

Transition from Perhutani to University Brawijaya Forest Management: Socioeconomic Impact in Malang, Indonesia

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Abstract

Agroforestry is a sustainable land management system where trees coexist with food crops or pasture, creating ecological and economic synergies. Strategic land use management involves evaluating potential and optimal land use to enhance economic and social conditions through participatory processes and stakeholder engagement. Implementing effective land management practices on an appropriate scale supports productivity, agricultural systems, and ensures sustainable food production to meet community needs. This study focuses on the impact of the transition from Perhutani's agroforestry to Universitas Brawijaya Forest (UBF) management in the UB Forest of Karangploso sub-district, covering Tawangargo, Donowarih, and Ngenep villages. Data collection utilized a mixed-method approach including questionnaires, in-depth interviews, site observations, and secondary data. The triangulation technique, combining quantitative and qualitative data, was applied for analysis. Results indicated a significant improvement in socioeconomic aspects, including total economic income, social interaction, and infrastructure, perceived by 67% of respondents after the transition from Perhutani to UBF management. The study revealed that 70% of farmers are aware of their reliance on the UB Forest *tumpangsari* agroforestry system. Moreover, 88.86% strongly agreed that *tumpangsari* agroforestry yields contribute significantly to their family income, while 84.57% affirmed its importance as a source of raw materials for food and living expenses. However, 76% of farmers expressed a neutral stance on the use of *tumpangsari* crops for medicinal purposes alongside consumption and income generation. Additionally, 82.29% strongly agreed that UB Forest management supports *tumpangsari* agroforestry, leading to increased family income. In conclusion, this study highlights that the transition from Perhutani to UBF management markedly enhanced socioeconomic aspects, including economic income, social interactions, and infrastructure. It further underscores the crucial

role of *tumpangsari* activities as a primary income source for the traditional farming community at UBF, crucial for their livelihood sustainability.

Keywords: Agroforestry Community, Socioeconomic Impact, Tumpangsari, Perception.

Introduction

In 2015, governments worldwide took bold and decisive action by adopting the 2030 Agenda for Sustainable Development (UN, 2015), or the 2030 Agenda as it is often called. Since then, the 2030 Agenda and its 17 Sustainable Development Goals (SDGs) have become the overarching framework for sustainable development. The universal and inclusive nature of the 2030 Agenda commits the international community to act together to overcome the multiple and complex challenges facing the world in the twenty-first century. It will guide development policies worldwide during the next decade and beyond. Sustainable land use is that which meets the needs of the present while, at the same time, conserving resources for future generations. This requires a combination of production and conservation: the production of goods needed by people, combined with natural resources. Production depends on ensuring continued production in the future.

Sustainable land management combines technologies, policies, and activities aimed at integrating socioeconomic principles with environmental concerns. As population and human aspirations increase, land becomes an increasingly scarce resource, calling for land-use planning. In particular, population growth has led to an increase while straining the earth's natural resources at the same time (FAO, 2018). Food security is intricately linked to energy consumption, and it is a major driving factor in natural resource consumption (Mertens et al., 2000). The purpose of land-use planning is to support decision-makers and land users in selecting and putting into practice those land uses that will best meet the needs of people while safeguarding natural resources and ecosystem services for current and future generations. Tools and methods for land-use planning at appropriate scales should encourage and assist the diverse and often competing users of land resources in selecting land-use and management options that increase their productivity, support sustainable agriculture and food systems, promote governance over land and water resources and meet the needs of society (FAO, 1993). In addition, land-use planning aims to achieve a balance among these goals through information on trade-offs, appropriate technology, and consensus-based decision-making.

According to World Bank (2004), the pressure on natural resources is the most acute because almost 70% of the poorest are heavily dependent on forests for their livelihoods. Mayers and Vermeulen (2002), claimed that forestry has many advantages compared to other sectors offering the potential means out of rural poverty. It can also provide resource safety nets. More specifically, forest ecosystems offer several services, including supplies of timber, wood fuel (charcoal and firewood) and non-wood forest products, water purification, stabilization of local climate and preservation of biodiversity (MEA, 2005). Agroforestry is a forest land that uses a management system in which trees are mixed in the same land with food crops or pasture for domestic animals. In agroforestry systems, there are both ecological and economic interactions between the different components. Woody perennial-based with mixed-species production systems or agroforestry has the very potential to avoid land degradation. Site productivity will improve through interactions with all surrounding trees, soil, agricultural crops, and livestock in that area. It will restore a part of the lands that have

been degraded. Agroforestry also can improve rural livelihood and enhance the integrated management of the natural resource base (Nair, 1993).

The application of *tumpangsari*-agroforestry in Indonesia's agrarian community has a long tradition. *Tumpangsari* is an agroforestry system adopted in Indonesia to establish forest plantations. *Tumpangsari* means co-occupation for a limited period, and the occupants are agricultural crops in the forest area (Kartasubrata, 1979). Consequently, there is an extensive body of empirical knowledge on using and managing trees and associated crops. In addition, the economic productivity of the product is relatively well documented, but more tree studies should be undertaken (Kartasubrata, 1979). In this system, landless farmers receive 0.25 hectares of forest land on which they have to plant trees and cash crops until the third year, and the labour wage is paid in-kind with the yields of the cash crops. Various studies have been conducted on the importance of *tumpangsari* in sustaining the socioeconomic of rural communities, such as by Kustanti (2021), Kartasubrata et al. (1995), Sunderlin (1992), Stoney & Bratamihardja (1990), Aminudin, (1997), Ambayoen et al., (2021) have been conducted to determine the potential of *tumpangsari* programs to alleviate the socioeconomic problems of the rural forest people. Such a study explores the historical relations of the agency and the people to state forests. The development of *tumpangsari* system in Indonesia has increased the growth of the main species of forest trees and the yield of food crop species (Sukandi, 1993). The *tumpangsari* program has been developed in the areas since 1970. The program was framed to reflect both social forestry and casual *tumpangsari*. The positive trend of *tumpangsari* land use indicates that forest villagers increasingly demand participation in the *tumpangsari* program. However, the lands available for *tumpangsari* are becoming more and more scarce. As a result, the farmers' *tumpangsari* land size is small, ranging between 0.5ha to 3.0 ha.

However, *tumpangsari* practices are oriented more towards the subsistence needs of the participants. Therefore, it is not surprising that more *tumpangsari* resources are allocated to fulfil household purposes instead of commercial crop development. According to Meyers and Vermeulen (2002), agroforestry activities such as *tumpangsari* have many advantages compared to other sectors in offering the potential means out of poverty and providing resource safety nets. Thus, this study is carried out to assess the impact caused by the transition of *tumpangsari* forest management system on socioeconomic and evaluate the perception of the community on *tumpangsari* agroforestry system at UB Forest.

Methodology

Study Area

The study is situated in Karangploso in Malang region of East Java Province (Figure 1). It has been under the management of University Brawijaya Forest (UBF) since December 31, 2015, following approval from Indonesia's Ministry of Live Environment and Forestry (MLEF). UBF serves as both an educational and training forest, overseen by Universitas Brawijaya and established in 2016. Officially, UBF spans three villages: Donowarih, Tawangargo, and Ngenep, located in Karangploso District, Malang Regency. Specifically, it covers Sumber Sari hamlet in Tawangargo village, Sumberwangi hamlet in Donowarih village, and Tumpangrejo hamlet in Ngenep village.

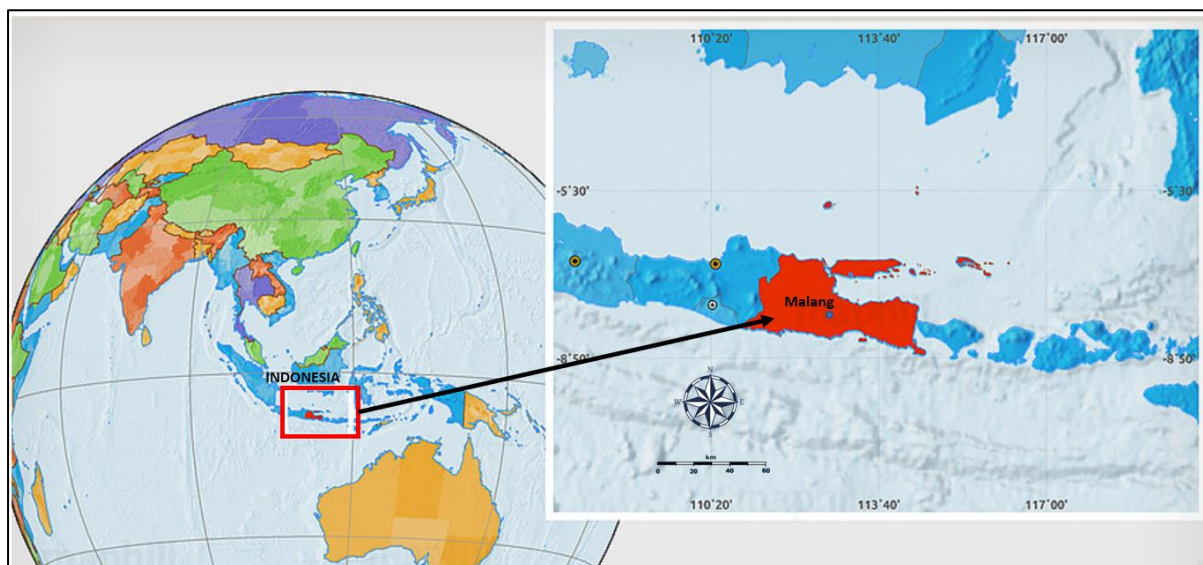


Figure 1. A world map showing the Indonesia country and East Java Province where the study sites at UBF at Gunung Arjuna-Lalijiwo, Malang, East Java, Indonesia.

The initial authorization for UB Forest's establishment was granted through the Decree of the Minister of the Environment and Forestry of the Republic of Indonesia, Number: 676/MenLHK-Setjen/2015. It initially covered an area of approximately 514 hectares, which later expanded to a total of 544.74 hectares as an Educational and Training Forest. Universitas Brawijaya (UB) manages the forest through corporate social responsibility and supports the economic development and well-being of the community in the educational forest at Karangploso. The selection of this study area was based on its ecological diversity, potential for agroforestry, opportunities for research collaboration, socioeconomic significance, and policy implications. The geography and climate are conducive to implementing agroforestry practices, offering insights into sustainable land use strategies. The topography/slope conditions of UB Forest are categorized into three classes: 0-8% covering an area of 40.97 ha, > 8-15% covering an area of 484.89 ha, and > 15% covering an area of 23.81 ha. The annual average rainfall is 250 mm, with an average temperature of 27°C. The UB Forest area comprises three types of soil: brown alluvial soil, brown latosol, and grey regosol.

