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Developing a sustainable community forest management strategy in the mountainous areas of Tanggamus, Lampung, Indonesia

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Abstract. *Morizon, Nurrochmat DR, Maharijaya A, Putra PK. 2023. Developing a sustainable community forest management strategy in the mountainous areas of Tanggamus, Lampung, Indonesia. Biodiversitas 24: 4503-4513. The* Community Forest (HKm) program allows local communities to legally manage forests to strengthen their rights and reduce conflicts over forest resources. However, the program has yet to be successful in achieving its goals. This study aims to provide recommendations for HKM management strategies. The research involved surveys, field observations, and literature studies. Respondents were selected using purposive sampling and data analysis applied qualitative methods, including triangulation and SWOT analysis. The study found that the social and institutional aspects of the HKM program were not functioning well, with poor relationships among members of the farmers' group (Gapoktan). From an ecological perspective, there has been a decline in plant species. At the same time, the economic aspect shows that only 15% of members benefited from HKM, leaving the rest feeling its negative impact. The study recommends institutional restructuring, coaching, and capacity building for human resources, implementing agroforestry and organic schemes for coffee cultivation, providing guidance on alternative crops such as cardamom, and optimizing the role of cooperatives within the group. Key players must actively participate in HKM management. These recommendations could lead to the effective implementation of the HKM program.

Keywords: Agroforestry, community forestry, ecological measures, economic measures, social and institutional governance

INTRODUCTION

In Indonesian, a community forest called *Hutan Kemasyarakatan* (HKm) aims to conserve forests by involving locals in forest management (Astuti et al. 2020; Rahmani et al. 2021; Hasannudin et al. 2022). HKm seeks to increase the local community's well-being by optimally, equitably, and sustainably using forest resources (Darusman 2001; Ekawati and Nurrochmat 2014; Kaskoyo et al. 2017). Giving HKm license to locals is expected to strengthen management right and reduce conflicts in forest utilization (Rahmani et al. 2022), as well as a role in helping guard the forest functions (Adalina et al. 2014; Supriyanto 2017; Nurrochmat et al. 2021). This program is one of the social forestry schemes purposed to achieve social welfare and other supporting schemes such as village digitalization (Mazya et al. 2023). Lampung is a province in the southern part of Sumatra Island, rich in natural forest resources. However, the Lampung forests experienced significant damage for several decades due to various human activities, such as illegal logging and land encroachment. To overcome the forest destruction, the government and communities in Lampung have developed community forests through the HKm program. Through this program, the people of Lampung can directly participate in forest management and earn benefits from agroforestry products, particularly coffee (Nurrochmat et al. 2020). According to the Directorate General of Social Forestry and Environmental Partnership (PSKL 2020) data, HKm contributes 29.15% of the total achievement of the social forestry program. The Lampung Province has an enormous number of HKm licenses compared to other regions.

Tanggamus is one of the areas in Lampung with great potency for developing coffee planted in the agroforestry system under the HKm program. Coffee is an essential commodity that helps increase locals' ability or fulfill daily needs, such as financing children's education, buying equipment, repairing the house, and investing in farms**.** However, farmers in the area have faced various constraints in developing their coffee business over the years, including inadequate knowledge and technology and limited access to the market. The consolidated Beringin Jaya and Sidodadi Farmers Group (Gapoktan), as an HKm license holder, reached the highest awards from the Ministry of Environment and Forestry in 2016. However, the data shows an increase in the poverty line in the district of Tanggamus in 2021. There is also a declining function of the ecology of the HKm sites. It is crucial to identify a management practice of HKm that delivers social, economic, institutional, and ecological benefits and recommend management strategies.

MATERIALS AND METHODS

Study site and time

The study was held from November to December 2022 in the mountainous areas of Tanggamus District, Lampung Province, Indonesia. The study is conducted in the Community Forests (HKm) of Beringin Jaya and Sidodadi. The location of HKm is at an altitude of 500-1,000 meters a.s.l. (Figure 1).

Data collection

The study site was intentionally determined (purposive method), i.e., HKm Beringin Jaya and Sidodadi, the national forest farmers' group's competition winner *(Wanalestari).* Samples were selected with purposive sampling by considering specific criteria, i.e., active members, productive ages, number of Robusta coffee farmers in HKm, capacity, and respondents' knowledge of relevant information. The number of respondents was 50, consisting of 40 respondents who used a structured questionnaire and field observation. The other ten respondents are key informants with employed in-depth interviews. The secondary data is obtained from written documents, including official statistical data, *Gapoktan*'s documents, Forest Plans (RKU and RKT), and other relevant documents.

Data analysis

The study employed a descriptive qualitative analysis with a triangulation technique. It is a technique of data validation using something other than data to validate or compare data (Moleong 2009). The descriptive qualitative analysis is interpreted as a problem-solving procedure that is investigated by describing the current state of the research object based on the existing factors set. This analysis is used to examine the application of community forestry practices (HKm) that already give benefits in an institutional, social, and ecological manner. It was done with a direct interview with respondents to understand the community's well-being, changing behaviors of the administrators and members of HKm, gender perspectives, and the latest development of the institutional group. The qualitative method needs a verbal expression and offers complex descriptions (Ten Have 2004).

