

## SUSTAINABLE MANAGEMENT AND RURAL AGROPOLITAN DEVELOPMENT IN SENDANG VILLAGE OF TULUNGAGUNG EAST JAVA A MULTIDIMENSIONAL ANALYSIS OF SUSTAINABILITY

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### ABSTRAK

Kajian tentang pembangunan berkelanjutan menunjukkan bahwa kawasan agropolitan adalah salah satu konsep pembangunan yang mempunyai karakter khusus dan menawarkan desain yang cocok pengembang kawasan urban yang berkelanjutan. Konsep agropolitan bertujuan untuk mengatasi celah pada aliran modal antara kota dan desa. Meski demikian analisa mendalam diperlukan untuk menguji aspek-aspek keberlanjutan yang tercipta dari pembangunan ekonomi berdasarkan konsep agropolitan. Mengambil kasus program Agropolitan di Desa Sedang, Kabupaten Tulungagung (Jawa Timur), penelitian ini bertujuan untuk menganalisis keberlanjutan manajemen Agropolitan Sendang berdasarkan penilaian *Multidimensional Scaling* (MDS). Kerangka penghidupan berkelanjutan dibagi menjadi lima komponen modal: manusia, alam, fisik, keuangan, dan sosial. Analisis keberlanjutan dilakukan dengan menggunakan pendekatan Multi-Dimensional Scaling (MDS) dengan *Rapid Appraisal Techniques for Fisheries* (Rap-fish). Berdasarkan hasil Rapfish, kami memperoleh nilai indeks modal: manusia (54,63%), alami (58,34%), keuangan (31,55%), fisik (22,13%), dan sosial (56,41%). Modal manusia, alam, dan sosial dikategorikan sebagai cukup berkelanjutan. Keuangan dikategorikan sebagai kurang berkelanjutan. Modal fisik dikategorikan sebagai tidak berkelanjutan. Secara umum, status keberlanjutan dalam pengelolaan Agropolitan Sendang *cukup memadai*.

**Kata kunci:** *Berkelanjutan; MDS; Modal; Rapfish.*

### ABSTRACT

Studies on sustainable development show that agropolitan area is one of the urban development concepts that distinctively offers a design for sustainable development for planning. The concept of agropolitan area offers a way to fill in the gap of capital flow gap between cities and villages. However, detailed analysis of the variety of sustainability is necessary to examine dimensions of sustainability. Taking the case of an Agropolitan project in the Sendang village of Tulungagung East Java, this study aims to identify the level of the sustainability of Agropolitan management. In assessing the level of sustainability, this study employs the method of Multidimensional Scaling (MDS). The framework of sustainable livelihoods is divided into five components of capital: human, natural, physical, financial, and social. The sustainability analysis is carried out by using the Multi-Dimensional Scaling (MDS)

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approach with Rapid Appraisal Techniques for Fisheries (Rap-fish). Based on Rapfish result, we obtain an index value of capitals : human (54.63%), natural (58,34%), financial (31.55%), physical (22.13%), and social (56.41%). Human, natural, and social capital are categorized as quite sustainable. Financial and physical aspects appear less sustainable than other aspects. In general, the status of sustainability in the management of the Sendang Agropolitan is quite sufficient.

**Keywords:** *Capitals; MDS; Rapfish; Sustainable.*

## INTRODUCTION

The term agropolitan has emerged as a key concept in sustainable development policy and practice. Scholars have explored the origin of the concept (Gangwar et al., 2017; Wiggering et al., 2016; Costanza et al., 2014) as well as the impact of the approach in the development of agricultural areas and land use that improve environmental services to humans (Diehl et al., 2016, Fischer and Eastwood, 2016, Jones et al., 2016). Decision makers then adopt the concept for the implementation of development policies. When it is seen that a region has significant social, economic and environmental characteristics of the agricultural sector, a planner can propose an agropolitan development policy that values ecosystem services (Schröter, 2014, van Zanten et al., 2014; von Haaren et al., 2014). However, precise information of the level of sustainability achieved through agropolitan model of development remains unclear.

Agropolitan area is one of the urban development concepts that is distinctive, popular, and efficient for more than one purpose, designed for urban, and becomes the center for local markets planning. This concept is based on the benefits and capital flow gap between cities and villages. Agropolitan is more active for development activities that are concentrated in rural areas with a population of 50000-150000 (Buang, 2011; Saleh et al., 2017; Indah et al., 2017; Oryzanti et al., 2018). Spatial management in agropolitan term allows interaction between the center of the rural area and others as agricultural producers (Nair, 2014). Agricultural products will be processed be-

fore being traded to a wider market (Mariyono, 2014). This process will increase the local value and maintain local economic components (Hudson, 2013, Sakir et al., 2017). As a form of the spatial management concept that is pro-environment and society, the nature preservation and increasing income are the basis for agropolitan formation by continuing the principles of justice and independence (Amalia, 2006; Gallent and Shaw, 2007). These efforts can be held by combining the capabilities of development capital: human, natural, financial, physical, and social capital (Donohue and Biggs, 2015). The five component capitals are optimized by paying attention to efforts towards empowerment of local communities with the support of financial markets in rural market financial towards the strengthening of rural institution strengthening.

