Sriwijaya Journal of Environment
Article
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Analysis of Sustainability of Living Space of Orang Rimba in National Park of Bukit Dua Belas

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Article history

Received	Received in revised form	Accepted	Available online
20 August 2023	19 September 2023	25 December 2023	29 Desember 2023

Abstract: This study aims to analyze the sustainability status and attributes sensitive to the sustainability status of Orang Rimba living space in the Taman Nasional Bukit Dua Belas (TNBD) area. This study used sustainability analysis with RAPS analysis, while to find out sensitive attributes was done with leverage analysis. The results showed that the sustainability status of Orang Rimba living space in the TNBD area in the ecological, economic, and institutional dimensions is quite sustainable, while socio-cultural is less sustainable. Multidimensional analysis of the sustainability of Orang Rimba living space in TNBD with an index of expert respondents and public respondents, both of which are categorized as unsustainable. Sensitive attributes of the ecological dimension include the suitability of Orang Rimba customary spaces with management zones, biodiversity management, and the suitability of Orang Rimba living activities. Sensitive attributes of the economic dimension include the potential of non-timber forest products, Orang Rimba's high expenditure, TNBD's direct benefits to Orang Rimba, and the market for non-timber forest products. Sensitive attributes of the socio-cultural dimension include Orang Rimba involvement in TNBD management, population growth, Orang Rimba education, local cultural practices, and trusting relationships among Orang Rimba. Sensitive attributes of institutional dimensions include the involvement of customary institutions in supervision and evaluation, stakeholder capacity, and mentoring of Orang Rimba.
Keywords: sustainability, living space, Orang Rimba, TNBD

1. Introduction

The important and fundamental matter of the policy of designating and establishing the Taman Nasional Bukit Dua Belas (TNBD) area as a national park is the special mandate of the TNBD to "protect the living space and sources of livelihood of the “Orang Rimba" by Minister of Forestry and Plantation Decree No. 258/Kpts-II/2000 on the Designation of National Park Areas of Bukit Dua Belas. Based on the above mandate, in the management of TNBD two main pillars that cannot be separated and influence each other, namely the Orang Rimba as the TNBD entity and the Taman Nasional Bukit Dua Belas Authority (TNBD Office) as the management authority. Since being designated as a national park in 2000 the two pillars have not synergized in management, there are often differences of opinion and mutual distrust between the Orang Rimba and the area manager, namely the TNBD Office.

According to [25] the TNBD area has experienced various pressures that have reduced the carrying capacity of the area as a provider of living space for Orang Rimba, among others caused by activities carried out by Orang Rimba in utilizing space in this area such as land conversion to gardens, relatively high population growth of Orang Rimba every year, the socio-cultural changes of the Orang Rimba tend to be negative and there is intervention from the outside community, as well as the low social capital of the Orang Rimba.

Apart from the pressure on the TNBD area, the Orang Rimba also practices a culture of wisdom on how to live in harmony with nature, the indigenous knowledge of the Orang Rimba is in harmony and even supports TNBD conservation efforts. Thus, the solution to the problem of the sustainability of the Orang Rimba living space in the complex TNBD area requires a sustainable development approach which is a development concept that is useful for meeting the needs of today's life without destroying or reducing the ability of future generations to meet their needs. So far, research on the sustainability of Orang Rimba living space in the TNBD area has never been carried out. In this study, the approach used to look at the status of the sustainability of the Orang Rimba living space in the TNBD area uses four dimensions, namely ecological, economic, socio-cultural, and institutional dimensions. This is related to the research object of the Orang Rimba living space which is closely related to the sustainability of the four dimensions. For that, we need an approach that harmonizes the goals of these

dimensions. Furthermore, each of these dimensions will be broken down into several attributes which will then be measured for these sensitive attributes in each dimension.

This study aims to assess the status of the sustainability of the Orang Rimba living space and analyze the attributes that influence the sustainability of the Orang Rimba living space in the TNBD area. The analysis of the sustainability of the Orang Rimba's living space was carried out using the RAPS (Rapid Appraisal for Sustainability) analysis with the ordinated Multidimensional Scaling (MDS) approach.

2. Research Methods

2.1. Research Site

The research was carried out in the TNBD area, Sarolangun Regency, Batanghari Regency, and Tebo Regency, Jambi Province.

2.2. Sampling Technique

This research uses public respondents and expert respondents. Sampling on expert respondents was conducted by nonprobability sampling technique with purposive sampling method, namely the technique of determining the sample with certain considerations.

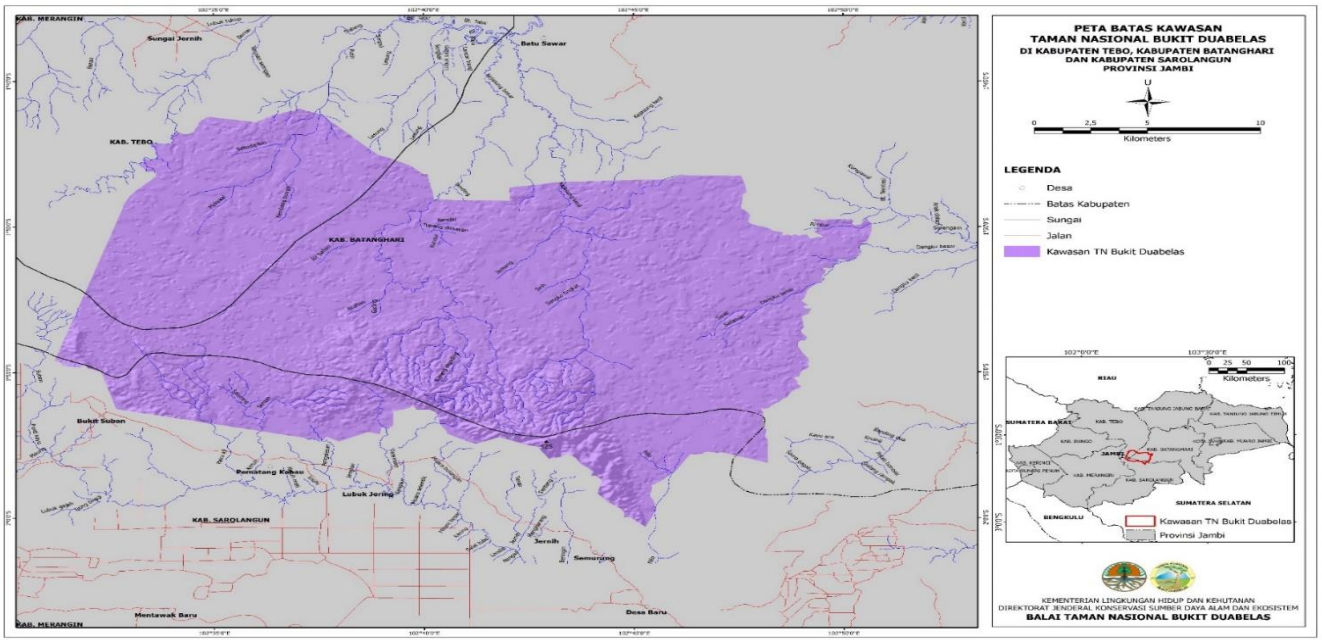

Figure 1. Research Location

According to [1] certain considerations are intended for those who meet the expert criteria (expert). The criteria for an expert include: 1) expertise due to knowledge at the academic or research level, 2) expertise due to position, and 3) expertise due to specificity or someone who has special expertise or has been in the field for decades studied/researched. The number of samples of expert respondents is as follows:

