

Empowerment Model Of Aren (Arenga Pinnata (Wurmb) Merr) Farmer Through Their Interaction With The Environment

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Abstract: This study analyzed the factor supporting formulate the empowerment model and find out empowerment model through interaction between aren farmer and environment. The results showed that social economic conditions of aren (Arenga Pinnata (Wurmb) Merr) farmers, among others: all of aren farmers were in the productive age (42 year old in average), their experience in farming practice between 5-35 years, their formal education were elementary school, most of them (68.75%) have dependents more than three people, and average aren farmers have 10-15 aren trees (Arenga Pinnata (Wurmb) Merr) . The existing programs about farmer empowerment only partial emphasis on the economic aspect that focused on cultivated plants without pay attention to various benefit (social, economic, and environmental benefit) of aren trees (Arenga Pinnata (Wurmb) Merr). Aren farmer empowerment model based on their interaction with the environment could increase the farmer's income, ensuring the social value and sustainability of the area function.

Key word: aren farmer, empowerment model, environment, interaction, sustainable

1 Introduction

Aren trees (Arenga Pinnata (Wurmb) Merr) are pioneer plant. It could grow in places where other plants cannot grow. Aren trees (Arenga Pinnata (Wurmb) Merr) are quite extensive, from the coast to the top of mountain and wet tropical forests. Aren trees (Arenga Pinnata (Wurmb) Merr) serve as land conservation plant capable of maintaining environmental balance (Gingold, 2010 [1]; Hunt, 2010 [2]; Ministry of Environment, 2009 [3]; Suprpto, 2010 [4]; World Bank, 2010 [5]). Aren (Arenga Pinnata (Wurmb) Merr) had been known by society since a long time as a plant that have social and economic value. The potential of aren found in West Muna District - Southeast Sulawesi Province. Nevertheless, aren trees (Arenga Pinnata (Wurmb) Merr) grew wild (Abdullah, et al., 2015)[6]. It causes less concern, and utilizes the aren trees (Arenga Pinnata (Wurmb) Merr) by farmers as economic interests. The ignorance about the benefits of the aren tree also contributes to this condition. The ignorance of farmers against aren trees (Arenga Pinnata (Wurmb) Merr) is often manifested by the replacement of aren trees into plantations or crops.

This has an impact on the poorly protected environment of soil structure, fertility, and water content. The environmental conservation function is owned by aren trees (Arenga Pinnata (Wurmb) Merr) is not owned by plantations or crops cultivated by farmers as a substitute for aren trees (Arenga Pinnata (Wurmb) Merr). Farmers rely on agriculture as the main source of their income. They take advantage from the major products such as fruits and tubers of all types of their cultivated plants. Other side products such as stems, leaves or waste of plants did not utilized. This caused lower welfare of farming communities around the forest. Aren farmers usually live around the forest area and the karst area. They did not yet get values added from nearby forest resources. The aren farmer did not optimize their interaction with environment. Low level of education and skill also cause aren farmers less able to compete (Abdullah, et al., 2015)[6]. Therefore, it is crucial things to find out empowerment model base on the interaction between aren farmer and environment. All the time, farmer's empowerment in the forest surrounding area has focused on the plantation commodity products with ignorance the various products of aren trees (Arenga Pinnata (Wurmb) Merr) that grows wild surrounding. The development of aren product through farmer empowerment must base on the various aspects. The empowerment of aren farmer is build and grow the independence through the giving of power to realize the aren farmer who have a quality and reliable (Colchester, 2010 [7]; Lempang, 2012 [8]; Nasdian, 2006 [9]; Noer, 2011 [10]). The result study of Temudo (2017) [11] showed importance of identifying the most relevant temporal and geographic scales, and the multiple (and sometimes opposing) environmental and social processes working simultaneously in different places as an efforts to assess threats to and the regeneration capacity of mangrove forests in Guinea-Bissau. (Serrano, 2017) [12] also emphasize the importance of identifying social groups within a population and understanding their particular characteristics and perspectives before developing conservation and land use planning policies. Therefore, some crucial problems in this paper; how the factor supporting formulate the empowerment model such as condition of aren farmers in social, economic, and environmental aspects, and find out an empowerment

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model through interaction between aren farmer and environment.