However, the development of an agropolitan area totally depends on five capital aspects of Sustainable Livelihood Approach (SLA). Every aspect of capital has an effect on sustainability in different ways. The influence is so great that it is very important to reveal. The purpose of SLA in this study is to evaluate, monitor, and analyze the development of sustainable agropolitan areas and maintain the conservation of the surrounding environment (Chambers and Conway, 1991, Ellis, 1999). SLA is a conceptual approach that aims to improve understanding of people's lives that focus on complexity by approaching different factors and opportunities (DfiD, 1999). A framework is divided into five component capital. The vulnerability of an area can be understood through external influences on society that affect the fundamentals of capital (Erenstein et al., 2007).

Tulungagung is one of the districts in East Java Province where most of the population are farmers (42.44%). This condition encouraged the government to make the agricultural sector as one of the focuses of development through the establishment of an agropolitan area. Sendang District is chosen in accordance with the Decree of the Regent No. 524 of 2004. However, community empowerment is considered lacking, so that the management con-

cept is underdeveloped. The agropolitan area needs participation, partnership, and collaboration which leads to the community development. The purpose of this study is to analyze the sustainability of Sendang Agropolitan management based on the assessment of Multidimensional Scaling (MDS). This research is useful as a basic example of sustainable agropolitan area development. This research is original and based on data collection undertaken in a structured manner by authors and cooperation with several related parties.

Sustainable Livelihood is built as a concept that responds to growing dissatisfaction with uneven development theories (Figure 1). Consensus stated that there was a shift from top-down macro and conventional policies to various factors consisting of policies from the community itself (Peng *et al.*, 2019). The Sustainable Livelihood Approach is an approach that was originally used to alleviate poverty (Krantz, 2001). This more advanced concept uses a Participatory approach that is formulated to access at more holistic problems, such as the causes of the lack of community income that cause poverty, which not only describes the mistakes of household-scale monetary management, including health and access to adequate education (Anaand and Sen, 1997; Chen and Ravellion, 2012, Krantz, 2001).

A sustainable livelihood is a conceptual approach that aims to improve understanding of very complex community life by accessing different factors and opportunities that shape community life strategies (DfID, 1999). Vulnerability condition can be understood as an external influence on households that affect people's lives (Gaillard *et al.*, 2009). The framework is divided into five components of capital (Table 1). Human capital includes the health of people and the ability to work, knowledge, skills, experience both now and from the older generation. The human capital attributes used in this study are the forms of skills, knowledge, the ability for labor and good health. Natural capital includes sustainable natural resources and their services: land, water, forests, air quality, erosion protection, and biodiversity. This capital is useful for supporting community sources

of livelihood. Natural capital used in this study is natural resources and its services to sustainability. In addition, this study also used natural disasters in anticipation of the influence on agropolitan conditions. Financial capital comes from conversion or production shift into savings or cash. In this study, financial capital includes income from households and their valuable assets. Physical capital consists of the basic of the infrastructure that needed to support livelihoods. This is very important in the sustainability of existing livelihoods. This insufficient capital will prevent education, access to health services and income. The physical capital of this research is equipment, tools, and infrastructure: roads, availability of public transportation facilities, market infrastructure, and information facilities. Social capital is a cultural use of local people who support their livelihoods. In this study, social capital is used in terms of increasing public trust, the ability to work together, membership in groups, and the system of regulations, norms, and sanctions.

Table 1. The capital and attributes

Capital	Attributes
Human	Education Skills Training Health Human Development Index
Natural	Accessibility to existing natural resources The positive impact of natural resources Negative impacts of natural resources Policy direction for natural resources The existence of a water source
Financial	Income Area of land owned Ownership of livestock (cattle or goats) Percentage of use of own capital and loans Level of expenditure
Physical	Transportation Road conditions to the agropolitan area The amount and variety of infrastructure that is adequate to support the development of agribusiness Number and variety of public facilities that are in accordance with standards Number and variety of social welfare facilities
Social	Customary / cultural regulations Social/custom organization Public trust Participation in a management network Proactive action

