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AGRARIS: Journal of Agribusiness and Rural Development Research

Vol. 4 No. 1 Januari -Juni 2018

Strategic Policy of Coastal Sustainability based on Local Conditions and Needs in Sambas Regency, West Kalimantan

https://doi.org/10.18196/agr.4161

ABSTRACT

Recently, there has been a growing controversy on strategic policy issues in coastal areas. Coastal regions have the most diverse, complex, and productive ecosystems due to demographic and economic pressure. This ecosystems are important for food security. On the other hand, coastal problems are national issues, not just state or local issues. This research aims to propose the priority dimension of a stakeholder role in a strategic policy to promote the coordination and sustainability of socioeconomic activities in coastal areas involving stakeholders as primary data, i.e. fishermen, merchants, private, and government using SUSTAIN indicators with AHP and Rap-Coastal methods. The result reveals that governance dimension was still the most priority and the most sustainable index to achieve policies; monitoring tools; human resources capacity building, implementation of good management practices; and public participation. Meanwhile, social well-being dimension was the most priority to achieve the economy through transportation; and attaining the goal of equity was the priority for government policy. There are three sensitive aspects of coastal sustainability management, including integrated program, identified parties actively informed and involved, and partnership between local governments and communities.

Keywords: coastal management, governance, strategic policy, sustainability.

INTRODUCTION

Coastal zones are unique areas with diverse species that connect land and sea. The zones are economically valuable and extremely important for human activities as they provide many benefits to humans, such as biodiversity, food sources, and renewable energy. Coastal zones also provide an intangible benefit, i.e. an aesthetic value, recreation, an essential contribution to cultural heritage, and supporting human activities.

However, the economy and human activities related to fishery, aquaculture, and tourism activities are environmentally sensitive since they give real pressure as part of the world's coasts, i.e. loss of biodiversity, contamination by hazardous substances, non-indigenous species and marine litter, and land-claim development (RCS, 2010). Furthermore, the exploitation of coastal resources often causes serious environmental problems, such as the global climate change and the rise of sea-level, unexpected natural episodic events, and unexpected man-made disasters (Zsamboky, Fernández-Bilbao, Smith, Knight, & Allan, 2011).

Recently, adaptive and collaborative approaches to manage coastal areas and shared governance processes has emerged. The coastal management in many regions (Siry, 2009; Harvey & Katon, 2010; Newmann, Vafeidis, Zimmermann, & Nicholls, 2015; Goble, Hill, & Phillips, 2017) has also developed over time and reflects global trends due to the growing emphasis on pub-

lic participation, ecological concern, improved integration among sectors, less engineered solution, and the centrality of the concept of sustainability (Kenchington, Stocker, &Wood, 2012). Nevertheless, many people and the government are not fully aware of the significant relevance between the coastal areas management and the commitment of the government, which has a responsibility for planning and making decisions, as well as producing regulations which cover a large proportion of land and sea areas in the coastal zone, both at national policy and local implementation scales to consciously integrate social, cultural, ecological and economical aspects.

Hence, it is equally important to understand the people, as their unique cultures and economies are connected to coasts for understanding the ecological model to manage the coastal sustainable task. A coherent approach in formulating policies for sustainable protection, usage and management of coastal resources which supports long-term sustainable growth with technical innovation and expansion is needed, particularly to address the challenge and new ways to integrate multiple considerations into adaptive implementation in order to respond to the local conditions and needs.

What is more concerning is that there is a pronounced lack of experience in implementing the assessment tools in general and practice. The discrepancy between expectations and practical application is one of the key issues that should be addressed. Another issue is a lack of methodology standard. Often, there is confusion, whether some actions should be considered as a tool as their tools.

Therefore, this research tried to propose priority dimension of a stakeholder role in a strategic policy to promote the coordination and sustainability of socioeconomic activities in coastal areas with combination of AHP and Rap-Coastal methods to prove the leading dimension drawn from economic, environmental quality, social well-being, and governance dimensions objectives into coastal management and policy making based on the local conditions and needs. This priority dimension is expected to make the coastal management process more efficient and effective. This also provides the groundwork for sustainable coastal management policies, plans or programs, which can be assessed into decision making for future coastal developments, exploitation of coastal resources, and the management of certain coastal issues, particularly Sambas district in West Kalimantan that has the largest coastal area of 198.36 km^2 for achieving sustainable coastal areas management.