Methods

The method employed in this study adopted a mixed-methods approach, combining qualitative and quantitative data collection techniques. Quantitative data were gathered through the administration of a questionnaire, while qualitative data were obtained through in-depth interviews and field observations. This approach aimed to gain a comprehensive understanding of the research topic by integrating numerical data with rich qualitative insights. Following the completion of data collection, the next step involved the integration and analysis of findings from both the quantitative and qualitative data sources. This process followed the explanatory sequential triangulation design framework, wherein the results from both data types were combined to gain a deeper understanding of the research phenomenon. Figure 2 shows a visual representation of the formulation design framework employed in this study, illustrating the various stages of the research process, including data collection, analysis, and integration. By adhering to this systematic approach, the study aimed to

generate reliable and robust findings that contributed to the overall research objectives.

The triangulation method is utilized in this study to converge findings from diverse data sources, enhancing the validity and reliability of the results. The combination of quantitative and qualitative data enables researchers to develop a comprehensive understanding of the factors under investigation and draw more robust conclusions.

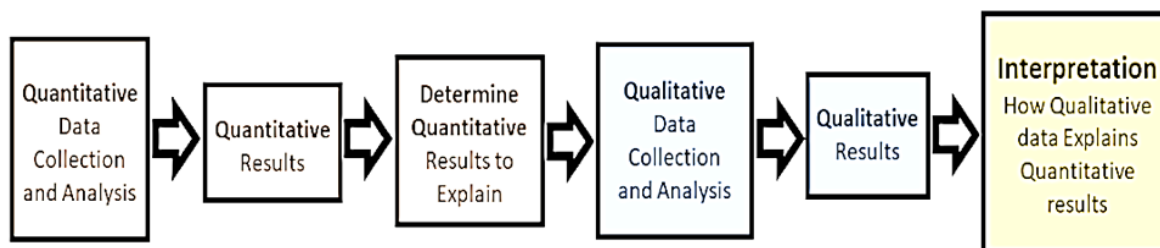


Figure 2. The explanatory sequential triangulation design framework used in the study.

Data Collection

Data was collected from both primary and secondary sources. Primary data involved gathering information directly from research participants, while secondary data was obtained from existing sources. Using both methods provided a comprehensive view and ensured the reliability and validity of the findings. For primary data, questionnaires were distributed in the study area, resulting in 350 completed surveys returned for analysis. In-depth interviews were also conducted for more detailed insights. Qualitative data supplemented the primary data and was gathered from various external sources such as journals, books, and reports.

In the qualitative approach, 15 individuals including key informants participated in in-depth interviews. Their insights enriched the understanding of the research topic. This approach allowed for a comprehensive examination of the factors and impacts of agroforestry on the socioeconomic aspects of the respondents.

A convenience sampling approach was chosen for practicality and allowed for the collection of basic data and identification of trends. Respondents were heads of families who owned arable land in the UB Forest area, along with family members involved in cultivating crops. Slovin's Formula was employed to determine the sample size, considering the known population size (N) and acceptable error value (e). The resulting sample size was calculated to ensure the generalizability of the results. According to Sugiyono (2014), this method does not require a table of sample sizes for calculations. The Slovin formula for determining the sample size is as follows:

$$n = \frac{N}{1 + N(e^2)}$$

Where,

n = Sample size/ number of respondents

N = Size/number of populations

e = sampling error

Survey Instrument Preparation: Questionnaire

The primary instrument used in the study was a questionnaire, carefully designed to align with the research objectives. This was achieved through a thorough review of prior studies and examination of questionnaire forms used by previous researchers (Withana &

Auch, 2014). Key informants were also interviewed to gather essential information about various aspects of the local community, which served as the basis for formulating the questionnaire.

A total of 48 questions were developed, organized into five sections. Part A focused on demographic information, including age, gender, marital status, religion, education level, family size, ownership of durable items, and social participation, with 19 questions in total. Part B contained six multiple-choice questions about the respondents' economic activities. Part C encompassed questions about sources of income, including five main questions and additional fractional questions. Parts D and E utilized a five-point Likert scale, ranging from "strongly disagree/very dissatisfied" to "strongly agree/very satisfied," with scores from 1 to 5 (Withana & Auch, 2014). This scale allows respondents to indicate their level of agreement or satisfaction, providing nuanced responses. Part D consisted of eight questions evaluating respondents' dependency on the *tumpangsari* agroforestry system at UB Forest and its role in generating side income, including agro-tourism activities. It included eight questions in total. Part E focused on respondents' knowledge regarding the impact of *tumpangsari* agroforestry system implementation on income generation and the effects of changes in forest management on the local community, with ten questions in total.

Pilot and Actual Study of The Instruments

In order to ensure the questionnaire's reliability, a pilot study was conducted. Reliability refers to the consistency in measuring a variable (Drost, 2011), indicating the stability of the items used. Cronbach's Alpha (CA) coefficient was used to assess reliability, a widely accepted measure of internal consistency (Carminee & Zeller, 1979). CA ranges from 0 (no internal consistency) to 1 (perfect internal consistency). In social science studies, a reliability coefficient of ≥ 0.7 is generally considered acceptable (Nunnally, 1978; Creswell, 2002; Whitana & Auch, 2014).

A total of 40 questionnaires (8.3% of the sample size) were randomly administered in two hamlets (Sumbersari and Sumberwangi) for the pilot study. For the actual study, 350 questionnaires were distributed. Table 1 presents CA values for questions from Part B to Part E for both the pilot and actual studies. Part B showed the highest CA value of 0.866, indicating high internal consistency among its items. This suggests effective measurement of economic conditions. Conversely, Part E had the lowest CA value of 0.796, indicating slightly lower internal consistency. Despite this, it still showed reasonably good consistency. Importantly, CA values from the pilot and actual studies did not significantly differ. This indicates that the questions in the questionnaire maintained high consistency across both phases, ensuring reliability in measuring the intended variables.

Table 1.*Cronbach's Alpha (CA) value for pilot and actual study*

Part	Question	CA value for the pilot study (N=40)	CA value for actual study (N=350)
B	Economic conditions	0.852	0.866
C	Differences in the income generated from agroforestry/ <i>tumpangsari</i> agroforestry and income derived from products in the forest area.	0.783	0.838
D	Level of community dependency on agroforestry/ <i>tumpangsari</i> agroforestry in UB forest	0.855	0.837
E	Additional information about community dependency on agroforestry/ <i>tumpangsari</i> agroforestry in UB forest.	0.733	0.796

Data Analysis

The data analysis involved calculating descriptive statistics (frequencies, percentages, mean scores, and standard deviations) to summarize the survey data. Descriptive analysis aims to present the collected data without drawing general conclusions for the wider population (Sugiyono, 2014). Data from the questionnaire were processed using Statistical Package for the Social Sciences (SPSS) ver.23 and Microsoft Excel. Additionally, qualitative data were tabulated separately. These qualitative findings, which include statements, observations, and photos, serve to validate and provide context to the qualitative results.

The study employed multiple linear regression analysis to estimate the impact of socio-economic variables on the area of land cultivated by the community in the UB Forest. This method was chosen when two or more independent variables were found to affect the dependent variable. In this case, the dependent variable (Y) is the area of arable land in the UB Forest, while the independent variables (LB, JT, TP, PEN, JAK) represent public socio-economic factors. The regression equation is as follows:

$$Y = \beta_0 + \beta_1 LB + \beta_2 JT + \beta_3 TP + \beta_4 PEN + \beta_5 JAK + e$$

Where,

Y = The area of land cultivated by the community in the UB Forest area (ha)

I = Respondent i (i=1,2,.....n)

β_0 = Regression constant or intercept

$\beta_1 - \beta_5$ = Regression coefficient

LB = Length of work in the forest (years)

JT = Number of plant species (number of plant species)

TP = Length of education (years)

PEN = Income (rupiah per month)

JAK = Number of family members (persons)

E = Standard error

The accuracy was assessed through its coefficient of determination, denoted as R² (R Square). In regression analysis, R² signifies the goodness-of-fit of the obtained regression line. A higher R² value indicates a stronger ability of the regression model to accurately represent real-world conditions. The coefficient of determination (R²) is employed to quantify the percentage change in Y (the area of land cultivated by the community in the UB Forest area) attributable to variations in factors like length of work in the forest, number of plant species, level of education, income, and family size. Essentially, it measures how well the model accounts for variations in the independent variable. Lastly, to analyse impact, descriptive analysis (utilizing mean values) was employed to articulate agreement or disagreement with statements provided by the respondents.

Data collection and analysis techniques for qualitative method.

The interview method was utilized to gather in-depth and comprehensive information concerning specific issues and themes related to the research. The chosen interviewees included heads of Summersari, Sumberwangi, and Tumpangrejo hamlets, representing coffee farmers before and after their collaboration with UB. Additionally, middlemen (tengkulak) purchasing coffee, the head of Kelompok Tani Sumber Makmur (Farmer Group), Perhutani officers, the UB Forest director, and officials from the agriculture department of Karangploso were interviewed. These key informants possessed valuable insights and knowledge regarding the changes in coffee cultivation practices before and after transitioning to UB Forest management.

During the interviews, information was directly obtained about respondents' characteristics and observed social changes following cooperation with UB Forest, including knowledge, behavior, social networks, and economic aspects like income and work ethic. An interview guide containing pertinent questions aligned with research objectives facilitated data collection, ensuring focused interviews and comprehensive answers. Observations were also carried out to gain a firsthand understanding of the situations in Summersari, Sumberwangi, and Tumpangrejo Hamlets, along with Donowarih and Ngenep Villages in Karangploso. These observations helped document village conditions, infrastructure, and the social life of farming communities, complementing the interview data for a better understanding of the research context.

Data analysis was conducted using an interactive model adapted from Miles and Huberman (2014). This approach was employed continuously and interactively to ensure the saturation of data results. The term "continuous" signifies that data analysis activities occurred from the initial data acquisition through to the current stage. The analysis involved three stages namely, (i) Data condensation, which involves the process of selecting, simplifying, abstracting, and transforming data obtained from various sources, such as written field notes, interview transcripts, documents, and other empirical materials, (ii) Data presentation, where involved organizing and aggregating the data in a manner that allowed for inference and action. Data presentation aided in understanding the phenomena under study and enabled deeper analysis or the formulation of actions based on the insights gained, and (iii) Conclusion, where the final and crucial analysis activity entailed drawing conclusions and verifying the findings. Throughout the data collection process, the qualitative analyst sought to uncover the meaning behind the data, noting regularities, potential patterns, causal relationships, and propositions.

Data validity: A triangulation method

This study employed a triangulation technique as a research method to ensure the validity and reliability of the data. The triangulation technique involved comparing and corroborating information from multiple sources to assess the credibility of the data (Moleong, 2012). Various sources of information were utilized in the triangulation method. The findings from interviews with key informants were carefully examined to ensure the accuracy and consistency of the data. By comparing information obtained from different sources, the credibility of the data was thoroughly evaluated. The trustworthiness of the data was further examined through triangulation with different data collection methods. The research findings were cross validated by comparing them with data obtained through interviews, observations, and documentation. This comprehensive approach, employing both source and method triangulation, aimed to strengthen the validity and credibility of the data.