Source: data analysis, 2019

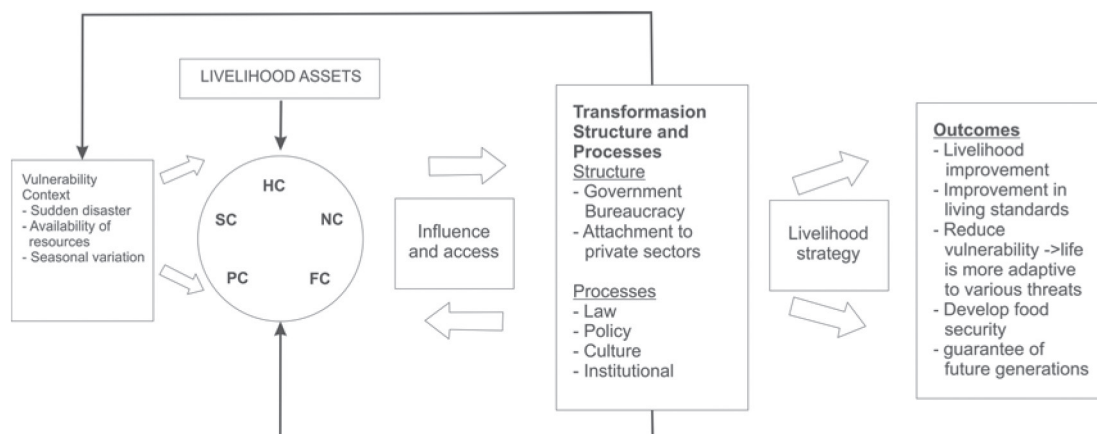


Figure 1. Sustainable Livelihood Framework. Keys : SC=Social capital, NC=Natural capital, PC=Physical capital, HC=Human capital, FC=Financial capital  
Source: data analysis, 2019

The sustainability analysis of Sendang Agropolitan is carried out by using the Multi-Dimensional Scaling (MDS) approach with Rapid Appraisal Techniques for Fisheries (Rap-fish). This method was developed by the Fisheries Center of British Columbia University (Kavanagh and Pitcher, 2004). The method is generally used for the sustainability of fisheries, including in Indonesia (Pitcher and Preikshot, 2001; Fauzi and Anna, 2002; Hartono et al., 2005). However, the implementation of Rapfish is not only limited to knowing the sustainability of capture fisheries. The study used the Rapfish method by modifying the attributes used (Pitcher and Preikshot 2001; Kavanagh and Pitcher 2004). The Rapfish method has undergone a number of improvements and innovation since it was first introduced. Some updates in the Rapfish method include: 1) additional and revised attributes for the evaluation of the sustainability of Rapfish; 2) Explanation and guidelines for scoring; 3) Rapfish can be used in assessing government and management; 4) Introduction through a multilevel evaluation approach; 5) Can display forms other than sustainability status; 6) Improvement of the Rapfish algorithm including R-code web-based analysis (Pitcher et al., 2013).

The MDS method is carried out through several steps. First, determining the status of

sustainability. The sustainability of agropolitan areas is determined by (a) attributes of each sustainability dimension and identifying them through literature review and field observations; (b) Assessment of attributes on an ordinal scale (scoring) based on the results of surveys and interviews; (c) Analysis of ordination with MDS to determine the position of sustainability status in each dimension in the sustainability index scale; (d) Assessing sustainability index and status in each dimension; (e) Conduct sensitivity analysis (leverage) to determine which sensitive variables affect sustainability; (f) Monte Carlo analysis to account for uncertainty dimensions (Kavanagh and Pitcher 2004, Hidayanto et al. 2009).

Furthermore, we carried out an assessment of the factors affecting agropolitan sustainability. The status of sustainability is divided into four categories and is a category that can be rated or ordinal so that to answer of this purpose ordinal logistic regression analysis is used. Ordinal logistic regression is a regression analysis that is used to describe the relationship between dependent variables with a set of independent variables, where the dependent variable is ordinal, which has more than two categories and each category can be ranked. The model used for ordinal logistic regression is the logit model. Logit model in ordinal logit uses the cumulative

opportunity, where  $P(Y \leq j | x_i)$ . The model used in ordinal logit regression is (Akbar et al, 2010):

$$\text{Logit } P(Z=1) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \alpha_1 D_1 + \alpha_2 D_2$$

Where P is the opportunity of an event with the formula:

$$P(Z = 1) = \frac{e^{(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \alpha D_1 + \alpha D_2)}}{1 + e^{(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \alpha D_1 + \alpha D_2)}}$$

Information:

- P = opportunity for people to develop sustainable agropolitan
- Z = opportunity for the community to do sustainable agropolitan development, where:
- Z = 4 to carry out sustainable agropolitan development,
- Z = 3 to do agropolitan development is quite sustainable,
- Z = 2 to do agropolitan development less sustainable,
- Z = 1 to do agropolitan development is not sustainable.
- $\alpha, \beta$  = regression coefficient
- e = natural number (2,718)
- X = independent variable

Through the MDS method, the position of the sustainability point is visualized in the horizontal and vertical axes (Figure 2). The existence of a rotation process results in the point position then visualized on the horizontal axis with the sustainability index value which is given a score of 0% (bad) and 100% (good). The system stated as sustainable if sustainability index value of  $\geq 50\%$ , and vice versa (Table 2).



Figure 2.

Illustration of determining the index for the sustainability in Agropolitan Sendang area  
Source: data analysis, 2019

Table 2. The index value of the sustainability of the development based on RAPFISH analysis

Index value	Category
0 - 24,99	Bad
25 - 49,99	Less
50 - 74,99	Enough
75 - 100	Good

Source: Pitcher and Preikshot, 2001

The level of sustainability of the agropolitan areas is the existing and ideal value (Hardjomidjojo *et al*, 2016). Existing values are used as input analysis and the ideal value is the expected value of the management of the agropolitan area. Existing values and ideal values for each attribute are obtained from the results of a gradual and systematic analysis. The results obtained are the current level of achievement. These attributes are then evaluated for their suitability with the initial goal of development. If the values of existing attributes tend to lead to development goals, the final result of the analysis will lead to the effectiveness of the development of the agropolitan area. Conversely, if the attribute values deviate from the original goal, then the possibility of developing an agropolitan area is not effective so that all dimensions and attributes need to be reviewed.