METHODS

The research was conducted in the Sambas region as the largest coastal areas in West Kalimantan, Indonesia, using primary data through purposive sampling that were collected from stakeholders as primary data, including fishermen, merchants, government (Marine and Fishery Agency and Regional Development and Planning Agency) using a set of semi-structured questions employed in interviews. Interview was used as a data collection method as it generates good results due to better sampling, the fewer respondents to get the same results, also elicits distractions, faster and cheaper; and flexible (Turner, 2010; Mack, Woodsong, MacQueen, Quest, & Namey, 2011; Alshenqeeti, 2014).

The findings are structured based on SUSTAIN indicators to create a fully implementable policy tool to deliver sustainability coast management, i.e the economics, environmental quality, social well-being, and governance dimensions (SUSTAIN-Partnership, 2012). The sustainability dimensions were formulated to answer the priority of the strategy. The chain of evidence and the clear linkages between the dimensions will be established through research questions, relevant literature and data tools used to attain conclusions (Schernewski, Schönwald, & Katarzyte, 2014).

The data were analyzed in two sections. The first was decomposing the problem into a hierarchy of sub problems to measure the weight of each dimension of sustainable coastal management using Analytic Hierarchy Process (AHP) with 9 scale criterias (1=equal importance up to 9= extreme importance) with expert choice software for making a decision through following steps: (1) Define the problem and determine the desired solution; (2) Create a hierarchical structure; (3) Form a pairwise comparison matrix; (4) Normalize data; (5) Calculating the eigenvector value and testing its consistency; (6) Repeat steps, 3, 4, and 5 for the entire hierarchy level; (7) Calculating the eigenvector of each pairwise comparison matrix; (8) The consistency-test for the hierarchy (Saaty, 2008; Saaty & Vargas, 2012). The second was ordinating the entities in attribute space with Rap-Coastal that was adopted from Rap-Fish method using MDS (multidimensional scaling) with a scale from the worst possible ("Bad") to the best possible score ("Good") with following steps: (1) Determine the initial configuration of objects in dimensional space; (2) Calculating the euclideal distance between the objects of the configuration; (3) perform monotonic regression; (4) calculate the value of STRESS; (5) adjust the object configuration as the second stage. In the stan-

TABLE 1. CHARACTERISTICS OF FISHERMEN IN COASTAL AREAS

Characteristics	Freq (person)	Percent
Age of householder:		
≤40 ages	10	33.34
40 - 50 ages	12	40.00
51 - 60 ages	5	16.66
61 - 70 ages	3	10.00
Ethnic group:		
Bugis	1	3.33
Malay	29	96.67
Education:		
≥ Elementary School	22	73.33
> Junior High School	5	16.67
> Senior High School	4	13.33
Ownership of ships/boats:		
None	3	10.00
1	27	90.00
Family members:		
≤ 4	8	26.67
5 - 6	19	63.34
> 6	3	10.00
Additional work of householder:		
Yes	19	63.33
No	11	36.67
Parties that play a role in the economic activities of fisheries:		
Intermediary Traders	4	13.33
Fisherman Owner	8	26.67
Fisherman	18	60.00
Role of fishing behavior:		
Exploitation without understanding the boundaries	20	66.67
Exploiting combined with conservation actions	10	33.33
Category/status of fisherman:		
Ministry of Fisheries Statistics:		
Full Fishers	21	70
Main Part Fishers	9	30
Ownership of Fishing Means (Fisheries Sharing Law):		
Fishermen	28	93.33
Owner	2	6.67
Team work:		
Individual Fishers	29	96.67
Business Group Fishers	1	3.33
Kind of waters:		
Sea Fishers	18	60
Teritory Fishers	10	33.33
Exclusive Economic Zone Fishers	2	6.67
Fisheries Law:		
Fishers	6	20
Small Fishers	24	80
Livelihood:		
Subsistence Fishers	19	63.33
Native/indigenous/aboriginal fisher	11	36.67
Aspects of professional skills:		
Non-formal Fisher	29	96.67
Formal Akademic Fisher	1	3.33

dard method, scores are assigned on a scale of zero to ten (either 10 or 0 represents Good or Bad - this can be mixed among the attributes if necessary) as it recently has become a standard (Kavanagh & Pitcher, 2004).