From the ecological perspective, an inventory of potential data with a direct interview method and field observation (plants, land covers, vegetation strata, and environmental services) gave a view of the percentage of the multipurpose tree species (*MPTS)* and trees planted in the HKm area. For the economic benefits of HKm, this study used income contribution analysis of the HKm farmers, using the following formula (Hasib 2004):

$$Z = \left(\frac{A}{B}\right) * 100$$

Where:

Z : The income contribution of coffee farming in HKm to the total family income in the HKm site

A : The income from Robusta coffee (IDR/year)

B : The total family income (IDR/year)

The following criteria can be used to show the details of the existing standards regarding income levels influencing household consumption behavior (Mosher 1987). Based on Table 1 Income level is associated with higher household expenditure. To calculate the percentage contribution of coffee income in community forests (HKm) and outside community forests to the total income of HKm farming families, the following formulation is used.

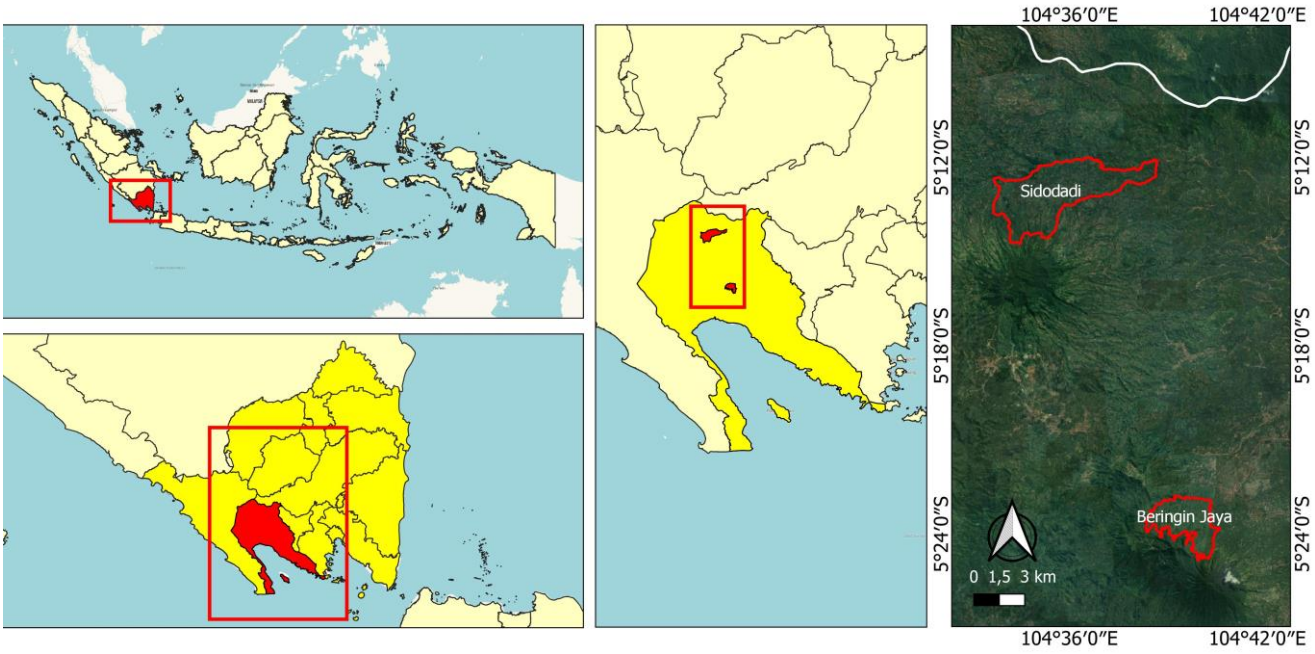

Figure 1. Map of Beringin Jaya and Sidodadi Community Forests of Tanggamus District, Lampung Province, Indonesia. (Source: (RKU 2018-2027 HKm Beringin Jaya) (SK Menhutbun No. 256/Kpts-II/2000)

Table 1. Criteria for the contribution of coffee income to HKm Farmers

Criteria	Description
Z ≤ 35%	Then own mark contribution low to income farmer HKm
35% < Z ≤ 70%	Then own mark contribution currently to income farmer HKm
Z > 70%	Then own mark contribution tall to income farmer HKm

For measuring the well-being level of the HKm farmers, this study used a well-being ladder of coffee farmer method, measuring the expenditure for food and non-food. The spending is based on the leading food, meat, seasonings, fat sources, nuts, and drinks. Non-food cost includes food, health, education, electricity, communications, clothing, fuels, transportation, furniture, house repairs, supplies, cigarettes, goods and services, and social necessities. The systematic criteria of the Good Service Ratio can be formulated as follows (Soekartawi 1995):

$$GSR = \frac{Expediture\ on\ Food\ Needs}{Expediture\ on\ Non-Food\ Needs}$$

Where: GSR>1 means the poor household; GSR=1 means the prosperous household; GSR<1 means the upper prosperous household

A stakeholder analysis was used to map the actors involved in the management of HKm. The actors were classified according to their interest and influence on the community forest: subject, key player, context setter, and crowd. Key player refers to an individual or group with high interest and power, as reflected by their influence in decision-making related to natural resources management. On the other hand, context setter refers to the actor who owns high power but has a low interest. Actors are positioned as subjects when their power is low but have a high interest. Meanwhile, actors are named crowd if their interest is low and has a weak influence. The interests and power of each actor determine that the dependency of each actor is different (Bryson 2004; Eden and Ackermann 1998; Reed et al. 2009).

Mapping stakeholders aims to identify and classify stakeholders' interests and use them as a reference for determining the involvement of actors in the decision-making process (Grimble and Wellard 1997; Paletto et al. 2015). All stakeholders of community forests have their interests and influence (power). They are diverse; some have positive characteristics and are compatible with the objectives of HKm. However, some others are negative and contradictory to the aims of HKm. The key informant interviews obtained the measurement related to influence and interest level scores from one to five (Tables 4 and 5).