2 Material and Method

The location of this study was at Muna District-Southeast Sulawesi Province, Indonesia, especially in the Sub District of Tongkuno, Parigi, Lakapera, Kontu Kowuna, and Watopute. Primary data were collected by observation, in-depth-interview methods, while secondary data derived from the farmers empowering program activities. Data was analysed by descriptive and revenue cost ratio (R/C ratio) method.

3 Results and Discussion

Aren (Arenga Pinnata (Wurmb) Merr) is one of palm. It grows wild without cultivation effort, generally in Indonesia, particularly in Muna District, South East Sulawesi Province. The physical view of aren trees (Arenga Pinnata (Wurmb) Merr) could be seen in Figure 1. However, aren trees (Arenga Pinnata (Wurmb) Merr) have an advantage in the productivity of sap compare to other palms. Aren trees (Arenga Pinnata (Wurmb) Merr) can produce abundance sap about 10-30 liters per day (twice tapping in a day; morning and afternoon).



Fig 1. Aren Tree (Arenga pinnata (Wurmb))

Muna Societies develop aren in Kaindea system. It was called as community forest in the form of agroforestry, as shown in Figure 2.



Fig 2. Kaindea System

At the Kaindea system, the communities cultivate a variety of plantations and crops amongst woody plants. Aren trees (Arenga Pinnata (Wurmb) Merr) as one of the woody plants in their cultivated land. Unfortunately, farmers often did not pay attention to various advantages of aren trees (Arenga Pinnata (Wurmb) Merr), they prefer to process their cultivation plants. It was because the farmers have limited knowledge and skills in integrating aren trees for environmental management that bring sustainable prosperity. Hence, they need an empowerment model that could synergize the benefits of forestry plant especially aren trees (Arenga Pinnata (Wurmb) Merr) with cultivated plants and the socio-economic characteristics of farmers.

3.1 Factor (Social, Economic and Environment) Supporting Formulate the Empowerment Model of Aren Farmer

Description of socio-economic conditions of aren farmer (Table 1), among others: all of aren farmers were in the productive age that was 28-62 years old or 47.4 years old in average with business experiences in aren sugar processing between 2-33 years or 16.4 years in average. Their mainly have formal education of Elementary School (50% of aren farmer). Interestingly, they used family labor, most of the farmers (60.00%) have dependents more than three people. Aren farmer has 2 -20 aren trees (Arenga Pinnata (Wurmb) Merr) or 7 trees in average that they tap twice a day in to get aren sap as raw material of brown sugar or alcohol.

Table 1.
Socio-Economic Conditions of Aren Farmers

Description	Socio-Economic Condition							
	Age		Education Level				Dependents	
	15-54	>54	NFES	ES	JHS	HS	0-3	4-7
Percent (%)	80.00	20.00	20.00	50.00	25.00	5.00	40.00	60.00
Total (%)	100.00%		100%				100%	
Highest	62.00 years old		HS				7 persons	
Lowest	28.00 years old		NFES				2 person	
Average	47.4 years old						4 persons	

Note: NFES = Not Finish Elementary School; ES = Elementary school; JHS = Junior high school; HS = High school

(a)

Description	Socio-Economic Condition					
	Business experience			Aren tree tapped		
	0-15	16-30	>30	0-7	8-15	>15
Percent (%)	55.00	40.00	5.00	65.00	25.00	10.00
Total (%)	100%			100%		
Highest	33 years			20 trees		
Lowest	2 years			2 trees		
Average	16.4 years			7 trees		

(b)

