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# Sustainable Resource Development in the Province of Small Island's North Maluku (Case Moti Island)

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### ABSTRACT

Small Islands strategic role in the development of a nation. Facts prove that on the island of Small Island are the natural resources of renewable and non-renewable energy is very abundant for development. Besides the abundance of resources, small islands also have various constraints compared to the big island. Abundance coastal and marine resources in the present moment has been depleted. For that sustainable development should be maximized to ensure the awakening and preservation of these resources. This study aimed to analyze the sustainability of resources Moti Island through the ecological dimension, economic dimension, the dimension of socio-cultural, legal and institutional dimensions, and dimension-infrastructure technology. By using the method of multidimensional scaling (MDS) through software modifications Rapsfish. The study uncovered the index value on the resource sustainability: ecological dimension, the economic, socio-cultural dimensions, legal-institutional dimension, the dimension-infrastructure technology, and the union dimensions, is smaller than 50%, thus categorized as less unabated. Level less continues can be improved through optimization of resource management parameters of the five dimensions.

**Keywords:** Sustainable development of small island resources.

### 1. GLANCE TOURISM IN EAST JAVA

Natural Resources Small Islands has been located at various<sup>2</sup> research topics. Three major themes that were examined include: the sovereignty of the Unitary State of Indonesia, waking the ecological environment, and socio-economic life of society. The substance of the research on the defense function and resiliency, especially the outermost islands, leading, and retarded. Do not miss the factor abundance of marine natural resources/fisheries, ecosystems and the ecological role of Small Island as regulators of the hydrological cycle/biochemistry, and determines the global climate becomes sub-themes of research.

Small islands contain a wealth of natural and environmental services (environmental services) with huge potential for economic development and productive society, reception area, and foreign exchange. In addition to the abundance of fish resources, there are also mangroves, coral reefs, sea grass and associated organisms living in it. Also the area of recreation, tourism, conservation and other land (Adrianto, 2004; Bengen and Retraubun, 2006). This wealth is an asset adhesive national unity, social, cultural, and political interests of state defense and security (CTF 2013).

In addition to resource abundance, Small Island also has some ultimate constraint, such as: limited land area, the high level of alienation, limited economies of scale, lack of clean water sources, lack of erosion control (Kusumastanto, 2004); low levels of public education, limited access to transportation to the main island/large, are vulnerable to erosion and sedimentation, water catchment areas are relatively small, as the target of a landfill/waste, as well as socio-economic and cultural conditions of society is distinctive. Insularity small Islands lies on transport and communications, monopolistic economic environment, uncertainty of supply, dependence on imported products, economies of scale are limited, and the local competition (Briguglio, 1995).

North Maluku is a province of islands with an area of 136,148.61 km<sup>2</sup> (water 91.078.95 km<sup>2</sup> (66.9%; and mainland 45.069.66 km<sup>2</sup> (33.1%)), with a number of islands 805 pieces (Strategic WP3K north Maluku 2012). Island Moti is an administrative section of Ternate been a case of this study. With an area of 2,468 ha, island Moti has the potential of marine, coastal, mangroves, coral reefs, sea grass and natural tourism potential is huge and amazing. However, the euphoria of reform and autonomy, with the spirit of improving the reception area has eroded various spills such natural wealth. To that end, efforts to strategic development of natural resources Island Moti, to be sustainable ecologically, economically and socio-culturally. Implementation, Spatial Planning city Ternate (RTRW 2010-2030) designated as Strategic Growth Areas particularly the agricultural sector. in order to maintain the ecological sustainability of mangrove forests, coral reefs and sea grass protection, and coastal ecosystems and marine resources Moti Island, then in the Zoning Plan for coastal Areas and Small Islands (RZWP3K 2010) city Ternate, Moti Island designated as a Conservation Area.

## **2. THEORITICAL REVIEW**

Sustainable development is a concept dimensionless present and future. Some opinions of them, who cares for the development of life readiness economic, social, and ecological for the trans-generation (Conrad, 1999; Alexander, 2009; Brunland Commission, 1987; Chua, 2006; WCED, 1987). Covering the three pillars (trident), namely: economic, social, and ecological (George, 2007; Meadowcroft, 1999; MacNeill, 2000). Optimizing the benefits of natural resources, human resources, and harmonizing both in development (Salim, 2004). Environmental integrity, economic efficiency, and fairness (Young, 1992) in the Key and Alder (2005), Budiharsono (2006). Increased awareness of the global network of environmental issues, socio-economic (poverty and inequality), and concerns about the health of humanity (Hopwood). No decline in economic production capacity in the future (Barry, 1997). Are ecologically sustainable, economic, social, cultural and political (Rahim, 2000). "Justice as fairness" which means people from different generations have a duty and responsibility to one another as human beings have in one generation (Beller, 1990). The present generation can improve their welfare without compromising the welfare of generations (Serageldin, 1994). Dynamic balance between function maintenance (sustainability) and

transformation (development) in order to meet the necessities of life (Khanna et. al., 1999); Cornelissen et. al., (2001).

Associated with Small Islands, interpretation of sustainable development is intended to prevent conflicts of utilization, ensure sustainable use, as well as the optimization of space and resources for the welfare and economic growth (Cicin- Sain and Knecht (1998). Factors integration between dimensions that are “constraint based development “requires the development of small islands are able to bring economic sustainability of efficient and optimal; the sustainability of socio-cultural justice and ecological sustainability that does not exceed the carrying capacity of the environment, and politically be the glue of the nation (Dahuri, 2002; Beatley et. al., (1994), and the World Coast Conference (1993). Beller et. al., (1990) sustainable development in small island is determined by the ability of its inhabitants retain property resources of the island (energy, water, natural systems, technology, flexibility resident of access development, ecosystem resilience of natural disasters, cooperation government and the community in preventing damage to the environment, cultural values. Kenchington (1995) should pay attention to the issue of biological, cultural, geological, jurisdiction, law and administration, politics and bureaucracy, as well as social and economic.

Law No. 27 2007 on the Management of Coastal Areas and Small Islands, mandates development of Small Island should be based on the principles: sustainability, consistency, coherence, legal certainty, partnerships, equity, public participation, openness, decentralization, accountability, and fairness, With the purpose of (1) to protect, conserve, rehabilitate, utilize, and enrich the Coastal Resources and Small Islands as well as the ecological systems on an ongoing basis; (2) create harmony and synergy between the Government and the Local Government in the management of Coastal Resources and Small Islands; (3) strengthen the role of the community and government agencies, and encouraging communities in the management of Coastal Resources and Small Islands in order to achieve justice, equity, and sustainability; and (4) increasing the value of the social, economic, and cultural communities through community participation in the utilization of Coastal Resources and Small Islands.