David (2011) argues that matrix SWOT (Strengths-Weaknesses-Opportunities-Threats) is a tool for synchronizing strengths, weaknesses, opportunities, and threats to create a series of strategic choice policies. It is a tool often used in strategic plans and is obtained from the various opinions of the people involved in making the strategic plan (Phadermrod et al. 2019). SWOT analysis recommends appropriate strategies in community forests (HKM).

RESULTS AND DISCUSSION

Social and institutional governance

According to Fauzi et al. (2019), management forests in the area studies have experienced significant change going in more directions. This situation happened when the government gave access to the public through the scheme HKm, especially in the period 2009-2013 years combined Farmers Group (Gapoktan) was formed as a condition for obtaining permission HKm and managing the forest. Based on criteria and indicators evaluation performance (Permen LHK No 9 2021), several indicators of social change has identified in research in HKm Beringin Jaya and Sidodadi, especially in the 2016-2022 period, including behavior, institutions, partnerships, and innovation. Table 2 shows how Gapoktan Beringin Jaya and Sidodadi experienced social and institutional change after getting HKm's permission and awarding Wanalestari in 2016 and 2017.

Forest Farmer Group (KTH) in community forest management (HKm) experiences problems internally and externally. Conflicts internally and externally need to be resolved because of the lack of meetings and deliberations on what to do because that management from social forestry must, in a manner, independently carry out the management of conflict as a form of adaptive control (Agrawal 2007; Rachmani et al. 2022).

Transparency in fund management, administration, and finance remains a problem faced by Gapoktan administrators and external parties. The lack of human resource capacity and knowledge in managing internal and external administration/bookkeeping and finance is the cause. It is necessary for intensive mentoring to be conducted by the protected forest management unit's (KPHL) extension workers or local governments along with civil society organizations (CSOs) to increase human resource capacity in the group and provide greater trust in managing the institution (Sukwika et al. 2016). Furthermore, Baynes et al. (2015) saw government support as one of the keys to the success of community forestry programs.

The role of men is still dominant in HKm management, so women's involvement in economic and agricultural activities is not widely recognized. Farming families involve wives in activities on agricultural land, but men mostly manage forest areas. Therefore, active participation of women in HKm management is necessary to recognize gender perspectives. In addition, Mwangi et al. (2011) showed that a balanced composition of women and men in forest management works better than a homogeneous group. Despite support from various parties, several innovative activities are still being carried out by KTH members, such as managing clean water sources and existing environmental services that have not been developed.

Ecological measures

This study shows that HKm has significant ecological benefits, where the crown strata are increasingly similar to climax forest conditions. However, granting rights to communities in managing forest areas has also had negative impacts, such as the loss of several endemic species in forest areas, especially species that grow slowly or do not have high economic value (Table 3).

The Wanalestari Award is given to HKm, which has succeeded in improving regional governance and community welfare. It shows the important role of the community in managing forest areas but also reminds us that the protection of endemic species needs to be a major concern. However, in the context of HKm in certain areas, these awards also impact changing the composition of the group of plant species cultivated by the community. After six years of receiving awards, endemic species such as *basing* (*Alstonia spatulata* Blume), *benda* (*Artocarpus elasticus* Reinw. ex Blume), *gendang* (*Ficus variegate* Blume), *jelutung* (*Dyera* sp), *suren* (*Toona sureni* (Blume) Merr.), *ruka* (*Flacourtia rukam* Zoll. & Moritzi) and *pasang* (*Castanopsis javanica* (Blume) A.DC.) began to extinct. They were replaced by species more desirable to the community because of the high prices of NTFP products or useful shade plants.

The decline in the number of endemic species in this area needs serious attention because each species has an important role in maintaining the balance of the ecosystem. The loss of one species can disrupt the food chain and threaten the survival of other species. Therefore, all efforts in conserving forests and planting high-canopy plants are very important. However, in some cases, there is a problem where tall plants such as mahogany interfere with the productivity of other plants, such as coffee, because they block the sunlight needed for photosynthesis.

Light intensity is essential for plant photosynthesis; each species has different light requirements. Each plant species requires a certain light intensity to achieve maximum photosynthesis. Therefore, it is necessary to consider planting canopy plants according to the needs of other plant species so that the ecosystem remains balanced. It is also supported by the research of Nasruddin and Kuruseng (2006), which found that shade is closely related to light intensity, while light intensity is closely related to the process of photosynthesis and the activity of plant stomata (Wachjar et al. 2002). The presence of shade affects the intensity of sunlight hitting plants. Strong coffee requires 40-70% shade to grow (Sakiroh and Herman 2011).

