.256	2.142	0.058	-0.022	1.118	-0.022	1.118
Age (A)	-1.845	0.354	-5.217	0.000	-2.632	-1.057	-2.632	-1.057
Education (P)	0.172	0.116	1.487	0.168	-0.086	0.430	-0.086	0.430
R ²	0.835							
N	16							
Durbin-Watson statistic = 2.05892								

The demand function in this study was based on the level/frequency of tourist visits (V) influenced by the variable total costs incurred for traveling to Bukit Lawang (TC), distance from the place of origin/country of origin (D), income per capita (I), age (A), education (P) and dependents of respondents (T). In this equation, the level of visit was the dependent variable or variable influenced by the costs incurred from place of origin to Bukit Lawang only (TC), distance traveled (D), income (I), age (A) and education (P).

The results of linear regression analysis are presented in Table 4. The coefficient value of determination R^2 was equal to 0.835 meaning that the independent variable was only able to explain changing variation in dependent variable by 83.5%, and the rest was explained by other variables not examined (included) in this study. Based on Table 4, the regression equation is obtained as follows:

$$\ln V = 2.89 - 0.444 \ln TC - 0.0136 \ln D + 0.548 \ln I - 1.84 \ln A + 0.172 P$$

The test result showed that the five variables observed were three (3) variables that had a significant influence on the total costs incurred (TC), income (I), and age (A), while distance (D) and education (P) of tourists had no significant effect. This can be seen from the t-count and P-value from the regression analysis in Table 4.

In this study, the level of tourist visits was influenced by travel costs (TC), income and age. Consumer surplus was difference among the level of consumers' willingness to pay and the costs that must be paid to obtain a satisfaction, higher tourists' expenditure when they visit to this location. This means that tourists are more satisfied to the tourist location that they visited and vice versa.

Consumer surplus is the willingness level of consumers to pay costs that must be incurred to obtain satisfaction. The level of tourists' satisfaction visiting Orangutan conservation tourism in Bukit Lawang can be seen based on the expenditure level of tourist coming to visit the conservation tourism. The lower the expenditure tourists pay when visiting the location, the more satisfied the tourist feel when visiting tourist objects and vice versa.

The general formula used in calculating consumer surplus is Consumer Surplus $CS = -V / B1$. Based on the result of regression equation analysis using an individual approach, it produces the request function above so that the β_0 -0.44 and CS coefficients obtained are Rp. 5.52 (in million) (Fauzi 2014).

From the demand equation it can be obtained from consumer supply per individual of Rp. 5.52 (in million). This means that each upsurge of travel costs will negatively affect the level of satisfaction. The consumer surplus describes the ability to pay outside the market price which is part of proxy from regional economic value. For example, if the cost of traveling increases by 1%, the estimated frequency of visits will decrease by 0.444 times. For tourism in total per year it can be calculated based on total tourist visits per year multiplied by the consumer surplus value per individual ($CS \times$ Number of visits/Year). The number of tourist visiting to Bukit Lawang per year during 2018 was 16,531 people, then Rp. 5.52 x 16,531 people = 91,332. Total consumer surplus for tourism in sum per year was Rp. 91,332 (in million) if the average visitor in one year was 16 531 people. This value was generated by multiplying the consumer surplus value multiplied by the total value of visits per year. Indeed, according to Fauzi (2014), ITCM method is truncated and censored emerging. This was because the ITCM only recorded visitors coming to the location when the survey was conducted. Censored characteristic was due to the dependent variable which may not record visits that is less than once.

Discussion. Cost Valuation of Gunung Leuser National Park NPMS V Bukit Lawang In general, the consequences of these conservation tourism activities have caused losses to surrounding community (negative externalities) in the form of opportunity loss for community to earn income from the GLNP forest. On the contrary, in OCT, it was precisely the local community that had the benefits. From data collected in the field, regarding on total cost of managing conservation tourism issued by the government (GHGLNP) in 2018, it was found as big as Rp. 5,653,979,610.00. Costs incurred were on investment costs, operational costs (other transaction costs) and social costs (Table 5). The investment cost was the largest composition, but it was rarely done because of

limited funds, which was also caused by OCTB with a specific and different tourism object needed to be maintained to remain natural and sustainable.