The location is chosen with criterion-based selection technique, where location criteria are adjusted to the reselu arch objectives so that the background and facts in the field are attempted to achieve complete information (LeCompte and Preissle, 1993). Respondents became the main data in this study, while for secondary data, documents from related institutions were used. This secondary data is data or information that has been processed and is only used as supporting data. Secondary data were obtained from the Tulungagung District Regional Planning Agency (BAPPEDA), the Central Statistics Agency, and the District or Village Government. Secondary data are expected to support and assist this research process (Johnston, 2014).

## DISCUSSION

Human capital is comprised of attributes related to human abilities, skills, and knowledge that support development progress. Human capital consists of several attributes that give effect to the sustainability status of the management of Agropolitan Sendang namely Education, Skills, Training, Health, and the Human Development Index (HDI). The HDI explains how residents can access development outcomes through income, health, education, etc. (BPS, 2018). Based on the results of the RAPFISH analysis for human capital, we obtain an index value of 54.63%. The pattern of distribution of attributes used is in the middle (Figure 3). These results indicate that the management of Agropolitan Sendang in human capital is quite sustainable. Communities around the location have the strong human capital to support sustainable management in the future. The existing attributes need to be monitored and improved in the future, so that does not mean that all attributes will have a positive impact on the sustainability of this Agropolitan area management.

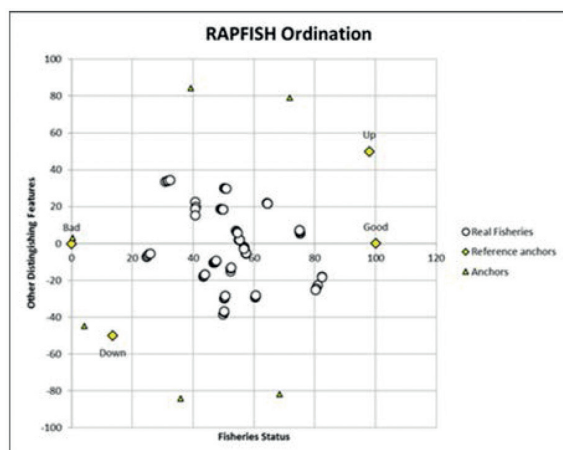


Figure 3.  
Sustainability index value of human capital  
Source : data analysis, 2019

The value of each of these attributes will show its sensitivity to management sustainability. The higher of value indicate the more sensitive and vice versa. The results of this

attribute analysis use leverage analysis (Figure 4).

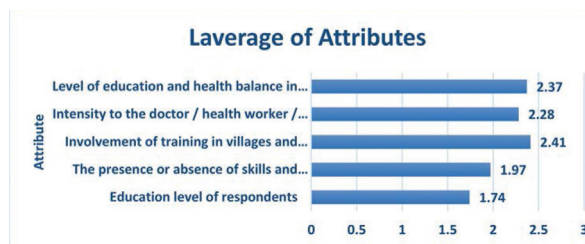


Figure 4.  
The role of each attribute in human capital  
Source : data analysis, 2019

The most sensitive leverage value on human capital is the activity of the community in participating in training, both in the village and outside of it (9.05). This illustrates that a need to intervene in the form of training conducted in Sendang Village to manage and develop the sustainability of the Agropolitan system. The training has been given regularly by the district government in preparing and improving the agropolitan system. This training is related to the operation of a typical village agricultural production system, distribution flows, capital, and understanding of markets and consumers. In this attribute, we get the fact that the most training is carried out in the village, and not balanced with the outside. In fact, training outside of the village can provide experiences and other creative images that can help the community in managing Sendang Village. Village organizations need appropriate creative ideas to improve their performance. This is very important to be obtained through forms of practice and training so that there will be a transfer of knowledge and expertise. Knowledge and training make the community competitive and ready to compete in the agropolitan system (Sulaiman et al., 2015; Samašonok and Leškiene-Hussey, 2015; Scott, 2004).

The support of the government, stakeholders, NGOs, and the community is needed to provide training outside the village (Cawley, 2009; Chen and Scott, 2013; Nair, 2014). The training can take the form of visits to other agropolitan villages, home industry areas,

and related agencies. The training should be focused on supporting the favored sectors, such as the development of agricultural, plantation and livestock products. New topics training should be avoided to maintain continuity and interest. Facts in the community show their low interest in training that is not linear with their daily work. Then, skills and socio-economic capital have second rank(7.91). The social life of the Sendang Village community is very good in supporting the agropolitan development. The facts show that they support in line with agropolitan activities. This is based on economic benefits that are also felt by the community.