RESULTS DAN DISCUSSIONS

RESPONDENT CHARACTERISTICS

The characteristics of fishermen as one of the stakeholders in priority strategic policy in coastal areas was presented in Table 1.

Table 1 shows that the fishers is predominantly by Malay ethnic with majority 40-70 years old as well as the characteristics of coastal populations in other districts in West Kalimantan, which illustrates the effect of age and experience of fishermen on the income level of fishers (Jamal, 2016).

Moreover, the majority of fisher's education is elementary school; the ownership of the boat is also very limited and there are even some fishers who act as tenants/shareholders; the number of family members is dominated by more than 4 people and most fisher's families have additional income to support family needs; fisher's wives had strategic roles to maintain the household; and social activities were limited. The position in the community was entirely as a direct beneficiary of the existing environmental resources, thus demonstrating the continuous exploitation of fishery resources without understanding its boundaries and only a small part exploiting fishery resources combined with conservation measures.

Furthermore, the social characteristics based on the category/status of fishers shown that the fishers were full-time, tenants, individuals, coastal, small, subsistent, non-formal, traditional, local, and micro which provide certain characteristics related to gender systems, patron-client relations, resource exploitation patterns, social leadership due to the influence of the environment characteristics. Moreover, the fishers also characterized by three patterns that is more than one day, one day, and the mid-day fishing pattern. While, the attributes that used as the indicators in governance, economy, environmental quality and social well-being were presented in Table 2.

TABLE 2. THE INDICATORS OF GOVERNANCE, ECONOMIC, ENVIRONMENTAL QUALITY AND SOCIAL WELL-BEING DIMENSIONS

Dimensions	Indicators	Means
Governance	Policy and sustainability strategy	9.29
	Monitoring tool for sustainability	7.67
	The improvement of human resources capacity	8.00
	Implementation of appropriate management practices	8.50
	Stakeholder engagement/ community participation	7.75
Economic	Economic opportunities	4.00
	Land use	10.00
	Transportation	4.40
	Fisheries and Aquaculture	2.00
Environmental quality	Biodiversity and natural resource management	2.00
	Energy and Environmental Change	2.00
	Land use	8.00
	Water resources and pollution	2.00
Social well-being	Demographics	2.00
	Equity	6.00
	Local identity and culture	10.00
	Public health and safety	4.80

The results answer the research questions about strategic priority to achieve sustainable coastal management. They shows that CI result was less than 0.1 (or 0.07). So, the answers to comparisons made by this method through the amount of redundancy in the approach are meeting the requirements. The AHP values of all dimensions are presented in Figure 1.

In Figure 1, the governance dimension is the most prioritized, followed by the economic, environmental quality, and social well-being that commonly happened in the coastal zone management decisions due to inequalities of dimensions contribution involved in the decision (EU, 2012). Furthermore, the success and sustainability of efforts to strengthen the public sector organizations and processes depend on legitimate public authority that can be earned through good governance as a proven ability to reinforce public sector systems and processes that respond to the citizens' needs, while being subject to public evaluation (CommGAP, 2011). The goals of governance dimensions were analyzed using AHP for each dimension of sustainable coastal management as presented in Table 3.

TABLE 3. GOVERNANCE GOALS IN SUSTAINABILITY COASTAL MANAGEMENT DIMENSIONS

Goals	Value result of AHP			
	Governance	Economics	Environmental Quality	Social Well-being
Policies	0.638	0.228	0.078	0.056
Monitoring tools	0.595	0.226	0.111	0.068
Human resources capacity building	0.633	0.222	0.090	0.055
Implementation of good management practices	0.601	0.219	0.116	0.064
Public participation	0.601	0.219	0.116	0.064
Mean	0.614	0.223	0.102	0.061

This research revealed that governance dimension had the highest value (0.614) in the sustainability coastal management compare than the others and still the most prioritized to meet the policies for sustainability (Pisano et al., 2011; Urama et al., 2014), followed by monitoring tools (IEEP, 2011; OECD, 2015); human resource capacity building, implementation of the good management practices (UNIDO, 2010; Uneke et.al., 2012); and public participation (Yee, 2010; OECD, 2015). The governance role is proved in many aspects of the environment and sustainable coastal management work such as financial contribution aspects through cost shifting including recycling due to the limitation of local government budgets (UNEP, 2009; ADB, 2010; Helgeson & Ellis, 2015; Asmawi et.al., 2015) and natural resources strategies development (DENR, 2010; LGANT, 2010; Huffman, 2015; DENR, 2016).