Table 1. Expert Respondents

No.	Respondents	Total	Information
1	2	3	4
1	TNBD Office	2	Head of TNBD Office Head of SPTN Region II
2	Bappeda	2	Bappeda Jambi Province Bappeda Sarolangun Regency
3	Academics	1	Universitas Jambi
4	NGO	2	KKI Warsi, Cappa Keadilan Konservasi
5	Traditional Figure	2	Jenang dan Ujung Waris
	Grand Total	9	

Sampling for public respondents was carried out using a probability sampling technique using the simple random sampling method, said to be simple because the sample members from the population were taken randomly without regard to the strata in the population [2]. Determining the sampling for public respondents, determining the size (number) of the sample is done using the Slovin formula with a 90% confidence level [3] :

$$n = \frac{\mathrm{n}}{1 + \mathrm{N(e)}^2}$$

where

n = Number of samples

N = Number of population
$(e)^2$ = The real level or limit of error

$$n = \frac{N}{1 + 718(0{,}1^2)}$$
$$= \frac{718}{8{,}18}$$
$$= 87{,}775$$
$$n = 88\ respondents\ (rounding\ off\ values)$$

After taking the sample, the head of the Orang Rimba family will be determined to represent the temenggung group using the proportional formula [4] as follows :

$$ni = \frac{\text{Ni. n}}{\text{N}}$$

ni = Total of respondents in the temenggung group i
Ni = Total sub-population of temenggung i
n = Total of sample
N = Total of population

Table 2. Public Respondents

No.	Temenggung	Population	Total
1	Afrizal	20	2
2	Bebayang	19	2
3	Bepayung	20	2
4	Celitai	45	6
5	Girang	35	4
6	Jelitai	142	17
7	Meladang	46	6
8	Nangkus	83	10
9	Ngadap	101	12
10	Ngrip	95	12
11	Nyenong	29	4
12	Ngelembo	62	8
13	Ngamal	21	4
	Grand Total	718	88

2.3. *Dimensions and Research Attributes*

Analysis of the sustainability of Orang Rimba living space is carried out using RAPS (Rapid Appraisal for Sustainability) analysis, according to [1] RAPS is a term or definition used to represent sustainability analysis tools in general. Determination of the attributes of each dimension refers to several previous studies.

Table 3. Dimensions and Research Attributes

Dimensions	Attributes	Source
1	2	3
Ecology	1. Boundary setting	[5]
	2. Vegetation cover	
	3. Biodiversity management	
	4. Protection of flora and fauna	
	5. Planting activity	
	6. Compatibility of Orang Rimba customary space with zoning	[6]
	7. Suitability of Orang Rimba activities	
	8. Pressure on the region	[7]
	9. Forest fires	
Economy	1. Average income of Orang Rimba	[7]
	2. Average spending of Orang Rimba	
	3. Tourism economic potential	
	4. Area accessibility	
	5. Direct benefits of the area	
	6. Economic support	[8]
	7. Potential non-timber forest products (NTFP)	[5]
	8. Existence of the NTFP market	
	9. Utilization settings of NTFP	
Socio-cultural	1. The educational level of Orang Rimba	[3]
	2. The level of conflict	
	3. Population growth rate Orang Rimba	[9] [10]
	4. Relationship of mutual trust	[11]
	5. Conflict resolution mechanisms	[5]
	6. Balance of rights and obligations	
	7. Availability of utilization procedures	
	8. Involvement of Orang Rimba in area management	
	9. Local cultural practices in area conservation	
Institutional	1. Orang Rimba compliance level	[12]
	2. Counseling on management regulations	
	3. Monitoring and supervision of management activities	
	4. Law enforcement	[7]
	5. Program integration	
	6. Involvement of customary institutions in monitoring and evaluation	
	7. Availability of regulations in the management of natural resources	[7]
	8. Assistance for Orang Rimba	[3]
	9. Stakeholder capacity (decision maker)	[13]

2.4. *Data analysis method*

2.4.1. Analysis of indexes and status sustainability

To assess the sustainability status of Orang Rimba living space in the TNBD area, it is analyzed by RAPS using the MDS statistical technique to make a rapid assessment of the sustainability status of a system.

The ordination or distance determination technique in MDS is based on the euclidian distance which in n-dimensional space can be written as follows [14].

$$\boldsymbol{d} = \sqrt{(|\boldsymbol{x_1} - \boldsymbol{x_2}|^2 + |\boldsymbol{y_1} - \boldsymbol{y_2}|^2 + |\boldsymbol{z_1} - \boldsymbol{z_2}|^2 + \cdots)}$$

d : distance between euclidian points
x_1-x_2 : difference in attribute values (x)
y_1-y_2 : attribute value difference (y)
z_1-z_2 : attribute value difference (z)

The ordination of an object in MDS is then approximated by regressing the euclidian distance (dij) from point i to point j with the origin (σij) as the following equation:

$$d_{ij} = \alpha + \beta\delta ij + \epsilon$$

d_{ij} : the euclidian distance from point i to point j
α : constant
β : regression coefficient
δ_{ij} : euclidian value of origin
ϵ : standard error

Then the above equation is regressed using the ALSCAL algorithm method. The ALSCAL method optimizes the distance from the quadrant (dijk) to the quadrant of origin = (oijk), in three dimensions (i,j,k) written using the S-Stress formula [1] as follows :

$$s = \sqrt{\frac{1}{m}\sum_{k=1}^{m}\left[\frac{\sum_i\sum_j\left(d_{ijk}^2 - o_{ijk}^2\right)^2}{\sum_i\sum_j o_{ij}^4}\right]}$$

where:
s : *stressed*
m : total attributes
d_{ijk} : the euclidian distance in the i, j, k dimensions
o_{ijk} : the value of the origin on the i, j, k dimensions

Where the squared distance is the Euclidean distance weighted by the following equation:

$$d_{ijk}^2 = \sum_{\alpha=1}^{r} W_{k\alpha}\left(x_{i\alpha} - x_{j\alpha}\right)^2$$

d^2 : Euclidian squared distance from point i to point j
$W_{k\alpha}$: the number of points included in the area on dimension (k) from level to a
xia : point value (x) at the *a* level of the *i* attribute
xja : point value (x) at the *a* level of the *j* attribute

The index scale for the sustainability of the Orang Rimba living space in the TNBD area ranges from 0% to 100%. In this study, four categories of sustainability status are used as references. The sustainability status category is presented in the table below.