Table 3. Changes in the number of types of plant groups

	Beringin Jaya		**Sidodadi**	
	2013-2016	**2017-2022**	**2013-2016**	**2017-2022**
Endemic	9	0	0	0
Wood plant	8	0	0	0
Temporary shade	3	0	0	0
MPTs	15	15	9	13

Table 2. Social and Institutional Governance Transition in Forest Management in Beringin Jaya and Sidodadi

1998-2009 (Before There is permission HKm)	**2009-2013** (Submission Period permits and Management HKm)	**2013-2016** (Gapoktan Accepted the Wanalestari Award from the Ministry of Environment and Forestry)	**2016-2022** (Post Accept Award Wanalestari)
1. Where the public, on initiative alone or in groups, cut down forests (illegal logging) and gardening 2. Looting wood results in reforestation 3. Cultivation returned to the fields by the community (Fauzi et al. 2019)	1. Group public own initiative manage forest legally 2. Community together companion (Korut) filed condition as Gapoktan, managing forest legally. 3. Kindly group preparing RKT/RKU and sustainably plans business gardening.	1. Gapoktan manages coffee and commodity plantations other for the enhancement of well-being. 2. Cooperative units formed 3. Cover forest increase with pattern agroforestry and multipurpose trees 4. Cooperation with group companion become Power leverage Gapoktan to obtain resources and innovation besides the application of agroforestry	1. There is a decrease in organizational performance and decision-making processes, including responses to problems and conflicts around Gapoktan. 2. The problem of transparency and openness in Gapoktan 3. Several innovations, such as the management of clean water sources and existing environmental services, have not developed, despite the support of the parties; 4. The internalization of HKm's mission and objectives did not occur at the village government level, giving birth to "group individualism." 5. Organizational (internal) mechanisms need to be stronger, and there needs to be coordination and meeting of members. 6. Gender issues: Male dominance in Organizations and decision making

As stakeholders in forest management, communities can influence the planning, management, implementation, and monitoring of forest conservation (Beyerl et al. 2016). However, it should be remembered that the success of forest conservation does not only depend on the community but also on the need for collaboration between communities, governments, and scientists to achieve sustainable and balanced forest conservation goals. The community's knowledge and perceptions are important in maintaining endemic species' sustainability.

Economy measures

Forest management activities that involve the community provide an opportunity for the community to earn income to meet their daily needs. Community income from forests is influenced by the level of their dependence on forests and the intensity of land management. Robusta coffee plants are the main source of income for most HKm farmers in Tanggamus.

As many as 55% of respondents in Tanggamus rely on robusta coffee as the main income for HKm farming families. The coffee plants are supplemented by low, medium, and high-canopy crops from agroforestry systems, such as nutmeg, cloves, bananas, avocados, and pepper. Robusta coffee plants in Tanggamus have been developed for generations because they suit climate and soil conditions. However, coffee product processing depends on farmers' capacity and human resources. Because the average education level of farmers in HKm is still low, they have not been able to accept innovation and new technology in coffee processing, especially in the coffee harvesting and post-harvesting processes.

The low level of education of HKm farmers can be an obstacle to utilizing more efficient coffee processing technologies. The low education level of farmers is caused by unfavorable circumstances, traditions, costs, and considerable distance, as well as the small number of schools available due to infrastructure development that cannot be carried out in forest areas. In addition, the factor of low learning motivation also influences. Therefore, it is important to provide non-formal education for farmers through extension workers, non-governmental organizations, or universities so that the capacities and skills of coffee farmers in HKm can be more optimal.

Farmers group welfare

This study uses the GSR (Good Service Ratio) analysis method to measure the welfare level of farmers. Every farmer's household can be considered prosperous if the non-food expenditure is higher than the food expenditure, which shows the farmer's ability to meet his life needs.

Figure 2 shows that most coffee farmers in HKm Beringin Jaya and Sidodadi are less prosperous with GSR > 1, while only 15% are categorized as more prosperous with GSR<1. More prosperous farmers have higher non-food expenditures than food expenditures, which means it's used for needs such as children's education costs, health, clothing, electricity bills, maintenance of clean water, transportation, and communications. Meanwhile, less prosperous farmers have higher food expenditures than non-food expenditures, especially to buy rice as a staple for the family. Martina and Praza (2018) considered income structure, expenditure structure, diversity of food security, and low purchasing power are essential to measuring prosperity. It is important to note that the most important factor for increasing the income of coffee farmers is formal and non-formal education. Farmers can adapt well to agricultural technology and innovation with education, increasing their welfare and income (Alfrida and Noor 2017).

However, many farmers still experience financial difficulties and rely on coffee intermediaries to obtain capital or money for daily needs. In addition, coffee productivity has declined in the last three years due to the use of chemicals that damage soil nutrients and the lack of regular pruning as a form of maintenance. Another factor contributing to the decline in productivity is climate change, which affects coffee growth. A comprehensive approach is needed, including education, better agricultural management, and reducing dependence on intermediaries to improve the welfare of coffee farmers in HKm.

The relationship between farmers and intermediaries or collectors in HKm Beringin Jaya and Sidodadi is more like that of debtors and creditors than sellers and equal buyers-capital to manage their HKm land and buy harvests directly from farmers at prices determined by the intermediaries. As a result, farmers have no bargaining power in determining the price of coffee or other commodities, all determined by the intermediaries. The coffee price for farmers with debt tends to be lower than for farmers who do not. This condition is one factor that makes farmers not prosperous even though they have managed their HKm land for 6-9 years.

To solve that condition, the Gapoktan agreed to establish cooperatives. This cooperative expected would give some loans to its members to develop their businesses and reduce the role of the middleman in providing capital. Cooperatives also play a role as coffee collectors and dispensers, with an agreed percentage of the price taken by the cooperative from the farmer. With processing coffee, the price and quality could be better, and coffee can be sold to other parts To measure farmers' welfare level. Unfortunately, the cooperative can not be operated properly due to a lack of trust from its members.

