An overview of the potential impacts of interventions on diverse coffee agroforestry system to gender dynamics in Pagar Alam District, South Sumatera

Elok Mulyoutami, Endri Martini, James M Roshetko

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Table of Contents

List of Figures

List of Tables

EXECUTIVE SUMMARY

The introduction of agroforestry management best-fit practices has consequences for household income-streams and potentially for access to income-generating opportunities for the different household members, i.e. the wife, husband, and children (boys and girls). Changing coffee farming practices influences the relation between men and women in the household and the community. Understand the dynamic of gender relation with regards to the changing farming practices is particularly important to measure the impact of new technology or farming systems introduction. It is acknowledged that women's income generation is strengthened by enhancing their agriculture management skills and capacity, which can be used on-farm or in wage labor. This development likewise improves household income and livelihood conditions. Thus, this study is conducted to understand the potential impacts of interventions on coffee farming agroforestry systems' diversification to gender dynamics at the household level (i.e. gender tasks division and income contribution). The study is part of the project implementation that aims to enhance coffee farmers' livelihood through diverse agroforestry systems in Pagar Alam district, South Sumatra.

This study was conducted through interviews (in-depth and semi-structured interview) and focus group discussions with coffee households and farmers in Pagar Alam District from September to October 2020. Two subdistricts were selected as focused study sites. These two subdistricts have received intervention from a project to enhance coffee farmers livelihood through diverse agroforestry systems, named Empower Project that has been running in the subdistricts since 2018. In total, 125 respondents were interviewed through semi-structured interviews to understand gender dynamics at the household level. Eight key informants were interviewed to understand the type of agroforestry interventions implemented and how they perceived it. To triangulate the interview data results, a series of four focus group discussions (FGD), disaggregated between women and men, were held in 4 villages of the 2 subdistricts. This study deployed a qualitative analysis to generate the results.

This study showed no negative impacts from the intervention on gender dynamics at the household level. Men and women's roles in coffee-based agroforestry systems and other farming practices are complementary and mutually supportive, resulting in synergism. However, most decision making remains under the control of men, which may lead to potential risks in the imbalanced relationship between men and women in the household. The imbalanced relationship between men and women requires attention to fill the gender gaps in roles and responsibilities. Thus, any intervention program to the community would need to enhance cooperation between men and women in the household, such as developing effective communication between men

and women. More opportunities should be given to women to increase their access and participation in capacity-building programs. Providing equal opportunities for capacity buildings to both women and men is essential as they are both important actors in agricultural production. Not recognizing women's critical role in agriculture or limiting the opportunities to enhance their knowledge and skills restricts prospects to increase household agricultural production and income. Enhancing women's opportunities and capacity is not solely about women's empowerment, but more importantly, about household empowerment through increasing agricultural production and household income. Recommendations are provided from this study that can be used by agencies that will implement gender-sensitive approaches of interventions on coffee agroforestry system's diversification.

1. Introduction

Globally, agroforestry is acknowledged as a farming system that contributes to resilient livelihoods for smallholder farmers and contributes to ecosystem services. In coffee agroforestry systems, shade trees are critical components that influence coffee production. Appropriate tree species with regulated spacing distance can contribute to improvements in coffee production and contribute to income diversification through diversification of products. Additionally, other aspects need to be considered when optimizing coffee from an agroforestry system, such as planting seedlings of superior quality, applying organic fertilizers, pruning, pests and diseases management and post-harvest handling.

The introduction of agroforestry management's best practices has consequences for household income-streams and potentially on access to income-generating opportunities for the different members of the household, i.e. the wife, husband, and children (male and female). Generally, all family members make proportional contributions to coffee production at the household and community level. Normally, men and women have different but complementary roles in farming systems. Changing coffee farming practices influences the relation between men and women in the household and the community. Understand the dynamic of gender relation with regards to the changing farming practices is particularly important to measure the impact of new technology or farming systems introduced.

Coffee farmers in Pagar Alam practice coffee agroforestry systems from the very simple to the more complex systems. Generally, in the initial stage of coffee farming, farmers apply a simple agroforestry system using only one species as a shade tree, i.e. the Gliricidia. Gradually, farmers add more species to their coffee systems, slowly shifting the system to a more complex one. The decision-making process influences the transformation process from a simple system to a more complex system, or vice versa, at the household level that includes interaction and communication between males and females. In the household, the decision-making process is greatly influenced by the level of knowledge of both males and females, affecting how they perceive the risks and benefits of their decisions. Males and females have their knowledge, capacities, and practices that are all complementary to each other, and therefore they both must be involved in any intervention program. Thus, understanding the gender relation and dynamics in the decision-making process and the share-benefit potentials between males and females can help identify the potential impacts and risks at the household level resulting from changes in their farming systems.

This study's general objective was to understand and map gender dynamics and household decision-making in smallholder coffee farmers when changing their farming practices from simple coffee agroforestry to more diverse systems. Selecting shade trees was the major aspect observed when farmers change their system from simple to complex and vice versa. This study examines how changes in the farming systems influence different income streams, income stream divisions in the household and the potential impacts and risks of the intervention related to farming systems transformations on gender dynamics in the household.

2. Methodology

2.1 Study framework

An option to diversify coffee farmers' income and increase farm productivity in the existing coffee farming practices is to transform the systems into more diverse agroforestry systems containing high-value species that provide alternative income options. Diversifying the number of species in the system is expected to diversify and increase income and provide additional ecosystem services such as nitrogen fixation, soil improvement, and pest and disease control.

