The important role of coffee agroecosystem for rural development

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Abstract. Rural development based on local resources utilization has been promoted as a strategy to achieve people prosperity in Indonesia. Although many studies have found that resource-based strategy is no longer relevant nowadays, for many areas this is still considered an appropriate approach. In order to examine the significance, we conducted a study in Sumba Barat Daya District of East Nusa Tenggara, focussing on coffee as one of the most abundant products in the region. Utilizing a socio-ecological approach, we collected data and information to depict the dynamics of coffee-based activities. A detailed study in Kadi Roma Village of Sumba Barat Daya on coffee ecosystem contribution to local community revealed that despite traditionally managed, coffee plays a significant role socially and economically. As a source of income to almost 17,000 smallholder farmers in Sumba Barat Daya, it can be concluded that coffee can become a gateway to attain successful rural development program. It also provides various opportunities for the community to participate which requires supportive innovation ecosystem to be established systematically by relevant local institutions, including include local government.

1. Introduction

Rural development is one of the strategies to improve society’s welfare, which has been applied in many countries in the world in a different form depending on the socio-economic condition of each region. The main consideration of the implementation rural development strategy is poverty and inequity, problems that motivated the US to launch a program called Country Life Movement in early twentieth [1]. Having similar problems, many countries adopt the strategy and implement it with variety of schemes adapted in accordance with the local condition [1–2]. Despite the success stories in many cases, rural development strategy is not free from challenges. Lack of coherent strategy is one of the significant obstacles to attain sustainability [3–4] that resulted in conflicts at the community level and caused social resistance [5]. Such a case can happen from the failure to appreciate local potency, overlooking the existence of the social system and ecosystem as well.

Based on past studies, alteration from top to bottom methodology at present is an approach in which local potency is highly appreciated. Inclusivity has become the emphasis on improving the rural economy, as implemented in India [2] and also in the form of Self Help program in Nigeria [3], as well as a movement of a local initiative to develop rural areas in European Alpa [6]. The similarity of those cases is that local potency becomes the main point of embarkation to achieve rural development objective. In fact, the agricultural first principle is believed as the most appropriate approach. It implies
the development of agriculture as the first step before the establishment of rural industries rather than the advancement of absolute industrialization which disconnects rural society with its ecosystem.

Taking into account that poverty is the main problem to solve, we conducted a study to explore the significance of coffee based traditional agroecosystem to achieve the objective of rural development, i.e. the betterment of farmers prosperity.

Indonesian government launched the achievement of national development through the development of rural areas to provide opportunities for the local villages to plan and design their rural development strategy. This opportunity was ordained through Act No. 6 of 2014 on Village which gives freedom to the creation of community creativity by strengthening local potential including human, natural and technological resources. The prepared support system is not only on hard aspects, but also on socio-cultural. All aspects of the rural ecosystem are subject to be utilized.

The policy provides ample space for village led by the village chief to determine the steps. The chosen program implementation approach is open, from the basic needs approach to industrialization approach. Range of approaches have been applied by various countries depending on the situation of the village being alleviated. As we know that basic needs approach has been used by India [2], industrialization approach used by Korea [5], and in between there is also an approach with less emphasize toward agriculture and induce the promotion of rural industry [7]. Regardless of the approach, emphasize on inclusivity for equity should always be considered. Korea has learned a hard lesson when gap widening between rural and urban ecosystem resulted in severe socio-economic turmoil, and correction was made by broadening the implementation of Seamaul Undong strategy of rural development [5]. Different from Korea, Carels et al. Reported the success story of Belgium which could produce and implement the agricultural development policy in accord with rural development resulting in inter-sectoral productive cooperation [8].

Discourse on the rural development approach continues to occur, but one thing that can be emphasized here is that rural development on an agricultural basis is the first step towards achieving regional progress before the community is ready to face full industrialization. The consideration which underlies this study to assess the prospect of the coffee-based agricultural system as potential assets is for sustainable rural development.

2. Methodology

Qualitative and quantitative methodologies were utilized for this study allowing the inductive approach to generate insights into the phenomenon. Data and information were collected through focus group discussion and in-depth interview to key persons representing different entities within the relevant social system. Qualitative method provides comprehensive descriptive processes. It is also a method that fits to accommodate exploration of experiences, perspectives, and attitudes of those of certain profiles [9]. Furthermore, a survey was conducted to provide measurable data used integratedly with the results of qualitative information obtained. Respondents were selected purposively, i.e. farmers who have cultivated coffee in their land for at least a decade so that their knowledge is well-proven over time.