Results and Discussion**Respondents' Demographic Profile**

Table 2 presents the demographic profile of the respondents. The variables for the profile include gender, age, marital status, and education level. Out of the 350 respondents, 78.86% are male, while 21.14% are female. This distribution may be attributed to the fact that males typically serve as the household heads and were more likely to participate in the data collection process. The age factor is expected to have significant implications in this study as different age groups tend to have diverse experiences and engage in various activities, ultimately influencing their socioeconomic status. The age factor is expected to have significant implications in this study as different age groups tend to have diverse experiences and engage in various activities, ultimately influencing their socioeconomic status. The data highlights that the highest proportion of respondents falls within the age range of 51-60, constituting 141 individuals, which accounts for 40.30% of the total. Following closely are those aged 41-50, with 91 respondents representing 26.00% of the sample. Additionally, the age group of 31-40 comprises 64 respondents, making up 18.3% of the total. Comparatively, individuals above the age of 60 account for a smaller percentage, with 36 respondents constituting a mere 0.3%. These findings shed light on the fact that within these three hamlets, individuals aged 51-60 form the backbone of their families and act as catalysts within the local community.

A majority of the respondents, comprising 323 individuals or 92.30%, were married. In contrast, a smaller proportion of respondents, totalling 15 individuals or 4.30%, reported being single. Divorced individuals represented a minority within the sample, with only 12 respondents accounting for 3.4% of the total. An intriguing observation emerges from the data regarding the marital relationships of the respondents. The majority of married individuals reported having spouses who hailed from the local area, either from the same village or nearby villages. The educational attainment reveals a significant gap in educational opportunities, particularly about higher levels of education such as secondary and tertiary education. The majority of the population has completed their education only up to the elementary school level, followed by junior high school, with a smaller percentage completing high school.

Table 2.*Demographic profile of the respondents*

Variables	Attribute/Value	Frequency (n)	Percentage (%)
Gender	Male	276	78.86
	Female	74	21.14
Age	21-30 yrs	18	5.10
	31-40yrs	64	18.30
	41-50 yrs	91	26.00
	51-60 yrs	141	40.30
	60 years and above	36	10.30
Marital status	Single	15	4.30
	Married	323	92.30
	Divorced	12	3.40
Education level	No formal education	223	63.70
	Primary school	109	31.15
	Secondary school	18	5.15
	College/University	0	0

A total of 223 individuals or 63.70% of the sample, reported having no formal education. This indicates a lack of access to educational opportunities in these hamlets. Furthermore, 109 individuals (31.15%) had primary education, indicating a relatively low level of educational attainment. Only a small number of respondents, specifically 10 individuals (12.6%), had attended secondary school. None of the respondents had higher education at the college or university. The lack of financial resources prevented many individuals from continuing their studies beyond the elementary or primary level.

Assessing The Impact Caused by The Transition of The Forest Management System on The Socioeconomic by Income.

Income plays a crucial role in assessing the socioeconomic conditions of households within the community. There is a substantial difference in the income they earned during the transition from the Perhutani forest management system to the UB Forest management in 2016. Initially, during the early stages of the transition, there was no significant difference in income for the UB Forest farmers. However, studies conducted in 2017 and 2018 revealed that some farmers reported a decrease in their income due to the discontinuation of pine tapping by UB Forest management, resulting in a loss of income that was previously available during the Perhutani management period. However, with the implementation of the UB Forest management master plan strategy, which involves knowledge sharing, collaboration, marketing strategies, exploration of new opportunities, and other factors, the farmers have experienced an increase in their income. As a result, the income of respondents from the three hamlets now ranges from IDR 500,000 to more than IDR 4,000,000 monthly under the UB Forest management. Table 3 provides a breakdown of the respondents' income from the

three hamlets under UB Forest management, while Table 4 displays the income during the Perhutani management period.

Table 3.

Respondent's income (UBF management system) from the three hamlets

Income (IDR)	Respondents from three hamlets	
	Number (Person)	Percentage (%)
100rb-1jt	7	2.0
1jt-2jt	103	29.4
2jt-3jt	198	56.6
3jt-4jt	36	10.3
> 4jt	6	1.7
Total	350	100.0

Table 4.

Respondent's income (PERHUTANI management system) from the three hamlets.

Income (IDR)	Respondents from three (3) Hamlets	
	Number (Person)	Percentage (%)
100rb-1jt	40	11.4
1jt-2jt	192	54.9
2jt-3jt	110	31.4
3jt-4jt	8	2.3
>4jt	0	0.0
Total	350	100.0

The income distribution among the respondents from the three hamlets under UB Forest management can be explained as follows: a majority of respondents, accounting for 56.6%, have an income between IDR 2,000,000 and IDR 3,000,000. The next largest group, comprising 29.4% of the respondents, falls within the income range of IDR 1,000,000 to IDR 2,000,000. Approximately 10% of the respondents report an income between IDR 3,000,000 and IDR 4,000,000. The lowest income category, ranging from IDR 100,000 to IDR 1,000,000, represents 2.0% of the respondents. Finally, the highest income bracket, exceeding IDR 4,000,000, accounts for 1.7% of the respondents.

These findings illustrate the distribution of income levels among the respondents, with the majority falling within the range of IDR 2,000,000 to IDR 3,000,000. During the Perhutani management period, 54.9%, earned a monthly income ranging from 1M to 2M. This indicates that a significant portion of the community members from the Summersari, Sumberwangi, and Tumpangrejo hamlets had relatively low incomes. The second most prevalent income category during the Perhutani period was between 2M to 3M, which accounted for 31.4% of the respondents. This suggests that a substantial number of individuals experienced a slightly higher income level within this range. On the other hand, a smaller proportion of respondents, representing 11.4%, earned less than 1M per month, indicating that some

community members struggled with very limited income during the Perhutani management period.

In terms of the highest income category, only eight respondents, corresponding to a mere 2.3%, reported earning between 3M to 4M monthly. This implies that achieving a relatively higher income was challenging for the majority of respondents from these three hamlets under the Perhutani management system. In contrast, the transition to UB Forest management brought about notable changes in the income distribution. The specific differences in monthly income before and after the transition are illustrated in Figure 3.

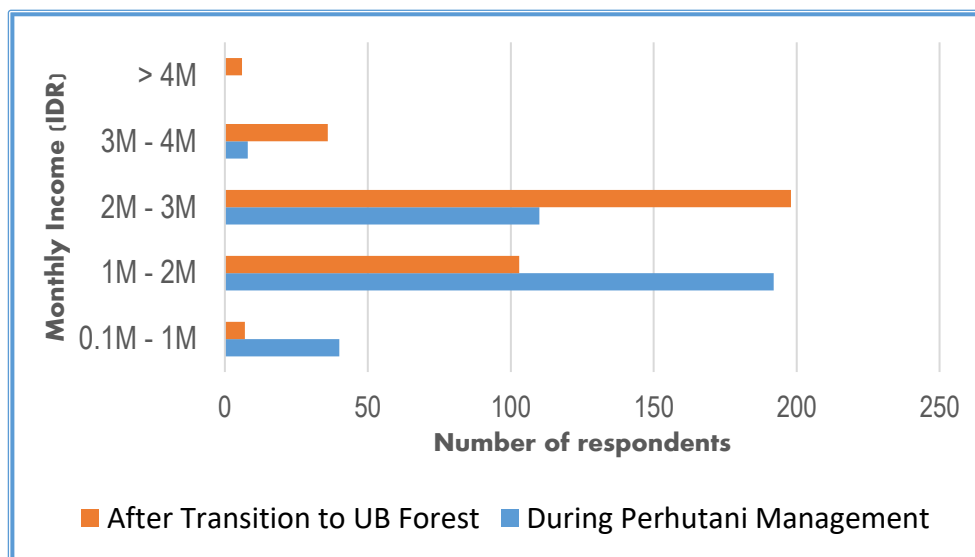
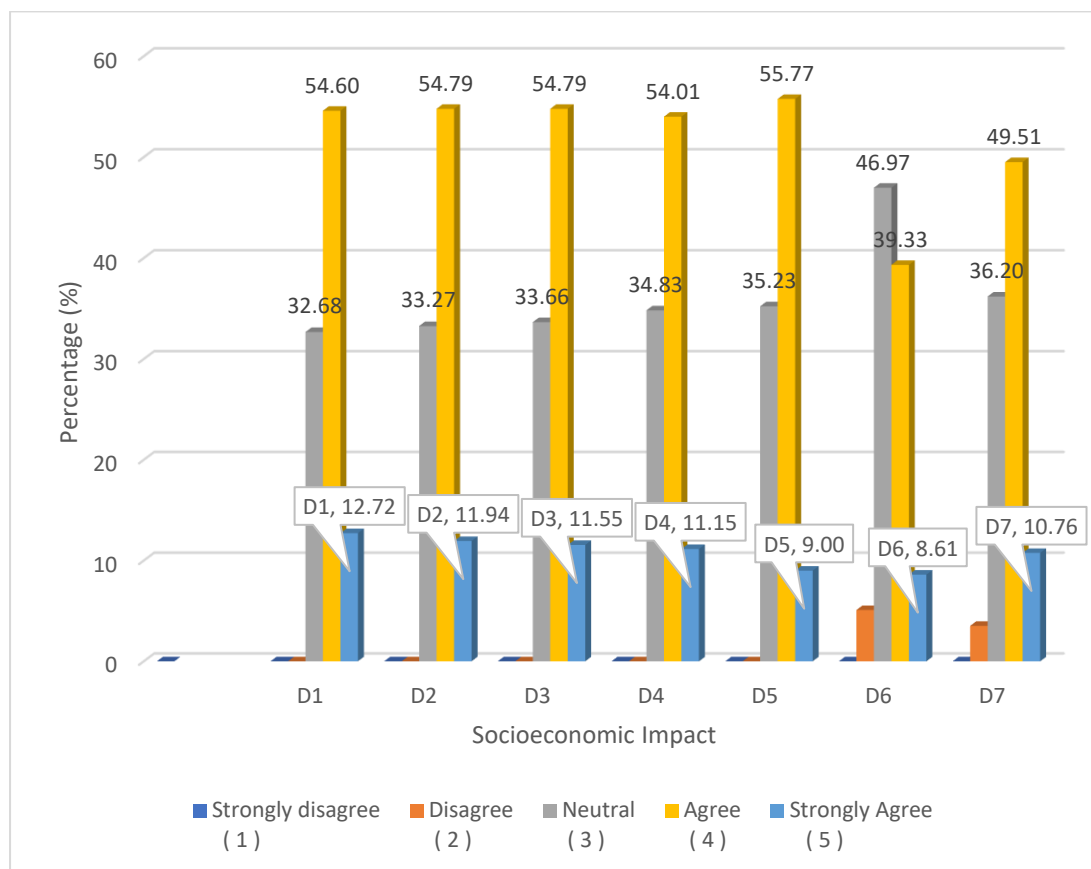


Figure 3. The difference between the monthly income gained by the respondents during Perhutani and after the transition to UB Forest.