Table 4. Index Category and Sustainability Status [15]

Index Value	Category
0.000 – 25.00	Bad : Not sustainable
25.01 – 50.00	Less : Less sustainable
50.01 – 75.00	Sufficient : Sufficiently sustainable
75.01 – 100.00	Good : Highly sustainable

Through MDS, the position of the sustainability point can be visualized through the horizontal and vertical axes. Point positions can be visualized on the horizontal axis with a sustainability index assigned a value of 0% (bad) and 100% (good). Illustration of the results of the coordination of the sustainability index value as shown in the following figure 2.

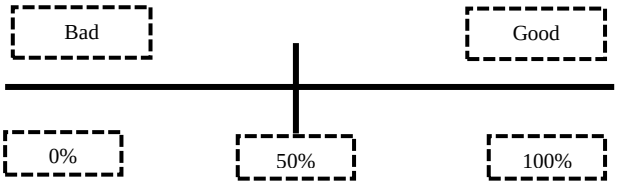

Figure 2. Ordination of Sustainability Index Value

If the system under study has a sustainable index value of >50%, the system is said to be sustainable and the condition is unsustainable if the value is <50% [15].

2.4.2. Sensitive Attribute Analysis

In this research carried out with leverage analysis, namely to see the most sensitive attributes that contribute to the sustainability index. Sensitivity analysis using leverage analysis to see the form of changes in Root Mean Square (RMS) ordination at source X. The greater the change in the RMS value, the more sensitive this attribute will be to the sustainability of the Orang Rimba's living space. Simply change the RMS by removing the attributes of the formula, as in the formula below:

$$\boldsymbol{RMS} = \sqrt{\left(\frac{\sum_{i=1}^{n}\{\boldsymbol{Vf}(\boldsymbol{i},\boldsymbol{1}) - \boldsymbol{Vf}(.,\boldsymbol{1})\}}{\boldsymbol{n}}\right)}$$

Vf (i,1)= The resulting ordinate values (after rotation and flapping in the *i* row and *j* column
Vf (.,1)= The middle value of the results of ordination in the 1st column.

The determination of the main lever attribute is carried out using an approach as a law/rule for determining Sensitive Attributes (sensitive attribute) using the Law of the Middle Value, namely the law where the main lever attribute is determined based on the value above the average value of the attribute variable. This law assumes that the lever attribute will appear in more than one attribute [1].

2.4.3. Model validation
2.4.3.1. Monte Carlo analysis

To determine the effect of random error on the process of estimating the ordination value of Orang Rimba living space, Monte Carlo analysis was used. Monte Carlo Analysis was carried out to detect sources of error from diversity. Monte Carlo parameters use a quantitative approach with the normal error method (Gaussian) with 95% confidence intervals determined by the researcher and expressed as a percentage of the full attribute score range for each attribute.

2.4.3.2. Stress Value (A Lack of Fit Measure)

In the ALSCAL (Alternative Least Square Scaling) computer application, the Stress value is interpreted as a measure of error (lack of fit or error), ie the smaller the Stress value, the smaller the error between the distance and the similarity value of the space presented. The following is the formula for estimating the stress value.

$$STRESS = \left[\frac{\sum_{j=1}^{n}\sum_{i=1}^{n}\left(\delta_{ij} - \zeta_{ij}\right)^2}{\sum_{j=1}^{n}\sum_{i=1}^{n}\delta_{ij}^{\ 2}}\right]^{1/2}$$

The Stress value is a measure of the mismatch (a lack of fit measure) between the model (measurement results) and the actual data. The smaller the stress value, indicating a monotonous relationship that is formed between dissimilarity and disparity, the better, and the configuration map criteria that are formed are more perfect. In other words, the closer to 0 the stress value is, the more similar the resulting model will be to the real situation. [1].

According to [1], referring to Kavanagh's opinion, it states that the stress value that can be tolerated is <20%. This is in line with the requirements of [1] which categorizes stress values to detect model feasibility in 5 (five) classes, as follows:

Table 5. Stress Value [1]

No.	*Stress Value* (%)	Criteria
1.	0 – 2.5	Perfect
2.	2.5 – 5.0	Very Good
3.	5.0 – 10.0	Good
4.	10.0 – 20.0	Enough
5.	>20.0	Not Enough

Goodness of fit is a measurement of how precisely the point configuration can reflect the original data in MDS which is reflected in the magnitude of the Stress value which is calculated based on the value of S above the value of R2. A low-stress value indicates a good fit while a high one does the opposite. In the using approach, a good RAPS analysis method is indicated by a stress value that is less than 0.25 or S <0.25 [16]. Meanwhile, a good R2 value is close to 1.

2.4.3.3. R Square value

According to [2], the R2 value ranges from 0 (zero) to 1 (one), which as a percentage ranges from 0% to 100%. A low R2 value means that it has a very limited dependent variance, and a value close to 1.0 or 100% indicates that the independent variable can provide the information needed to predict the dependent variable. In other words, the data can be explained well from the resulting model. R2 can also be interpreted that closer to 1 or 100% means that the existing data is better mapped or used to determine the proximity of the data to the map. This is to check how the distance data between these objects is well represented on the perceptual map.

2.5.*Kite Diagram*

The trade-off is a description of the theory of balance (balanced theory) in this case the balance of the level of sustainability of each dimension studied [1]. A comparative analysis of sustainability between dimensions is visualized in the form of a kite diagram as shown in the following figure.

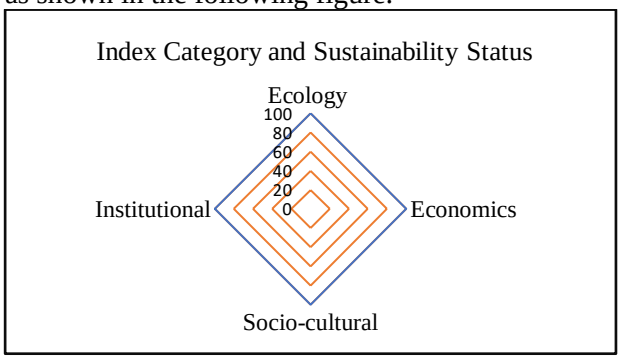

Figure 3. Diagram Kite of Inter-Dimensional Comparison

3. Results and Discussion

3.1. Sustainability of Orang Rimba Living Space

3.1.1. Analysis of sustainability and sensitive attributes of ecological dimensions

The ordination analysis on the ecological dimension obtained a value of 57.10% for expert respondents and 54.95% for public respondents, this value is categorized as "quite sustainable".