There were farmers who have a land area with a mixture of aren and other commodities (plantations and crops) where 12.50% only have less than 0.5 acres and 87.50% who have 0.50 to 2 acres. However, forest begins to decrease, as well as the area of aren trees (Arenga Pinnata (Wurmb) Merr) because of increasing the need of land, while they

have lack of effort to cultivate and preserve. Farmers replaced woody plants (forestry plants) with a variety of plantations and crops, (Baka, et al., 2014 [13]; Colchester and Chao, 2011 [14]). Socio-economic conditions of the farmers are generally similar to the state of the agricultural sector in other agricultural areas. It was supported by Tran (2016) [15] who found that households with nonfarm employment had higher levels of education, income and assets. A Socio-economic condition of farmers was very important to be considered for formulating empowerment model. Improvement of low socio-economic conditions could improve the welfare of farmers. This is supported by findings from Ramos (2016) [16] that having more education, having more assets, the age of the head of household and have access to portable water and electricity in their household. These variables positively related with the probability of escaping the poverty condition. In addition, Muna people who live in the potential areas of aren trees (*Arenga Pinnata* (Wurmb) Merr) only use aren sap. However, the main utilization of aren sap was processed into alcoholic drink, commonly called kameko. It was shown in Figure 3.

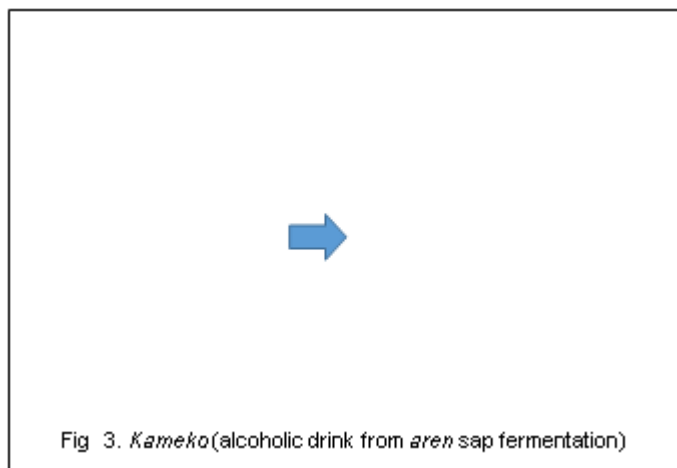


Fig 3. *Kameko*(alcoholic drink from *aren* sap fermentation)

Aren sap was actually very potential as a raw material of brown sugar commodities, but there were still very few people who process them into brown sugar or aren sugar. *Kameko* have limited market share, actually, because it includes illegal commodity. It was the reason why the farmers replace their aren trees (*Arenga Pinnata* (Wurmb) Merr) with plantations and crops. Unfortunately, if the empowerment of farmers did not care the important value of aren tree, while aren trees (*Arenga Pinnata* (Wurmb) Merr) have the value of social, economic, and environment. Although aren trees (*Arenga Pinnata* (Wurmb) Merr) could grow everywhere, on broad climate and soil variations, but the most interesting that Muna District become the paradise of aren trees (*Arenga Pinnata* (Wurmb) Merr). Aren tree is very abundant even without any good cultivation practices (Abdullah, 2015) [6], also in the Muna District (Table 2). Therefore, this area becomes a tremendous potential. The condition indicated the waiver of various benefit of aren tree in empowering the aren farmer. It was like the result study of Tadesse (2017)[17] who find that local people mostly appreciated a few services of high market value while most ecosystem services are not traded in local markets and hence not highly valued.

