Dynamics of gender in agroforestry management and its impact on household income: a case study in Bendosari, Pujon, Malang, Indonesia

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HIGHLIGHTS

- Women's participation in agroforestry practices in Bendosari Village tends to be low in sectors considered to be the domain of men.
- Agroforestry has significant potential to provide benefits to women, especially through non-commercial sectors such as fruit and vegetable collection.
- The contribution of agroforestry to farmers' household income is related to several variables such as agroforestry type, sale price, fertiliser use and production costs.
- Men contribute more to agroforestry management based on labour time allocation, while women are more involved in decision-making related to crop types, post-production activities and family financial management.
- Decision-making in family finance is carried out by women individually, while decisions related to agroforestry are made jointly by husbands and wives.

SUMMARY

This study analyses the participation of women and men and the impact of agroforestry on farmers' income in Bendosari Village, Indonesia. The role of women was studied specifically in agroforestry management through an in-depth interview method that was applied to 97 agroforestry farmers. Women's participation tends to be low in enterprises that are considered as men's domain but the results showed that agroforestry has significant potential to benefit women. The contribution of agroforestry shows that variable x (type of agroforestry, selling price of marketed products, amount of fertilizer, and production cost expenditure) has a correlation to variable y (household income). Based on the allocation of labour time, men contribute more than women. Decision-making in determining the types of crops other than staple crops, post-production activities and financial management is done jointly by husbands and wives, while decision-making in family finances is decided by wives alone.

Keywords: agroforestry, gender, contribution, participation, farmers

Dynamique des sexes dans la gestion de l'agroforesterie et ses impacts sur les revenus des ménages: une étude-cas à Bendosari, Pujon, Malang, en Indonésie

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Cette étude analyse la participation des femmes et des hommes et l'impact de l'agroforesterie sur les revenus des exploitants dans le village de Bendosari, en Indonésie. Le rôle des femmes a été étudié spécifiquement dans la gestion de l'agroforesterie, à l'aide d'une méthode d'interviews poussées appliquée à 97 fermiers en agroforesterie. La participation des femmes a tendance à être faible au sein des entreprise, qui sont considérées comme le domaine de l'homme; mais les résultats ont néanmoins montré que l'agroforesterie porte des bénéfices potentiels importants pour les femmes. La contribution de l'agroforesterie montre que la variable x (type d'agroforesterie, prix de vente des produits commercialisés, quantité de fertilisants, et dépenses associées aux coûts de production) est corrélée à la variable y (revenus des ménages). En se basant sur l'octroi de temps de travail, les hommes contribuent davantage que les femmes. Les prises de décisions dans la détermination des types de récolte autres que les récoltes habituelles, les activités post-production et la gestion financière sont opérées de concert par maris et femmes, alors que les prises de décisions dans le domaine des finances familiales sont prises, quant à elles, uniquement par les femmes.

Dinámica de género en la gestión agroforestal y su impacto en los ingresos familiares: un estudio de caso en Bendosari de Pujon, en la regencia de Malang en Indonesia

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Este estudio analiza la participación de mujeres y hombres y el impacto de la agroforestería en los ingresos de los agricultores de la aldea de Bendosari en Indonesia. El papel de la mujer se estudió específicamente en el ámbito de la gestión agroforestal mediante entrevistas en profundidad aplicadas a 97 agricultores agroforestales. La participación de las mujeres tiende a ser baja en empresas que se consideran del dominio masculino, pero los resultados mostraron que la agroforestería tiene un potencial considerable para beneficiar a las mujeres. La contribución de la agroforestería muestra que la variable x (tipo de agroforestería, precio de venta de los productos comercializados, cantidad de abono y gastos de los costos de producción) tiene una correlación con la variable y (ingresos familiares). Respecto a la distribución del tiempo dedicado al trabajo, los hombres contribuyen más que las mujeres. La toma de decisiones para determinar los tipos de cultivos diferentes de los cultivos básicos, las actividades posteriores a la producción y la gestión financiera la realizan conjuntamente los maridos y las esposas, mientras que la toma de decisiones sobre las finanzas familiares la deciden únicamente las esposas.

INTRODUCTION

Agroforestry is a land management system that integrates agricultural or food crops with tree or forest crops in a single area (Nair *et al*. 2021, Pantera *et al*. 2021), and is an approach that is widely recognized as an effective solution to global environmental and socio-economic challenges (Paudel *et al*. 2022, Plieninger *et al*. 2020. Rolo *et al*. 2020). Besides its ecological advantages, such as soil and water conservation, agroforestry holds the potential to enhance the overall well-being of communities, including women (Benjamin *et al*. 2021, Castle *et al*. 2021, Gonçalves *et al*. 2021, Rolo *et al*. 2020). Within the realm of agroforestry, women play a pivotal role in land and natural resource management (Myers and Hansen 2020) They are actively engaged in agricultural activities, crop maintenance and forest management (Octavia *et al*. 2022). The involvement of women in agroforestry not only impacts the economic aspect but also contributes significantly to ecosystem sustainability and the overall sustainability of communities. Agroforestry provides direct benefits to women, including improved access to resources (Bocci and Mishra 2021, Leone 2019), income increase (Nöldeke *et al*. 2021, Pandit *et al*. 2019) and enhanced participation and decision-making in land management (Rola-Rubzen *et al*. 2020). Through agroforestry practices, women can derive additional economic advantages by harvesting agricultural crops and forest products, and they also have opportunities to participate in decision-making processes related to agroforestry management. However, it's essential to recognize that women often face barriers in accessing resources and technical knowledge, limiting their participation in agroforestry activities (Catacutan and Naz 2015, Nguyen *et al*. 2021).