Figure 4 depicts the notable percentage of respondents regarding the positive effects of transitioning the forest management from Perhutani to the University of Brawijaya (UB Forest) on their socioeconomic conditions. The data reveals that a significant portion of respondents were in agreement with the benefits brought about by this transition. Specifically, a considerable 54.6% of respondents agreed and 11.2% strongly agreed that the transition had a positive impact on the yield, sales, and prices of the main crop produce. Furthermore, 54.0% of respondents agreed and 11.1% agreed that the transition had a significant positive effect on the production and sales of other agricultural crops. In terms of job opportunities, 39.3% of respondents agreed and 8.6% strongly agreed that the management transition had led to an increase in job prospects within UB Forest. Additionally, 49.51% of respondents agreed and 10.8% strongly agreed that their total income had risen due to the transition. These highlight the consensus among the majority of respondents that the forest management transition from Perhutani to the University of Brawijaya has yielded positive impacts on the socioeconomic aspect.



No. Item	Economic change due to transition after five (5) years
D1	Increase the yield of main crops produced
D2	Increase the sales of main crops produced
D3	Increase the prices of other crops produce
D4	Increase the sales of other crops and produce
D5	Sales of agricultural products increase
D6	Job opportunity increases
D7	Total income increases

Figure 4. Respondents from the three hamlets’ feedback based on economic change (socioeconomic impact) due to the transition of UB Forest from PERHUTANI management after 5 years (2016-2021).

Evaluating The Perception of Community Dependence on *Tumpangsari* Agroforestry System at UB Forest.

Table 5 summarizes respondents' perception on their reliance on the tumpangsari agroforestry system at UB Forest. The data indicates that 70% of respondents acknowledged their dependence on this system, demonstrating a high level of community awareness. Moreover, a significant majority (88.86%) believed that the agroforestry system positively impacts their family income. Similarly, 84.57% stated that it is a crucial source of raw material for their daily needs.

However, when it came to the potential medicinal use of *tumpangsari* crops, 76% of respondents held a neutral stance. This suggests varying levels of awareness regarding the medicinal properties of these crops. On a positive note, 82.29% strongly agreed that UB Forest's management plays a supportive role in the agroforestry system, leading to increased family income. This indicates the community's confidence in the institution's practices.

The findings underscore the community's recognition of their dependence on the *tumpangsari* agroforestry system, particularly for income and sustenance. Additionally, there is a need for increased awareness about the medicinal potential of certain crops. The positive perception of UB Forest's management reflects the community's trust in the institution's support for their agroforestry practices and economic well-being.

Table 5.

Frequency and percentage of respondents' perception of community dependence on the tumpangsari agroforestry system at UB Forest.

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Frequency/ Percentage (%)				
I depend entirely on <i>tumpangsari</i> agroforestry crops.	0	0	0	69(19.71)	281(80.29)
Agroforestry crops can indeed generate my income.	0	0	0	72(20.57)	278(79.43)
Some of the <i>tumpangsari</i> crops cultivated are for medicinal use in addition to being used as food and sold to generate income.	0	0	266(76.0)	84(24.0)	0
<i>Tumpangsari</i> agroforestry yields at UB Forest help the family income.	0	0	0	39(11.14)	311(88.86)
I feel that UB Forest management help in <i>tumpangsari</i> agroforestry so it can increase family income.	0	0	0	62(17.71)	288(82.29)
Yields from <i>tumpangsari</i> agroforestry are significant as a source of raw material for own food and living expenses.	0	0	0	54(15.43)	296(84.57)

Triangulation Table Results from Quantitative and Qualitative Data.

The in-depth interview was conducted with key informants in the study area. A total of 15 selected key informants is as follows; Head of Tawangargo, Donowarih, and Ngenep Village (3), Head of Hamlets-Sumbersari, Sumberwangi, Tumpangrejo (3), Head of The Sumber Makmur Farmer Group block (2), Middleman / "*Tengkulak*" (Tawangargo, Donowarih (2), Perhutani State agency Officer (1), Karangploso District Agriculture Officer (1), Director of UB Forest Management (1) and lecturer of the Faculty of Agriculture, Postgraduate Program University of Brawijaya (2).

Table 6 shows a triangulation table that combines quantitative and qualitative methods to assess the impact of the transition of the forest management system to UB Forest

on socioeconomic aspects, specifically income, in terms of agroforestry. The answers from respondents during an interview regarding the impact of the transition of the forest management system to UB Forest on their income in terms of agroforestry are as follows:

Interviewer: How has the transition to UB Forest management impacted your income from agroforestry?

Respondent 1: Since the transition, I have experienced a significant improvement in my income from agroforestry activities. Previously, under the previous forest management system, we faced several restrictions and limited access to market opportunities. However, with the introduction of UB Forest management and their support in marketing our agroforestry products, my income has increased considerably.

Respondent 1a: I strongly agree that since the transition, there has been a significant improvement in my income from agroforestry activities. My income was higher when UB Forest took over the management compared to when we were under the previous forest management system which is PERHUTANI. UB Forest management really supports us in terms of knowledge and marketing our agroforestry products, thus our income has increased.

Interviewer: Can you provide an estimate of the income growth you have observed?

Respondent 2: Certainly! Before the transition, my average monthly income from agroforestry was around IDR 1,500,000. However, after the transition, my income has more than doubled, reaching an average of IDR 3,500,000 per month. This increase has been possible due to better market linkages, improved product quality, and increased demand for our agroforestry products.

Interviewer: Are there any specific factors or strategies that have contributed to this income improvement?

Respondent 3: Yes, there have been a few key factors. Firstly, UB Forest Management has provided us with training and technical support to enhance our agroforestry practices. This has resulted in higher yields and improved product quality. Secondly, they have facilitated collaborations with local businesses and introduced us to new markets, allowing us to fetch better prices for our products. Lastly, the sharing of knowledge and experiences among agroforestry farmers within the UB Forest community has been invaluable in identifying new income-generating opportunities and optimizing our production processes.

Table 6.

Triangulation table for quantitative and qualitative methods to assess the impact of the transition of the forest management system to UB forest.

No.	Research Objective Item	Questionnaire (Quantitative method)	Interview (Qualitative method)	Observation	Documentation	Interpretation
						Conclusion
1.	To examine factors contributing to the total area of cultivated land from <i>tumpangsari</i> agroforestry system at UB Forest (Factors for Economic Income)	<p>Survey campaign: Distribute questionnaires.</p> <p>In the UB forest, not all farmers have the same size of cultivated area. The regression's coefficient of determination (R^2) is 0.847. This is explained by the variation of independent variables, namely length of work, number of plant species, level of education, income, and number of family members, to changes in the value of the area of arable land in the UB Forest area by 84.7%.</p>	<p>In-Depth Interview:</p> <p>Majority of Key Informants agreed that length of work, number of plant species, level of education, income, and number of family members play significant roles in determining the size of the land cultivated by UB Forest farmers.</p>	<p>The sizes of cultivated or arable land among farmers vary, indicating an inequality in land distribution. This inequality in land size is connected to socioeconomic factors within the community. These factors include the duration of work in the forest, the variety of plant species cultivated, the level of education, income, and the number of family members.</p>	<ol style="list-style-type: none"> Permit that has been issued by Perhutani since 1970's show that, farmers can request to increase their cultivated land. Documentation from UB Forest said that farmers can continue their work in UB Forest with their existing cultivated land (No changes from UBF) 	<p>The agreement between the questionnaire and in-depth interviews in this context is that both methods provide evidence that certain factors play a significant role in determining the size of the land cultivated by UB Forest farmers. Specifically, the statement suggests that the length of work, number of plant species, level of education, income, and number of family members are identified as influential factors.</p> <p>The questionnaire method, being a quantitative approach, would have collected numerical data from a larger sample of UB Forest farmers. Through statistical analysis, the researchers would have identified correlations or relationships between the variables mentioned (length of work, number of plant species, level of education, income, and number of family members) and the size of land cultivated.</p> <p>On the other hand, the in-depth interviews, being a qualitative method, would have provided detailed insights and perspectives from the UB Forest farmers themselves.</p>

						<p>The interviews would have explored the farmers' experiences and perceptions related to the factors influencing the size of land cultivated. These interviews likely supported and complemented the quantitative findings by offering a deeper understanding of the farmers' motivations, decision-making processes, and the specific ways in which the identified factors influence their choices.</p> <p>Therefore, the agreement between the questionnaire and in-depth interviews lies in their collective findings, indicating that the mentioned factors (length of work, number of plant species, level of education, income, and number of family members) have been shown to play a significant role in determining the size of the land cultivated by UB Forest farmers. The combination of quantitative and qualitative methods enhances the comprehensiveness and validity of the research findings.</p>
2.	To assess the impact caused by the transition of <i>tumpangsari</i> forest management system on socioeconomic in terms of income. (Impact of the Management Strategy Implementation)	<p>Survey campaign: Distribute questionnaires.</p> <p>During Perhutani management, most of the respondents earned between 1M – 2M, which is 192 respondents (54.9%), followed by 110 respondents with an income between 2M – 3M (31.4%). On the other hand, forty</p>	<p>In-Depth Interview:</p> <p>From the in-depth interviews, a significant consensus was reached among the majority of key informants. They agreed that following the transition to the new management system, there was a noticeable improvement in farmers' income. This observation suggests that the changes</p>	<p>Observation – infrastructure are improved (access road, drainage system, mosque, primary school).</p> <p>Most Farmers have their own vehicle (motorcycle, car, van)</p> <p>Most house have complete furniture, tv, etc.</p>	<p>- Article & Thesis that shows the improvement and positive impact caused by the transition forest management system on socioeconomic in terms of income.</p>	<p>The transition from Perhutani to UB forest management has had a notable impact on the income of farmers. Both qualitative and quantitative methods used in the study confirm the presence of a significant difference in farmers' income before and after the transition in 2016. Initially, during the early stage of the transition, there were no noticeable changes in income for UB Forest</p>