Figure 5. Sustainability index of the ecological dimension

The difference between the sustainability index value and Monte Carlo is less than 1, the system is by real conditions, as shown in the following table.

Table 6. Monte Carlo validation of ecological dimensions

Sustainability Index of Ecological Dimension						Category
Ordinate MDS		*Monte Carlo*		Difference		
Expert	Public	Expert	Public	Expert	Public	
57.10	54.95	56.80	54.50	0.30	0.45	Valid

The stress value is 0.1485 for expert respondents and 0.1427 for public respondents, this shows that the feasibility of the model is in the sufficient category. While the R2 value is 0.9456 for expert respondents and 0.9478 for public respondents. This R2 value indicates the ecological dimension has provided the required information.

Table 7. Stress value and R2 ecological dimensions

Stress Value		R^2	
Expert	Public	Expert	Public
0.1485	0.1427	0.9456	0.9478

The ecological dimension leverage analysis was carried out using nine attributes that are thought to influence the ecological sustainability of living space Orang Rimba.

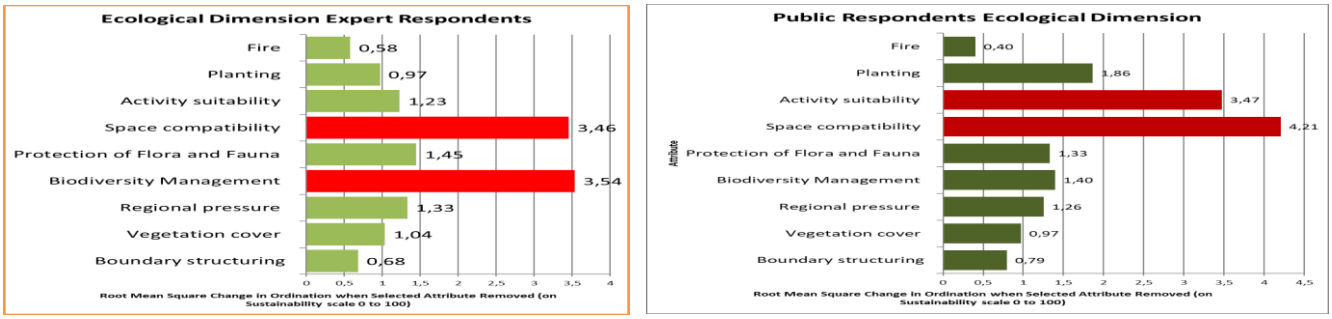

Figure 6. The sensitive attribute of the ecological dimension Sustainability

Leverage analysis from expert respondents and public respondents, obtained three sensitive attributes on the ecological dimension which are the main lever factors that make the ecological sustainability of the Orang Rimba living space in the sufficient category, the three sensitive attributes referred to include: 1) compatibility between Orang Rimba traditional spaces and TNBD management zone, 2), biodiversity management, and 3) compatibility of Orang Rimba living activities with the TNBD zoning division.

Table 8. Sensitive attribute of ecological dimension Sustainability

Attribute	Expert	Public
Source compatibility	3.46	4.21
Activity suitability	1.23	3.47
Biodiversity management	3.54	1.40

The relatively sustainable status of the ecological dimension in the sustainability of Orang Rimba living space is caused by the main lever attribute related to the suitability of Orang Rimba customary space with zoning management carried out by formulating the concept of compatibility of Orang Rimba customary space with the TNBD management zone, this concept begins with conducting dialogue with Orang Rimba and other related parties, and in the process called building a joint agenda "Integrating the customary rules of the Orang Rimba with state regulations in the management of the Taman Nasional Bukit Dua Belas". With an understanding, The Orang Rimba and the area manager have the same frame regarding the management of customary space which is also the living space of the Orang Rimba in the TNBD area.

The next sensitive attribute is optimizing the implementation of the biodiversity management program in the TNBD agency in the form of having a biodiversity management planning document in the TNBD area, the document referred to is contained in the 2021-2030 TNBD Long Term Management Plan (RPJP), this plan has not been properly implemented as a reference fundamental in developing and implementing conservation missions with other stakeholders.

Biodiversity is the millions of plants, animals, and microorganisms including those they own and the complex ecosystems they form in the living environment. According to [17] biodiversity has a function for humans and nature, and biodiversity also has a role in the development of human life. Humans will not be able to live without animal and plant commodities found in nature, some of the functions of biodiversity include 1) increasing ecosystem productivity in the biodiversity of each species that has a role in each ecosystem, 2) species diversity can help sustain nature to support all types of ecosystem forms, 3) improve human health, and 4) provide environmental services for humans such as maintaining water resources, protecting soil from landslides and floods.

In the management of the TNBD area, the management of biodiversity cannot be separated from the function of the TNBD area itself as the living space

and livelihood of the Orang Rimba which is the mandate of the appointment and designation of this area. The facts show that the condition of the Orang Rimba living space in the TNBD area is relatively under pressure in its management. In the TNBD area, pressure on ecological aspects occurs due to various factors, both directly and indirectly. So that in managing biodiversity, there must be a good management plan, then the plan can be implemented optimally according to the characteristics of the TNBD, as the only national park in Indonesia that accommodates the presence of humans in the national park area.

The direct factors causing pressure on the area are in the form of land conversion which is increasingly expanding monoculture plants in the form of oil palm plantations which are increasingly being cultivated by Orang Rimba, illegal logging activities, environmental pollution resulting from illegal gold mining (PETI), etc., while indirect factors namely the lack of attention from stakeholders or related agencies in forest area management activities. According to [18], the protection of biodiversity is important given the many violations against biodiversity which also involve traditional knowledge of indigenous peoples/traditional communities, and is one of the reasons and considerations why biodiversity needs special attention. In the management of biodiversity must also consider the suitability of the Orang Rimba customary space within the TNBD area, where it balance, where must exist biodiversity management, can be carried out and the livelihood activities of the Orang Rimba can be maintained.