In agroforestry development, understanding the gender dimension, including the roles, contributions, and challenges faced by women, is crucial. Gender-sensitive agroforestry development involves efforts to bridge gender gaps, enhance women's resource access and knowledge and promote their active involvement in decision-making regarding agroforestry (Duffy *et al*. 2021, Simelton *et al*. 2021). Achieving this necessitates implementing policies and programs supporting women's empowerment, ensuring equitable training and education and establishing participatory mechanisms actively engaging women in agroforestry management. By addressing gender dimensions and conducting in-depth gender analysis, agroforestry development can become more inclusive, gender-equitable and sustainable.

This research aims to analyze women's participation in agroforestry practices, comparing it with men's participation and identifying the challenges and successes they face. Additionally, the study examines the correlation between agroforestry's contribution and the increase in farmers' income. Furthermore, this research explores the role of gender in agroforestry management, particularly concerning labor time and decision-making. This approach provides profound insights into women's contribution to agroforestry and the factors influencing their roles in overall agroforestry management.

AGROFORESTRY: A GENDER PERSPECTIVE IN INDONESIA

In Indonesia, as elsewhere, gender plays an important role in various aspects of life, including in agroforestry development (Octavia *et al*. 2022). Women in Indonesia actively participate in farmland management, crop maintenance and natural resource management (Chrisendo *et al*. 2020). However, they also face barriers such as limited access to resources and technical knowledge, leading to gaps in participation in agroforestry-related decision-making. Viewing agroforestry through a gender lens allows us to understand the diverse roles, contributions and challenges faced by women in these practices (Rozaki *et al*. 2021, Villamor *et al*. 2015). In this context, gender becomes a vital factor that must be considered to achieve sustainability and equality in agroforestry management. Women's participation in agroforestry encompasses agricultural activities, crop maintenance and forest management, impacting not only the economic aspects but also the sustainability of ecosystems and communities at large. From a gender perspective, addressing equality and equity in agroforestry practices is imperative. This involves improving women's access to resources, providing equitable education and training, and reinforcing their active participation and

roles in agroforestry decision-making processes (Colfer *et al*. 2015, Herawati *et al*. 2019).

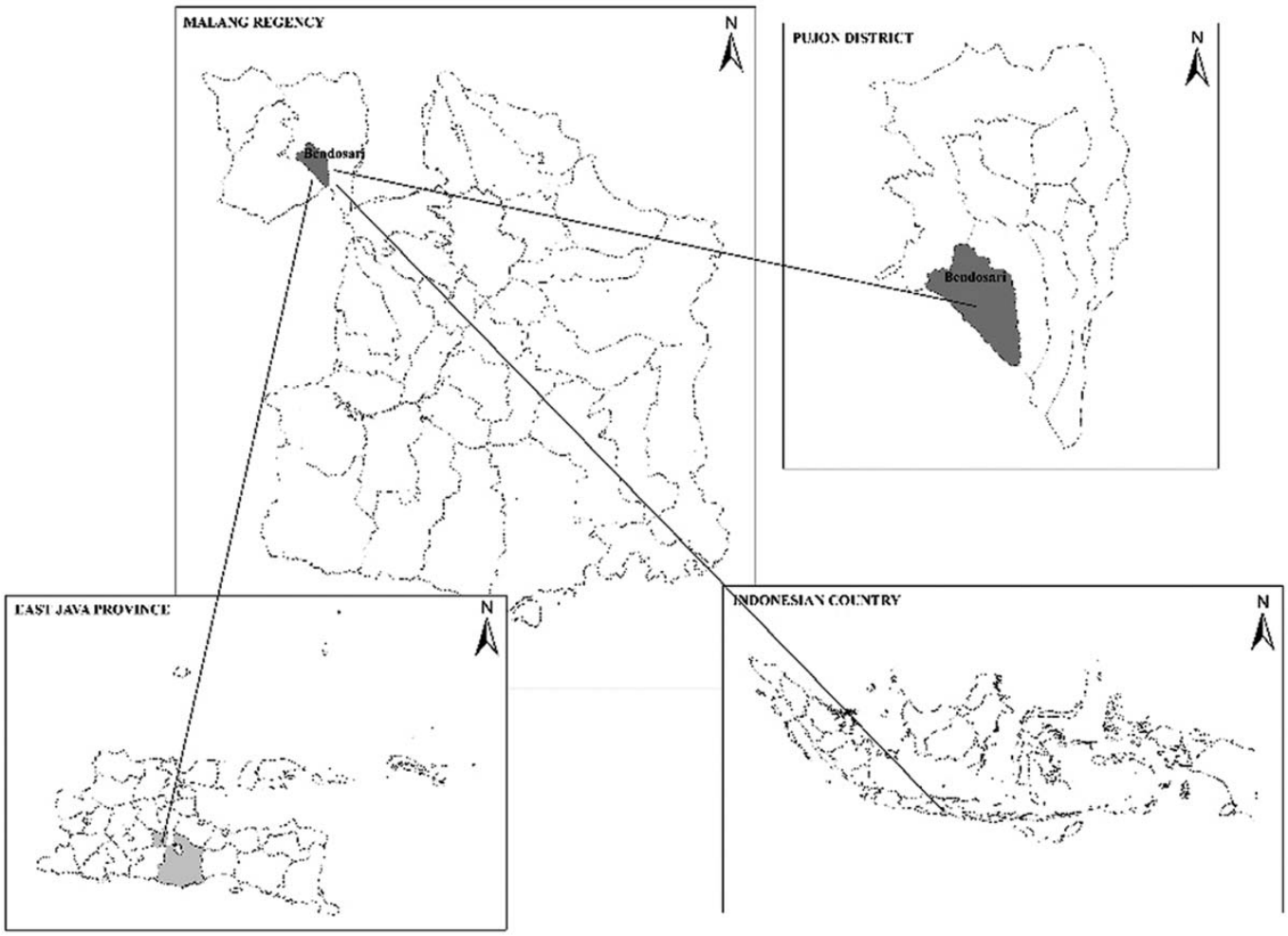
In the realm of agroforestry development, it is crucial to establish an environment where women can actively engage and contribute, leveraging their energy, enthusiasm, practical skills and valuable knowledge (Benjamin *et al*. 2021, Kusters 2023). Emphasizing the tangible roles they play, including their labor, expertise in land and natural resource management, and inspiring enthusiasm, can significantly enhance agroforestry initiatives. Women not only fulfill specific roles but also provide essential labor and local knowledge that can significantly augment the efficiency, productivity and sustainability of agroforestry practices (Gonçalves *et al*. 2021, Manginsela *et al*. 2021). Moreover, involving women actively in agroforestry not only bridges the gender equality gap but also fortifies agroforestry practices holistically. This approach is not merely about overcoming barriers that women might face but recognizing and strengthening the potentials that women bring to sustainable natural resource management.