The implementation is done in integrated regional development, with a focus on the study of natural resources Small Islands through approaches: (1) The ecological dimension; (2) the economic dimension; (3) socio-cultural dimensions; (4) The legal and institutional dimensions; and (5) Technology and infrastructure dimensions.

### **3. RESEARCH METHODS**

#### **Research Sites**

The study was conducted in North Maluku Moti Island. Selection is done with consideration Moti Island The island has natural resources potential and as a supplier of food needs for the city of Ternate, but the late start depleted.

#### **Types and Sources of Data**

Data used include primary data and secondary data. Of these coming from the field, the public and stakeholders on the island of Moti.

### SDA Sustainability Analysis Method Moti Island

Moti Island resources sustainability analysis conducted by the method of multidimensional scaling (MDS) through software modifications Rapfish (Kavanagh, 2001). With MDS sustainability index can be illustrated in the vertical and horizontal dimensions. The dots on the horizontal line, consisting of extreme point “bad” was given a score of 0% and a point of “extreme” both by a score of 100%. Ordinated analysis can be done in a multidimensional or partially, the result shows the status of each dimension of sustainability. Scale sustainability index can be seen in the table below.

**Table 1**  
**Categories resource sustainability status**  
**Moti Island based index value of each dimension**

<i>Index value</i>	<i>Accountability standard (Susilo, 2003)</i>
0 –25	Less Accountable
26 –50	
51 – 75	Accountable
76 – 100	

*Source:* Analysis ordinated RAPFISH 2015

Moti Island resources sustainability index shortened to IKB-SDAPM. IKB-SDAPM value of each dimension is visualized through a diagram Kite (kite diagram). Then do a sensitivity analysis, which aims to detect the most sensitive attributes that contribute to the IKB-SDAPM. To see the role of each attribute of the IKB-SDAPM do with “the analysis of leverage”. Its influence can be seen in the form of change “root mean square” (RMS) ordination contained in the axis of sustainability. If the RMS value changes due to the loss of one attribute is great, this shows the attributes that contribute greatly to the IKB-SDAPM, otherwise if one attribute is removed from the analysis, but the results did not change significantly, then the sensitivity of these attributes have no effect. Furthermore, to evaluate the effect of the error (errors) that occur in the process assumed a statistical value of sustainability natural resources Moti Island, then used the analysis of “Monte Carlo”.

### Determination of Value Scoring

Dimensional indicators studied by the score/ranking shows the status of sustainability. Value score describes a bad score on one side and a good value on the other side. Among the two values “extreme” that there are one or more values that show the value of the amount depends on the number of ranking each parameter.

Parameter Ecology, include: Resource exploitation of fish (SDI), the utilization rate SDI, exploitation/ destruction of mangroves, coral reefs closing levels, exploitation and destruction of coral reefs, sea grass beds closing levels, the conservation of ecosystems

Parameter Economics, include: Advantages activity SDI and Marine, revenues from business utilization of SDI relative to total revenue, Contributions Fisheries/Marine Against the welfare of the community, Contributions Ecotourism Against Welfare society, Institutional Economics, Financial Institutions Local, Support Economic last 10 years, industry development support for the sustainability of the industrial

system, Climate Local Economy. Scoring parameters referring to the scale economies Susenas, 2015 and Modifications Rapfish.

Parameter Socio-Cultural, include: Growth Utilization Rate SDI last 10 years, knowledge of the environment, behavior in the management of SDI, education level relative Island community Moti, workforce skills, frequency of conflict, participation of the family against the use of SDI, society's role in the management of Resources coastal, public awareness efforts, health improvement of coastal communities, the education level of the majority of fishermen. Scoring parameters of socio-cultural reference to the scale Susenas, 2015 and Modifications Rapfish.

Parameter-Institutional Law, include: Regulation formally management, availability of regulatory Indigenous and trust/Religious, Legal Education index value of natural resources and environmental management, their role models were honored, the Local Supervisory Authority of 0.95, and the role of the provincial government's policy towards Moti Island, and the role of government policy toward the island city Moti, Frequency counseling and training relevant agencies, Perception Related agencies on the autonomy of the management of coastal resources, local institutional development on a community initiative.

Parameter Technology and Infrastructure, include: The road network in Moti, Condition District and provincial road network, Transport Facilities, access to sea ports, availability of electricity, water supply systems (refer to Susenas, 2015). Capture Device Type, Infrastructure capture fisheries, aquaculture Infrastructure, Infrastructure fish processing, tourism supporting infrastructure (refer to Rapfish).

## **4. RESULTS AND DISCUSSION**

### **Combined Dimensions**

Rapfish analysis results for the combined dimensions (ecological, economic, socio-cultural, legal-institutional, and technology-infrastructure) with 48 parameters, to demonstrate the value of sustainability index Moti Island Resource of 42.50% on the sustainability scale of 0 -100%. These values mean that the union dimensions are at a scale of less continue, so it takes a maximum management of the parameters of these dimensions. This category refers to the continued lack of accountability standards set Susilo (2003).

### **Dimensions Ecology**

The results of the analysis Rapfish find the value of sustainability index Moti's Island Resource ordinated by 45.78% ecological dimension of sustainability scale of 0 -100%. The Index represents the value of the 7 parameters. Values above shows that the sustainability index in the range approaching the level of 50%, which means less ongoing ecological dimension, so it takes a maximum management for ecological sustainability. Category refers to the continued lack of accountability standards set by Susilo (2003).

Leverage of attributes to 7 parameter shows the ecological dimension index values as follows: Resource exploitation of fish (SDI) of 2.7. The utilization rate SDI has an index value of 3.8. Exploitation/ destruction of mangroves with an index value of 6.6. The index value of coral reefs closing level of 4.9. The index value exploitation and destruction of coral reefs of 1.6. The closing level of 2.7 sea grass. Their ecosystem conservation of 3.6. Scale ordinated sustainability (On sustainability scale 0-100), 7 of these parameters have a very low value. To enhance the ecological sustainability of resource Island Moti to do steps

(1) the conservation of coral reefs, mangroves and sea grass; (2) minimize the potential for exploitation and damage to coral reefs and mangroves; (3) prevent overfishing of the fish resources; (4) Maintain Ecotourism mangrove forest areas; (5) Improve land management of aquaculture compared to habitat conditions; (6) Conducting aquaculture methods that are environmentally friendly.