		<p>respondents earned less than 1M monthly (11.4%), then only eight respondents earned the highest income monthly from these three hamlets, which is between 3M – 4M (2.3%). Therefore, the average income from Perhutani management for the three hamlets, Sumbersari, Sumberwangi and Tumpangrejo, was low.</p> <p>After the transition, most respondents have an income between IDR 2M – 3 M (56.6%), followed by respondents with an income between 1M – 2M (29.4%). The third one is the respondents with an income between 3M – 4M (10%). At the same time, the lowest income gain is between 100 thousand – 1M, which is (2.0%). The highest income represents 1.7%, where the income is more than 4M.</p>	<p>implemented in the management strategy had a positive impact on the economic well-being of the farmers. The agreement among the key informants indicates a consistent pattern and strengthens the credibility of the statement. It implies that the transition to the new system brought about tangible benefits in terms of financial gains for the farmers involved. The increased income can potentially be attributed to various factors associated with the new management approach, such as improved agricultural practices, better market access, enhanced productivity, or the introduction of additional income-generating activities. This finding aligns with the objective of the transition, which was likely aimed at improving the socioeconomic conditions of the farmers in the UB forest area. The increase in income not only provides economic stability but also has the potential to positively impact other aspects of their lives, such as access to education, healthcare, and a higher standard of living.</p>	<p>Most farmers can afford good clothes, shoes, etc.</p> <p>From UB – i) Coffee center (collect, process & packaging coffee product) (ii) Public toilet (iii) Home stay (iv) Eco-tourism infra – bicycle & motorcycle track, 4 by 4 track.</p>	<p>farmers. However, as the implementation of the UB Forest management Master plan strategy progressed, their income began to increase. This increase in income can be attributed to various factors such as knowledge sharing, collaboration, marketing strategies, exploration of new opportunities, and other related factors. The implementation of the UB Forest management strategy has resulted in a range of monthly incomes for farmers in the three hamlets, varying from IDR 500,000 to over IDR 4,000,000. This substantial increase in income highlights the positive impact of the transition on the economic well-being of the farmers. It signifies that the new management approach has provided them with improved opportunities and financial stability. Furthermore, the majority (90.3%) of farmers in the three hamlets strongly agreed that the transition from Perhutani to UB forest management has significantly influenced their socioeconomic aspects. These aspects include not only their total economic income but also their social interaction and infrastructure. This agreement among the farmers further validates the substantial impact of the management transition on various dimensions of their lives, indicating a comprehensive</p>
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						<p>improvement in their overall well-being.</p> <p>It is worth noting that these findings portray the early stages of the transition, suggesting that there may still be further room for growth and development in terms of farmers' income. Continued implementation of the UB Forest management strategy, coupled with ongoing support and collaboration, has the potential to foster even more significant improvements in the future.</p>
3	<p>To evaluate the perception of the community on <i>tumpangsari</i> agroforestry system at UB Forest (refer to social, economic & infrastructure aspects)</p>	<p>Survey campaign: Distribute questionnaires.</p> <p>The evaluation of the community's perception of their dependence on the <i>tumpangsari</i> agroforestry system in UB Forest focused on gathering the questionnaire survey from respondents who were directly involved in farming activities within the forest. They were asked to share their views on statements related to their reliance on the agroforestry system.</p> <p>Table 4.6 displays the frequency and percentage of respondents' perceptions concerning their dependence on the <i>tumpangsari</i> agroforestry system in UB Forest. The</p>	<p>In-Depth Interview:</p> <p>Majority of respondents strongly agreed that the management of UB Forest plays a supportive role in the <i>tumpangsari</i> agroforestry system, ultimately contributing to increased family income. This highlights key informant perception that the forest management practices implemented by UB Forest have a positive impact on community agricultural activities and overall economic well-being.</p> <p>The interview underscores the community's acknowledgement of their dependence on the <i>tumpangsari</i> agroforestry system at UB Forest, particularly in terms of income generation and fulfilling their food and living needs.</p>	<p>- Participants of farmers for University of Brawijaya and others universities program such as KKN and 'Dr. Mengabdi'.</p> <p>-</p>	<p>-</p>	<p>Based on the combination of quantitative and qualitative methods used, the farmers' perception of their dependency on the <i>tumpangsari</i> agroforestry system at UB Forest can be summarized as follows.</p> <p>First, a significant proportion of farmers demonstrate awareness of their reliance on the UB Forest <i>tumpangsari</i> agroforestry system. This indicates a good understanding among farmers regarding the importance of this agricultural practice. Furthermore, majority of key informant agree that the <i>tumpangsari</i> agroforestry yields at UB Forest contribute significantly to their family income. This highlights the positive impact of agroforestry yields on farmers' financial well-being, indicating that the system plays a</p>

		<p>results revealed that an overall 70% of the respondents acknowledged their reliance on the agroforestry system. This indicates a high level of awareness within the community regarding the importance of this specific agricultural practice. Additionally, a substantial majority of 88.86% of the respondents strongly agreed that the tumpangsari agroforestry system at UB Forest significantly contributes to their family income. This finding underscores the positive impact of agroforestry yields on their financial well-being. Similarly, 84.57% of the respondents strongly agreed that the yield obtained from the tumpangsari agroforestry system serves as a vital source of raw material for their food and daily expenses. This highlights the crucial role of the agroforestry system in meeting their fundamental needs.</p>			<p>crucial role in income generation.</p> <p>Likewise, a significant majority (84.57%) of farmers strongly agree that the tumpangsari agroforestry yields serve as a vital source of raw materials for their own food and living expenses. This emphasizes the significance of the agroforestry system in meeting their basic needs, showcasing its multifunctionality and importance in providing sustenance.</p> <p>Moreover, both respondents and key informant strongly agree that they feel supported by UB Forest management in their tumpangsari agroforestry practices, ultimately leading to an increase in family income. This positive perception highlights the confidence farmers have in the institution's management practices and their belief that it positively impacts their agricultural activities and economic well-being.</p> <p>The findings indicate a generally positive perception of the current tumpangsari agroforestry system in UB Forest. Farmers recognize their reliance on the system for income generation and meeting their food and living needs.</p>
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Source: Primary Data Processed (2022)

Interviewer: Have you faced any challenges or obstacles in generating income from agroforestry post-transition?

Respondent 4: While the overall impact has been positive, there have been a few challenges. One major challenge is the fluctuating market prices for agroforestry products, which can affect our income from time to time. Additionally, access to financial resources for expanding and investing in our agroforestry activities remains a concern. Nevertheless, with the support and guidance from UB Forest management, we are working on strategies to overcome these challenges and sustain our income growth in the long run.

The answers from respondents during an interview regarding the impact of the transition of the forest management system to UB Forest on their income in terms of agroforestry are as follows:

Interviewer: How has the transition to UB Forest management impacted your income from agroforestry?

Respondent 1: Since the transition, I have experienced a significant improvement in my income from agroforestry activities. Previously, under the previous forest management system, we faced several restrictions and limited access to market opportunities. However, with the introduction of UB Forest management and their support in marketing our agroforestry products, my income has increased considerably.

Interviewer: Can you provide an estimate of the income growth you have observed?

Respondent 2: Certainly! Before the transition, my average monthly income from agroforestry was around IDR 1,500,000. However, after the transition, my income has more than doubled, reaching an average of IDR 3,500,000 per month. This increase has been possible due to better market linkages, improved product quality, and increased demand for our agroforestry products.

Interviewer: Are there any specific factors or strategies that have contributed to this income improvement?

Respondent 3: Yes, there have been a few key factors. Firstly, UB Forest Management has provided us with training and technical support to enhance our agroforestry practices. This has resulted in higher yields and improved product quality. Secondly, they have facilitated collaborations with local businesses and introduced us to new markets, allowing us to fetch better prices for our products. Lastly, the sharing of knowledge and experiences among agroforestry farmers within the UB Forest community has been invaluable in identifying new income-generating opportunities and optimizing our production processes.

Interviewer: Have you faced any challenges or obstacles in generating income from agroforestry post-transition?

Respondent 4: While the overall impact has been positive, there have been a few challenges. One major challenge is the fluctuating market prices for agroforestry products, which can affect our income from time to time. Additionally, access to financial resources for expanding and investing in our agroforestry activities remains a concern. Nevertheless, with the support and guidance from UB Forest management, we are working on strategies to overcome these challenges and sustain our income growth in the long run.

Discussion From a Qualitative Approach: Reviewed Forms of Cooperation Between Coffee Farmers and Perhutani in Summersari, Sumberwangi, and Tumpangrejo Hamlets Before the Transition.

Since the 1970s, the government agency Perhutani has collaborated with the local community in forest management. Perhutani has established a strong relationship with the village community through the Forest Village Community Institution (LMDH). The primary focus of these collaborative efforts has been the management of the forest. Mr. KN, a staff member of Perhutani who worked closely with the communities of Summersari, Sumberwangi, and Tumpangrejo before the transition, provided the following explanation:

"The village community entered into an LMDH contract with ADM Malang, who serves as the stakeholder for the forest area. Through this contract, cooperative efforts were initiated. The community actively participates in various work activities, assisting Perhutani in activities such as tapping. Perhutani provides the necessary infrastructure, while the community contributes labour, and the products are subsequently purchased by Perhutani."

Mr. KN's statement elucidates that the local community is organized through an institution known as the Forest Village Community Institution (LMDH). This association represents the communities residing in the vicinity of the forest area. Through the LMDH, they established a contractual agreement with Perhutani. The LMDH serves as a platform that enables the community to collaborate with Perhutani, engaging in a variety of work activities aimed at supporting forest management. Additionally, it allows the community residing near the forest to utilize the forest area for their livelihoods.

The cooperative agreement between the community and Perhutani is formalized through the LMDH and Perhutani cooperation agreement. The terms and responsibilities of both parties are outlined in this agreement. According to the Perhutani documentation, Perhutani is designated as the FIRST PARTY, while the LMDH is identified as the SECOND PARTY. The respective rights and obligations of both parties are delineated in Article 6 of the agreement. This section defines the specific responsibilities and authorities of each party involved. The cooperative relationship between Perhutani and the local community, facilitated through the LMDH, demonstrates a shared commitment to forest management. The agreement between the parties outlines their respective roles and obligations, ensuring a collaborative approach to sustainably utilizing and managing the forest resources.

Reviewed Forms of Collaboration Between Coffee Farmers and UB Forest

As of December 31, 2015, the transition of forest management from Perhutani to Universitas Brawijaya (UB) was officially completed. This transition was finalized through the issuance of the Ministerial Decree, which established Forest Areas with Special Purposes (FASP) in the Protection and Production Forest Areas located in Karangploso District, Malang Regency, East Java Province. The management of FASP UB Forest, which serves as an education and training forest, has had a clear impact on the communities residing in Summersari, Sumberwangi, and Tumpangrejo hamlets, who previously utilized the forest. The change in ownership rights and the transfer of forest management from Perhutani to UB Forest has brought about differences in policies and regulations. These differences have been determined and agreed upon through discussions with key informants interviewed in Summersari, Sumberwangi, and Tumpangrejo hamlets. The transition has resulted in changes in the patterns of cooperation, the implementation of new policies, and the introduction of new regulations by UB Forest.

The specifics of these changes in cooperation, policies, and regulations implemented by UB Forest are described as follows.

a. Student Visit Intensity

The forest village community has clearly experienced a notable difference in their interactions with UB Forest compared to the previous management by Perhutani. One prominent difference is the increased intensity of student visits to UB Forest. Mr. SB's statement reinforces this observation:

"Since it has been managed by UB, many students have started to come, sir. They visit UB Forest to conduct research, engage in community service (KKN), or carry out agricultural practicum. We also always communicate with them to gain new knowledge about our cultivated crops."