By highlighting the substantial contributions of women in terms of their energy, enthusiasm, practical skills, and knowledge, agroforestry becomes not only a means to address equity concerns but also a method to boost the overall efficacy of land and natural resource management. Concrete steps have been taken to empower women in agroforestry, including initiatives aimed at enhancing their access to resources through tailored training programs. Additionally, increasing the involvement of women in decision-making processes related to agroforestry is a primary focus. Ensuring that women have access to education, information and technical knowledge is vital to enhance their capabilities in managing agroforestry effectively. Furthermore, attention to protecting women's rights, preventing discrimination and violence, and promoting gender equality within agroforestry practices is paramount. By fostering an inclusive and supportive environment, agroforestry can emerge as a sustainable solution for land and natural resource management. Simultaneously, it amplifies the vital role of women in overall sustainable development efforts.

OVERVIEW OF RESEARCH LOCATION

Bendosari village is located in Pujon sub-district (Figure 1), situated on the slopes of Mount Kawi in Malang district of Java. The area has an altitude of around 1200 meters above sea level and the air in the village is cold with a temperature of around 20°C. The majority of land in Bendosari Village is

FIGURE 1 *Research location*



used for agriculture and plantations on a small scale, as most of the population works in the agricultural sector. Bendosari Village is an integral part of the regional system of Pujon Sub-district. Geographically, the village is located in a mountainous region and most of it is upland.

In Bendosari Village, the lifestyle and outlook of the community focus heavily on livestock and agriculture. Most of the community are forest farmers who manage forest land by growing agricultural crops under forest stands (Figure 2). This forest land is owned by Perum Perhutani, a state-owned forestry company, and the community has been granted the right to manage it under a community-based forest management scheme known locally as *pesanggem* (Figure 2).

Agroforestry practices are important in Bendosari Village, as they allow locals to utilize forest land sustainably and involves a combination of trees, agricultural crops and livestock in one integrated system. Forest farmers in Bendosari Village usually plant agricultural crops such as vegetables, tubers, and fruits under the canopy of existing forest trees. These trees provide shade for agricultural crops, protect them from direct sunlight and help retain soil moisture. In addition, the trees also provide other benefits such as the provision of firewood, carbon sequestration, and soil protection from erosion. Agroforestry in Bendosari Village also involves animal husbandry practices, particularly cattle and chicken farming. This farming is combined with forest land management, where cows and chickens can forage for grass and insects in the surrounding forest. This integrated approach provides the dual benefits of efficient land use and reduced pressure on natural resources. Unlike conventional farming practices that might require clearing additional land for grazing or fodder, agroforestry utilizes the existing forest canopy, minimizing the need for further deforestation and preserving the natural habitat. Through the implementation of agroforestry practices, Bendosari Village has optimized forest land use and maintained biodiversity.

This sustainable approach has become a vital source of livelihood for villagers, strengthening food security and bolstering the local economy. Agroforestry, as a system, not only supports existing livelihoods but also enhances them by diversifying income sources and ensuring a continuous supply of food. In Bendosari Village, women actively engage in planting, maintaining, and harvesting crops, as well as managing livestock and processing agricultural products beneath the forest canopy. While women are involved in decision-making processes, ensuring their continued active participation and equal access to resources is crucial. This sustained involvement guarantees that their valuable insights and expertise are consistently incorporated into agroforestry initiatives, thereby enhancing the overall effectiveness and sustainability of the practices employed.

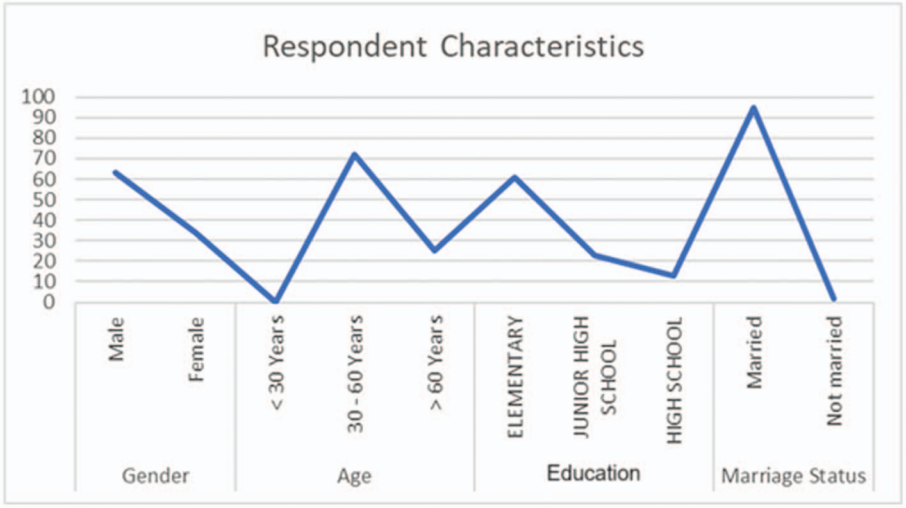
METHOD

This research on gender dynamics in agroforestry-based social forestry forest management uses mixed methods, which combine two research methods (Marutha and Dikotla 2022). Quantitative research was undertaken to analyze the contribution of agroforestry to income followed by qualitative research designed to analyzed gender roles in agroforestry management based on work time and gender-based decision-making. Interviews were conducted with 97 forest farmers who were purposively selected based on their agroforestry land management model. The respondents included both men and women, and interviews were conducted separately for each gender. This approach was taken to ensure a comprehensive understanding of gender dynamics within agroforestry practices. The interviews were conducted by a team of researchers, comprising both male and female interviewers, to minimize bias and provide a balanced perspective on gender roles and decision-making in agroforestry management. Interviews were conducted to find out the characteristics of farmers including identity data, socio-economic status, decision making, and gender activities (details of respondent characteristics can be seen in Figure 3) in Bendosari Village, Pujon Sub-district, Malang District, East Java Province, Indonesia.