Table 2.
Aren Tree (Arenga Pinnata) Land Area in Southeast Sulawesi Province, Indonesia

No	District/City	Aren Tree Land Area	
		Ha	%
1	North Buton	5	0.14
2	North Konawe	2	0.06
3	South Konawe	5	0.14
4	Bau-Bau City	14	0.40
5	Kendari City	22	0.63
6	Wakatobi	26	0.75
7	Buton	59	1.70
8	Konawe	37	1.06
9	Muna	301	8.66
10	North Kolaka	136	3.91
11	Kolaka	200	5.75
12	Bombana	2,670	76.79

In social side, aren has historical value and role in the life of farmers and blend with agricultural activities. The role of kameko in agricultural activities became a marker of the feasibility of new land for agriculture. Pouring kameko into holes to choose the new lands did it. New land was not feasible for agricultural activities if kameko quickly absorbed by the soil. Kameko was also used as a daily drink that was believed to maintain their healthy, but it was also used as a complementary drink during the parties.

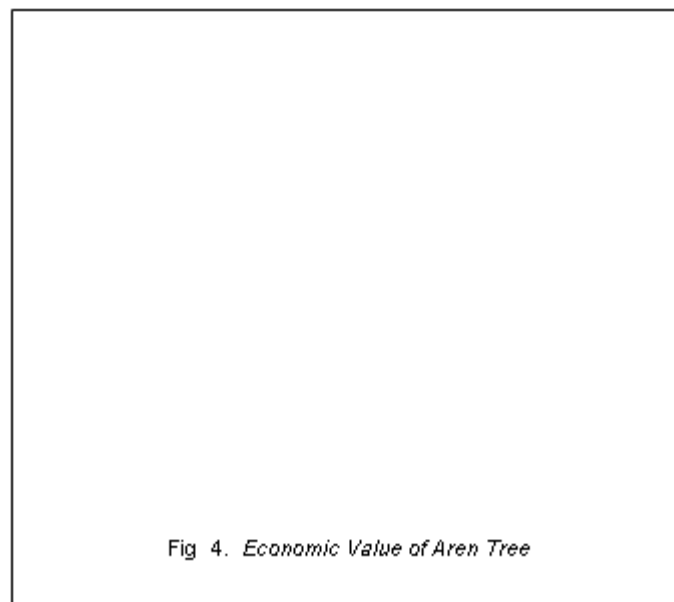


Fig 4. *Economic Value of Aren Tree*

Interestingly, that aren trees (*Arenga Pinnata* (Wurmb) Merr) have high economic values. Almost part of aren tree could be processed became a value things. Many parts of this plant could be made into various souvenirs. In addition, the leaves for the roof, stick for stick broom, fiber for palm fiber broom, fruit for kolang-kaling, sap for raw materials brown sugar, alcohol, biogas, sticks for building materials or household appliances, roots for drugs such as fibers for air like household items, souvenirs, and stem for building materials (Baka, et al., 2014 [13]; Colchester, 2010 [7]; Siregar, 2013 [18]). Some of aren's products that have economic values could be seen in Figure 4. Some farmers have processed sap of aren tree became brown sugar or aren sugar. This business actually give a lot contributes to the survival of farmers. Farmers could earn income every

day due to the production process could be done every day. It was supported by the abundant availability of the raw materials (aren sap). According to revenue cost ratio (R/C ratio), aren sugar processing business was feasible financially. It was showed by the value of R/C ratio higher than 1.00, about 1.24 (Table 3). It means that aren sugar business could be the solution for the farmer empowerment. The income from the aren sugar business could fulfill the daily need of farmers. Thus, the aren trees (*Arenga Pinnata* (Wurmb) Merr) should not be ignored by the farmers. The economic potentials of aren trees (*Arenga Pinnata* (Wurmb) Merr) should be more explored than the cultivation of various plantations and crops.