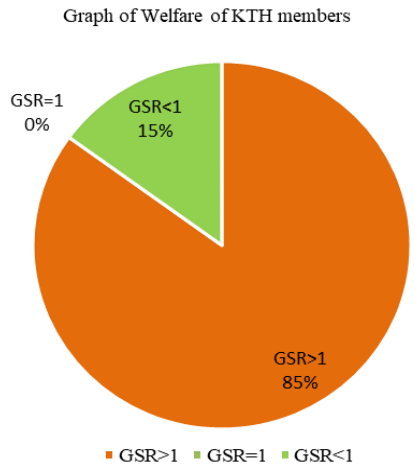

Figure 2. Distribution of Robusta Coffee Farmers' GSR Value in HKm Beringin Jaya and Sidodadi

Stakeholder analysis

Stakeholder mapping may help the HKm managers to involve stakeholders in achieving goals (Reed et al. 2009). Based on the criteria for stakeholder analysis Tables 4 and 5, the results of in-depth interviews involving several stakeholders show that they can be categorized based on their power and interest.

According to de Groot et al. (2002), there are five types of interest: regulation or setting, habitat, production, information, and carrier. On the other hand, Groenendijk and Dopheide (2003) put forward that there are five types of levels of influence (power to influence stakeholders) that are giving punishment or equivalent sanctions to other stakeholders (condign power), power influence gained through the ability to provide compensation to other stakeholders (compensatory power), power influence gained through belief manipulation or the formation of opinion and information (conditioning power), power influence gained Because aspect personality (personality power), and power influence gained from the organization that has suitability fields, tasks, networks, good systems and contributions to facilitation (organization power).

Figure 3 shows that the key stakeholders (key players) in HKm management are Gapoktan, administrators, middlemen, KPHL Batu Tegi, and Kota Agungutara, the Lampung Provincial Forestry Service. These four actors have the highest interest and strongest power in HKm management. Gapoktan, KPHL Batu Tegi administrators, and Kota Agungutara have different roles and approaches in program implementation. Gapoktan managers have high interest and influence because they have compelling policies at the site level, especially in work plan programs jointly prepared in RKU/RKT documents, and have close and direct relations with the community. It created higher trust than the KPHL Batu Tegi and Kota Agungutara.

KPHL Batu Tegi and Kota Agungutara, regional technical implementing units (UPTD) under the central government's authority, have much higher legitimacy than Gapoktan administrators. However, influence on the community or KTH members is better for Gapoktan management because KPHL has limitations in human resources, funding in assistance, and a wider scope of work than Gapoktan administrators.

The Lampung Provincial Forestry Service (Dishut Lampung) and Middleman have strong influence and interest in HKm management. The Lampung Forestry Office has authority in regulation from HKm. Thus, it also has a strong influence on community forests. The intermediaries have strong influence and interest. Regarding influence, intermediaries have a close relationship with the forest community or members of KTH because they help farmers in the source of capital and the marketing chain of farmers' products, be it coffee or other commodities. The interest of intermediaries is to get the maximum sustainable profit from the community's business. In addition, intermediaries are coercive, especially in returning the capital borrowed by the forest community or members of KTH.

KTH members Beringin Jaya and Sidodadi are subjects who have a high and direct interest in managing permits and resources in HKm. However, they do not influence deciding policies because Gapoktan officials regulate everything. It is due to the low capacity of human resources, which can be seen from the limited education, knowledge, skills, and capital. In addition, the cohesiveness of KTH members also began to decline, especially in voicing the interests of groups. They are more inclined to fight for their own-interests.

The consortium of *Agungutara* is the only actor categorized as a context setter with significant influence and emotional closeness to the community. In addition to playing a role as a companion for Gapoktan and KTH members, the level of interest is considered low because it has limited funding time and no legitimacy at the lower level. BPDAS HL Way Seputih Way Sekampung, Pokja PPS Lampung, and Pekon/village government are categorized as a crowd for HKm management. BPDAS HL Way Seputih-Way Sekampung is a government agency whose role is to fund land rehabilitation in HKm but has no direct interest or influence. The same is true for Lampung's social forestry (Pokja PPS) working group, whose role is only consulting and observing social forestry policies at the regional level. The village government also has no direct influence and interest because it is only limited to the village administrative area and has no legitimacy and regulation at the site level.

Table 4. Stakeholder relationship table based on the level of interest and influence

Stakeholder[1]	Influence						Interest					
	Instruments and sources of power[1]						Function management at HKm[1]					
	1	2	3	4	5	Score	6	7	8	9	10	Score
Lampung Provincial Forestry Service	5	4	3	3	5	4	5	4	3	4	4	4
BPDAS HL Way Seputih Way Sekampung	1	1	1	1	2	1.2	1	2	1	2	1	1.4
KPHL Kota Agungutara	5	4	3	3	5	4	5	5	4	3	4	4.2
KPHL Batu Tegi	5	4	3	3	5	4	5	5	4	3	4	4.2
Working Group PPS Lampung	1	1	1	2	1	1.2	1	1	1	2	1	1.2
Consortium Agungutara	3	3	3	3	5	3.4	1	3	3	2	1	2
Middleman	3	5	4	5	4	4.2	5	4	5	4	4	4.4
Government village	1	1	1	2	1	1.2	1	2	1	3	2	1.8
Manager Gapoktan	4	5	3	3	5	4	4	5	5	5	5	4.8
KTH members	1	1	2	2	1	1.4	4	5	5	4	4	4.4

Note: [1]Stakeholder interests and influence; 1: Condign power, 2: Compensatory power, 3: Conditioning power, 4: Personality power, 5: Organizational power, 6: Regulation, 7: Habitat, 8: Production, 9: Information, and 10: Carrier

Table 5. The interests and roles of actors in the management of HKm in Tanggamus District, Lampung, Indonesia