Gender roles in agroforestry management based on work time were analysed. The work time of women and men in productive and reproductive activities was measured using the unit of Working Person Days (HOK, for *hari orang kerja*), where 1 HOK is equivalent to 8 hours of work.

FIGURE 2 *Combination of coffee and carrot commodities under pine stands at Bendosari*

FIGURE 3 *Respondent Characteristics*



$$\text{Person-days (HOK)} = \frac{\text{working time}}{1\text{HOK}}$$

Furthermore, gender-based decision-making in agroforestry management was analyzed. The decision-making process can occur in the pattern of decision-making by wives alone, husbands alone, or jointly and equally. The decisions were related to production activities, post-production activities, finance, and social activities. Finally, the contribution of agroforestry to total farm household income was analyzed using the Spearman Rank correlation test.

$$r_s = 1 - \frac{6\sum d^2}{n(n^2-1)}.$$

Description:

r_s = Spearman correlation value
d^2 = Difference of rank pairs
n = Number of rank pairs
6 = constant number

This test was used to examine the relationship between various variables such as agroforestry type, land area, selling price, agroforestry yield, and other factors with agroforestry net income. In this analysis, the rank correlation coefficient (rs) was calculated using a predetermined formula.

RESULTS

Gender roles in agroforestry management based on work time

The roles of women and men in agroforestry management can be analyzed through their dedicated work hours. In this study, work time specifically refers to hours committed to agroforestry-related activities, excluding productive and reproductive tasks. Productive work involves income-generating activities, while reproductive work includes household and caregiving responsibilities. Focusing solely on agroforestry work time provides detailed insights into the distinct contributions of women and men in agroforestry management practices. Figure 4 and Figure 5 illustrate the exclusive hours allocated to agroforestry activities for each respondent.

The work time between men and women in agroforestry is presented, where male respondents play a role of 75.3% and female respondents play a role of 24.7%. This means that men play a greater role in agroforestry land management than women, indicating the dominance of the role of men compared to women in agroforestry land management, possibly explained by the fact that agroforestry management activities require extra energy from men.

HOUSEHOLD DECISION MAKING BASED ON GENDER ROLES

Family decision-making in agroforestry management production activities

Family decision-making in agroforestry management production activities is presented in Figure 6.

Decision-making in agroforestry management production activities is divided into several categories. In determining the type of plants other than staple crops, 68% of the total respondents indicated that husbands and wives share the decision. In investment in farming equipment, 84.3% of husbands and wives were involved in the decision-making process. In crop maintenance activities, 67.7% of husbands and wives shared the decision-making responsibilities. Similarly, in decision-making for fertilization activities, 70.1% of husbands and wives were jointly involved in the decision-making process. These results indicate that in agroforestry management production activities, husbands and wives participated in decision-making, although the decisions might not always be equal or fair.

Decision-making in post-production activities of agroforestry management

Decision-making in post-production activities of agroforestry management is presented in Figure 7.

FIGURE 4 *Working day hour (HOK)*

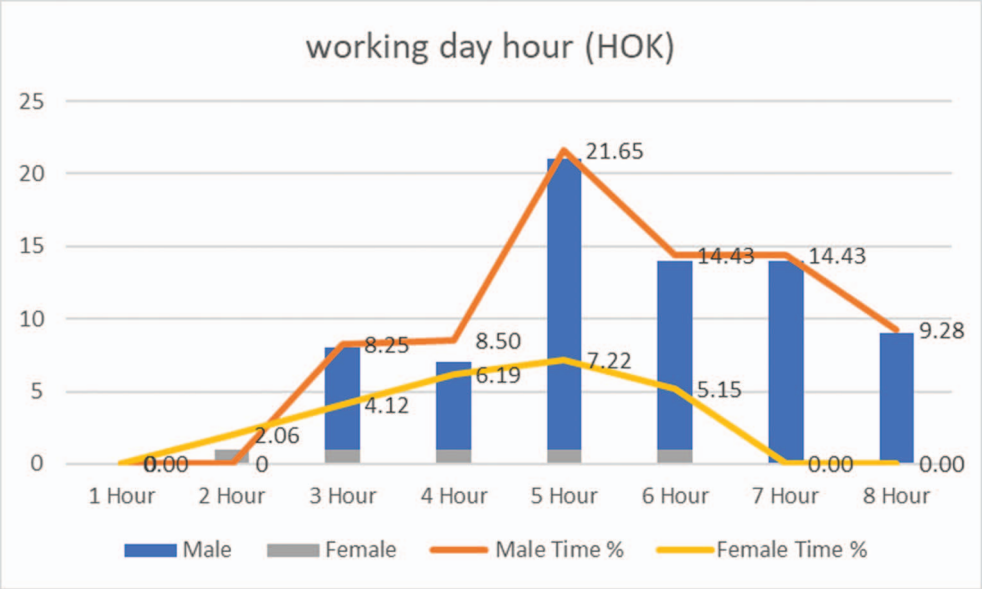
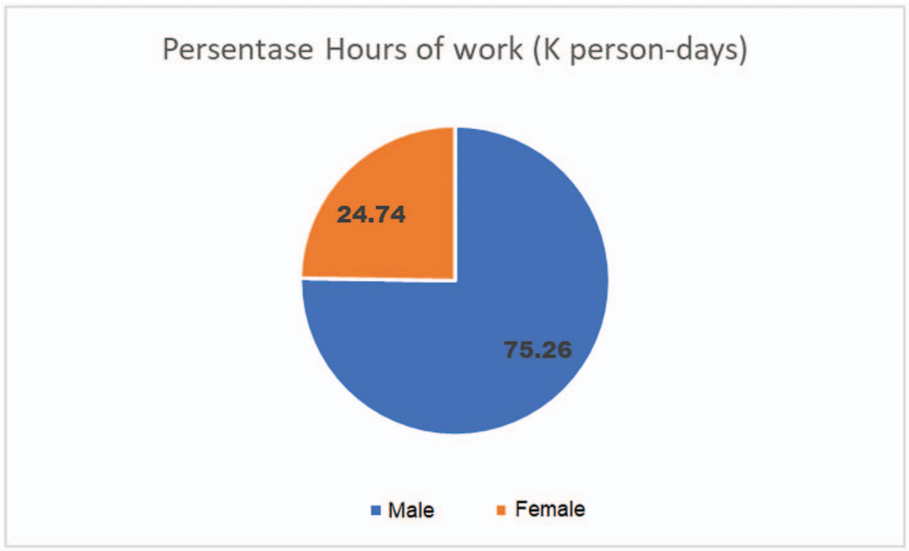