### **Economic Dimension**

Rapfish analysis results showed that the Resource Sustainability Index Moti Island on the economic dimension is also less continues (35.32%). Meaning of the parameters studied, almost all levers parameters must still be improved. This continued lack appropriate category accountability standards Susilo (2003).

Leverage of attributes to 9 parameter economic dimension shows the index value for each parameter as follows: Advantages of SDI activities of marine of 3.00. Revenue from the SDI utilization relative to total revenue of 4.29. Contributions fishing/marine in community welfare 3.97. Marine ecotourism contributes to the public welfare by 4.63. Institutional Economics worth 3.97. Local financial institutions amounting to 4.70. Means economy in the last 10 years amounted to 2,19. The development of supporting industries to the sustainability of industrial systems of 4.17. Local economic climate for 3.47.

In line with the conditions of the economic dimension, efforts to increase the capacity of the economy must be made through levers factors such as: (1) increase the number of economic facilities; (2) increase the acceptance of business fishing/marine; (3) To stimulate the local economy; (4) Improving the local market and the inter-island; (5) Increase/open a craft business and industry-based local nontraditional fish and marine resources; (6) Increase efforts made traditional fish and marine resources.

### **Socio-Cultural Dimensions**

Results showed analysts RAPFISH Socio-Cultural Dimensions in resource development Moti Island has a score of 45.6 on a scale of 0-100. The value means that, for parameters which are the basis for the socio-cultural dimension of resource development on the island of Moti still needs to be improved from the category of the index is less continues (45.6) into the category of indexes continued. This continued lack appropriate category accountability standards Susilo (2003).

Leverage of attributes to 11 Socio-cultural dimension parameter shows the value of the index as follows: Growth TK utilization of SDI in the past 10 years of 0.26. Knowledge of the environment of 0.50. Behavior in the management of SDI by 0.56. The level of education relative Moti Island communities by 0.56. Skilled labor 0.53. Frequency conflicts with value of 0.49. Family participation on the utilization of SDI worth 1.17. The role of the community in the management of coastal resources of 1.17. Public awareness efforts worth 0.58. Health Improvement coastal communities have an index value of 0.18. The majority of the index value education level of fishermen of 0.92.

To increase the value of the index of this dimension, a variety of improvements to the management of the parameters of socio-cultural needs to be implemented, such as: (1) raising the level of education/community skills; (2) Increasing public awareness about the ongoing resource and sustainable environment; (3) increase the role of the community in the management of fish and marine resources; (4). Improving public health and environmental sanitation; (5) Improving the skills of the workforce; (6) equip people with the knowledge to prevent and manage conflicts be positive for development.

## **Legal and Institutional Dimensions**

The results obtained by the index value RAPFISH analyst Legal and Institutional Dimensions in resource development Moti Island is at 43.45 value of sustainability scale of 0-100, which by Susilo (2003) categorized at level less continue. That is, with the index value is less continues, then the parameters into the socio-cultural dimension lever for the development of resources on the island of Moti should be the main focus for improvement.

Leverage of attributes to 10 Legal and Institutional dimensional parameter shows the value of the index as follows: Regulation formally management has an index value of 0.42. Availability regulations Indigenous and belief/Religion has an index value of 0.54. Value index Legal Education Management of natural resources and the environment 0.77. Role models who respected their index value of 0.90. Local Supervisory Authority index value of 0.95. The role and provincial government policy towards Moti Island of 0.93. The index value and the role of government policy toward the island city Moti is 0.75. Frequency of counseling and training relevant agencies of 0.34. Perceptions Related Agencies on the autonomy of management of coastal resources amounting to 1.99. Local institutional development on a community initiative of 1.33.

Value index of these parameters are very small in scale from 0-100, so as to optimize the dimensions of maximally need improvement, such as: (1) Increase the frequency and quality of information dissemination of relevant agencies to small island resource management in a sustainable manner; (2) increase transparency in the management policy of SDI/Marine; (3) enhance the role and involvement of technical institutions Regency/City and the provinces; (4) increasing the role of local regulatory agencies; (5) Improving adherence to customs, culture, local wisdom; (6) The existence of role models; (7) the availability of law enforcement personnel in the location

## **Dimensional Technology and Infrastructure**

Results RAPFISH analysts note that the value of the index Dimensional Technology and Infrastructure in resource development Moti Island reached a value of 39.57 on a scale of 0-100. That is, the development of resources on the island of Moti on the dimensions of technology and infrastructure turned out to be at the level of less continue. This condition is justified Susilo (2003), that the dimensions of less than 50% are in the category of less continue. Thus, to increase the value of the index this dimension, the parameters that become levers should be optimized so as to shift from the less continue to become more continuous. Leverage of attributes for parameter 11 shows the dimensions of Technology and Infrastructure index values as follows: The road network on the island of Moti at 1.79. Conditions district and provincial road network of 1.80. Means of Transportation is 1.97. Access to the seaport of 4.50. Availability of electrical energy of 3.41. Of clean water with an index value of 1.77. The index value of 1.61 gear types. Infrastructure in the field of fisheries by 3.55. Infrastructure in the field of aquaculture of 3.22. Infrastructure in the processing of fishery products 0.26. The supporting infrastructure of tourism worth 2.35.

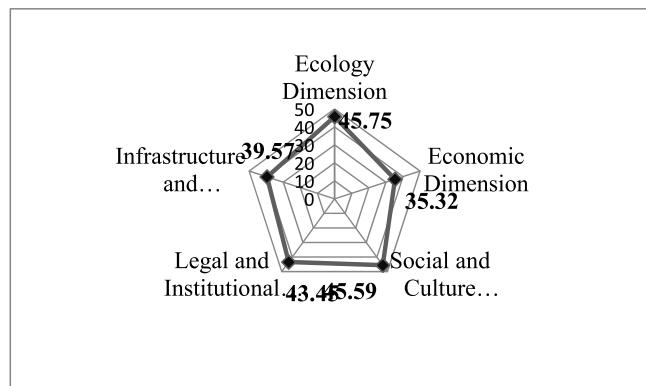
To increase the value of this dimension, can be carried out as follows: (1) add to and improve the electricity infrastructure, clean water, and communications; (2) add and repair of roads and bridges; (3) improvement of fishing gears; (4) the processing of fish and seafood; (5) aquaculture infrastructure; (6) and supporting tourism infrastructure.