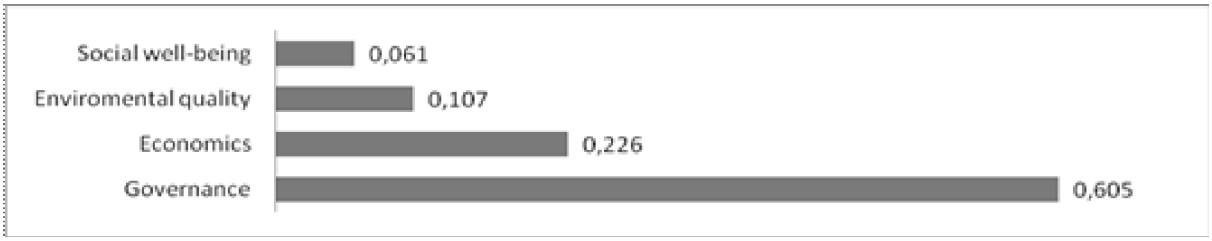


FIGURE 1. THE STRATEGIC PRIORITY DIMENSION OF SUSTAINABLE COASTAL MANAGEMENT

TABLE 4. DIMENSIONS VALUE IN SUSTAINABILITY COASTAL MANAGEMENT

Economics/Environmetal quality/Sosial well-being	Dimensions Value of AHP			
Goals	Governance	Economics	Environmental Quality	Social Well-being
Economics:				
Economy opportunity	0.588	0.238	0.118	0.059
Land use	0.061	0.101	0.249	0.589
Transportation	0.057	0.114	0.220	0.609
Fisheries & aquaculture	0.069	0.120	0.208	0.602
Mean	0.194	0.143	0.199	0.465
Environmental quality:				
Biodiversity and natural resources	0.609	0.187	0.133	0.071
Energy & climate change	0.609	0.187	0.133	0.071
Water resources and pollution	0.575	0.251	0.119	0.055
Land use	0.532	0.257	0.138	0.072
Mean	0.598	0.208	0.128	0.066
Social well-being:				
Demography	0.532	0.257	0.138	0.072
Equity	0.618	0.225	0.099	0.058
Local and cultural Identity	0.588	0.235	0.118	0.059
Public health and safety	0.609	0.187	0.133	0.071
Mean	0.587	0.226	0.122	0.065

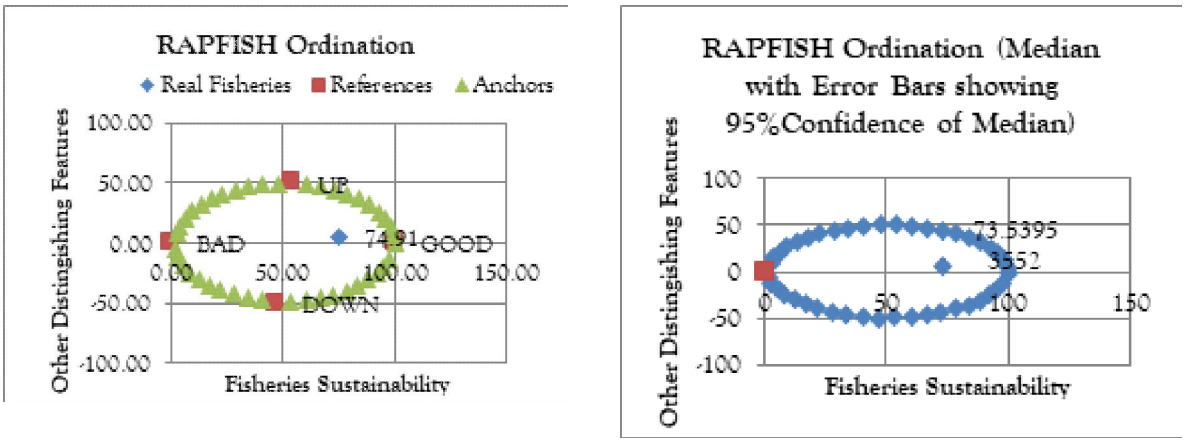
The involvement of the government in enhancing capacity (GESAMP, 2001; Brugere, 2006; OECD, 2012; SCBD, 2015) is positively correlated with tangible factors, such as the population and expenditure, and negatively correlated with extensiveness of lands (Zerenler, 2009; Husein, 2012). However, the capability of local governments was limited to place sturdy environmental conditions on approvals and generally best accomplished by negotiating conditions instead of refusing developments or imposing restrictive conditions that might bring on appeals for anticipating and preventing the gradual degradation (River, 2005; River, 2009).