FIGURE 5 *Percentage Hours of work (K person-days)*



Decision-making in post-production activities of agroforestry management is explained based on several indicators. When considering the indicator of determining the utilization of crops, 56.7% of the time, husbands and wives decided together. Meanwhile, in the indicator of determining the perpetrators of crop sales activities, the decision was made jointly by husbands and wives 53.6% of the time, highlighting the shared decision-making aspect within marital partnerships. Additionally, the study also recognizes the significance of individual decision-making in the context of gender dynamics. Individual decisions made by both husbands and wives contributed significantly to the multifaceted gender roles observed in agroforestry management, reflecting the complexity of gender interactions in the decision-making processes. Therefore, it is essential to acknowledge and explore both shared and individual decision-making aspects to comprehensively understand gender dimensions within agroforestry management.

Decision making in agroforestry management finance

Decision making in agroforestry management finance is presented in Figure 8.

The decision-making process in planning business costs in agroforestry management exhibits a diverse pattern. Specifically, 32.0% of the time, decisions are made by the wife alone, 23.7% by the husband alone, and 44.3% by the wife and husband jointly. Similarly, in managing finances for agroforestry businesses, 44.3% of the decisions are made by the wife alone, 30.9% by the husband alone, and 24.7% by the wife and husband collaboratively. These findings emphasize the variability in decision-making dynamics within agroforestry management finance. While some decisions are shared equally between spouses, others are made independently, reflecting the complex and nuanced nature of financial decision-making processes within marital partnerships.

FIGURE 6 *Agroforestry production decision making in the family*

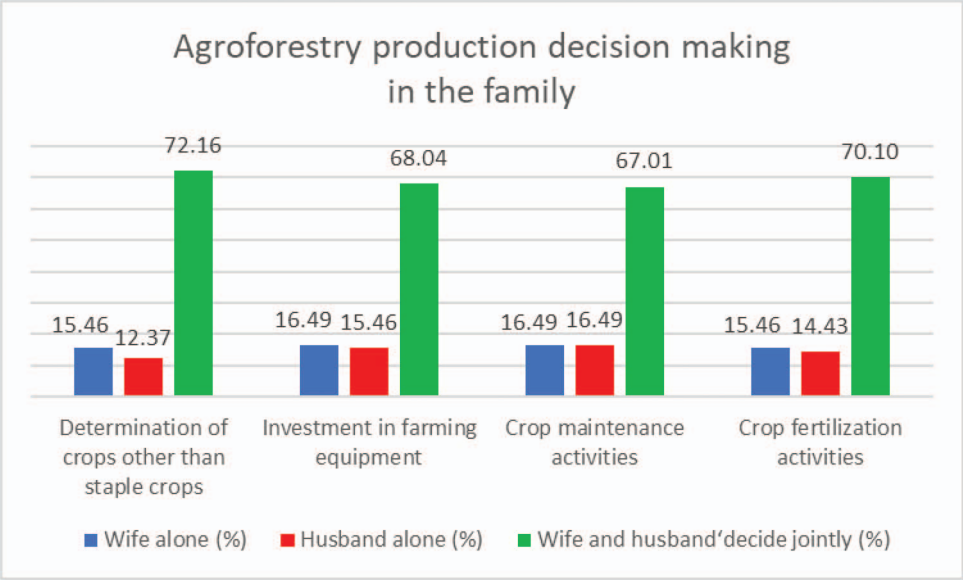


FIGURE 7 *Decision making in post-production activities of agroforestry management*