Mr. SB's statement serves as evidence that the management of UB Forest differs from that of Perhutani, particularly in terms of student visits. Furthermore, the forest community actively participates in activities alongside the visiting students. Mr. SB further explains:

"If there are students who have permission to do KKN, I'm sure I will find a place for them to live, and the residents will also accompany the activities that they do there, sir. Like it or not, we are involved."

This statement highlights the community's direct involvement in the activities carried out by students visiting UB Forest. They provide support and assistance to the students, offering accommodations and accompanying them during their activities. The increased intensity of student visits and the active involvement of the community demonstrate the unique nature of UB Forest's management. The difference in the management of FASP UB Forest becomes evident through the disparity in student visits and the level of community engagement in these activities. UB Forest, being an education and training forest, strives to serve as an innovative learning environment for educational institutions and actively involves the surrounding community. It aims to foster practical applications, research opportunities, and coaching for all educational stakeholders, while also benefiting the local community

b. Pine Sap Tapping Activities

In contrast to the policy implemented by Perhutani, which mandated the community to carry out pine resin tapping activities and required regular deposits every two weeks, UB Forest has decided to discontinue the practice of tapping pine resin. This decision was made to ensure the safety of students conducting activities under the pine tree stands. Mr. SB provides an explanation regarding the cessation of pine resin tapping by the new manager, UB Forest:

"Until now, working on the land is still the same as when we were with Perhutani. The difference is that with UB, there is no pine tapping, and the focus is more on coffee cultivation. The reason for not allowing tapping is to avoid endangering students who enter the forest."

Prof. GN also reinforces the statement about the discontinuation of pine resin tapping by UB Forest, highlighting that the current regulations no longer require the community to engage in tapping activities. Instead, the focus has shifted to coffee cultivation:

"Yes, in the past, the community was instructed to tap as per Perhutani's requirement, but not anymore. We are now more focused on coffee cultivation."

The UB Forest Development report, which outlines the progress made in the management of UB Forest over five years, has been submitted to the Head of Perum Perhutani East Java Regional Division. This report serves as a means for Perhutani to supervise and provide guidance to the new managers. The report details the formation of farmer groups, which act as a bridge between Universitas Brawijaya and the farmers, utilizing the

untapped pine potential. The policies and practices of UB Forest differ from those of Perhutani. The discontinuation of pine resin tapping activities prioritizes the safety of students while focusing on coffee cultivation as a key agricultural activity. The UB Forest Development report highlights the establishment of farmer groups to foster collaboration between the university and local farmers, capitalizing on the untapped potential of pine resources.

c. Coffee Cultivation

The change in ownership rights of forest management from Perhutani to UB Forest has resulted in differences in policies and regulations, as agreed upon with informants residing in Sumberwangi Hamlet. A notable policy change introduced by UB Forest is the emphasis on coffee cultivation, particularly in the harvest of red-picked coffee. Prior to collaborating with UB, farmers in the area were not primarily focused on coffee cultivation but instead engaged in targeted pine-tapping activities. However, UB Forest has shifted its focus to prioritize coffee cultivation and has ceased sap-tapping activities. Mr. SB explains the shift towards coffee cultivation:

"Currently, we are more focused on coffee cultivation, ma'am. So, the farmers here are also aligning their focus with coffee cultivation. In the past, most of them planted vegetables, you know, sir."

Prof. GN supports this statement, emphasizing UB's focus on coffee cultivation:

"UB will concentrate on coffee cultivation because coffee from UB Forest can serve as an example of a final product derived from forests, rather than raw materials. By prioritizing coffee production, it will bring economic benefits to the surrounding community and foster closer collaboration between students, researchers, and the forest."

Furthermore, the emphasis on coffee cultivation is particularly directed towards red-picked coffee. Red-picked coffee is associated with high-quality coffee, as the best quality is derived from red coffee beans. Mr. SB explains the significance of red-picked coffee:

"The coffee sent to UB is exclusively red picks, sir. It's only red bean coffee. It's different if you sell it to middlemen, as they can mix it with green bean coffee, but the price is indeed higher if you sell it to UB, which selects the red picks. So, it's more profitable."

Prof. GN reinforces this notion, highlighting the superiority of red coffee beans in terms of quality and quantity:

"Compared to green coffee beans, red coffee beans possess superior quality. In fact, it is not only about quality but also quantity. Red coffee beans weigh more than green coffee beans. Thus, this benefits farmers significantly in terms of both quality and quantity."

The implementation of the red picks policy by UB Forest is anticipated to generate economic benefits for farmers, enhancing their livelihoods in Sumberwangi Hamlet, Donowarih Village. To facilitate the coffee management process, UB Forest inaugurated the UB Forest Coffee Center in Sumberwangi Hamlet, Donowarih Village in 2017.

The coffee processing is facilitated by the UB Forest coffee centre located within the forest area and aims to provide benefits to the surrounding community while fostering closer connections between students, researchers, and the forest. Prof. GN highlights the significance of the UB Forest coffee centre:

"The UB Forest coffee centre is expected to cultivate motivation among students and researchers to create creative and innovative finished products. Periodically, evaluations will be conducted to assess innovations and coffee yields. Additionally, we assist farmers in marketing their end products."

At the UB Forest coffee centre, coffee deposited by farmers is dried, stored, and processed into finished products. The establishment of this centre within the forest serves as a platform for students to develop existing coffee products and explore unprecedented innovations. It is not only students who benefit from the coffee centre but also researchers who are encouraged to innovate and introduce new coffee varieties that can be embraced by people across Indonesia.

The presence of the UB Forest coffee centre contributes to the development and enhancement of the coffee industry. It serves as a hub for creativity, innovation, and collaboration, creating opportunities for students and researchers to explore the full potential of coffee products. Furthermore, the centre plays a vital role in supporting farmers by assisting them in marketing their coffee products and expanding their reach to a broader consumer base.

d. Coffee Profit Sharing

In addition to the red picks, UB Forest has implemented new regulations, one of which is a profit-sharing system known as the 70:30 scheme. Under this scheme, farmers who own arable land and cultivate coffee in the UB Forest area are required to deposit 30% of their coffee harvest to UB Forest. The deposited coffee will then be processed into coffee powder at the coffee production warehouse located in Dusun Sumberwangi (Figure 4.4). The 30% share given to UB Forest will be further divided, with 10% allocated for operational purposes, including wages for the plot leaders responsible for collecting coffee from farmers in each plot. The processed coffee powder will be sold and marketed to gain recognition among a broader community.

Prior to depositing their coffee yields to UB Forest, farmers store their harvest in the provided coffee storage room. The natural coffee processing carried out in the forest, utilizing its specific atmosphere and humidity, is an attractive feature and advantage of UB Forest coffee. The hope is that the resulting coffee powder, processed in this unique environment, will gain recognition among a wider community.

However, the change in land ownership from Perhutani to UB Forest has also sparked some negative sentiments regarding new policies perceived as disadvantageous to farmers. Mr. SR explains:

"Initially, when UB took over the forest management, many residents were sceptical and afraid, sir. There was a fear of being suddenly evicted or the implementation of policies that could lead to financial losses, such as the mandatory depositing of targeted crop yields to UB."

Initially, the farmers in Sumberwangi Hamlet harboured uncertainties regarding the policies to be implemented by UB. Nonetheless, they still place their trust in UB as the new forest manager, believing that various parties, especially lecturers and intelligent students, will be available to assist and support the farmers. DM expresses this sentiment:

"Yes, even though Perhutani is no longer in charge, it's alright, sir. I am confident that UB can manage the forest effectively. Moreover, UB is a reputable university with numerous educators and bright students who can provide assistance to farmers like us, sir."

Despite the initial apprehension, farmers have come to see the potential benefits of UB Forest's management, particularly in terms of academic support and expertise available from the university community. This positive perception of UB's capabilities and willingness to help farmers instils confidence in the farmers regarding the future management of the forest.

Social Changes of UB Forest Farmers

The transfer of land ownership from Perhutani to Brawijaya University (UB) in Donowarih Village led to the formation of a partnership between farmers and UB Forest. This partnership revolves around their collaboration in coffee cultivation. As a result of this collaboration, farmers in UB Forest have undergone significant social transformations in various aspects of their lives. These transformations include changes in knowledge and behaviour, social connections, income, and work ethic. A change in land ownership brings about changes in the cooperative dynamics between UB and farmers. The knowledge and behaviour of coffee farmers have transformed, driven by increased community interactions, attentiveness, and improved communication among farmers. Prior to collaborating with UB Forest, farmers had limited interaction and participation in agricultural meetings or farmer group activities, as they were deemed unprofitable or insignificant. As expressed by Mr. SW:

"Before the formation of farmer groups, people rarely gathered for agricultural meetings. They believed there was no profit in it, sir. So, it was quite challenging."

However, since working with UB Forest, most farmers have reported improved interactions and increased engagement in local activities such as deliberation meetings and community services organized by their local community. Several informants have also highlighted their positive relationships with neighbours, indicating a vibrant village atmosphere, especially during evening hours. Mr. JN shares:

"Yes. It's never quiet here until midnight. Even at night, there's a lot of hustle and bustle. Many residents gather and engage in conversations. Farmer group meetings, especially, can extend past 9 or 10 o'clock, starting after the evening prayer."

One contributing factor to the relatively high level of interaction among UB Forest farmers in Sumberwangi Hamlet is the need for information exchange regarding market prices and the selling prices of crops they cultivate, such as Cayenne Pepper, Beans, and Mustard. Mr. KN explains:

"Well, of course, we need to stay updated. Even if it's not daily, we often inquire about vegetable prices in the market. We sell to the same middleman and visit the same market, so we frequently discuss it."

Statements from Mr. JN and Mr. KN confirm that interaction among UB Forest farmers is thriving due to activities that necessitate gathering and sharing the latest market information. Similarly, the activities of coffee farmers require interdependence among individuals. At the interpersonal level, there appears to be a harmonious complementarity of roles among individuals.

Participation in local farmer groups further aids farmers in expanding their social networks and establishing relationships. Farmers who actively engage in these groups acknowledge meeting new people and acquiring fresh knowledge about coffee cultivation. The existence of farmer groups fosters harmonious relationships and solidarity among farmers, which serve as vital driving forces for carrying out activities professionally. Mr. SB explains:

"Since I joined the farmer group and extension workers frequently visit, I've had the opportunity to meet new people. When UB instructors come and provide coffee-related explanations, I gain new knowledge."

Mr. SB's statement demonstrates that farmers cultivate new relationships and gain innovative insights by participating in activities organized by farmer groups, such as deliberation meetings and counselling sessions frequently held by UB Forest.

Table 10 shows 60% participation of engagement in farmer group activities, while 40% reported a high level of participation. The activities in question were attendance at meetings or deliberations held twice a month and participation in UB-organized activities, such as counselling sessions. Informants expressed their frequent attendance at meetings and events organized by UB, as they believed these gatherings increased their knowledge about coffee, provided the latest information, and facilitated the exchange of ideas among farmers. Mr. SB elaborates:

"Villagers who are part of the farmer group always attend the regular meetings held twice a month. When there is an extension worker, I inform them, and they willingly participate."