**Moti Island Sustainable Resource Calculation**

Tables 2 and kite diagram (Figure 1), showed him that the 5-dimensional and multidimensional partially analyzed, all of them at the level of less continued (<50%) and the weakest economic dimension compared to the 4 other dimensions. However, there is no resource dimension are classified as “poor” (bad). To achieve good status (Good) on the interval 75-100, necessary repairs/improvements in all five dimensions.

**Table 2**  
**Value Index and Sustainability Development Dimensions Moti Island**

No	Dimension	Index value	Accountability
1	Ecology	45,80	Less continues
2	Economy	35,30	Less continues
3	Socio cultural	45,60	Less continues
4	Legal and Institutional	43,45	Less continues
5	Technology and infrastructure	39,60	Less continues
6	Multidimensional	42,50	Less continues
	Average		Less continues



**Figure 1: Diagram IKB kite-SDAPM on each dimension Moti Island**

Statistically approach Multidimensional Scaling (MDS) combined dimensions or partially, the value of “stress” is entirely <0.25%, thus not requiring changes to the parameter.

**Table 3**  
**The values of statistics relating to the analysis of IKB RAP-SDAPM**

Statistical value	DIMENSION					
	Multi	Ecology	Economy	Socio cultural	Institutional law	Technology infrastructure
Stress	0,13	0,14	0,14	0,15	0,14	0,13
R <sup>2</sup>	0,96	0,95	0,95	0,95	0,95	0,95
Number of iterations	2	2	2	2	2	2
Rotation angle	269,04	215,20	144,68	180,84	180,83	180,37

The table shows that the coefficient of determination (R2) on the analysis of RAP-SDAPM IKB, all partial dimensions (ecological, economic, social, cultural, institutional and legal, technological and infrastructure) as well as multidimensional have relatively similar coefficient of determination. The value



indicates the points that were analyzed relatively no differences significant. To increase the coefficient of determination becomes larger can be done by adding a parameter of each dimension studied.

The level of confidence Moti Island Resource sustainability index conducted by analysis of IKB RAP-SDAPM, then compared with the results of Monte Carlo analysis, as follows.

**Table 4**  
**Comparison of IKB-SDAPM MDS and Monte Carlo on  $\alpha = 95\%$**

<i>Dimension</i>	<i>MDS</i>	<i>Monte Carlo</i>	<i>Difference</i>
Multidimensional	42,50	42,93	0,43
Dimensions Ecology	45,78	45,86	0,08
Economic dimension	35,32	36,15	0,17
Social Dimensions of Culture	45,59	45,56	0,03
Legal and Institutional Dimensions	43,45	43,59	0,14
Dimensional Technology and Infrastructure	39,57	39,92	0,35

An index value of MDS analysis results and Monte Carlo has a relatively small difference in all dimensions (combined, ecological, economic, social, cultural, legal and institutional, technological and infrastructure). The small difference in the value of the index every dimension analyzed, resource sustainability has a very high degree of accuracy.

## 5. CONCLUSION

The results of the analysis carried out partially or multi-dimensional, showing Moti Island resources at the level of less continue. For ecological dimension necessary efforts to reduce the exploitation and destruction of coral reefs, reducing the exploitation/overfishing, and stop the destruction of sea grass beds. While the economic dimension, development of economic instruments should be improved compared to eight other parameters. Further to the dimensions of socio-cultural, legal and institutional entire management parameters investigated should optimally so that these dimensions can be continued. And to the dimensions of technology-infrastructure, infrastructure in the management of the fishery is still very low and should be a major concern in its management.

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Appendix 1

Table 1  
Scoring Criteria Parameter Examined

<i>Dimensions/Parameters</i>	<i>Score</i>	<i>Good</i>	<i>Bad</i>	<i>Informayion</i>
(1)	(2)	(3)	(4)	(5)
<i>Ecological dimension</i>				
Exploitation of Natural Resources/ Marine	0,1,2,3,4	0	4	Referring to the scale of FAO; 0 (less); 1 (full); 2 (very heavy); 3 (over fishing); 4 (crushed)
Utilization Rate SDI	0,1,2,3	3	0	(0) Exceeding capacity; (1) low; (2) medium; (3) optimal
Mangrove exploitation	0,1,2	0	2	(0) bad; (1) medium; (2) either
Closing Level Coral	0,1,2,3	3	0	0 < 25%; (1) 26 -50%; (2) 51-75%; (3) > 75%
Exploitation of coral reefs	0,1,2	2	0	(0) bad; (1) medium; (2) either
Closure Seagrass	0,1,2,3	3	0	0 < 25%; (1) 26 -50%; (2) 51-75%; (3) > 75%
Waste disposal	0,1	0	1	(0) No; (1) No
Their Ecosystem Conservation	0,1,2	0	2	(0) There are no conservation; (1) No conservation <30.2) conservation of > 30%
<i>Economic dimension</i>				
Advantages and Marine SDI activities	0,1,2,3,4	0	4	Referring to Rapfish. (0) is very favorable; (1) the marginal returns; (2) return of capital; (3) loss a little; (4) a big loss
SDI utilization relative to total revenue	0,1,2	2	0	(0) <50%; (1) 50% -80%; (2) > 80%
Contributions Fisheries/Marine Against welfare	0,1,2	2	0	Referring to Rapfish. (0) is low; (1) medium; (2) High
Contributions Ecotourism Against Welfare	0,1,2	2	0	Referring to Rapfish. (0) is low; (1) medium; (2) High
Institutional Economics	0,1,2	0	2	(0) There and functioning; (1) Less functioning; (2) There is but does not function
Local Financial Institutions	0,1,2	0	2	(0) There is/are easily accessible; (1) Difficult to access; (2) No
The last 10 years of Economic Means	0,1,2	2	0	(0) is reduced; (1) Fixed; (3) Increase
Supporting industrial development system sustainability	0,1	1	0	Bappenas. (0) No; (1) There
Local Economic Climate	0,1,2	2	0	(0) Not conducive; (1) Conducive; (3) Very conducive
<i>Social dimension</i>				
Utilization growth TK SDI in last 10 years	0,1,2,3	3	0	Referring to Rapfish. (0) <10%; (1) 10% -20%; (2) 20% -30%; (3) > 30%
Knowledge of the environment	0,1,2	2	0	(0) Very minimal; (1) Enough; (2) Many
Behavior in HR management	0,1,2	2	0	(0) bad; (1) medium; (2) either
Education level relative Moti Island community	0,1,2	2	0	(0) did not complete primary school and complete primary school; (1) completed junior and senior; (2) Not graduated and graduated PT
Skilled labor	0,1,2	2	0	(0) not available; (1) are limited; (2) provided sufficient
Frequency of conflicts	0,1,2	2	0	(0) no; (1) there is a little bit; (2) many