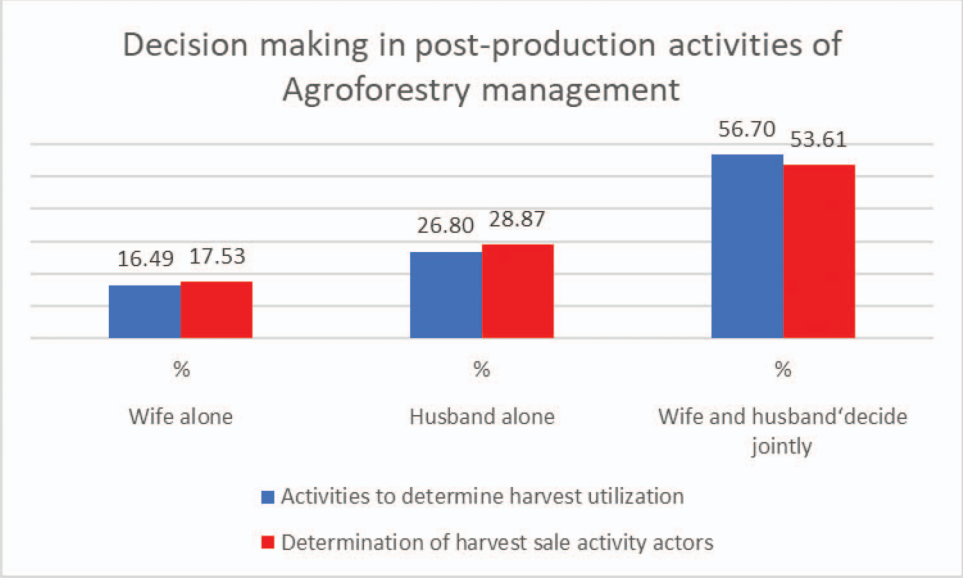
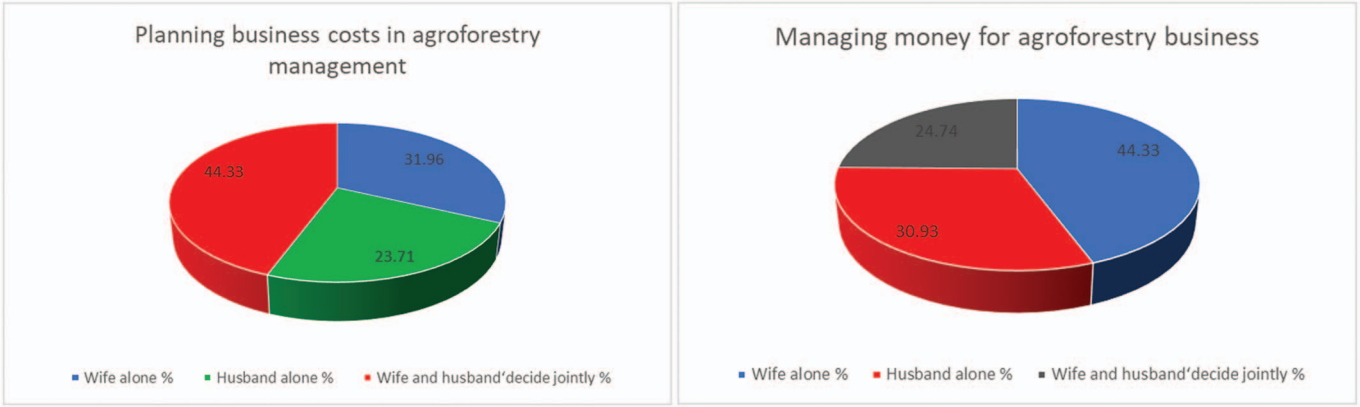


FIGURE 8 *Decision-making in agroforestry management finance*



Decision-making in family finance

Decision-making in family finance is presented in Table 1.

In terms of family financial planning, 81.4% of the decisions were made by the wife alone, 6.2% by the husband alone, and 12.4% jointly by the wife and husband. Regarding family financial management, 80.4% of the decisions were made by the wife alone, 6.2% by the husband alone, and 13.4% jointly by the wife and husband. When it comes to decisions on family expenditure, 75.3% were made by the wife alone, 7.2% by the husband alone, and 17.5% jointly by both spouses. Moreover, in decisions concerning borrowing money for family needs, 58.8% were made by the wife alone, 13.4% by the husband alone, and 27.8% jointly by both spouses. When finding ways to solve financial problems 29.9% of the decisions were made by the wife alone, 10.3% by the husband alone, and 59.8% jointly by the wife and husband. These results illustrate that decision-making in family finances significantly involves the wife.

Decision-making in social activities

Decision-making in social activities is presented in Table 2.

In the statement of determining the number of children, 13.4% were decided by the husband alone and 86.6% by the wife and husband. The statement of determining children's education in the family, 16.5% was decided by the wife alone, 13.4% by the husband alone and 70.1% by the wife and husband. The statement of determining and purchasing food, 57.8% was decided by the wife alone, 7.2% by the husband alone and 35.1% by the wife and husband. The statement on purchasing household appliances, 50.5% was decided by the wife alone, 5.2% by the husband alone and 44.3% by the wife and husband. The statement on health care, 32.0% was decided by the wife alone, 19.6% by the husband alone and 48.4% by the wife and husband. This indicates that decision-making in family finances is often determined by the wife alone.

CONTRIBUTION OF AGROFORESTRY MANAGEMENT ACTIVITIES TO HOUSEHOLD INCOME

Spearman Rank Correlation Test

To see the level of strength (closeness) of the relationship between the two variables, the Spearman rank correlation test was conducted (Table 3).

This data analysis is the result of the Spearman correlation test, which is used to determine whether there is a statistical relationship between two variables that do not have normal distribution assumptions, in this case between various factors associated with agroforestry net income. The following is an explanation of the correlation test results for each variable:

- *Agroforestry type*
- Correlation coefficient: -0.277
- Significance value: 0.020 The results show that there is a significant negative correlation between agroforestry type and agroforestry net income. The negative correlation coefficient indicates that the more diverse the types of agroforestry, the lower the agroforestry net income tends to be.