The problem of limitations and pressure on biodiversity mentioned above, can be prevented by managing the environment by working together, such as reducing environmental pollution, protecting endangered biodiversity by domesticating these animals, and creating protections for certain animals that are a threat to predators. Biodiversity management must cover three sectors including ecology, economy, and social besides that the role of the community, NGOs, and other related parties is needed in protecting biodiversity so that it can be sustainable for future generations. The suitability of Orang Rimba activities within the area is closely related to the compatibility between Orang Rimba customary spaces and the national park management zone.

By agreeing on space compatibility, the activities of the Orang Rimba can be controlled so that they can carry out various other activities by the uses of the living space of the Orang Rimba that have been agreed upon and this concept will directly affect the sustainability of the TNBD area itself. To optimize the space compatibility concept that has only been implemented in recent years in the management of the TNBD, intensive assistance from the manager is needed so that the existing concept can be understood and implemented wisely by the Orang Rimba so that the sustainability of the Orang Rimba living space is maintained.

The suitability of Orang Rimba activities with zoning divisions must be supported by clear boundaries between zoning, not only imaginary boundaries on the map in the form of dotted lines but also must be implemented in the field by installing boundary markers between each zone or Orang Rimba space. The forest in the TNBD area. Installation of boundary markers for each zone is mandatory to include Orang Rimba, so that this community understands the limits of permissible and prohibited activities so that the TNBD area can become a living space for Orang Rimba in the present and the future.

3.1.2. Analysis of sustainability and dimension sensitive attributes economic

The results of the ordination analysis for the economic dimension of the Orang Rimba's living space show that the magnitude of the sustainability index for expert respondents is 52.16%, and for public respondents is 55.37%. The sustainability index value is included in the "quite sustainable" category, as shown in Figure 7.

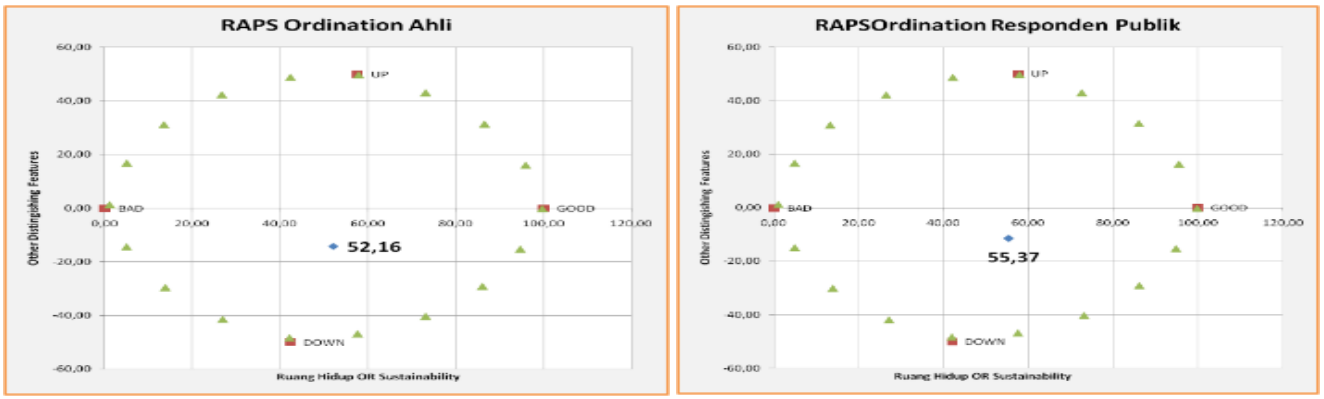

Figure 7 Economic dimension sustainability index

If the difference between the sustainability index value and Monte Carlo is less than 1, then the system is by real conditions. Monte Carlo values as in the following table.

Table 9. Monte Carlo validation of the economic dimension

MDS		*Monte Carlo*		Difference		Category
Expert	Public	Expert	Public	Expert	Public	
52.16	55.37	51.75	55.02	0.41	0.35	Valid

For the results of the stress value analysis, it was obtained a value of 0.1409 for expert respondents and 0.1408 for public respondents, the value indicates that the feasibility of the model falls into the sufficient category, as shown in the following table.

Table 10. Stress value and R2 economic dimension

Stress Value		R^2	
Expert	Public	Expert	Public
0.1409	0.1408	0.9481	0.9476

Meanwhile, the determination value (R2) which is close to 1 or 100% indicates that the model has provided the information needed to predict the dependent variable. To find out the sensitive attributes, a leverage analysis was carried out using 9 attributes that are thought to influence the sustainability of the economic dimension.

Recapitulating the results of the leverage analysis from expert respondents and public respondents, three sensitive attributes were determined on the economic dimension including 1) Potential NTFPs in increasing Orang Rimba income, 2) Average spending of Orang Rimba, 3) Direct benefits of the TNBD area for Orang Rimba, and 4) The existence of a market for non-timber forest products.

Table 11. Sustainability-sensitive attributes of the economic dimension

Attribute	Expert	Public
Direct benefits	2.95	2.11
HHBK settings	1.06	3.71
HHBK potential	5.61	5.44
The carrying capacity of the region	0.33	5.05
Expense	3.97	0.15

Forest resources are very important to the Orang Rimba. Apart from being a means of fulfilling the necessities of life, almost all their life process always come into contact with the existence of forest resources other than wood. Forest resources other than wood. are biological forest products both vegetable and animal along with their derivative products and cultivation except for wood originating from forests [19].

The products of non-timber forest resources in the TNBD area for several Orang Rimba groups are still a source of livelihood for the Orang Rimba. Based on the results of interviews with Orang Rimba respondents, most of the Orang Rimba revealed that the TNBD area still provides various non-timber forest resource products in the form of resin, rattan, sialang honey, forest fruits and so on which can be utilized by the Orang Rimba both for consumption and for sale, and the TNBD area can still be used as a place to live and make a living for the Orang Rimba if it is done wisely according to the local culture of the Orang Rimba themselves.

Several types of forest plants that have meaning for the lives of Orang Rimba whose existence is utilized and protected in the TNBD area include sialang trees, perch trees, sentubung trees, forest fruits, jernang, balam trees, and jelutung trees. The trees mentioned above are important for the Orang Rimba, especially sialang trees, sialang trees are the name for the types of trees where honey bees build nests and produce honey, trees that bees like to build their nests include forest kedondong, maro keluang wood, jelutung, and so on. then these trees are called sialang trees [20].

Regarding the use of non-timber forest products, Orang Rimba often complains to area managers and stakeholders regarding the poor accessibility to transport them from within the area, so that the costs incurred are not comparable to the selling price of these products. Related to Orang Rimba's request to improve accessibility in the utilization of non-timber forest resource products, and overcome excessive exploitation so that there is a potential for damage, intensive assistance activities by managers and arrangements for the utilization of these products by conservation principles need to be tightened and supervised by area managers and customary rulers of the Orang Rimba. In addition, a knowledge-based database is needed related to the potential products of non-timber forest resources in the TNBD area, so that it can be known which types of products can and may be utilized and in what quantity or quota of each type that may be utilized. so that resources can be maintained sustainability.