The government at local and wider scale tried to facilitate the forestall gradual shifts through strategic plans by formalizing the environmental values (Cohn, 2003; Schultink, 2007), for example the strategic land (UCLG, 2012). The literatures indicates that starting capability, responsiveness, and accountability as central features of good governance are needed to support the success of the sustainability goals (UNDP, 2011; Akhmouch, 2012; UN, 2015). Meanwhile, the results of the assessment of the goal of economic, environmental quality, and social well-being dimensions are presented in Table 4.

This research revealed that social well-being dimension had the highest value (0.465) compare than the others and the most prioritized to meet the economic purpose as the main goal for the society and community (Ivkoviæ et.al., 2014) since it will give a benefit to the society that implies the objective of well-being dimension (the adequate economic development) and the ensuing positive perception of people towards the right stage within the society. Moreover, the social well-being is qualitative aspect and a social dimension as well as the structural policy and public awareness rather that advanced material living standards and quantitative growth (Böhnke, 2005). It was also argued that the monitoring and quantification of well-being goal in an economic and a non-economic dimension had totally different levels of overall well-being goal (Ivkoviæ et.al., 2014) as the result of the qualitative aspects, progress of the social dimension, the structural policy and public awareness (Böhnke, 2005).

Besides, transportation was the highest value (0.609) in social well-being dimension. This is in line with the notion about the importance of providing infrastructures for sustainable coastal management (CRC, 2006; ADB, 2010; SCCG, 2015) and providing an essential economic and social activities as a critical dimension for households' socio-economic well-being (Dodson et.al., 2006; Stanley et.al., 2011) for the access to transport systems and the systems connection. This finding was followed by the role of fisheries and aquaculture (NOAA, 2013; MMO, 2013), land use (Race et al., 2007; OECD, 2009; Nevado-Peña et.al., 2015), and economic opportunity (UNRISD, 2012; CAE, 2013; UNDP, 2013).

Meanwhile, the environmental quality goal should be achieved with the priority on governance dimension, similar to the social well-being goal. Attaining the equity in social



(a) MDS sustainability index

(b) Monte Carlo sustainability index

FIGURE 2. MDS SUSTAINABILITY INDEX (A) AND MONTE CARLO SUSTAINABILITY INDEX (B) FOR GOVERNANCE DIMENSION

well-being goal was the most priority for government dimensions due to the government authority to allocate their expenditure to preserve the biodiversity, soil and cultural heritage for natural resource management and environmental protection infrastructure (CBD, 2008; UNCTAD, 2013). Therefore, the society needs to take part in progressive actions to solve the serious environmental problems and safeguard the environment with all levels of stakeholder involvement (OECD, 2011) by decoupling economic growth from environmental impact and maintaining sustainable production and consumption patterns (UNEP, 2011; Hennicke & Khosla, 2014).

Next, attaining the goal of equity in social well-being goal was the most prioritized for government policy due to the growing recognition of equity as a central goal of their programming (UN, 2009). However, the policy priorities are not consistently or coherently explored (CCSSO & ASPEN-Institute, 2016). Taking equity as a guiding principle has long been an important policy goal (Son, 2011). Equity can also assist how to ensure fair treatment for all citizens. There is still considerable inequity in developing countries (Kim, 2008; FOSU, 2010). The inequality reinforces patterns had intergenerational transmission and various formal and informal institutions (Mare, 2011; Alesina & Giuliano, 2014).