TABLE 1 *Decision-making in family finances*

No	Decision-making in family finance	Wife alone		Husband alone		Wife and husband decide jointly	
		N	%	N	%	N	%
1	Planning family money	79	81.44	6	6.19	12	12.37
2	Managing family money	78	80.41	6	6.19	13	13.40
3	Deciding to spend family money	73	75.26	7	7.22	17	17.53
4	Borrowing money for family needs	57	58.76	13	13.40	27	27.84
5	Finding ways to solve financial problems	29	29.9	10	10.31	58	59.79

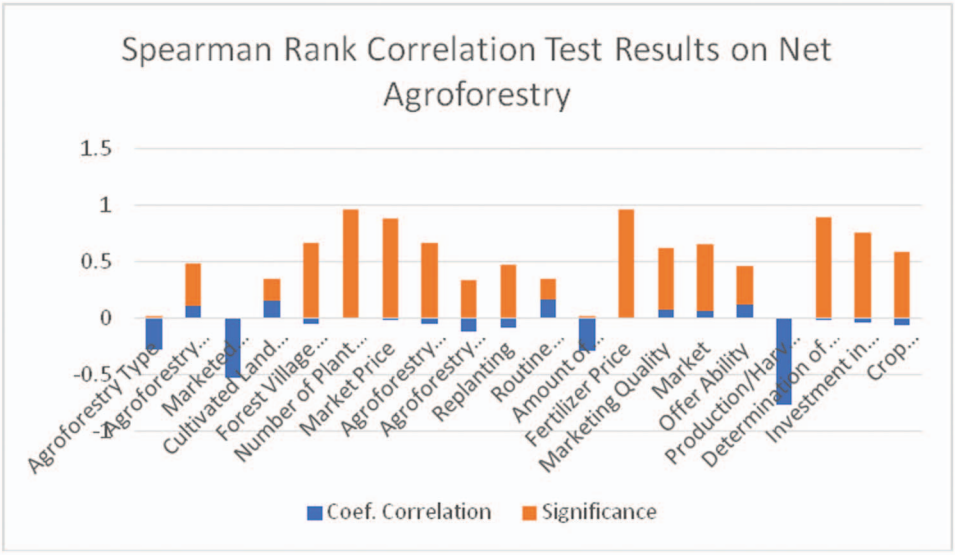
TABLE 2 *Decision-making in Reproductive Activities*

No	Decision-making in reproductive activities	Wife alone		Husband alone		Wife and husband decide jointly	
		N	%	N	%	N	%
1	Determining the number of children	0	0	13	13.40	84	86.60
2	Determination of children's education in the family	16	16.49	13	13.40	68	70.10
3	Determination and purchase of food	56	57.73	7	7.22	34	35.05
4	Purchase of household appliances	49	50.52	5	5.15	43	44.33
5	Health maintenance	31	31.96	19	19.59	47	48.45

TABLE 3 *Spearman Rank Correlation Test Results on Net Agroforestry*

No	Variable	Coef. Correlation	Significance	Description
1	Agroforestry Type	-0.277	0.02	Significant
2	Agroforestry Land Area	0.106	0.381	Not significant
3	Marketed Agroforestry Selling Price	0.528	0	Significant
4	Cultivated Land Area Affects Forest Village Community Income	0.158	0.19	Not significant
5	Forest Village Community Income is Influenced by Market Demand	-0.052	0.668	Not significant
6	Number of Plant Types	-0.005	0.967	Not significant
7	Market Price	-0.018	0.881	Not significant
8	Agroforestry Products	-0.052	0.668	Not significant
9	Agroforestry Marketing	-0.117	0.335	Not significant
10	Replanting	-0.087	0.475	Not significant
11	Routine Fertilization	0.16	0.187	Not significant
12	Amount of Fertilizer	-0.287	0.016	Significant
13	Fertilizer Price	-0.006	0.962	Not significant
14	Marketing Quality	0.073	0.551	Not significant
15	Market	0.066	0.586	Not significant
16	Offer Ability	0.114	0.346	Not significant
17	Production/Harvest Cost Expenditure	-0.776	0	Significant
18	Determination of crops other than staple crops	-0.017	0.892	Not significant
19	Investment in Farming Equipment	-0.037	0.759	Not significant
20	Crop Maintenance Activities	-0.067	0.582	Not significant

FIGURE 9 *Correlation contribution of agroforestry management activities*



- *Agroforestry Land Area*
- Correlation coefficient: 0.106
- Significance value: 0.381 Results show that there is no significant correlation between agroforestry land area and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.

- *Marketed Agroforestry Selling Price*
- Correlation coefficient: 0.528
- Significance value: 0.000 The results indicate a significant positive correlation (correlation coefficient = 0.528, p-value < 0.001) between the marketed agroforestry selling price and agroforestry net income. This means that there is a strong statistical relationship

between higher selling prices of agroforestry products and increased agroforestry net income. In simpler terms, when the selling price of agroforestry products rises, the agroforestry net income also tends to increase significantly.