Table 5

Total conservation costs for GLNP NPMS V Bukit Lawang (orangutan) 2018

No.	Cost description	Total cost per year	Percentage (%)
1	Investment Cost	3,973,763,610.00	70.28
2	Operational Cost	1,677,716,000.00	29.67
3	Social Cost	2,500,000.00	0.04
Total		5,653,979,610.00	100

Source: NPMS V Bukit Lawang, 2018.

The investment costs incurred by GLNP were only carried out in 2017 and 2018. This thing happened because OCTB was a special tourism site and the target of tourists was mostly foreigners in which foreign tourists generally want OCTB site in a truly natural site, such as the atmosphere and has a minimum infrastructure built in the area which can damage habitat and natural atmosphere. The example is that the trekking line must remain land and there should not be made permanent roads, such as concrete, asphalt or sidewalk (the result of direct communication with Mr. Paijo/Head of Subdivision of Cooperation and Planning GHGLNP). The investment costs incurred in 2017 were only for making a canopy trail for Rp. 400 millions, while in 2018 there was Rp. 3,973,763,610 used for the construction of tourism infrastructure, visitor service activities, and management of orangutans by NGOs as partner of GLNP. In the next 2019, there will have not been any plan to invest in OCTB, but there will be only maintenance and operational costs, so it is assumed that in this research investment the value in 2019 for OCTB in the future will be equal to 0.

Operational cost incurred for providing of conservation tourism by GLNP includes 34 employee salaries and forest police officer subsidy as many as 34 people consisting of 17 civil servant employees and 17 contract employees. These salaries and subsidies include operational costs, such as maintenance cost, office equipment, water, electricity, communication cost, patrol cost and monitoring cost for orangutans and tigers. These costs are accumulated so that the total operational costs were Rp. per year (Table 6).

Table 6

The average operational cost for providing NPMS V Orangutan conservation tourism in Bukit Lawang during 2018

Operating cost	Unit	Vol.	Total	Cost/month (Rp.)	Cost/year (Rp.)
Maintenance	Month				11,000,000
Employee salary (civil servant & contract)	Person	12	17		-
Furniture					-
Office stationery		12	1 package	2,500,000	30,000,000
Cost of law enforcement					-
Water and electricity	Package	12		1,000,000	12,000,000
Communication	Package	12		600,000	7,200,000
Motor maintenance	Unit	12	10	250,000	2,500,000
Car maintenance	Unit	12	2	2,500,000	60,000,000
Patrol	Package		25		6,800,000
Tiger monitoring	Package	2	2		10,000,000
Orangutan monitoring	Package		3		14,000,000
Total (A)					153,500,000
Civil servant salary				97,268,000	1,167,216,000
Honorary salary			17	1,750,000	357,000,000
Total (B)					1,524,216,000
Total A+B					1,677,716,000

Source: GHGLNP 2018.

The cost incurred by NPMS V Bukit Lawang on average per year in 2018 was Rp. 1,677,716,000. This expense includes operational cost, employee salaries for civil servant or contract, and costs for managing orangutan and natural tourism of Bukit Lawang. As for its activities, the revenues of orangutan natural tourism park in Bukit Lawang from 2015 to 2018 increased as shown in Table 7.

Indeed, in 2016 there was a decline in income of around 6% compared to that in 2017. There were a lot of factors, one of which was that in 2016 there was a worldwide event for football in Europe, namely UEFA Euro 2016 in France. Thus, foreign tourists who generally came from Europe preferred to have vacation or to use their holiday season to go to France. However, in 2017, there was a significant increase of 230.7% compared to that in 2016, and then in 2018 there was also an increasing income of 25.9% compared to that in 2017. Thus, the average increase for OCTB's income reached 83.55% per year in the last four years.