Mr. SB's statement indicates a relatively high level of involvement among Donowarih villagers, especially those who are part of farmer groups, as they regularly attend meetings and engage in agricultural counselling sessions. Changes in knowledge and behaviour are also evident in coffee cultivation. Since collaborating with UB Forest, farmers have focused on depositing red coffee beans, commonly known as red picks, to UB. Consequently, they have implemented post-harvest management practices to separate the red beans from the green beans, ensuring that they are not mixed. This post-harvest management has been in place since the partnership with UB Forest. Mr. SB explains:

"In the past, when we were with Perhutani, we didn't pay much attention to coffee; our main focus was tapping pine. But now, with UB, we no longer tap pine but instead focus on coffee. UB prioritizes red bean coffee. It has been a year since the introduction of the Red Pick system. So, what farmers deposit now is only red coffee beans."

Mr. SB's explanation under UB Forest's guidance, farmers focus on sorting red coffee beans from green ones, as UB Forest values red beans at IDR 7,800/kg compared to green or mixed beans at IDR 6,000/kg. This motivates farmers to meticulously sort their harvest for higher value. The Red Pick system for post-harvest management has enabled farmers to expertly differentiate between red and green beans, ensuring accurate depositing and increased value. Farmers, with varying levels of experience, have become proficient in all aspects of coffee cultivation, from planting to post-harvest management. Some newer farmers, who began their coffee cultivation journey with UB, are yet to undergo the harvest and post-harvest phases.:

"In the past, before UB Forest, I didn't grow coffee. It was only recently that I started planting coffee. So, I've never made a deposit to UB either. But as for the cultivation process itself, it's quite similar. We prepare the planting hole to a depth of approximately 50-60 cm and space the plants at 2-2.5 meters apart. Once everything is ready, we plant the coffee seeds in the hole and cover them with soil. For fertilization, we typically use manure or NPK fertilizer, applying it once a year. Pesticides are usually used at the beginning of the planting process. After that, we leave the rest to nature. Coffee is usually harvested when it reaches the age of 3-4 years. When I was still with Perhutani, during the harvest, we would immediately gather all the coffee, regardless of its colour. We would sell it directly to middlemen using the slash system. However, now we sort the coffee beans and only harvest the red ones because they fetch a better price. We wait for the green beans to turn red before harvesting them."

From Mr. WN's statement, it is evident that most farmers already had sufficient knowledge of coffee cultivation even before collaborating with UB Forest. Additionally, new farmers in the area have also acquired general knowledge about coffee farming, as agriculture is an essential aspect of life in Donowarih, Sumberwangi Hamlet, where most of the land is used for farming. As time has progressed, people's views and attitudes towards education

have also changed. Despite having an elementary-level education, UB Forest farmers are concerned about their children's future. In contrast to their experiences with Perhutani, where they were often discouraged from attending school to assist with farming duties, they now prioritize providing their children with a higher quality of education. They ensure their children have the necessary books, stationery, and school uniforms to support their education. They believe that sending their children to higher levels of education will help them secure better livelihoods in the future.

"In the past, access to school was still difficult, sir. In fact, parents still forbid them because there is no one to help take care of the land in the forest. In the past, the teacher rarely came, so I just studied for a day or two and the teacher didn't come back. If it's good now, sir, there's a vehicle. So even though the school is still far away it can still be delivered. Yes, if our children go to high school so that they can have a good life later".

The high perception of farmers is influenced by changes in the views of the farmers of Sumberwangi Hamlet on the importance of education. In addition, the easier road access to urban areas encourages farmers' perceptions that children's education is important. Awareness of the importance of health is also felt by residents of Donowarih Village, Sumberwangi Hamlet. This is because apart from the distance to the hospital or health centre, it will disrupt the work that is done every day such as cultivating plants, looking for grass for animal feed and looking for tree branches for cooking fuel. Explanation of Mr. KN:

"Obviously it's important. The hospital problem is also far from here. If there are families who are sick and it will be difficult for them to not be able to go to the land because you must take care of the sick at home too, right?"

According to several informants, health counselling was also often carried out and all residents attended the counselling so that they could receive treatment or have their health checked. According to them, it is better to prevent disease before it's too late because it will cost money and access to the health centre is far away. SS explanation:

"Yes, it's important sir, it's a pity if the child is sick and if you want to go to the doctor, that's a long way to go. There are often health counselling sessions, so I always participate. Just like yesterday, there was counselling and free vaccines, my child and I also participated".

Based on this information, it can be concluded that the community in Sumberwangi Hamlet values family health, and there has been a shift in the cultural values of local farmers. This change is evident in their improved knowledge and behaviour, increased social interaction, active participation in farmer groups, and better post-harvest management. The farmers now emphasize the importance of education and health, driven by the belief that self-improvement is essential for development. This transformation has changed their previously apathetic attitude towards life into a more progressive one. UB Forest farmers attending group meetings and agricultural counselling has played a significant role in this positive shift. The introduction of innovations in agriculture, particularly in coffee cultivation and post-harvest processing like red picking, has been instrumental in fostering change within the Sumberwangi Hamlet community.

Changes In the Social Network of UB Forest Coffee Farmers

The social network of farmers plays a crucial role in their farming activities, and UB Forest farmers in Donowarih Village are no exception. They have established relationships with various individuals and groups in their vicinity, including Perhutani (land owners), the market (for sourcing agricultural needs), farmer groups (for information exchange), and middlemen (as buyers of their produce). However, farmers in Donowarih Village often

encounter challenges in their agricultural endeavours, such as acquiring cultivation information, accessing quality seeds, and facing difficulties in marketing their agricultural products. To fulfil their production requirements, such as fertilizers, UB Forest farmers rely on multiple sources that they believe can meet their needs, including agricultural kiosks in Karangploso and farmer groups. Generally, farmers in Sumberwangi Hamlet seek solutions that can simplify their farming processes. However, limited capital poses a constraint, leading farmers to explore alternatives that align with their financial capabilities. When it comes to selling their coffee crops, farmers typically opt to sell directly to middlemen through the slashing method. This preference arises from a desire to avoid complexities, as selling to middlemen outside Donowarih Village in Indonesia may prove more challenging.

After collaborating with UB Forest, the social network of farmers undergoes changes compared to the pre-collaboration period. UB Forest farmers experience greater convenience in coffee cultivation. The collaborative partnership between UB Forest and farmers led to a transformation in the social network that existed prior to this collaboration. Previously, when farmers were engaged in pine tapping and lacked focus on coffee cultivation, their social network did not have a significant impact on their farming outcomes. Farmers had limited access to comprehensive and adequate information regarding cultivation practices and marketing strategies for coffee crops. However, after partnering with UB Forest, farmers gain access to valuable information about coffee cultivation, including clear standards and pricing details, making it easier for them to market their produce.

Farmers rely on UB Forest for guidance in cultivation practices and as a market for their coffee yields, while UB Forest relies on farmers to supply the necessary raw materials for their production. UB Forest also collaborates with farmers in terms of product innovation and marketing. The changes in the social network before and after the collaboration indicate that UB Forest and farmers have established a new social network characterized by a mutually beneficial partnership. While they continue to maintain existing relationships, the bond with Perhutani has weakened compared to before. Mr. WN explains:

"When it comes to selling coffee, we used to go directly to the middlemen using the slashing system, without sorting the red and green coffee beans. But now, UB requires us to sort the beans and focus on red picks. As for seeds and fertilizer, we still buy them at the nearby Karangploso market since it's convenient and we're already familiar with it."

Previously, farmers would sell their crops to middlemen using the slashing system, but after collaborating with UB Forest, they now sell their coffee harvest directly to UB Forest. They also sort the coffee beans to separate the red and green ones, as the red beans fetch a higher price. In terms of production needs like fertilizer, farmers tend to prefer buying directly from the Karangploso agricultural kiosk. Figure 5 shows the differences between the social networks before and after working with UB Forest:

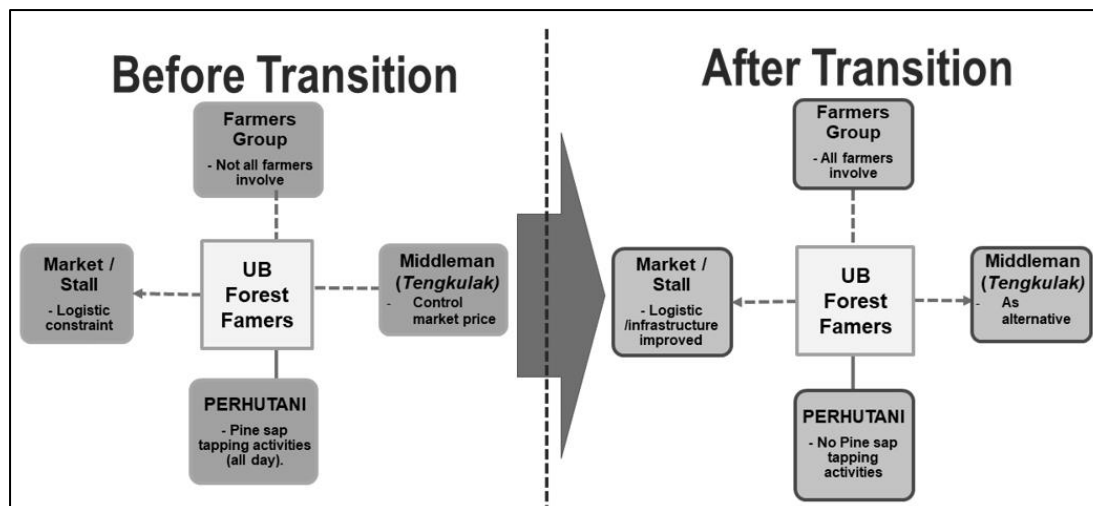


Figure 5. Differences in social networks before and after collaboration.

The changes in the social network of UB Forest farmers are reflected in the intensity of interactions between farmers and various elements of the social network. Prior to cooperating with UB Forest, the highest intensity of interaction was between farmers and Perhutani, followed by interactions with the market, middlemen, and farmer groups. However, after collaborating with UB Forest, the intensity of interactions has shifted. The direct interaction between farmers and UB Forest has become the highest, followed by interactions with the market, middlemen, and farmer groups. The change in cooperation did not result in the loss of the social network of farmers. Instead, it led to a change in the intensity of farmers' interactions with the existing social networks. This is because farmers now have a strong relationship with UB Forest, and the interaction between farmers and UB Forest continues to be sustained. The collaboration with UB Forest has influenced the intensity of interactions in the social network of farmers, with UB Forest becoming a central element in their network. The relationships with other network elements are still maintained but have shifted in terms of intensity.