The next sensitive attribute on the economic dimension which is the main lever is the average spending of Orang Rimba which is higher when compared to income. It is known that the average income of Orang Rimba is generally less than the UMP of Jambi Province, Rp. 2,063,949, - [9]. On the other hand, in general, Orang Rimba has an average expenditure that is greater than income. Existing in the field, there are still many Orang Rimba who have a consumptive lifestyle, this condition is commonly found in Orang Rimba groups who live close to settlements or villages adjacent to the location where

the Orang Rimba live with relatively affordable access, this condition requires assistance to provide education from various parties in using income wisely.

In general, the Orang Rimba still depend on the TNBD area for their lives, including the Orang Rimba who have lived or live in the village communities around the TNBD area. Orang Rimba still utilizes various types of traditional medicines used as traditional medicine, forest products such as honey, rattan, etc. as well as the use of various types of flowers for the implementation of activities or traditional rituals and or worship of gods.

The TNBD area also accommodates Orang Rimba to worship gods and cultivate cultivation in traditional zones while adjusting to a more advanced socio-cultural life. [21] states that this effort is by introducing a settled agricultural and plantation culture such as planting rice, corn, or tubers accompanied by the development of cultivation of rubber, jernang, rattan, balam, resin, and others in traditional zones or tano behuma in their respective customary territories. -each temenggung group. Efforts to develop the food sufficiency of the Orang Rimba through the cultivation of food crops, livestock, and fisheries are expected to be able to fulfill their daily needs. This activity is to support the food security of the Orang Rimba so that gathering and hunting activities are maintained as cultural heritage.

The TNBD has created a cultivation program that is directed at family sites in the traditional/tano behuma zone according to the spatial plan. The family site (family cultivated area) is part of the traditional zone or tanoh behuma within the customary territory of the temenggung group which is cultivated by the family as a source of production for various types of commodities both forestry, agriculture, and plantations (other than oil palm) in a traditional, environmentally friendly and sustainable manner so that this area becomes a food barn for each family in the temenggung group. The results of measurements and mapping in the field show that each Orang Hutan family cultivates between 1-5 hectares of land. The communal site is part of the traditional zone or tanoh behuma which has not been cultivated by group members and it becomes a reserve or stock of natural resources for the temenggung group concerned for the next generation.

The last sensitive attribute on the economic dimension is the availability of markets for non-timber forest products, this attribute is closely related to increasing the income of the Orang Rimba. With market availability, these products can be easily sold by Orang Rimba. However, the form of market availability referred to here is the existence of toke-toke or collectors of products from non-timber forest resources. Information in the field, both provided by Orang Rimba and field workers, also illustrates that there are many toke-toke or collectors of various non-timber forest product products such as jernang, various types of rattan, resin, etc.

3.1.3. Analysis of sustainability and dimension sensitive attributes socio-cultural

The ordination analysis for the socio-cultural dimension shows that the value of the sustainability index for expert respondents is 48.50%, and for public respondents is 46.62%. This value is included in the "unsustainable" category. As shown below. Monte Carlo analysis of sociocultural dimensions obtained a difference of less than 1, then the system is by real conditions.

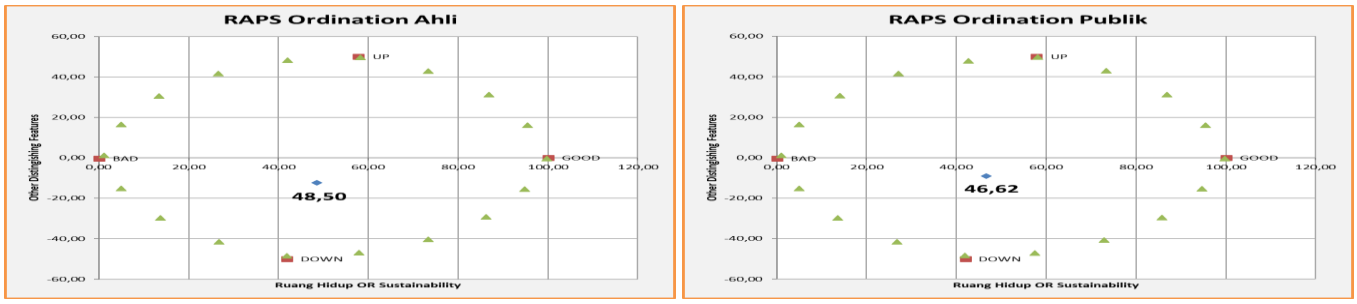

Figure 8. Socio-cultural dimension sustainability index

Table 12. Monte Carlo validation of socio-cultural dimensions

MDS		*Monte Carlo*		Difference		Category
Expert	Public	Expert	Public	Expert	Public	
48.50	46.62	48.13	46.36	0.37	0.26	Valid

The stress value for expert respondents is 0.1444 and for expert respondents is 0.1435, these two values indicate that the feasibility of the model falls into the sufficient category as shown in the following table.

Table 13. Stress value and R2 socio-cultural dimensions

Stress Value		R^2	
Expert	Public	Expert	Public
0.1444	0.1435	0.9478	0.9480

The R2 value indicates that the data provides the information needed to predict the dependent or dependent variable. For sensitive attribute analysis, a leverage analysis was carried out using 9 attributes that are thought to influence the sustainability of the socio-cultural dimension. The results of the leverage analysis from expert respondents and public respondents found sensitive attributes on the socio-cultural dimension including: 1) Orang Rimba involvement in the management of the TNBD area, 2) Orang Rimba population growth rate, 3) Orang Rimba education level, 4) Local cultural practices in preservation of the TNBD area, and 5) Relationships of mutual trust among Orang Rimba.