<i>Dimensions/Parameters</i>	<i>Score</i>	<i>Good</i>	<i>Bad</i>	<i>Informayion</i>
(1)	(2)	(3)	(4)	(5)
Family participation to the utilization of natural resources	0,1,2,3,4	4	0	(0) none; (1) 1-2 family members; (2) 3-4 family members; (3) 5-6 family members; (4) > 6 family members
The role of the community in the management of natural resources Moti Island	0,1,2,3,4	4	0	(0) is very negative; (1) negative; (2) neutral; (3) positive; (4) very positive
Public awareness efforts	0,1,2,3	0	3	(0) knowledge and low awareness; (1) knowledge of existing, low awareness; (2) knowledge does not exist, a high awareness; (3) knowledge and high awareness
Improved public health Moti Island	0,1,2	0	2	(0) no; (1) slightly; (2) many
The majority of education level of fishermen	0,1,2,3	3	0	(0) Not completed primary school; (1) Graduate from elementary school-junior high; (2) High School Graduate; (3) Graduate Diploma-Bachelor
Management regulations formally	0,1,2	2	0	(0) less; (1) sufficient; (2) many
<i>Legal-Institutional Dimensions</i>				
Availability of customs regulations and religious beliefs	0,1,2	2	0	(0) no; (1) slightly; (2) many
Legal counseling management of natural resources and environment	0,1,2	2	0	(0) Never; (1) rare; (2) Often
Their Role models	0,1,2	2	0	(0) no; (1) slightly; (2) many
Local watchdog agency	0,1,2	2	0	(0) there is not functioning; (1) lack of functioning; (2) There and functioning
The role of the provincial government and policy management Against Moti Island	0,1,2	2	0	(0) did not play a role; (1) play a role but it is limited; (2) optimal role
The role of municipal government policy and management against Moti Island	0,1,2	2	0	(0) did not play a role; (1) play a role but it is limited; (2) optimal role
Frequency of counseling and training related agencies	0,1,2,3,4	4	0	(0) no; (1) time in five years; (2) times in one year; (3) two times in one year; (4) at least 3 times in 1 year
The role of provincial government policies and management Against Moti Island	0,1,2	2	0	(0) did not play a role; (1) play a role but it is limited; (2) optimal role
Frequency of counseling and training related agencies	0,1,2,3,4	4	0	(0) no; (1) time in five years; (2) times in one year; (3) two times in one year; (4) at least 3 times in 1 year
Perception management autonomy SDA	0,1,2	2	0	(0) is low; (1) medium; (2) sufficient
Local institutional development on a community initiative	0,1	0	1	(0) no; (1) No
<i>Dimensional Technology and Infrastructure</i>				
The road network in Moti	0,1,2	2	0	(0) bad; (1) medium; (2) either
Conditions district and provincial road network	0,1,2	2	0	(0) bad; (1) medium; (2) either
Means of Transport	0,1,2	2	0	(0) not available; (1) available but not sufficient; (2) reasonably available

<i>Dimensions/Parameters</i>	<i>Score</i>	<i>Good</i>	<i>Bad</i>	<i>Informayion</i>
(1)	(2)	(3)	(4)	(5)
Access to the seaport	0,1	1	0	(0) difficult; (1) easy
Clean water facilities	0,1,2	2	0	(0) not available; (1) available but not sufficient; (2) reasonably available
The type of fishing gear	0,1,2	0	2	Modifications Rafish. (0) majority is passive; (1) balanced; (2) Active
Infrastructure of fisheries	0,1,2	2	0	(0) bad; (1) medium; (2) either
Infrastructure aquaculture	0,1,2	2	0	(0) bad; (1) medium; (2) either
Fish processing infrastructure	0,1,2	2	0	(0) bad; (1) medium; (2) either
Tourism support infrastructure	0,1,2	2	0	(0) bad; (1) medium; (2) either