Changes in Income of UB Forest Coffee Farmers

The change in forest ownership, transferring from Perhutani to Brawijaya University (UB), has brought significant impacts on the farmers in UB Forest. Previously, the farmers were engaged in tapping pine resin, but now their focus has shifted to coffee cultivation. Instead of tapping resin, they now cultivate their land solely for coffee production. Additionally, the farmers are required to deposit their coffee yields to UB Forest, with a profit-sharing system in place. Under this system, farmers receive 70% of the profits, while UB receives 30%.

The farmers' income before collaborating with UB Forest was relatively low. Approximately 80% of the respondents reported earning less than IDR 1,000,000 during that period. This can be attributed to the obligation of tapping pine resin, which had a monthly target to meet. The explanation from Mr. SD further clarifies this situation:

"My income still doesn't reach one million, sir. The issue is that we used to tap pine every month with a target of 30 kg. If we couldn't meet the target, we had to find resin from other sources, sometimes even purchasing it. It sometimes resulted in losses when we couldn't achieve the target because we had to pay for the shortfall."

Based on Mr. SD's explanation, it can be inferred that farmers who couldn't meet the resin tapping target had to resort to buying resin from other parties to fulfil the requirement. This practice often led to financial losses for the farmers.

After five years of transitioning, key informants representing UB Forest farmers, such as the head of hamlets and village communities, agreed that the farmers' income had improved significantly. Farmers who previously earned less than IDR 1,000,000 were able to increase their income to the range of IDR 1,000,000 to IDR 2,000,000. This positive change can be attributed to the absence of pine resin tapping obligations. Additionally, UB Forest farmers engaged in side jobs such as agricultural labour and trading to supplement their income. Over five years, farmers have adapted to coffee cultivation with the guidance and knowledge shared by students, lecturers, and researchers from the University of Brawijaya and other universities, resulting in income growth. Mr. SN expressed his perspective:

"In my opinion, it's better not to tap because when there's tapping, there's also a tax and tapping target. Now, without tapping, I can focus more on cultivating coffee and other crops. Alhamdulillah, the knowledge shared by students and lecturers who conduct fieldwork here has helped me increase my income to over 1 million."

Furthermore, Mr. TG clarified:

"In addition to farming in UB's forest, I sometimes work as a farm labourer to earn extra money. I earn around IDR 50,000 per half-day as a man and IDR 35,000 as a woman. The work is not guaranteed, so I only get paid when there's work available."

From these statements, it can be concluded that the elimination of pine resin tapping obligations by UB Forest has had a positive impact. Farmers no longer face taxes or targets related to tapping, allowing them to focus on other activities, such as working as farm labourers, to supplement their income.

Changes in the Work Ethics of UB Forest Coffee Farmers

UB Forest farmers also experience changes in their work habits due to shifts in land ownership. Previously, their daily routine involved working on the land and collecting pine resin through tapping. However, UB Forest's decision to discontinue pine resin tapping has altered the farmers' routines. Typically, the farmers would start working at 7 a.m. and head to the cultivated land. Afterwards, they would return home for a rest before continuing their afternoon task of searching for grass. One farmer, Mr. JN, described his routine as follows:

"I usually head to the land around 7 a.m. It's not too far, so walking there is feasible. I work on the land until around 2 p.m., then I go home for lunch and take a short break. Later, around 3 or 4 p.m., I return to the forest to gather grass or collect fallen wood for firewood. The grass is used to feed my cattle. It's different when you're still tapping, as you need to be attentive to prevent the sap container from overflowing and wasting it."

According to the key informant, the changes in activities, such as eating and sleeping patterns, did not disrupt the daily routines of UBF farmers. This can be attributed to the variety of tasks they engage in and the timing allocated for each activity. While Table 7 shows that according to the key informants' the motivation of UB Forest farmers can be classified as high in 87% of cases and medium in 13% of cases. These informants noted that farmers' high motivation is evident through their enthusiasm and dedication to working on their own land without postponing tasks. A key informant, identified as Mr SS, provided the following statement:

"Based on my observations, sir, I can see that many farmers are happy. They actively participate in counselling sessions and gatherings organized by UB Forest. Whenever there is

new information, a large number of farmers attend. Increasing our knowledge about agriculture is directly linked to increasing our income."

The statement implies that farmers frequently engage in activities facilitated by UB, such as counselling and knowledge-sharing sessions on coffee cultivation. These interactions between UB Forest and farmers serve as motivation for the farmers to diligently carry out their work and provide for their families without delay. Enthusiasm is considered crucial during work to achieve optimal results and meet expectations. Changes in land ownership have influenced a shift in work ethic, aiming to attain a stable income, which serves as a significant motivation for rural farmers.

Table 7.

Summary of Potential Impact Results and Directions of Social Change that Occurs After Farmers Collaborate with UB Forest.

Social transformation	Before Collaborating with UB Forest	After collaborating with UB Forest
Knowledge and Behaviour	a. There have not been many deliberation activities because there are no active farmer groups	a. Active in deliberation activities because there are farmer groups
	b. Perceives that interaction with other farmers is not profitable	b. Considers that interaction with other farmers is important for exchanging information about agriculture
	c. Do not carry out red picking and post-harvest activities on coffee	c. Do red picking and post-harvest coffee so that the selling value is higher
	d. Do not have awareness of the importance of education	d. Already have an awareness of the importance of education
	e. Do not have awareness of the importance of health	e. Already have awareness about the importance of health
Social network	a. Information on cultivation, seeds, and marketing of crops is not yet effective	a. Information regarding cultivation, seeds, and selling prices already has a clear standard
	b. Not tied to Perhutani	b. Bound with UB Forest because farmers need UB to market their crops and UB needs farmers to add raw materials to be processed into ground coffee
	c. Selling coffee harvests to middlemen with the Slash system	c. Selling coffee harvest directly to UB Forest
Income	a. 80% of the income obtained by informants is still below IDR 1,000,000	a. 60% of the income earned by informants is under IDR 1,000,000

	b. Sources of income are obtained from land cultivation and tapping of pine resin.	b. Sources of income are obtained from land cultivation, especially coffee, farm labour
	c. There is a target in tapping pine resin	c. There is no target in coffee cultivation
Work ethic	a. Farmers spend all day on the land for cultivation and overseeing the tapping of pine resin	a. Farmers go to the fields at 7 o'clock and return at noon to rest and return to the fields at 3 o'clock in the afternoon
	b. Not always participating in agricultural socialization activities	b. Always participate in agricultural socialization activities

Practical Implication

Agroforestry, as an integrated land management approach, holds great promise in addressing the challenges of poverty, resource utilization, and sustainable development in rural areas. The study shed light on the importance of systematic land use management, participatory processes, poverty alleviation, the *tumpangsari* agroforestry system, collaboration and guidance, and awareness in realizing the full potential of agroforestry for socioeconomic improvement.

- i. *Systematic Land Use Management*: One crucial practical implication of agroforestry is the adoption of a systematic approach to land use management. By assessing land potential and considering various factors such as available resources and community needs, agroforestry systems can be strategically developed and sustained. This ensures optimal land utilization, leading to improved economic and social conditions for rural communities.
- ii. *Participatory Processes*: The success of agroforestry initiatives relies on involving stakeholders in decision-making processes. By engaging local communities, farmers, government agencies, and other relevant parties, the design and implementation of agroforestry systems can align with community needs and aspirations. Participatory processes foster greater acceptance, ownership, and long-term sustainability of agroforestry practices.
- iii. *Addressing Poverty*: Agroforestry holds significant potential in reducing poverty, particularly in remote rural areas. By providing alternative income sources and improving livelihoods, agroforestry systems can uplift communities facing economic hardships. The study highlights that the transition to a university-led management approach had positive socioeconomic impacts, including increased economic income, improved social interaction, and enhanced infrastructure. Agroforestry plays a vital role in addressing the issue of poverty in these communities.
- iv. *Importance of Tumpangsari Agroforestry System*: The *tumpangsari* agroforestry system emerges as a crucial element in improving the living standards of communities around the forest. It serves as a valuable source of family income and provides raw materials for food and living expenses. Encouraging the cultivation of various crops within the *tumpangsari* system further enhances its benefits. This integrated approach allows for a sustainable and diversified agricultural system, fostering resilience and long-term prosperity.

- v. *Collaboration and Guidance*: Successful implementation of agroforestry requires collaboration between forest management entities, farmers, and local communities. Providing proper guidance and support to the community in utilizing arable land for diverse crop cultivation optimizes the benefits of agroforestry. This collaboration ensures the long-term sustainability of agroforestry systems, enhances productivity, and strengthens community engagement and participation.
- vi. *Awareness and Diversified Livelihood Strategies*: Raising national-level awareness about the benefits of agroforestry on livelihoods is essential. By promoting the adoption of agroforestry practices, rural communities can reduce poverty and achieve sustainable development. Additionally, exploring and adopting diversified livelihood strategies alongside agroforestry enhances community resilience and well-being. This holistic approach allows for a range of income-generating activities, further contributing to the socioeconomic development of rural areas.

Agroforestry has great potential for improving socioeconomic conditions when integrated with organized land use management, participatory processes, and targeted poverty alleviation initiatives. The *tumpangsari* agroforestry system, along with collaborative efforts and proper guidance, can drive sustainable development in rural communities. It is crucial to raise awareness about the benefits of agroforestry and promote a variety of livelihood strategies to fully tap into its potential. By taking these practical steps, stakeholders can promote inclusive growth, alleviate rural poverty, and enhance the overall well-being of communities through agroforestry. The *tumpangsari* agroforestry system in Summersari, Sumberwangi, and Tumpangrejo hamlets yielded positive outcomes, such as generating employment, increasing incomes, enhancing welfare, and improving food security for local communities.

Conclusion

The transition from Perhutani to UB Forest management significantly impacted farmers' income. Initially, there was no difference, but with the implementation of UB Forest management strategies, including knowledge sharing and marketing efforts, farmers' income saw a notable increase. The study also revealed that farmers recognized their dependency on the UB Forest agroforestry system. Furthermore, 88.86% believed that the agroforestry yields significantly contributed to their family income, and 84.57% saw it as a vital source of raw materials. However, 76% were neutral about whether some crops had medicinal value in addition to being used for consumption and income generation. Additionally, 82.29% strongly felt that UB Forest management supported *tumpangsari* agroforestry, leading to increased family income. The study carries managerial, theoretical, and empirical implications. It underscores the importance of systematic land use management and community involvement in agroforestry. Equitable distribution of benefits is crucial in poverty alleviation efforts. The study advances the theoretical understanding of agroforestry systems, demonstrating their potential socio-economic benefits. It highlights how collaborative approaches and targeted poverty reduction efforts can enhance the viability and sustainability of such practices. Empirically, the study provides concrete evidence of socio-economic improvement through *tumpangsari* agroforestry in Indonesia. It suggests that this success could serve as a model for other ASEAN countries, offering lessons for inclusive growth, rural poverty reduction, and overall community well-being.

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