Actor	Informant key	Category Influence	Interest	Role
Forestry Service Lampung Province	Head of the Forest Service Lampung Province	Forceful, legitimate, significant	Ensuring the HKm Program running at tread level	Maker policy at provincial level
BPDAS HL Way Seputih Way Sekampung, Lampung	Head of BPDASHL Way Seputih Way Sekampung	Reference, no influential	Rehabilitation walk on the land HKm	Do rehabilitation land in HKm
KPHL Kota Agungutara	KPHL Extension Officer, Agungutara City	Forceful, legitimate, significant	Ensuring the HKm Program and assistance running at tread level	Maker policies at the site level and assistance group
KPHL Batu Tegi	KPHL Batu Tegi extension worker	Forceful, legitimate, significant	Ensuring the HKm Program and assistance running at tread level	Maker policies at the site and counterpart levels group
Working Group PPS Lampung	Member Working Group PPS Lampung	Reference, expert, no influential	Consultation policy HKm in the area	Observer policy
Consortium Agungutara	Director Consortium Agungnorth	Significant	Ensure project donor-funded runs on Gapoktan	Accompaniment group
Middleman	Robusta coffee collectors scale big	Force, significant	Get profit big from business group	Help capital and marketing of coffee in HKm
Government Pekon / village	Manager Pekon / village	Reference, no influential	Ensure the administration village clear	Government administration at HKm
Manager Gapoktan	Secretary Gapoktan	Forceful, valid, significant	Implementation of RKT and RKU accordingly	Group implementation HKm
KTH members	Representative KTH members	Enough influential	Get well-being from HKm	Perpetrator HKm

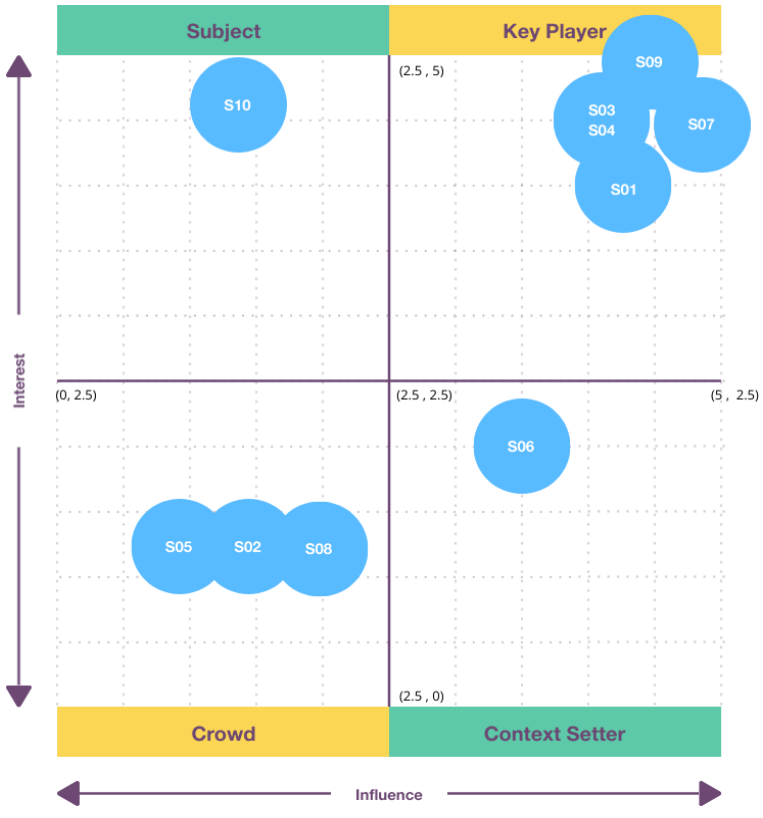

Figure 3. Matrix of factual interests-influence of actors in HKm management. [1] S01: Forest Service of Lampung Province, S02: BPDAS HL Way Seputih Way Sekampung, S03: KPHL Kota Agungutara, S04: KPHL Batu Tegi, S05: Pokja PPS Lampung, S06: Consortium Agungutara (LSM), S07: Tengkulak, S08: Village Covernment, S09: Gapoktan Management, dan S10: KTH Members

Community forest management strategy

The recommendations for HKm management strategies in Beringin Jaya and Sidodadi HKm can use a SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis. From the description of the social, ecological, economic and institutional aspects, several strategic factors are obtained to determine the direction of community forest management recommendations that can provide economic, social and ecological benefits for the group in the future. The influencing factors are internal factors consisting of strengths and weaknesses, and external factors in the form of opportunities and threats. This HKm management strategy recommendation is carried out by SWOT analysis by combining external factors and internal factors.

Internal factors

Based on interviews with community forest license holders and experts, internal variables were evaluated, as presented in Table 6. The table shows that the variable with the relatively highest internal variable strength score still has an HKm management permit with a score of 0.532. The variable with the lowest score is having a network with the local government, with a score of 0.261. Based on interviews with experts and community forest permit holders (KTH), an evaluation of the internal variables of weakness was obtained, as presented in Table 6. In this table, it can be seen that the variable that relatively has the highest score is the high dependence of farmers on intermediary traders with a score of 0.44, which is then followed by the variable lack of regular monthly and annual meetings and inadequate managerial skills at the group level with a variable score of 0.408 each. The variable with the lowest score is the lack of awareness of farmers in managing environmentally friendly areas, with a score of 0.136.

External factors

The data on external factors in community forest management in Gapoktan Beringin Jaya and Sidodadi can be seen in Table 7.