So, there are five core priorities approved for addressing equity, i.e. providing public services for fair treatment, such as health and education, improving quality delivery, strengthening the institutions (UNDP, 2011; Dingle et.al. 2013), and infrastructure (OECD, 2006; WEF & PWC, 2012); empowering disadvantaged groups (Tucker & Eva, 2012) as strengthening organizations for producer organizations, social movements, and trade unions (Jones, 2009; Fernando, 2012); social protection to ensure that nobody at a minimum level of wellbeing creates cycles of disadvantage (Domelen, 2007; Mukherjee, 2012); redistribution to improve equity by reducing inequality, such as land reform to provide the poor with productive assets (Boyce et al., 2005; Cotula et al., 2006; Meinzen-Dick, 2009), priority access to public services in health and education.

Furthermore, RAP-COASTAL analysis on governance dimensions as the most prioritized in the goals of sustainability coastal management dimensions that second sections in data analysis used the MDS technique ordination method. It proved that sustainability index value for governance dimension was 74.91 (very sustainable) as presented in Figure 2.

In Figure 2, Rap-Coastal results indicate that the error between MDS and Monte Carlo analysis was small, which indicate that the data input errors and data loss can be avoided. Sustainability ordinal scaling was also good and RSQ value was closer to 1 proving that the data were increasingly mapped perfectly. Meanwhile, leverage analysis as a determining aspect of the sensitive variables that affected the governance dimension for the sustainability of coastal management was presented in Figure 3.

In Figure 3, there were three sensitive attributes which affect the sustainability coastal management for governance dimension. Thus, the evaluations and interventions on these sensitive attributes must be done proportionally by considering the correlation amongst them. The first is an integrated program intended to enhance the sustainability of coastal areas. More attention should be given to coastal regions and small islands, particularly because of the intensity of conflicts related to resources use among sectors, including agri-