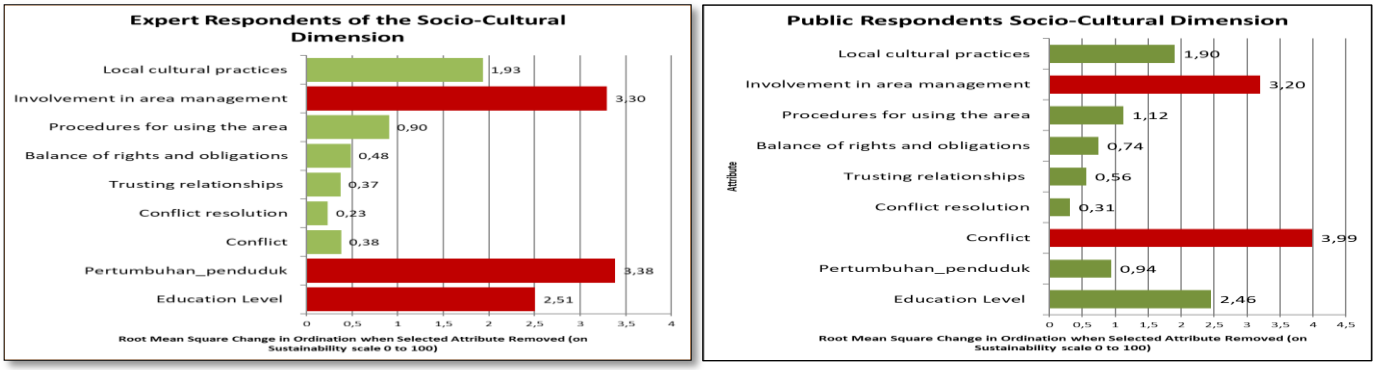

Figure 9. Sustainability-sensitive attributes of the socio-cultural dimension

The important thing in managing the TNBD area is how to make the Orang Rimba a subject in the TNBD management agenda. This community must be involved from planning, and implementation to monitoring and evaluation of management activities. The tangible form of Orang Rimba involvement that has been implemented in the implementation of area management is the involvement of Orang Rimba who are actively involved in security activities in the form of becoming members of the Forest Ranger Partner Community (FRPC), being involved in fire control becoming members of the Fire Care Community (FCC), and being a companion in every implementation of TNBD area management activities. In addition to the above, the most important thing of all is that the government system that is built must be able to have a real impact on improving the Orang Rimba's economy, especially in terms of meeting food needs. The above efforts will be ideal in making efforts to increase the educational level of Orang Rimba.

Table 14. Sustainability-sensitive attribute of the sociocultural dimension

Attribute	Expert	Public
Involvement in area management	3.30	3.20
Conflict	0.38	3.99
Population growth	3.38	0.94
Education level	2.51	2.46

The next sensitive attribute is the high growth rate of the Orang Rimba population, this condition is caused by the not yet optimal service of the Family Planning program for this community because most Orang Rimba still consider delaying pregnancy as a taboo. Another cause of high population growth is caused by Orang Rimba who marry in their teens commonly called early marriage (early marriage). Early marriage is a marriage carried out by someone who has a relatively young age. The relatively young age in question is the age of puberty, namely the age of 10-19 years.

According to BTNBD [10] the growth rate of the Orang Rimba population is in the range of 2.7% which is included in the high category and is above the national average population growth of 1.49%. If this condition continues, this high growth rate will hamper the sustainability of the Orang Rimba living space in the socio-cultural dimension, because the more Orang Rimba residents there are, the more space or land is needed to accommodate the life of this community. This condition is in line with the opinion of [1] which states that population density and the level of community participation are the levers of socio-cultural sustainability. So the two factors above, by themselves put pressure both directly and indirectly on the living space of the Orang Rimba in the TNBD area, one of the social impacts that can arise is like a conflict in the utilization of natural resources.

Existing conditions in the field, the average level of education of Orang Rimba is relatively low. One of these conditions is the low awareness of Orang Rimba in participating in education which is also caused by the unavailability of educational facilities and infrastructure, even if they are far from Orang Rimba settlements. Based on data from the 2018 Orang Rimba Census, the compulsory education age group for children 5-19 years is quite high, namely 41.66% of the total population of 2,960 people. For the level of education, there were 236 Orang Rimba who received formal education, namely around 7.97%, namely those who had attended elementary school education but not yet graduated, around 168 people, who had graduated from elementary school, around 39 people, who had graduated from junior high school and the equivalent, as many as 7 people, and those who had only 12 people or 0.41% have graduated from high school or equivalent. As for non-formal education, there are 188 people, or around 6.35% of the total number of Orang Rimba [22].

The low level of education of the Orang Rimba is quite worrying amidst the ongoing change from a traditional lifestyle to a consumptive lifestyle experienced by this community, the Orang Rimba have begun to assimilate and adapt to the way of life of the outside community. This condition tends to have negative effects in the form of Orang Rimba conditions which are often used by outsiders to carry out activities that damage the sustainability of the TNBD area, including engaging in illegal logging, clearing forests for gardens, and selling them to outsiders, hunting protected animals and taking plants that threaten sustainability.

Efforts made by the TNBD Office are implementing the Orang Rimba Education program by establishing jungle schools (non-formal schools) in several temenggung groups. Sekolah Rimba was formed because it is more in line with the conditions of the Orang Rimba, namely learning activities are more flexible in terms of curriculum, study time, place of study, number of students, and number of teaching staff. At Rimba School, children are taught simple knowledge, including recognizing letters and numbers so that children can read, write, and count, including lessons about their ancestral customs which are taught directly by the temenggung. As of 2020, 6 (six) Jungle School units have been built with a total of 150 students, 2 (two) Mobile School units and 20 children have taken part in the remote class program from the nearest Public Elementary School.

3.1.4. Analysis of sustainability and dimension sensitive attributes institutional

Coordination analysis on the institutional dimension obtained a value of 54.66% for expert respondents and 53.36% for public respondents, indicating that the institutional dimension is categorized as "sustainable enough" (Figure 11)

The difference in the value of the sustainability index with Monte Carlo is less than 1, so the system is by real conditions (Table 15).

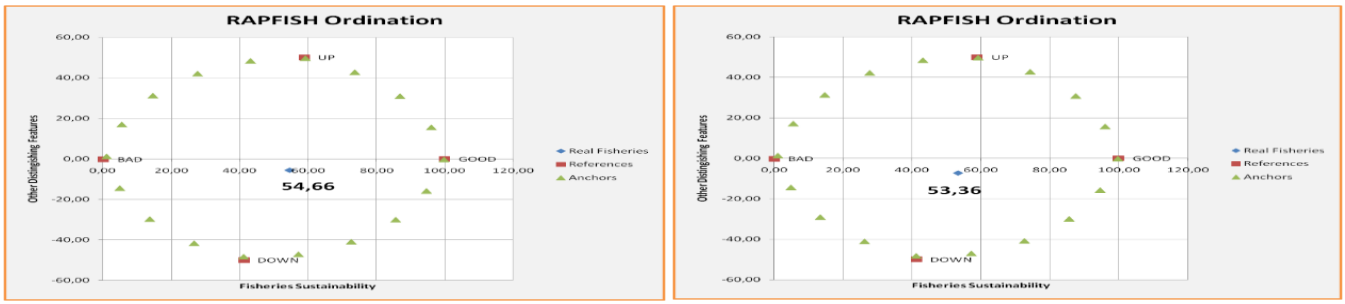

Figure 10. Institutional dimension sustainability index

Table 15. Monte Carlo validation of institutional dimensions

Sustainability Index						Category
MDS		*Monte Carlo*		Difference		
Expert	Public	Expert	Public	Expert	Public	
54.66	53.36	54.41	52.94	0.25	0.42	Valid

The stress value is 0.1484 for expert respondents and 0.1491 for public respondents, this value indicates that the feasibility of the model is in the sufficient category, as shown in the following table.