The lowest attribute is a balance between health and education (2.5), which shows a low level of sensitivity, but high instability. This illustrates that this attribute is able to support the sustainability of the agropolitan process. Even though it has low sensitivity, this attribute still requires attention and improvement to this attribute. The majority of the community stated that they had felt a balance in two sectors; health and education. This balance will show that the value of the Human Development Index (HDI) is high. HDI is an important indicator to measure success in the process of improving the quality of life of the community, to be able to find out the level of development of a region, and as a consideration of the Government in issuing General Allocation Funds (GAF). The majority of people have a good educational level which shows the awareness in obtaining an education. It thus advanced the mindset and creativity. In the health sector, the majority of people have rarely gone to health centers to seek treatment, this shows that the level of public health is high. This level of health will have an impact on individual productivity, the healthier individuals will increase their productivity. The balance between the two sectors can be utilized by the government and the community to realize the sustainability of regional management.

The government can begin to create a regional scholarship program for people of productive age in Sendang Village, with the

hope that in the future they will be able to bring change and promote regional sustainability. To improve this attribute, counseling can be done on the importance of maintaining good health for themselves and the environment. In addition, training is also needed for the first handling if family members or the community.

Efforts to improve this attribute are not only carried out on attributes that have high sensitivity but for other attributes that also support the sustainability of agropolitan area management. It is necessary to develop as much as possible to be able to suppress the attributes that might affect the level of sustainability of the region's human capital. Natural capital is influenced by government policies related to natural resources and services that exist in the Agropolitan Sendang Region. Based on RAPFISH, the natural capital index was 58,34% (Figure 5). The result showed that natural capital for management of Sendang Agropolitan is a continued effort.

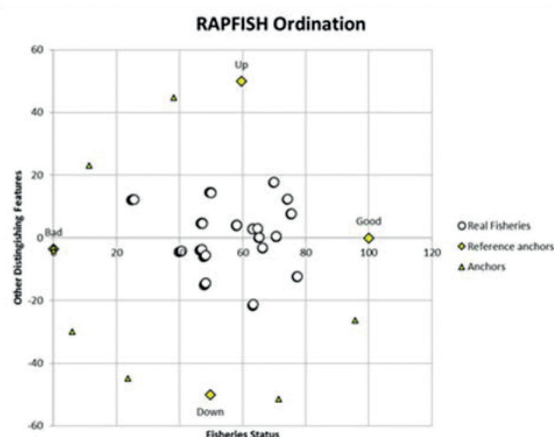


Figure 5.  
Sustainability index value from natural capital  
Source : data analysis, 2019

The highest attribute of natural capital is the natural resource policy in the Agropolitan region (5.22) and shows that this attribute is most sensitive in the agropolitan area (Figure 6). This attribute is closely related to the support of village and agropolitan leaders in Sendang Village. Based on the results of the questionnaire analysis, Sendang Village community revealed that the existing poli-

cies were in accordance with the needs. However, the impact of these policies has not had a direct impact on economic needs.

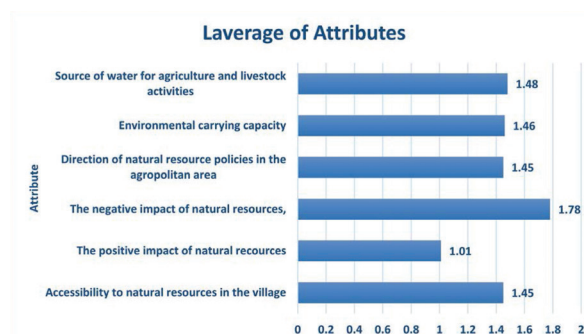


Figure 6.  
The role of each attribute from natural capital  
Source : data analysis, 2019

The local government regulation shows a very large part of its role in the sustainability of the Sendang Agropolitan Region, where the government's desire to emerge to diversify the economic form of Sendang Village (Mahardani, 2012). The emergence of the new economic sector is in the spotlight because it is not supported by most people. This will actually hamper economic growth and the rate of the Agropolitan Sendang Region. Policymaking should consider and be carried out by means of deliberation with the community, stakeholders, and the Sendang Village government, so as to produce policies that are appropriate and on target. Based on the results of the leverage attributes that are least sensitive to the sustainability of the management of the Sendang Agropolitan Area is the origin or source of water used for agricultural and livestock activities (3.07). This attribute has the smallest value because most of the community uses various water sources in a balanced manner between ground water, source water and river water for each activity.

However, the use of river dominates the use of water sources for agriculture and livestock. This is actually useful in saving groundwater use. Furthermore, the availability of river water to support the needs of the community is very sufficient, even in the peak of the dry season. Nevertheless, the role

of the government and the village community is needed to create a fair and structured irrigation system, as well as sustainable use to maintain availability. In addition, additional infiltration wells are needed to maintain groundwater uptake.

Financial capital is related to the conversion of production into cash in order to cover periods during production that are lacking or to invest in other activities. In this capital, there are several attributes that affect the sustainability of Agropolitan: expenditure, the proportion of use of own capital and loan capital, ownership of cattle or goats, the area of land owned, and fixed income of respondents. The results of the RAPFISH analysis showed a value of 31.55% (Figure 7). These results indicate that the Agropolitan Sendang Region seen from financial capital has a level of continuity that is less sustainable.