Table 7

Receipt/Revenue and deposit/payment of levies in the tourist area of NPMS V Bukit Lawang until 5 October 2018

<i>Year</i>	<i>Income (Rp)</i>	<i>Growth (%)</i>
2015	544,752,500	
2016	512,325,000	-5.95
2017	1,694,280,000	230.7
2018	2,132,971,899	25.90
Average	1,221,082,350	83.55

Source: NPMS V Bukit Lawang.

Social costs were the costs incurred to compensate for losses felt by the community. By the presence of OCTB, it certainly did not escape the social problem caused by orangutans. The social problems caused by orangutans were related to gardens/farms, especially the orchards owned by the residents. From the interview result with Official NPMS V Bukit Lawang and residents, there had been an animal conflict, which made orangutan enter the residents' durian garden utilization zone, so that all the durian flowers in one tree were shed by orangutan. The residents also demanded to GLNP Bukit Lawang to request compensation. Assumption for compensation is explained in Table 8. However, it is not a big amount, it's around Rp. 2,500,000.

Table 8

Social costs due to orangutan conservation tourism presence

<i>Social cost</i>	<i>Unit</i>	<i>Volume</i>	<i>Cost/item (Rp.)</i>	<i>Cost/year (Rp.)</i>
Loss of income (as a result of animal conflict/entering the Durian farm)	Item	300-500	5,000	2,500,000
Total				2,500,000

Source: Interviewed with Official NPMS V GLNP 2018.

In this research, there was no counting and intrinsic value determining for Sumatran orangutan. This was because there were no special costs incurred for orangutan, such as orangutan consumption feed cost, cost for palm tree invasion control, land rental cost, disease prevention cost, prevention cost for human disorder, cost for increasing population growth, individual procurement cost for orangutan, and cost directly related to orangutan conservation. Orangutans that exist today are semi-wild or wild, so there are no feeding sides because there is no more captivity, unlike what happened to orangutan in Kalimantan at BTN Tanjung Puting. This research was different from Sofiatin (2018) who revealed the estimation of the intrinsic value of Javan Rhinos (*Rhinoceros sondaicus*) considered to have the conservation value of endangered Javan Rhinos. Whereas this study more focuses on extrinsic values of orangutans as an object of tourism conservation.

At GHGLNP, the composition of budget for goods was only for patrol activities, flora and fauna monitoring, community empowerment, fire handling, management of natural tourism, and others spreading throughout GLNP. The general budget composition of 2015 to 2018 is explained in Table 9.

Table 9

Budget Composition GLNP 2015 to 2018

Year	<i>Budget composition 2015-2018 (Rp)</i>				Total
	<i>Salary and operational</i>	<i>Non operational</i>			
		<i>Contract worker salaries</i>	<i>Commodity expenditure</i>	<i>Capital expenditure</i>	
2015	16,341,606,000	865,000,000	21,049,172,000	2,631,928,000	40,887,706,000
2016	20,789,290,000	1,812,100,000	6,479,056,000	294,600,000	29,375,046,000
2017	20,330,700,000	1,945,450,000	5,472,245,000	2,879,805,000	30,628,200,000
2018	20,331,000,000	1,945,450,000	4,517,945,000	5,599,405,000	32,393,800,000

Based on the incurred cost data (cost valuation) including investment cost, operational cost, social cost and income up to 2018, cost benefit analysis was calculated. The calculation result of cost benefit analysis using a discount factor (DF) equivalent to a bank interest rate of 9.8% by counting the unexpected costs (including social costs) reaching 5 percent had obtained a positive NPV, after 10 year NPV would be Rp. 1,880,508,946.76. Based on this data, according to cost benefit analysis, it could be found that OCTB conservation program was financially feasible because the benefits obtained were greater than the costs incurred. Moreover, the investment made reached for more than 10 years, of course the benefits would be even greater. This did not include direct or indirect benefits felt by the community by the presence of OCTB's activities or ecotourism activities in Bukit Lawang.