### Appendix 2

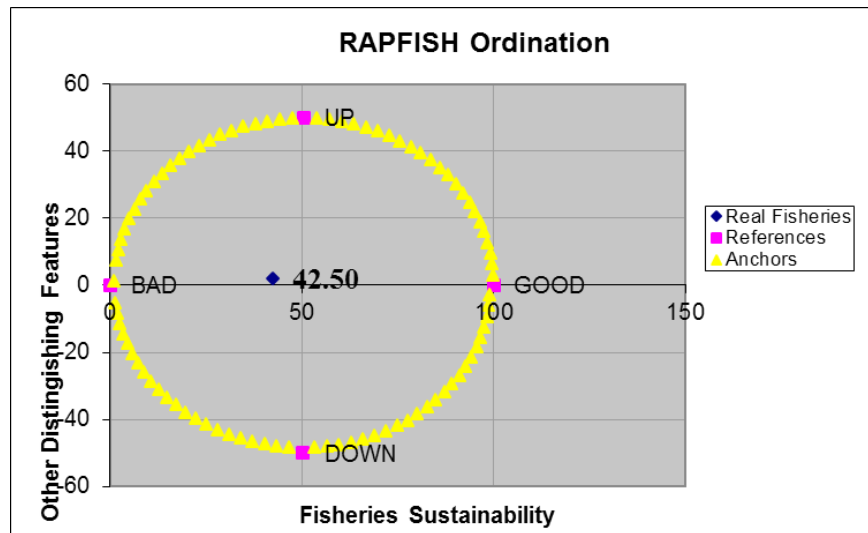


Figure 2: Value ITB-SDABM Dimensional Composite Moti Island

### Ecology Dimension

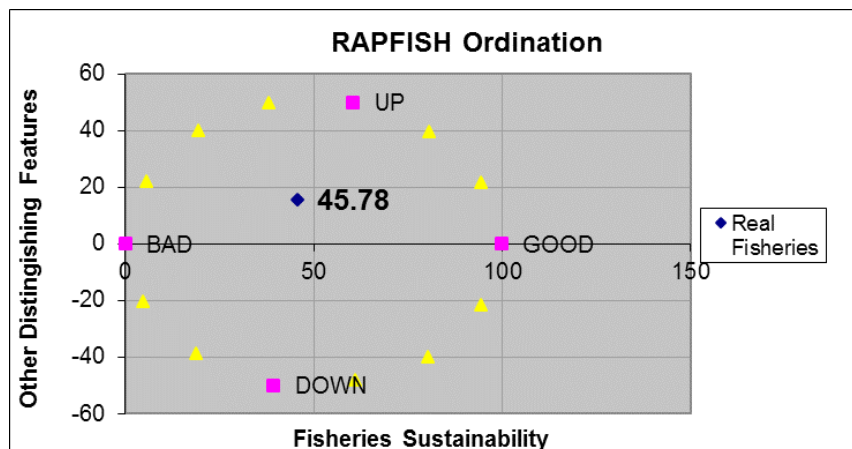


Figure 3: Value IK-IN Dimension Ecological Island Moti

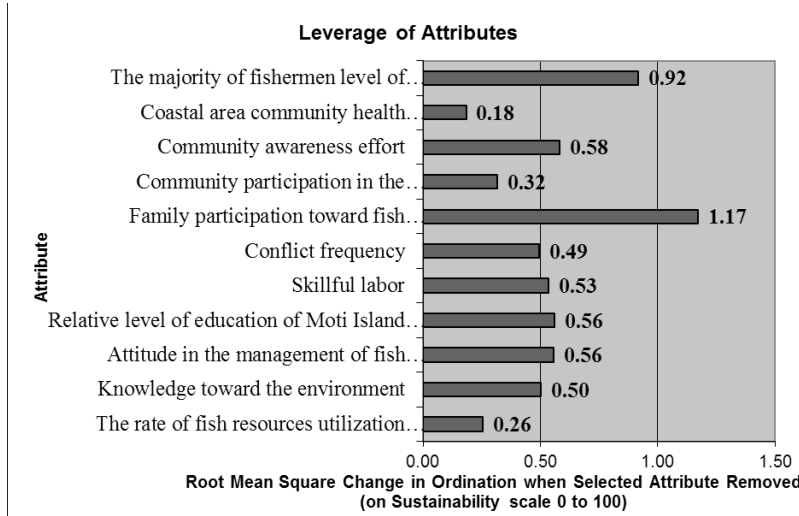


Figure 4: Leverage Attribute dimensions Ecology

Economic Dimension

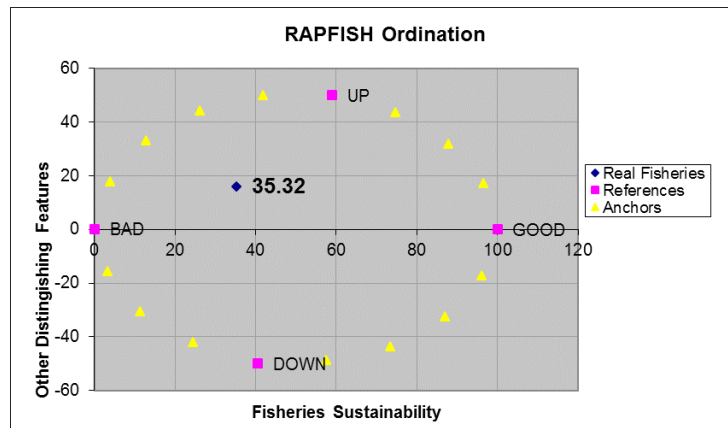


Figure 5: VALUE IKB-SDAPM Dimensions Economy in island Moti

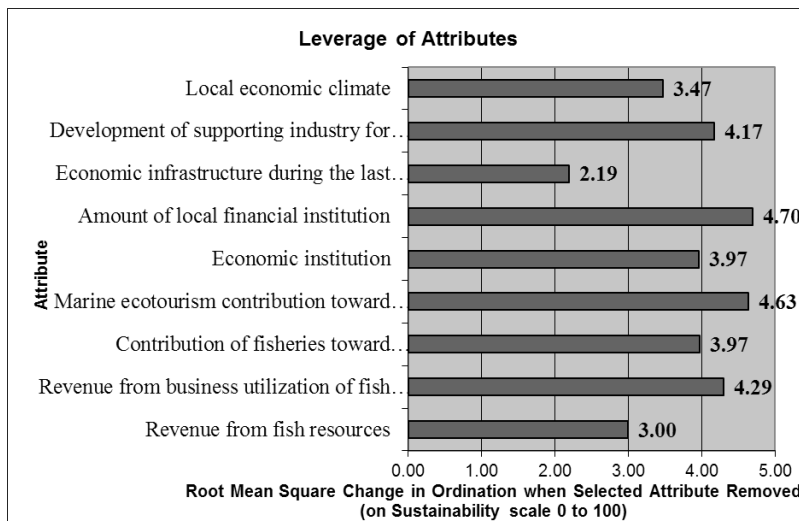


Figure 6: Leverage Attribute dimensions Economy