Table 3

R/C ratio of aren sugar processing business in the Muna District, Province of Southeast Sulawesi, Indonesia

Aren sugar production (kg)	Price (\$kg ⁻¹)	FC (\$)	VC (\$)	TC (\$)	R (\$)	R/C
574.50	1.11	5.25	509.78	515.02	638.57	1.24

The financial feasibility of processing business of aren sap into aren sugar still could be improved by promoting aren sugar as an organic sugar product. As already known that the supply of aren sap is derived from aren trees (*Arenga Pinnata* (Wurmb) Merr) that grows wild (natural), without any contamination of chemicals in the process of cultivation. Therefore, aren sugar business could become promotional activities, which could contribute as an incentive for the farmers to intensify the business of aren sugar processing. It has stated by Abdullah, et al (2015)[19] that exploring the promotion of palm sugar as an organic sweetener products in terms of raw materials and production processes, as well as to explore the factors that can increase the number of aren sugar supply in Indonesian and to scale the world trade. The value of the environment was also the superiority of aren trees (*Arenga Pinnata* (Wurmb) Merr) in addition to social and economic values that have been described before. Environmental value of aren trees (*Arenga Pinnata* (Wurmb) Merr) were conservation of soil and water because of the characteristic of aren tree was an adaptive plant. Aren tree was one of the plant which have ecological balance of ecosystem regions. More over, the specific ecologically function of aren tree is a preservative of natural resources, especially land (Hallam, 2009)[20]. Root fibers of aren tree are very solid, deep, and spread, so that, it has an important function for retaining soil erosion. Aren roots have the ability to bind water and does not need intensive care, so the aren trees (*Arenga Pinnata* (Wurmb) Merr) very suitable grown in dry areas include Muna District. Unfortunately, farmer empowerment (especially in dry area) has yet consider the interaction between aren farmer and environment that supported by their social economic condition.

3.2 The Empowerment Model of Aren Farmer through Their Interaction with the Environment

Farmer empowerment program is not really a new issue but the results are not yet make satisfied. Training activities are often the main activities in an empowerment setting but the implementation and results are not optimal. It is as the

result of research of Tjilen (2015)[21] that facilities of education and training in farmer empowerment cannot be utilized optimally. This situation becomes very important to be solved. The farmers who live around the forest usually use the forest as a land for cultivating the plantations and crops to meet the needs of their families. It means land clearing or forest conversion into plantation land. The activity can reduce soil carbon stock and micronutrient levels and increased soil compaction. It was as the result of research of Shate, et al (2016)[22] that the projects largely involved the conversion of both closed and open to closed forests and grasslands, which in turn reduced soil carbon stock and micronutrient levels and increased soil compaction. Therefore, the empowerment of farmers should not only focus on the management of various types of plantation and seasonal crops but also must pay attention to environmental management. Farmers should be able to take advantage of the various advantages of aren trees (*Arenga Pinnata* (Wurmb) Merr) for environmental conservation. Based on an observation, it was known that the result of empowerment program was not optimally satisfied, because it uses the concept of empowerment separately. It was not integrate amongst the social, economy, and local environment. Empowerment should not only prioritize on cultivation plants but also it must be able to optimize local potential of social, economic, and environmental values. The farmer empowerment is generally done in the form of training and assistance aids. However, the strategy should be formulated by considering the internal and external factors of farmers around the potential area of aren trees (*Arenga Pinnata* (Wurmb) Merr). Some of the internal factors of farmers that need to be considered in formulating empowerment models through the interaction of aren farmer and the environment, among others: the characteristic of farming was subsistence and small scale. The efforts to demonstrate the high economic value and its opportunities for achievement of the cultivated plants and abundant aren trees (*Arenga Pinnata* (Wurmb) Merr) have to be done. It was expected to change the mindset of aren farmers toward sustainable commercialization. The intention was commercial cultivation efforts which was the profit as the main purpose, but it also must pay attention to the benefits and impacts of various crops on an area of cultivating on the local environment. It could also reduce the narrowing of potential areas of aren trees (*Arenga Pinnata* (Wurmb) Merr) that were often done by farmers. The efforts should considered the low education of aren farmers, who mostly only primary education. Thus empowerment efforts should be simple, so that the farmers easily understand and implemented by aren farmers. In addition, it could also be done by reviving and optimizing the local institutions. The optimization of local institutions was particularly important for subsistence enterprises and small scale agriculture business. As a result of research from Besser (2017)[23] that smaller farms are characterized by strong locally based networks and higher sense of community belonging. Moreover, empowerment should not only focus on the cultivation process but also it should be attempted to improve the accessibility of farmers to technology, information, and markets. Some empowerment models will not maximize if without consider to external factors then the results. In fact, the aren farmers still have low bargaining position in marketing their products. The