Table 16. Stress values and R^2 institutional dimensions

Stress		R^2	
Expert	Public	Expert	Public
0.1484	0.1491	0.9457	0.9451

The R2 value of 0.9457 for expert respondents and 0.9451 for public respondents, shows that the institutional dimension has provided the information

needed to predict the dependent variable. Institutional dimension leverage analysis was carried out using 9 attributes that are thought to influence the sustainability dimension, as shown in the following figure.

Figure 11. Sustainability-sensitive attributes of institutional dimension

The results of the leverage analysis of expert respondents and public respondents on the institutional dimension obtained sensitive attributes including 1) the involvement of traditional institutions in monitoring and evaluation, 2) the capacity of stakeholders (decision makers), and 3) assistance to Orang Rimba. Of the three sensitive attributes mentioned above, the attribute of stakeholder capacity (decision maker) is an attribute for both types of respondents, this condition proves that from an expert approach and field facts this attribute has a very strong influence on the sustainability of the economic dimension.

Table 17. Sustainability-sensitive attribute of the institutional dimension

Attribute	Expert	Public
Decision maker	1.93	1.81
Mentoring	2.75	0.08
Involvement of indigenous institutions	0.65	3.54
Obedience Orang Rimba	1.42	1.29

Improving and developing the capacity of area managers both at the individual level and at the institutional level is something that has always been the concern of the TNBD organization, capacity building by involving employees in various education, training, and seminars to develop themselves and develop the capacity of employees, especially in the field of area management and assisting Orang Rimba. According to [23] capacity building is a process by which individuals, groups, organizations, institutions, and communities improve their ability to produce performance in carrying out basic tasks and functions, solve problems, formulate and achieve goals, and understand development needs in a broad context. in a sustainable way.

The next sensitive attribute is the level of involvement of traditional institutions which is interpreted as the role of Orang Rimba traditional institutions in the management of the TNBD area. The higher the participation of traditional institutions, the Orang Rimba feel that they "own" the TNBD area more and become the subject of management, and it is hoped that Orang Rimba will try their best together with the TNBD Office to preserve the TNBD area. Some forms of participation of the Orang Rimba traditional institutions in managing the area include being involved in the formulation of the revised zoning of the TNBD which was subsequently followed up into the Long Term Development Plan of the TNBD (RPJP TNBD) 2021–2030 which is an embodiment of the follow-up management and utilization of natural resources in each predetermined space so that can provide benefits according to the function of each space. To increase the involvement of traditional institutions, assistance is needed by the area manager so that the Orang Rimba understands the intent and direction of the vision and mission of the organization which is synchronized with the customs and culture of the Orang Rimba.

The last sensitive attribute is the implementation of mentoring activities. Assistance activities by the TNBD Office are carried out for 13 temenggung who have customary territories in the TNBD area, the assistants are appointed by the head of the TNBD Office through a decree with clear duties and responsibilities. This mentoring activity is motivated by the existence of a gap in understanding between the parties who are the target recipients of assistance and those who assistance. The cause of this gap is caused by many factors including differences and limitations in social, economic, and cultural conditions. In carrying out their duties, companions position themselves as planners, mentors, informers, motivators, liaisons, facilitators, and at the same time evaluators [24].

3.2. Kite Diagram

To describe balance, a trade-off is used, which is a description of balance (balanced theory), in this case, the balance of the level of sustainability of each dimension of the sustainability of the Orang Rimba's living space. For kite diagrams, the index and status of the sustainability of the Orang Rimba living space are as shown in the following figure.

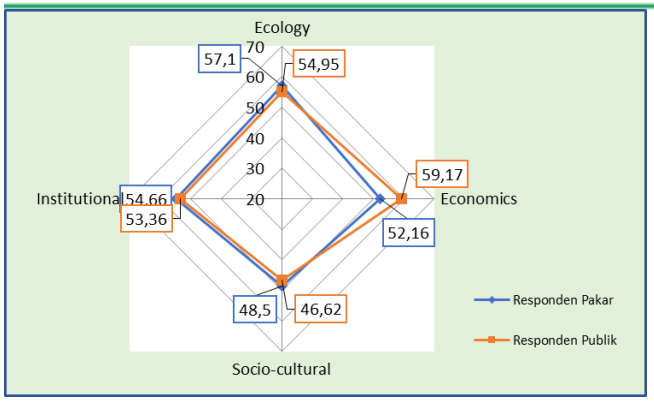

Figure 12. . Kite diagram of the sustainability of Orang living space

The index and status of the sustainability of the Orang Rimba living space in the TNBD area are in good condition the balance of categories is quite sustainable for the ecological, economic, and institutional dimensions in conditions, while the socio-cultural dimensions are in less sustainable conditions. But the value of the four dimensions.

4. Conclusions

The results of the study show that the status of the sustainability of the Orang Rimba living space in the TNBD area on the ecological, economic and institutional dimensions is quite sustainable, but the socio-cultural sustainability status is at a less sustainable status. Sensitive attributes to the sustainability of Orang Rimba living space in the TNBD area in each dimension, namely: a) Attributes that leverage the ecological dimension are 1) Compatibility between Orang Rimba customary spaces and the TNBD management zone, 2) management of biodiversity, and 3) suitability of activities live Orang Rimba with the zoning division of the TNBD; b) Sensitive attributes of the economic dimension, namely 1) the potential for non-timber forest resource products to increase Orang Rimba income, 2) the average spending of Orang Rimba, 3) the direct benefits of the TNBD area for Orang Rimba, and 4) the existence of a market for non-timber forest resource products ; c) Sensitive attributes of the socio-cultural dimension are 1) Orang Rimba involvement in TNBD area management activities, 2) Orang Rimba population growth rate, 3) Orang Rimba education level, 4) Local cultural practices in preserving the TNBD area, and 5) Relationship of mutual trust between fellow Orang Rimba; d) Sensitive attributes of the institutional dimension are 1) capacity of stakeholders (decision makers), 2) involvement of traditional institutions in monitoring and evaluation, and 3) assistance to Orang Rimba.

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