Social and Culture Dimension

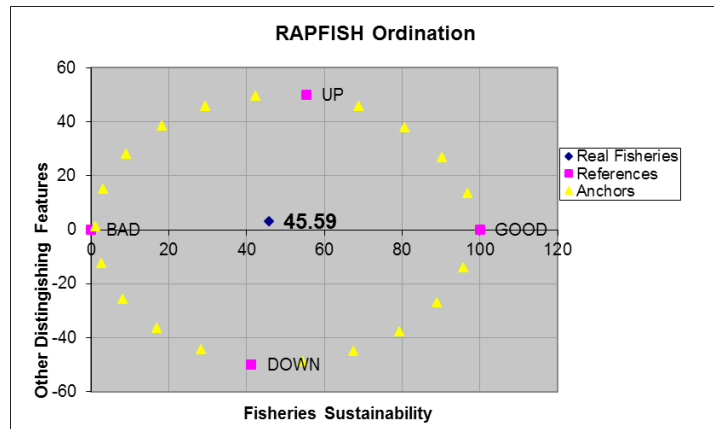


Figure 7: Value IKB-SDAPM Socio-Cultural Dimensions Island Moti

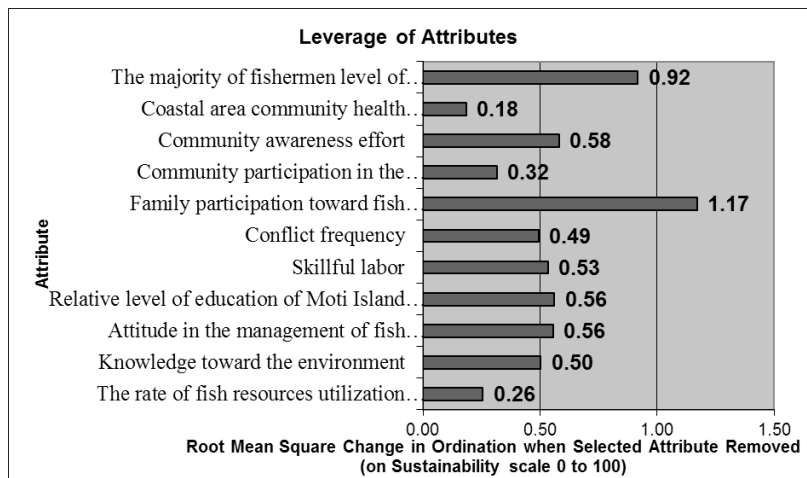


Figure 8: Leverage Attribute dimensions Socio-cultural

Legal and Institutional Dimension

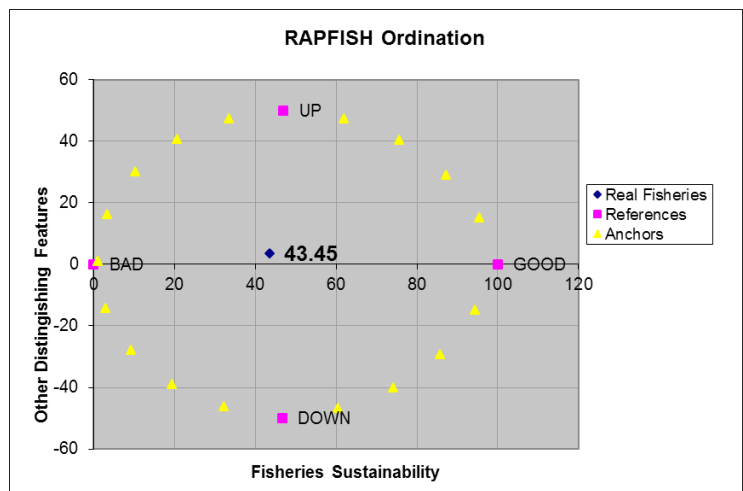


Figure 9: Value IKB-SDAPM Legal and Institutional Dimensions in Moti Island

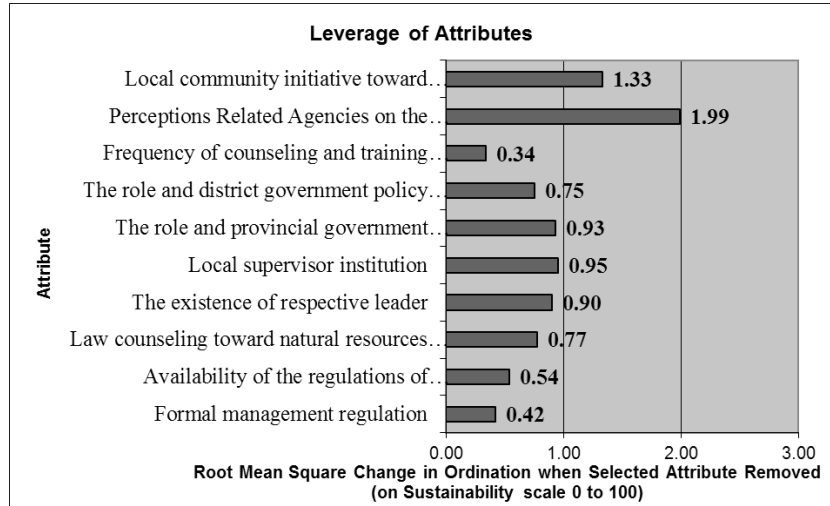


Figure 10: Leverage dimensions attributes and Institutional Law