specific characteristic of agricultural commodities like bulky, voluminous, and perishable, and the substantial substitution of raw material products produced by aren farmers while the buyers are only a few (the monopsony or oligopsony market structure) are the main cause. It needs capital support from financial institutions so that aren farmers want to be invited to do the processing of agricultural products. Capital problems, especially opinion that regard 'high cost' cases could also be overcome by optimizing local joint efforts (local group) to make efficient production costs. Risk guarantor institutions need to be established to enlarge the trust of debtors to allocate funds in agricultural development. Farmers who live around of potential areas of aren trees (*Arenga Pinnata* (Wurmb) Merr) should be equipped with knowledge of the tremendous benefits of aren trees (*Arenga Pinnata* (Wurmb) Merr) from the social, economic and environmental aspects, as well as the provision of skills to implement these benefits. The additional knowledge will improve the quality of farmer empowerment with environmental insight. Farmers are involved in environmental management through the utilization of aren trees (*Arenga Pinnata* (Wurmb) Merr). Farmers will be empowered and environment awake so that the welfare of aren farmers could be sustainable. In this condition, the farmers are willing to manage the environment because of the welfare that can be obtained through interaction with their environment. It is supported by the result research of Mills, et al (2017)[24] that in-depth understanding of farmer's willingness and ability to adopt environmental management practices and achieving sustained and durable environmental management. Also suitable with Lincoln, et al (2016)[25] who suggests that a more comprehensive view of farmers' environmental values and place connections may help illuminate individual farmers' decisions and sustainability-related practices. It should be done gradually, continuously, and implemented in groups by optimizing local institutions, non-government, and government. The opportunity of aren farmers to solve their own problem (self-supporting) about their daily need will increase with empowerment model based on interaction between aren farmer (their social economic condition) and environment. Interestingly, it also could increase the aren farmer's income, ensuring the social values and sustainability of the area function. Empowerment model of aren farmer through their interaction (their social economic condition) with the environment as describe above were more clearly shown in Figure 5. It could make authentic change the behavior, attitude, and knowledge of farmer in achieving their sustainable empowerment.

4 Conclusion

Almost the empowerment model of aren farmer were only emphasis on partial approach namely on the economic aspect of cultivated plants without involving other important values of aren trees (*Arenga Pinnata* (Wurmb) Merr) for aren farmer and surrounding environment. Therefore, empowerment model of aren farmers should be based interaction between aren farmer and environment that consider the linkages between internal and external factors, so it could increase and keep the sustainable welfare of aren farmer.

5 Implication

It is needed to shift the paradigm of empowerment from the old paradigm that more focus on technology transfer to a new paradigm that prioritizes the quality of aren farmer or change about their knowledge, behavior, and attitude based on interrelation of social, economic and through their interaction with the environment which allow sustainable self-empowerment occurred. Aren trees (*Arenga Pinnata* (Wurmb) Merr) are very familiar with the farmer so aren tree becomes a source of inspiration and beauty. In addition, Aren tree has high economic and environmental values, so aren (*Arenga Pinnata* (Wurmb) Merr) is expected to create an opportunity to achieve great farmer welfare.

6 Originality/Value

This study is original in nature and revealed a new paradigm of farmer empowerment model base interaction between farmer and environment, especially for farmer who live around the potential area of aren trees (*Arenga Pinnata* (Wurmb) Merr) .

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