Based on interviews with community forest license holders and experts, the evaluation of opportunity variables is presented in Table 7. Based on the data in this table, it can be seen that the variable with the relatively highest score is the accessibility variable, which is close to the district government center with a score value of 0.712. The variable with the lowest score is the availability of a potential HKM learning center, with a score of 0.18. Based on interviews with community forest license holders (KTH) and experts, external threat variables were evaluated, as presented in Table 7. Based on the data in this table, it can be seen that the variable with the relatively highest score is the variable of the increasing needs of farmers, with a score of 0.68. The variable with the lowest score is the excessive use of chemical poisons, with a score of 0.36.

Based on the weighting results for the SWOT diagram of internal and external factors as illustrated in Table 8, the analysis results show that the total score of internal strength factors is 1.506 and internal weakness factors is 1.983. The total score of opportunities for external factors is 1.716, and threats is 1.873. Based on these values, the position of the community forest development strategy is located in cell 3 with a coordinate value of (-0.477; 0.157). After obtaining the numbers from the difference between internal and external factors, a SWOT diagram can be made, which can be seen in Figure 4.

The SWOT diagram in Figure 4 shows that the position of the community forest is in the third cell, which means that the community forest management system in Gapoktan Beringin Jaya and Sidodadi Tanggamus District currently has enormous opportunities but, on the other hand, faces several internal constraints or weaknesses. According to Rangkuti (2015), if the position is in the third quadrant (cell), then a WO (Weakness-Opportunity) strategy should be applied, namely a strategy to minimize internal problems to seize better opportunities. The SWOT matrix for the community forest management strategy in Gapoktan, Beringin Jaya, and Sidodadi, Tanggamus Regency, can be seen in Table 9.

Table 6. IFAS (Internal Factor Analysis Summary) Matrix for Community Forest Management in Gapoktan Beringin Jaya and Sidodadi, Tanggamus District

Internal factors	Weight	Rating	Score
Strengths			
Still have 35 years HKm management licence	0.133	4	0.532
Never got Wanalestari	0.091	3	0.273
Network with local government	0.087	3	0.261
High community motivation	0.11	4	0.44
Number of strengths	0.421		1.506
Weaknesses			
High dependence of farmers on intermediary traders	0.11	4	0.44
Regular monthly and annual meetings reduced	0.102	4	0.408
The financial and administrative documentation of the group is not yet good	0.101	3	0.303
Inadequate managerial skills at the group level	0.102	4	0.408
Lack of awareness of farmers in managing environmentally friendly management areas	0.068	2	0.136
Limited funding	0.096	3	0.288
Number of Weaknesses	0.579		1.983
Total	1		3.489

Table 7. EFAS (External Factor Analysis Summary) Matrix for Community Forest Management in Gapoktan Beringin Jaya and Sidodadi, Tanggamus District

External factors	Weight	Rating	Score
Opportunities			
Close accessibility to the district government center	0.178	4	0.712
Private investment opportunities	0.131	4	0.524
Innovations from the local government	0.1	3	0.3
Has the potential for an HKm learning center	0.09	2	0.18
Number of Opportunities	0.499		1.716
Threats			
The increasing needs of farmers	0.17	4	0.68
Erratic weather	0.131	3	0.393
Some HKm locations have begun to be covered by the mahogany canopy	0.11	4	0.44
Excessive use of chemical toxins	0.09	4	0.36
Number of Threats	0.501		1.873
Total	1		3.589

Table 8. Weighting for SWOT diagram of internal and external factors

Description	Internal Factor		External Factor	
	Strengths	Weaknesses	Threats	Opportunities
Weight x Rating	1.506	1.983	1.873	1.716
Retrieved	-0.477		0.157	

The analysis results show that developing community forests (HKm) in the Beringin Jaya and Sidodadi farmer groups can provide economic, social, and ecological benefits. Therefore, the proposed strategy includes institutional restructuring of the group, capacity building for human resources, development of agroforestry and organic cultivation patterns, increased stakeholder involvement in assistance, replacing coffee plants with cardamom for areas affected by canopy closure, and optimizing the role of cooperatives in the group to reduce the role of intermediaries/coffee collectors in economic activities.

Institutional restructuring of the group is considered important because it is fundamental to the development of community forest management. The benefits of organizational restructuring include institutional development guidelines, strengthening institutional leadership capacity, and encouraging institutions to be strong in facing and interacting with external parties (Awang et al. 2008). Capacity building for human resources is also important because human resources (HR) are the core capital in developing HKm programs. This strategy can be carried out through counseling, training, assistance, and benchmarking studies.

The development of agroforestry and organic cultivation patterns based on coffee is also proposed because it can contribute to the conservation of soil, water, and biodiversity, as well as increasing nutrient content, microclimate changes, pest and disease control, and increasing farmers' income (Supriadi and Pranowo 2016). The active role of stakeholders in assisting is also considered important because it can improve institutional governance and help community forest management run better.

Replacing robusta coffee plants with cardamom in areas affected by mahogany canopy closure is also proposed because the productivity of coffee on land under mahogany and snorkeling trees with dense canopy closure decreases. Cardamom plants have good productivity even under the dense mahogany canopy and have high economic value.

Optimizing the role of cooperatives in the group is also proposed to reduce the role of intermediaries or coffee collectors in economic activities. It can be achieved by running savings and loans from cooperatives in the farmer group. So, farmers can borrow capital from the cooperative without having to depend on intermediaries or coffee collectors. With a healthy farmer group institution, farmers can reduce their dependence on intermediaries or coffee collectors (Sorrentino et al. 2017).