In this study, the key elements of socio-ecological system were used to picture rural dynamics triggered by the existence of coffee agroecosystem, assuming that the approach stipulates the scope of human and environment interaction as depicted by the social system and ecosystem respectively [10]. The survey, as well as focus group discussion, was conducted in Kadi Roma Village of Central Wewewa Sub-Districts of South West Sumba Regency. It is the only village in South West Sumba which proclaims coffee commodity to strengthen the rural community as the village strategic plan. Therefore, the applicable inputs resulting from the appropriate study will become a significant contribution to support local authorities in producing an appropriate strategy for them. In order to have a better background depicting the study area, secondary data from the relevant institution was also utilized. The data provides the rationale of this study which emphasize more on the significance.
3. Result and discussion

3.1. Study area

South West Sumba is one of 22 regencies and municipality in East Nusa Tenggara Province. Geographically it is situated on Sumba island, the most southern island of Indonesia. The Regency is located between 9°18’ – 10°20’ south latitude and 118°55’-120°23’ east longitude. It is called 3 T (three T) area that means tertinggal, terdepan and terluar (left behind, the most front, and the outest). 3T is character of the prioritized region to alleviate. In East Nusa Tenggara Province, South West Sumba is one of the most impoverished areas with high poverty rate, and lower Human Development Index compared to the Provincial index and the country average (figure 1).

![Figure 1. Human development index and poverty rate.](image)

As many marginalized areas in Indonesia, South West Sumba regency depends mainly on the agriculture sector. It is indicated by the share of regional income which 40.11% is contributed by agriculture, forestry, and fishery which is higher than agriculture share in the province and also Indonesia. This is inversely correlated with the share from manufacturing industry. The low percentage in comparison with agriculture share to gross regional domestic product is an indication of minimum value add given by agricultural based raw materials. As a rich region of produce, this phenomenon is not only a challenge but also an opportunity.

![Figure 2. Distribution of gross regional domestic product (% share).](image)
The low-added value was also found in coffee, the agricultural commodity produced by many farmers in South West Sumba, especially those in Wewewa area. A green region does not necessarily indicate that it has nutrient-rich soil, but the people’s livelihoods are mainly agroecosystem-based. They live and maintain the agroforestry system, which in local language is called kalio. Kalio plays important role socio-culturally, economically and ecologically. Farmers of coffee agroecosystem in South West Sumba disperse mainly in four sub-districts. The total area of coffee planting is 5,416 hectares which produced approximately 2,168 tonnes of green coffee in 2017 [11]. The estimated number of farmers engaged in coffee agroecosystem management is about 17,000. The data show the potency of utilizing coffee as a generator to the rural economy; however, more exploration is needed to uncover what and how it can be integrated into rural development strategy. Although the effectiveness of agriculture ecosystem-based development as a solution to poverty alleviation is in question [12], the experience of many countries indicates that agriculture contributes significantly to enhance the opportunity of achieving sustainable rural development [12–14].

3.2. Management of coffee based agroecosystem

In Wewewa Region of South West Sumba in East Nusa Tenggara Province of Indonesia, robusta coffee (Coffea canephora) grows in kalio productively. The farmers utilize local knowledge inherited from their predecessors. Almost all farmers plant coffee in their kalio. The number of plants varies according to farmers own decision, but 58% of plants in the agroecosystem are coffee. It indicates the motivation of rural people always to have coffee.

Employing local practice, land productivity reaches 0.4 kg per hectare which is lower than national productivity [15]. The species are planted as one of many perennials species and vegetable crops in kalio. Carolina revealed that at least 17 species of perennials are planted in the system to provide many necessities, and managed by the direction of local knowledge [16]. They practice lende ura, a strategy to maintain the ecological function of forest system [17]. Therefore, they can continue to utilize the agroecosystem service, including coffee from kalio.

Most of the products are sold directly to the local market, and diversity assures for farmers to have income throughout the year. Our study in Kadi Roma Village indicates that productivity of coffee in the kalio varies i.e, 0.1 kg/tree to 1.1 kg/tree. Compared to the latest research result on the coffee new strain, tree productivity is very low. Robusta yield reaches 1.5 to 4.4 kg per tree. Indeed, increasing productivity seems to be the target of rural development in South West Sumba, especially for innovative community such as those in Kadi Roma Village. The village agrees to improve the productivity of coffee agroecosystem as a collective action and local village policy.