### Infrastructure and Technology Dimension

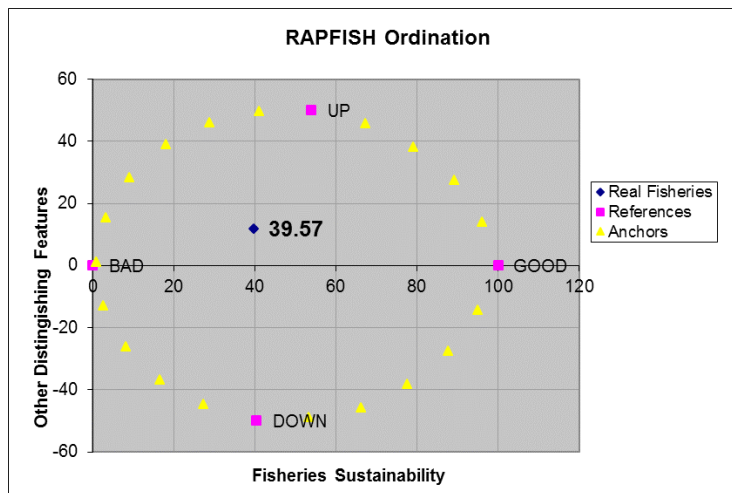


Figure 11: GPA-IN Dimensional Technology and Infrastructure at Moti Island

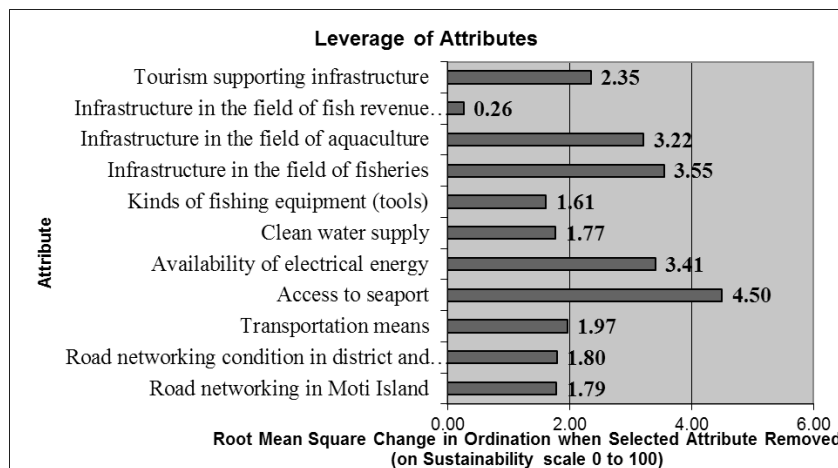
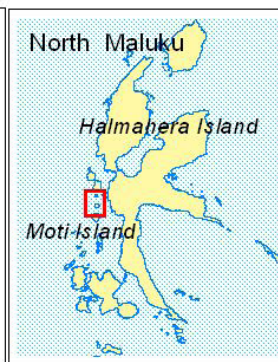
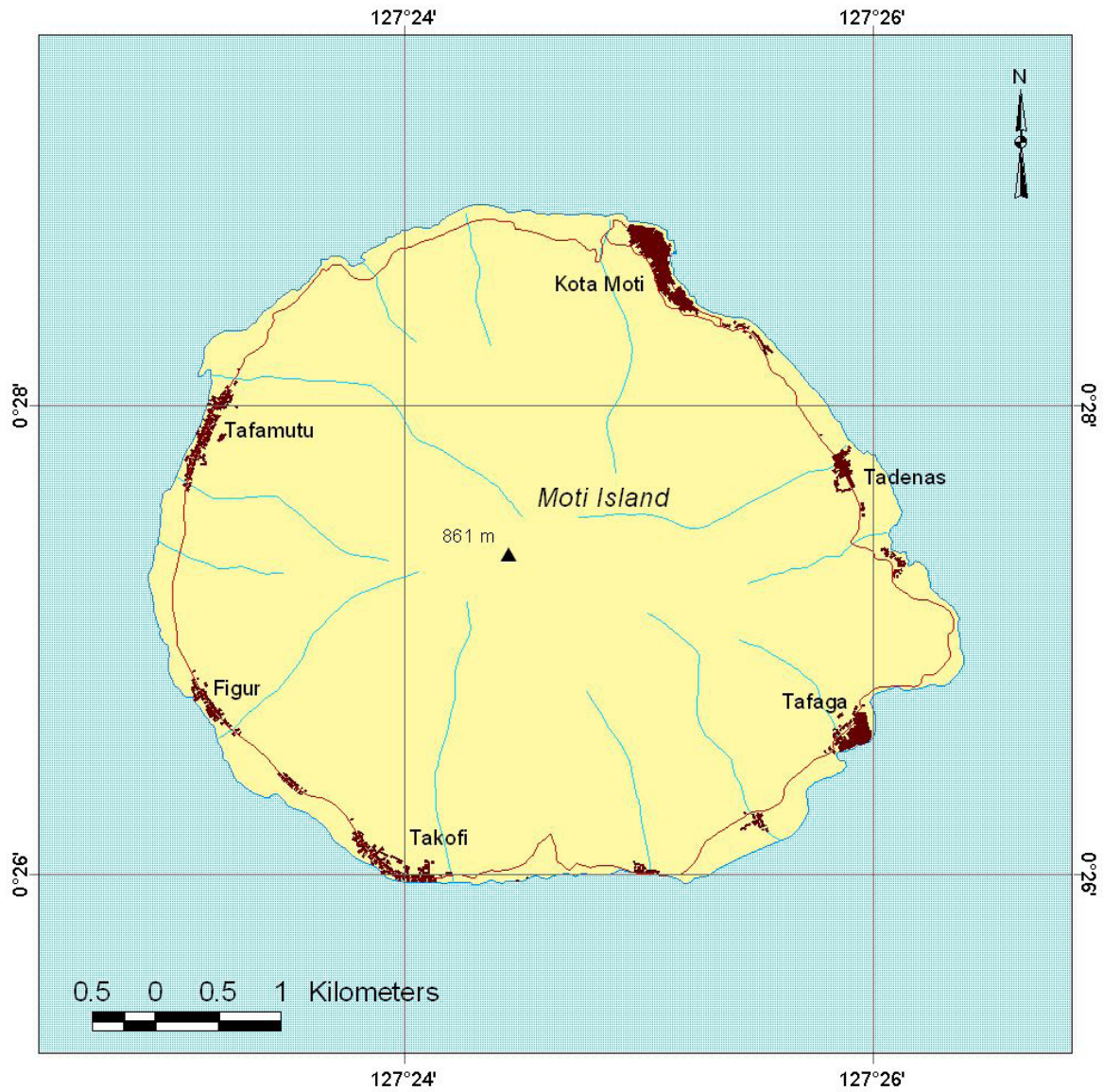


Figure 12: Leverage dimensions attributes and Infrastructure Technology



Appendix 3

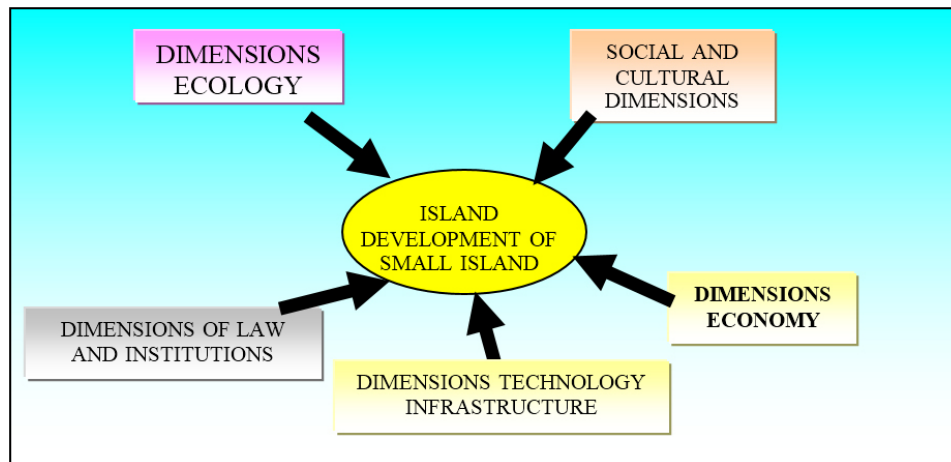
MAP OF MOTI ISLAND



Legend :

- Roads
- Rivers
- Coastal line
- Settlement
- Land
- Sea

*Appendix 4*



**Figure 1: Dimensions Island Development of Small Island**