In conclusion, the HKm program, which has been running for six years, has not had a good impact ecologically, economically, and socially on forest farmer groups. The low number and species of jungle wood species in the HKm area require enrichment activities for forest wood species to support productivity and water availability, prevent erosion and maintain soil fertility. Farmers' economic aspects and welfare are also not guaranteed due to decreased coffee productivity and increased expenses for the daily needs of farmers. There are also social and institutional aspects, such as a decrease in the active participation of farmer group members and organizational and financial management that is no longer active.

Strategies that can be recommended in managing HKm are restructuring farmer group institutions, fostering and increasing human resource capacity, carrying out coffee cultivation patterns by implementing agroforestry and organic-agriculture schemes, increasing the active role of stakeholders in assisting, changing coffee plants to cardamom for those with closed crowns, and optimizing the role of cooperatives in farmer groups. The social capital of HKm permit holders is very important for grounding management at the site level.

Table 9. SWOT matrix

Internal Factors / External Factors	Strengths (S)	Weaknesses (W)
	1. Still have a 35-year HKm management license 2. Never got Wanalestari 3. Network with local government 4. High community motivation	1. High dependence of farmers on intermediary traders 2. Regular monthly and annual meetings reduced 3. The financial and administrative documentation of the group is not yet good. 4. Inadequate managerial skills at the group level 5. Lack of awareness of farmers in managing environmentally friendly management areas 6. Limited funding
Opportunities (O) 1) Close accessibility to the district government center 2) Private investment opportunities 3) Innovations from the local government 4) Has the potential for an HKm learning center	**Strategy SO** 1. Expanding marketing network (S1, S3, 02) 2. Developing new innovations in HKm management (S2, S4, O1, O3, O4)	**Strategy WO** 1. Group institutional restructuring (W2, W4, O4) 2. Institutional capacity building (W3, W4, O3) 3. Implement environmentally friendly agroforestry cultivation patterns (W5, O2) 4. Conduct effective marketing of NTFPs (W1, W6, O1)
Threats (T) 1. The increasing needs of farmers 2. Erratic weather 3. Some HKm locations have begun to be covered by the mahogany canopy 4. Excessive use of chemical toxins	**Strategy ST** 1. Replacement of robusta coffee plants with cardamom plants (S1, S4, T2, T3) 2. Awareness-raising on reducing the use of chemical toxins (S2, S3, T1, T4)	**Strategy WT** 1. Institutional strengthening of community forest farmers (W2, W3, W4, T3, T4) 2. Improving farmers' bargaining position in the coffee business (W1, W6, W5, T1, T2)

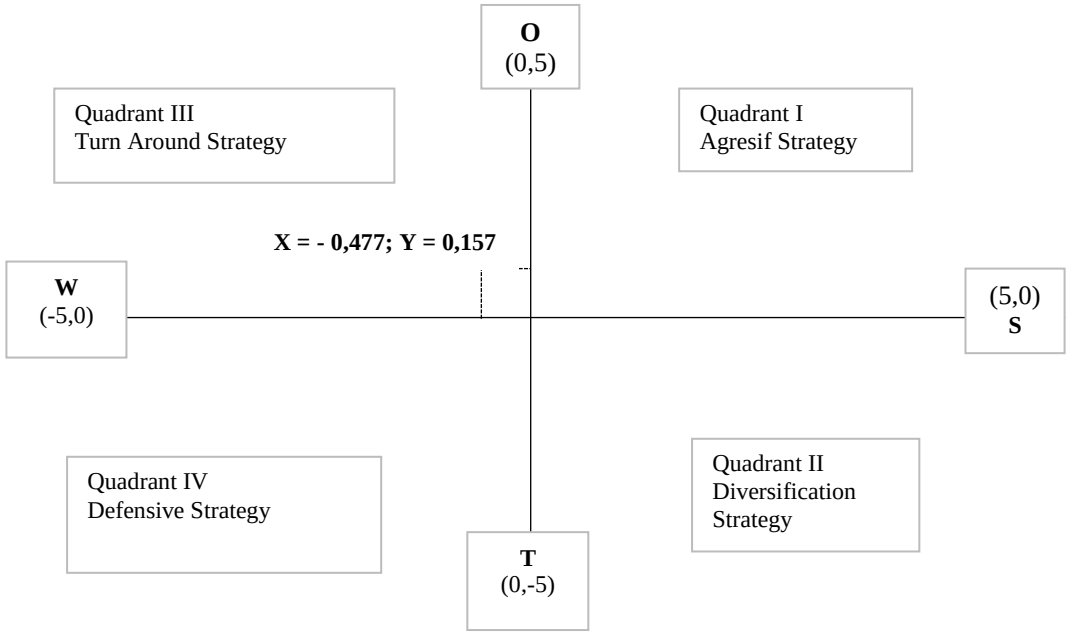

Figure 4. SWOT diagram of community forest management strategies in Gapoktan Beringin Jaya dan Sidodadi, Tanggamus District, Lampung, Indonesia

As key players, assistance from the protected forest management unit (KPHL) Batu Tegi and Kota Agungutara and the Forestry Service of Lampung Province is necessary to strengthen social capital in HKm and run quality HKm. The Gapoktan administrators should be replaced by young people who are more creative and innovative. They are expected to reduce the dominant role of intermediaries in managing HKm businesses by activating the function of savings and loans from cooperatives, which KTH members can expect as a source of capital and the marketing chain for coffee and other commodities.

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