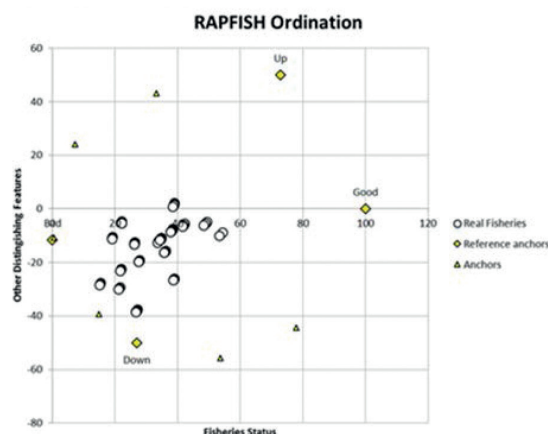


Figure 7.  
Sustainability index value from economic capital  
Source : data analysis, 2019

The biggest attribute value is the level of expenditure of the community (Figure 8). This attribute is very sensitive to financial capital and can encourage unsustainable management of the Agropolitan Sendang Region. The results of in-depth interviews show that the income of the majority of the community is less than 1,000,000, and the following expenditure reaches 1,000,000 to 3,000,000. This comparison shows that people are a bit more consumptive and have difficulty in determining the priority scale of their needs. In



addition, the financial management capacity of the community is quite low. This poor level of management will cause the public's enthusiasm for saving will be lower, and make them difficult to meet urgent needs.

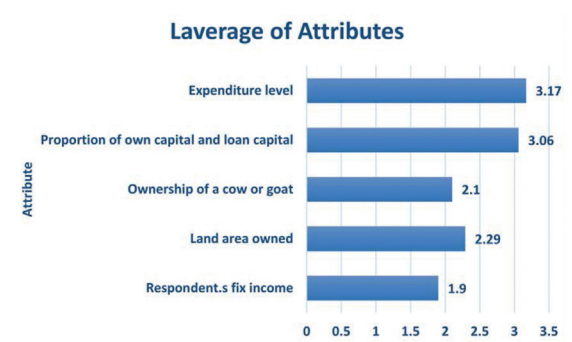


Figure 8.

The role of each attribute from economic capital  
Source : data analysis, 2019

As a solution, it is very necessary to have training and counseling for financial management from the community and training to determine the priority scale of financial use. Setting this priority scale is expected to be able to make people manage their finances well so that their expenditure will be suitable for primary, secondary, and investment needs

The lowest attribute value is the proportion of the use of own capital and loan capital (5.33). Sendang Village, the majority of which is cattle farmers, has a legacy system in the form of cows to their family members, so that to start a successful business, it does not require a lot of loan capital, but on the contrary, in this study, people use their own capital. This can be seen from the attributes of cattle ownership which shows that the community has at least 1-2 cows or goats in each house (7.51). Some of the people who do not have cows or goats have enough land to grow crops, so they can still meet the needs of their families. Increasing the capacity of capital and community ownership still needs to be maximized, namely by holding outreach events that support the main economic sectors in the Agropolitan Sendang Region, for example by developing agro-ecotourism which adds a level of community income.

Physical capital is the basic capital of the infrastructure needed to support community livelihood activities. This is very important in the sustainability of existing livelihoods. If the infrastructure does not meet the requirements, then various educational interests, access to health services and income will be hindered. Based on the results of RAPFISH, the sustainability index value of physical capital reached 22.13% (Figure 9). This value indicates that the physical capital for managing the Agropolitan Sendang area is bad or unsustainable.

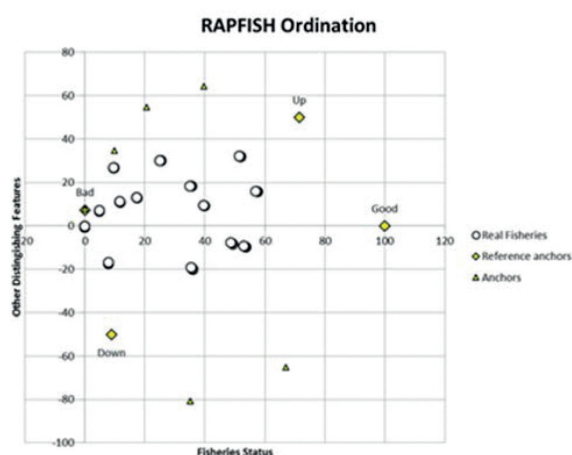


Figure 9.

Sustainability index value of physical capital  
Source : data analysis, 2019

The leverage results for the attributes of the number and variety of social welfare facilities and infrastructures have a high value (Figure 10) so that they are classified as sensitive and can lead to non-sustainability in agropolitan management. The majority of the community stated that there were many facilities and infrastructure for social welfare but not varied. Social welfare facilities and infrastructure greatly impact the level of welfare of its people. Increasing the range of facilities and infrastructures that are urgently needed for example are infrastructure for MCK, sanitation, energy sources, clean water, and electricity. Improvement of facilities and infrastructure in the village is expected to improve the quality of the environment and assist the community in improving the

surrounding environmental conditions (Eka-putra *et al.*, 2014). In addition, social welfare facilities and infrastructure such as village markets are needed, not only to accommodate the production of the agricultural and livestock sectors.