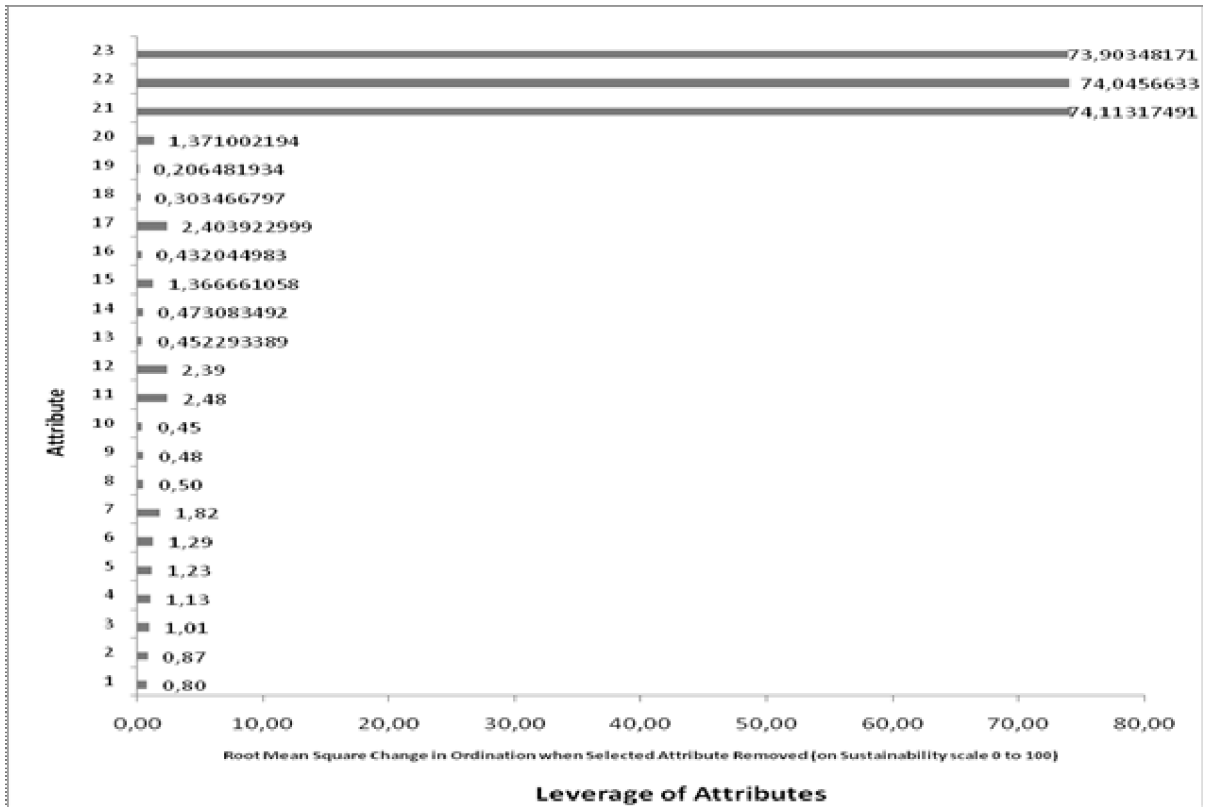


FIGURE 3. SENSITIVE ATTRIBUTE OF SUSTAINABILITY COASTAL MANAGEMENT

culture, aquaculture, fisheries, industry, recreation and tourism, transport, and urban settlements.

Thus, a holistic and cross-sectoral approach is needed to achieve sustainable human development, particularly some tangible factors driving local government capacity to initiate environmental programs, such as the beliefs and commitment from the councilors and community, local government officials' perceptions of their roles and responsibilities to influence the institutions such as effective regional environmental agencies (River, 2009; Brokaj, 2014). This finding is in line with Agenda 21, the Barbados Program of Action for little Island Developing States and also theRio+5 Forum. The proximity to areas with special environmental values, such as world heritage areas, can even aid their environmental commitment and effectiveness providing clues for long-run sustainable management with sensible support from alternative agencies (River, 2009).

The second is identifying all parties informed and actively involved (Jones, 2010; Epstein & Widener, 2011) to enforce and promote in different ways, i.e. the government in the lower levels tried to develop a strategy and actions that flow from the national level, reporting indicators and measurements across the public sector, or legislation to require sustainability reporting.

The third is the effective and equal partnerships between local governments and communities (Chirenje et.al, 2013; NILO, 2015) for full privatization that assume initiative and co-responsibility in focusing on the sustainability and environmental effect of private firms (Ran, 2010) and to access the finance, knowledge of technologies, managerial efficiency, and entrepreneurial spirit that are combined with the social responsibility, environmental awareness, local knowledge and job generation concerns of local governments. This is in line with current trends to emphasize the active involvement and participation of the civil society at massive, with local governments, businesses, and the community for the success of any local initiative (Srinivas, 2017).

CONCLUSIONS

The priority dimension of a stakeholder role in a strategic policy to promote the coordination and sustainability of socioeconomic activities in coastal areas reveals that the gov-

ernance dimension is the most prioritized factor, followed by the economic, the environmental quality, and the social well-being in the coastal zone management decisions. The governance dimension to achieve policies, followed by monitoring tools; human resources capacity building, implementation of good management practices; and public participation. Thus, the starting capability, responsiveness, and accountability as central features of good governance are needed to support the success of the sustainability goals.

While, the social well-being was the most prioritized factor to meet the economic purpose as the goal for every society and community. Meanwhile, the transportation was the highest value as it provides essential economic and social activities of households' socio-economic well-being, followed by fisheries and aquaculture, land use, and economy opportunity. Furthermore, attaining the equity in social well-being goal was the most prioritized for government dimensions through providing public services for fair treatment; empowering disadvantaged groups; social protection; redistribution to improve equity by reducing inequality.

There were three sensitive attributes which affect the sustainability of coastal management for governance dimension. The first is an integrated program using a holistic and cross-sectoral approach through tangible factors, i.e. the beliefs and commitment from the councilors and community, the perception of local government officials' roles and responsibilities to influence the institutions agencies. The second is identifying all parties informed and actively involved to enforce and promote in different ways, i.e. the lower levels of government tried to develop a strategy and actions, reporting indicators and measurements across the public sector, or legislation to require sustainability reporting. The third is the effective and equal partnerships between local governments and communities to complete privatization that assume initiative and co-responsibility in focusing on sustainability and environmental effect of private firms. Hence, the collaboration of local governments and stakeholders was needed to access the finance, knowledge of technologies, managerial efficiency, and entrepreneurial spirit that are combined with the social responsibility, environmental awareness, local knowledge and job generation concerns.

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