3.3. The potency of coffee agroecosystem to achieve sustainable rural development objectives

Act number 6 in 2014 on Village indicates the government determination to support the nation’s development from the bottom. The Act situates village system as the prime mover to rural development providing rights and responsibilities to activate local resources as potential assets to move the economy for the sake of rural community prosperity. It is assumed that embarking from local potency pathways to reach activation of sustainable rural development can be well constructed by creating lines of actions accustomed by the community. Providing that all are created from local resources, knowledge and tradition, complexity to reach rural development objectives should be in a lesser amount. The notion is taken as a reference to the prospect of utilizing coffee based agroecosystem and as a triggering factor to achieve rural community prosperity through rural development di South West Sumba, specifically for Wewewa area.

The fact that coffee agroecosystem promotes socio-economic and ecological roles is significant. Coffee serves as social linkage. The commodity is used to show courtesy to family and friends in joyous and desolation occasions. It is a must-have commodity at home. Homemade coffee is the most special one because it is ground and produced by the woman of the house. It is disgraceful if we cannot serve homemade coffee for our respectful guests.

Similarly important, coffee is valuable product to generate family income. Local trade system is a guarantee for farmers to exchange their coffee for cash. Even though the price does not give a fair return, the liquid cash flow provides safety for farmers to depend on their coffee agroecosystem. Its socio-
economic role promotes motivation to maintain the performance of the agroecosystem. The treatment toward coffee agroecosystem to some extent contributes to soil and water conservation. It benefits a social system which can be potential to promote sustainable productivity.

Referring to local technology acquisition and opportunity valuation, there are several potential coffee based forward and backward linkage economic activities that could be promoted (figure 3). In order to create and support the realization of the proposed activities, proper agroecosystem management should become a priority. It is important to ensure a continuous supply of good quality and sufficient quantity of raw materials. Promotion of coffee based economic activities in case of Wewewa area in South West Sumba will also require good support system to ensure continuous assistance in many aspects. As concluded by Francis that coherent cooperation and collaboration of public, private and civil sectors will promote sustainable rural development by improving agriculture ecosystem performance holistically [18].

![Figure 3. Coffee-based forward and backward linkage economic activities.](image)

In order to establish supporting ecosystem for those activities to be created and effective for sustainable rural development, it is necessary to perceive the rural area as a landscape of coffee based agroecosystem integrated with its social system. The perception will promote a more appropriate depiction of sustainable planning and management of ecosystem and social system as an integrated entity [19]. It is important in relevant to local community aspiration to establish coffee agroecosystem as an ecotourism focus. It is not a simple wish to realize, however, integrating with the local potency need to be executed in order to establish viable, sustainable economic activity to achieve noble objective of rural development, i.e. people’s prosperity with no one left behind [16]. Before designing a strategic plan of rural development, it is important to evaluate the ecosystem service of coffee-agroecosystem. The data will be a significant input to produce appropriate scheme because it will enable us to understand the strength and weaknesses of any decision made [20]. Moreover, in order to anticipate problems and opportunities of restructuring agriculture and rural development, careful analysis the of social, economic and environmental factors is an important task to achieve sustainability [13].
4. Conclusion
Enhancing the utilization of local resources to attain sustainable rural development remains a strategy to improve the prosperity of the rural community. The existence of coffee in rural agroecosystem is a socio-ecological prospective asset to be developed further. From the community tradition of coffee ecosystem management and post-harvest processing, coffee-based enterprises managed fully by local inhabitants are possible to be established. Productivity improvement and creative technology application which can give a high value of coffee is an appropriate strategy. In addition to that, it is necessary to establish local institution based on social capital which is well supported by relevant policy.

A further strategy is by strengthening agricultural sector, starting from the implementation of more amiable cultivation system, and preparing the foundation to support the birth of rural economic activities strengthened by appropriate technology to increase the added value to local natural resources. It includes significant assistance to build a strong community institution that serves its purpose. It can be concluded that coffee can become a gateway to attain successful rural development program. It also provides various opportunities for the community to participate which requires supportive innovation ecosystem to be established systematically by relevant local institutions, including local government.

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