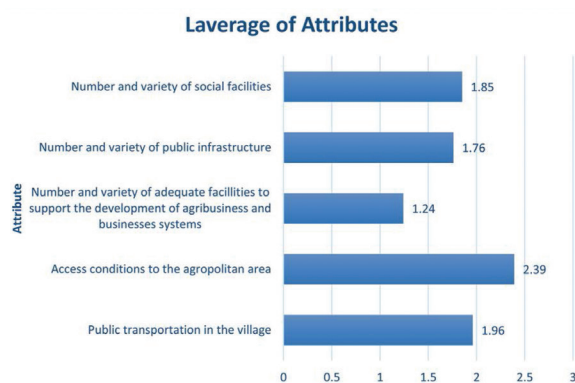


Figure 10.

The role of each attribute in physical capital  
Source : data analysis, 2019

In addition, the market also serves as a bridge to introduce processed Agropolitan Regions to the wider community and allows for export and sales to other regions (Basri and Arifin, 2010). In addition to the village market, the creation of an information service center can make it easier for the public to find out the market price of each product so as to minimize the losses that will be received by the community, and the existence of this information center will help the outside community to get to know the Agropolitan Sendang area, and if seen that the road conditions is the attribute that is needed so that it can push the Sendang area into a nature-based tourist area. The difference is that this will greatly affect the surrounding economic conditions.

The leverage results indicate that the road conditions to the Agropolitan area have the lowest value (4.06). This shows that the attribute is considered to be less sensitive to the sustainable management of Agropolitan Sendang. Based on the results of the analysis it was found that the condition of the road for access to the region in Agropolitan had different conditions, both bad and good. This

difference will affect all aspects that support agropolitan sustainability.

Some roads that are good enough to be used by the community as a means to provide goods and services for other regions, both inside and outside the Agropolitan Sendang Region. In addition, good road access will facilitate the marketing of products from the Agropolitan Sendang Region to other areas inside and outside Tulungagung.

This road access must be a serious concern because the community relies heavily on the existence of connecting roads between regions, not only the development within the Agropolitan Sendang Region but also the development of products outside the region (Subadyo and Poerwaningsih, 2017). In addition to the access road to the Agropolitan Sendang Region, the Tulungagung Government has also made a connecting bridge located on Tugu-Pabyongan Road Section. The bridge was directed to be able to connect Sendang Subdistrict as a tourist area and Agropolitan producing the largest vegetables in Tulungagung Regency to other areas such as the Kediri and Tulungagung districts. The bridge stretches over the Song River which has a fairly large water discharge during the rainy season.

This road condition will also affect public transportation in the village. If there are terrible roads, it will cause more difficulties in public transportation, which is found both for transportation in the village and outside the village, so there is a need for improvement to develop the area. In addition to repairing the existence of the transit terminal, it is also very important, this will make it easier for public transport to stop and take passengers who intend to go out of the area in order to trade or school. In addition, the village market in the Agropolitan Sendang Region has not been maximized, which has to be resolved. One way is to design a strategic location for village market development and to educate the public about market opportunities for superior products in the area. To be able to support sustainability there are still many facilities and infrastructure and in-

frastructure that must be improved. Pioneering cooperatives to serve and help residents is also needed. Social capital is related to the use of human resources or related to livelihoods. Social capital is connected to community networks and has the ability to work together in the community, both between individuals and between groups. Social capital has several attributes, namely proactive action, level of participation in a network, vertical trust (leadership), social organization (Network), and regulation / customary rules of culture/norms. Based on the results of RAPFISH, social capital has a sustainability value index of 56.41% (Figure 11). The value of this index shows that the social capital for sustainable management of the Agropolitan Sendang Region is quite sustainable.

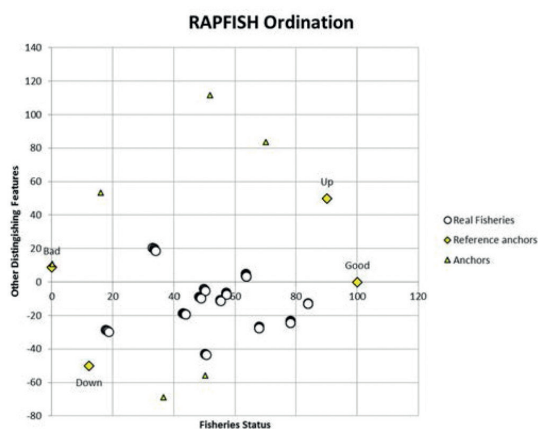


Figure 11. Sustainability index value of social capital  
Source : data analysis, 2019

The social organization has the greatest attribute value (13.86), so it is interpreted as one of the things that have a high sensitivity to agropolitan sustainability (Figure 12). The social organization in the Agropolitan Sendang Region aims to be able to connect between rural areas and outside the region, but the numbers are relatively low for an Agropolitan area (1-3 organizations) so that it can cause weakness or provide a gap in achieving sustainability. The role of this social organization is very large for the development of social welfare (Nugroho, 2008). The fewer social organizations, the more network com-

munication with other parties will be limited and this will have an impact on the difficulty of the community with small-scale businesses to market their goods and services. This social organization is one of organizations that are able to provide an assessment of the improvement of welfare to the government so that synchronization between these two elements is very important.