- *Area of Cultivated Land*
- Correlation coefficient: 0.158
- Significance value: 0.190 The results show that there is no significant correlation between the area of cultivated land and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Forest Village Community Income*
- Correlation coefficient: -0.052
- Significance value: 0.668 Results show that there is no significant correlation between forest village community income and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Number of plant species*
- Correlation coefficient: -0.005
- Significance value: 0.967 The results reveals an almost negligible negative correlation between the number of plant species and agroforestry net income (correlation coefficient = -0.005, p-value = 0.967). This implies that there is an extremely weak or practically no linear relationship between the diversity of plant species and agroforestry net income in this study. Moreover, the high significance value (greater than 0.05) indicates a lack of statistical significance, suggesting that the variety of plant species does not significantly influence agroforestry net income in this context.
- *Market Price*
- Correlation coefficient: -0.018
- Significance value: 0.881 The results show that there is no significant correlation between market price and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Agroforestry yields*
- Correlation coefficient: -0.052
- Significance value: 0.668 Results show that there is no significant correlation between agroforestry yield and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Agroforestry Marketing*
- Correlation coefficient: -0.117
- Significance value: 0.335 Results show that there is no significant correlation between agroforestry marketing and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Replanting Action*
- Correlation coefficient: -0.087
- Significance value: 0.475 The results show that there is no significant correlation between replanting actions and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Routine Fertilisation*
- Correlation coefficient: 0.160
- Significance value: 0.187 Results show that there is no significant correlation between routine fertilisation and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Amount of Fertiliser*
- Correlation coefficient: -0.287
- Significance value: 0.016 The results show that there is a significant negative correlation between the amount of fertiliser and agroforestry net income. The negative correlation coefficient indicates that the higher the amount of fertiliser, the lower the agroforestry net income.
- *Fertiliser Price*
- Correlation coefficient: -0.006
- Significance value: 0.962 Results show that there is no significant correlation between fertiliser price and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Marketing Quality*
- Correlation coefficient: 0.073
- Significance value: 0.551 The results show that there is no significant correlation between marketing quality and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Market*
- Correlation coefficient: 0.066
- Significance value: 0.586 Results show that there is no significant correlation between market and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Offering Ability*
- Correlation coefficient: 0.114
- Significance value: 0.346 Results show that there is no significant correlation between offering ability and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Production Cost Expenditure per Harvest*
- Correlation coefficient: -0.776
- Significance value: 0.000 The results show that there is a significant negative correlation between production cost expenditure per harvest and agroforestry net income. The negative correlation coefficient indicates that the higher the production cost expenditure per harvest, the lower the agroforestry net income.
- *Determination of crop types other than staple crops*
- Correlation coefficient: -0.017
- Significance value: 0.892 The results show that there is no significant correlation between the determination of crop types other than staple crops and agroforestry

net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.

- *Investment in Farming Equipment*
- Correlation coefficient: -0.037
- Significance value: 0.759 The results show that there is no significant correlation between investment in farming equipment and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.
- *Crop Maintenance Activities*
- Correlation coefficient: -0.067
- Significance value: 0.582 The results show that there is no significant correlation between crop maintenance activities and agroforestry net income. A significance value greater than 0.05 indicates that there is no strong relationship between these two variables.

The results of the Spearman correlation test showed a significant negative correlation between the type of agroforestry, the marketed selling price of agroforestry, the amount of fertiliser, and production cost expenditure per harvest with agroforestry net income. This means that the more diverse the types of agroforestry, the lower the marketed selling price of agroforestry, the higher the amount of fertiliser, and the higher the production cost expenditure per harvest, the lower the agroforestry net income tends to be. However, there is no significant relationship between other variables and agroforestry net income.

DISCUSSION

In agroforestry management in Bendosari Village, results indicated that men play a role of 75.3% and women play a role of 24.7%, which shows the dominance of men in agroforestry land management. These results are in accordance with previous studies that show the dominance of men's roles in agroforestry management. However, women also have the opportunity to contribute more value to the household.

In decision-making in agroforestry management, husbands and wives have the same role. They work together in production activities, post-production activities, agroforestry management finance, family finance, and social activities. This cooperation aims to achieve optimal results and save labor. Such decision-making is based on local ecological knowledge developed over generations and other considerations such as biophysical suitability, income and ease of marketing.

From the financial perspective, wives are involved in planning business costs and managing family money. Husbands also play a role, but if done by the wife alone, it will help the husband in other activities, while if done by the husband alone, it will make his duties more complex. Family financial decision-making is done jointly between husband and wife, with the aim of fulfilling needs and solving family financial problems.

In general, in reproductive activities, determining the number of children and determining children's education is carried out by the wife and husband together. However, there are some households where decision-making is done by either the wife or the husband alone. Overall, this study shows that while husbands and wives have significant differences in their roles in agroforestry management, there is close collaboration between them in several activities, including production, agroforestry finance and family financial decisions. This joint decision-making is based on local ecological knowledge that has developed over generations, as well as other considerations such as biophysical suitability, income and ease of marketing.

This research may indicate a change in the traditional roles of husbands and wives in the context of agriculture. In line with the research conducted by Anugrah (2022) and Mugniesyah (2019), typically, the husband's role is considered more dominant in decision-making and management of agricultural resources. However, this study shows that in agroforestry, husband-wife pairs play equal roles and support each other in decision-making.

The active participation of both partners is crucial in agroforestry management. When both husbands and wives actively contribute, the potential for sustainable agroforestry practices significantly increases. Sharing their collective knowledge, experiences, and insights enhances the efficiency and success of agroforestry enterprises. This research highlights the significance of gender equality in natural resource management. In the specific context of agroforestry, equal participation of husbands and wives in decision-making fosters a balanced power dynamic and fair involvement within couples. However, it's essential to acknowledge that various cultural, social, and economic factors in different communities could influence the roles of husbands and wives in agroforestry management.

CONCLUSION

Based on work time, men appear to contribute more to agroforestry management than women. This may be due to the traditional roles that are still dominant in the community regarding the division of tasks based on gender. However, it is important to note that this study only looked at work time and did not reflect the overall contribution of husbands and wives in agroforestry management.

Decision-making related to the determination of crop types other than staple crops, post-production activities of agroforestry management, and finances of agroforestry management are carried out jointly by husbands and wives which indicates the active involvement of both partners in making decisions regarding important aspects of agroforestry. However, decision-making related to family finances seems to be mostly decided by wives individually. This suggests that in the financial context, wives have a more dominant role in decision-making.

The contribution of agroforestry to household income is influenced by several factors. Variables such as the type of agroforestry applied, the selling price of agroforestry marketed, the amount of fertilizer used, and production cost expenditure

per harvest have a correlation to household income. This suggests that these factors play an important role in determining the extent to which agroforestry can make a significant economic contribution to the household.

Regarding policy implications, these findings underscore the need for women's economic empowerment, strengthening women's roles in financial decision-making, and enhancing gender equality in social policies. Additionally, family cooperation in agroforestry management needs to be reinforced, requiring the development of inclusive education policies and continuous support for research and development. The implementation of these policies is expected to enhance gender equality in agroforestry contexts while strengthening the productivity and sustainability of agroforestry practices within communities.

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