Based on the feasibility analysis of investment receipts using the internal rate of return (IRR) method, the IRR interest rate obtained was 20.2%, which was higher than the current bank interest rate, and BCR was 1.84 (above 1). Corporate or retail lending rates were currently around 10 adjust Bank Indonesia rules, then OCTB investment seemed feasible. Cash Flow Details and OCTB's Calculation of Cost Benefit Analysis can be seen in Table 10.

However, based on the benefit cost ratio (BCR) it was above 1, which was 1.84 in financial terms for 10 years. Between the benefit and direct cost of ticket sales, there has not been too profitable, but based on the results of multiplier effect from conservation activities and natural resource conservation, it was not renewable and could be extinct and very rare, namely the Sumatran orangutan, the benefits were far greater than the costs incurred for management at this time. Moreover, regarding the preservation of nature and maintenance, of course the benefits of orangutan conservation were very large.

Conclusions. Cost incurred to maintain and preserve species, ecosystems and management in OCTB was Rp. 5,653,979,610.00. The largest cost was the initial investment cost, that is, Rp 3,973,763,610.00 (70.28%). Therefore, the economic valuation (VE) is Rp 7,375,061,959.75. The benefit of OCTB is Rp. 1,721,082,350 per year. The results of benefit cost analysis produce a positive NPV. After 10 year, NPV will be Rp. 1,880,508,946.76 and the IRR obtained is 20.2% which is higher than the current bank interest rate. As a result, the investments in OCTB are financially feasible for BCR 1.84 (above 1). However, in term of the benefit for the local community/resident, especially the economic and the preservation of nature in Bukit Lawang, it is very feasible and beneficial for all parties based on the economic valuation of OCTB.

Table 10

Cash flow details and OCTB's calculation of cost benefit analysis

	Year										
	0	1	2	3	4	5	6	7	8	9	10
<i>Outflow</i>											
Investment	3,973,763,610										
Operating costs		1,677,716,000	1,677,716,000	1,677,716,000	1,677,716,000	1,677,716,000	1,677,716,000	1,677,716,000	1,677,716,000	1,677,716,000	1,677,716,000
Social costs		2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
Total outflow	3,973,763,610	1,680,216,000	1,680,216,000	1,680,216,000	1,680,216,000	1,680,216,000	1,680,216,000	1,680,216,000	1,680,216,000	1,680,216,000	1,680,216,000
NPV outflow	3,973,763,610	1,527,469,091	1,388,608,264	1,262,371,150	1,147,610,136	1,043,281,942	948,438,129	862,216,481	783,833,164	712,575,604	647,796,004
<i>Inflow</i>											
Ticket		2,132,971,899.00	2,132,971,899	2,132,971,899	2,132,971,899	2,132,971,899	2,132,971,899	2,132,971,899	2,132,971,899	2,132,971,899	2,132,971,899
Environmental services			-	-	-	-	-	-	-	-	-
Multiplier effect*		500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000	500,000,000
Inflow amount		2,632,971,899	2,632,971,899	2,632,971,899	2,632,971,899	2,632,971,899	2,632,971,899	2,632,971,899	2,632,971,899	2,632,971,899	2,632,971,899
Net	3,973,763,610	952,755,899	952,755,899	952,755,899	952,755,899	952,755,899	952,755,899	952,755,899	952,755,899	952,755,899	952,755,899
NPV inflow	0	2,393,610,817.27	2,176,009,833.88	1,978,190,758.08	1,798,355,234.62	1,634,868,395.10	1,486,243,995.55	1,351,130,905.05	1,228,300,822.77	1,116,637,111.61	1,015,124,646.92
Discount factor	10%										

Note: *minimal assumptions	
NPV	1,880,508,946,76
IRR	20.2%
BCR	1.84

Source: GHGLNP processed in 2018.

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