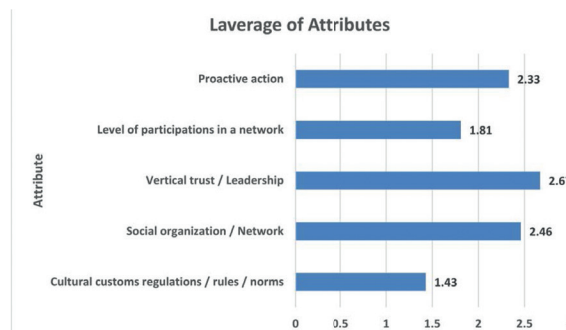


Figure 12. The role of each attribute in social capital  
Source : data analysis, 2019

The existence of this social organization must be further developed, although to be able to make social organizations need initiative from the community. However, the government can encourage the emergence of this initiative by holding a lot of counseling and training out of the village or region to observe areas that have succeeded in developing the region into sustainable agropolitan. The government and the community must have a lot of discussions to achieve this goal and encourage communication activities.

The lowest leverage results are cultural customs regulation/rules/norms, where this has little sensitivity and strongly supports agropolitan sustainability. However, the majority of the community must be encouraged first to support local norms. The positive impact is the ongoing communication and collaboration between the modern community. The negative impact is culture of community can decline. This is certainly very much related to the policies of the Tulungagung regional government on regional management.

The government is advised to provide mobile space or discussion for the commu-

nity with the government related to the management of the Agropolitan Sendang Region so that any aspirations of the community to be conveyed can be realized. It is very necessary to have support from the government regarding this action. Active community participation will be a strong factor due to the existence of local knowledge and understanding (indigenous knowledge) regarding the use of resources contained in their region. Therefore, it is necessary to revitalize understanding and local indigenous knowledge and review policies on their use of living resources.

Based on the results of the MDS analysis using RAPSIFH for five capitals that support regional sustainability: human, natural, financial, physical, and social capital can be described in various index values (Figure 13).

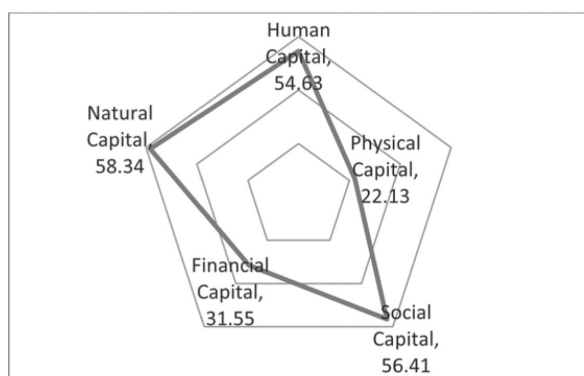


Figure 13.  
The Graph of sustainability index value of the Agropolitan in Sendang  
Source : data analysis, 2019

Human capital has the largest index value (54.63%) which means it is quite sustainable, natural capital with an index of 58.34% is also quite sustainable, financial capital with an index value of 31.55% or less sustainable, physical capital with an index of 22.13% which means unsustainable, and social capital with an index of 56.41%, which means it is quite sustainable. In general, the status of sustainability in the management of the Sendang Agropolitan Area is quite sufficient. However, this requires the development and improvement of each attribute in each capital so that the management of the Agropolitan

Sendang Region becomes more sustainable. In addition to the attributes that are considered to be sensitive to sustainability, but also to the capital that has supported so as not to decline.

The Sendang Agropolitan area is very prominent in natural capital. However, the attributes of policies towards natural resources and their management tend to change when the position of leader changes, and this makes this capital not have a maximum effect. To overcome this, the government can initiate regional development not only towards Agropolitan but also followed by the development towards nature-based tourism that is still linear with the community's main livelihoods, such as milk dairy, fruit picking, or other natural tourism. As for physical capital is considered unsustainable, especially in the attributes of the number and variety of social welfare infrastructure. This section is an important point that must be considered because the existence of facilities and infrastructure greatly affects social welfare.

## CONCLUSION

The results of MDS-fisheries show that Agropolitan Sendang is quite sustainable. Natural capital is a component with the highest index value (58.34%). Even so, it occupies a quite sustainable position and developments are still needed to low value attributes. In contrast, physical capital has the lowest index (22.13%), so the Tulungagung Government needs to notice it, especially infrastructure related to social life in the community. In the future, studies are needed to examine the impact of the development of sustainable agropolitan systems and their strengths in building a national village-based economy. Based on this study, district governments can consider physical and financial capital before completing an integrated agropolitan.

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