In the theory of change developed for understanding the potential impacts of interventions on diverse agroforestry to gender dynamics (Figure 1), three potential impacts are identified, i.e. (1) resilient local livelihood systems, (2) good agricultural practices, and (3) reducing the gap in gender inequality. Key strategies are to improved people's knowledge, skill, and capacities in practicing good agricultural systems. As the target also needs to reduce inequality or avoid any potential approach that could worsen the gender issues in the community, gender-sensitive approaches need to be employed. The diagram (Figure 1) shows that gender-disaggregated data systems and gender awareness-raising activities should be integrated into program interventions.

Looking at the relationship between gender equality, livelihood strategies, and gradual changes from existing coffee farming practices (with fewer shade trees of low economic value) to more diverse systems, basic information on those three interrelated aspects is important. The study was conducted to understand how males and females will respond to changes in farming systems, and the potential impact on income generation by both males and females in the household. Moreover, understanding the decision-making process in the household between males and females in managing their coffee farm practices could illustrate how males and females perceive the risks and opportunities behind their decision and how they mitigate the risks. Decision-making should focus not only at the intra-household level but also within the community, which similarly portrays the gender conditions in the local area.
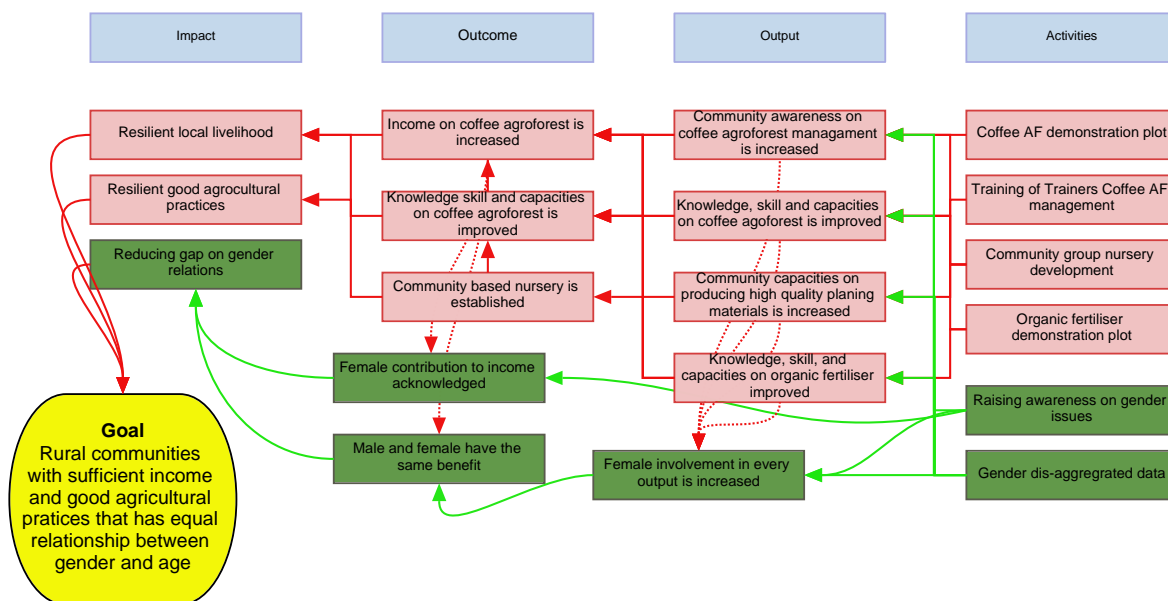
Figure 1. Theory of change of the process of transforming from simple coffee agroforestry to diverse agroforestry systems

Information on intra-household income contribution and division is important to describe how male and female interaction contributes to the total household income. Therefore, the program needs to see its effectiveness in boosting local livelihood and the impact on the intra-household gender dynamic. Moreover, how the changes in coffee management, from the very simple agroforestry to the more complex or diverse, include more activities that potentially impacted the intra-household tasks. And how those changes could influence both men's and women's income stream.

The research study was conducted in three stages: (1) understanding existing coffee farming systems and practices; (2) confirming/developing the theory of change for the transformation of the existing farming practices to the expected farming practices, based on farmers perspective; and (3) analyzing gender dynamics and household decision-making processes at each stage of the transformation process and its potential risks to gender relations.

Stages 1 and 2 generated important basic information to understand gender dynamics and the decision-making processes. That process analyzed gender relations and income contribution and division of work in the existing coffee farming systems and practices. The dynamics of gender relations became clear once the changes in existing farming systems and practices were identified and understood. This enabled a prediction of impacts in the future. The theory of change reflects the prediction or the expected outcome from the transformation process in the community. Farmer's perception of the transformation process reflects their hope; if the farmers are optimistic, their perception also reflects their potential resources and power. Stage 3 was the data collection and analysis of intra-household gender relations and dynamics. The study utilized multiple data collection methods.

2.2 Data collection

Data were collected from September to October 2020 in two subdistricts of Pagar Alam District, South Sumatra. Those two subdistricts (Dempo Tengah and Dempo Utara Subdistrict) were selected because farmers in those subdistricts have been receiving capacity development activities on diverse coffee agroforestry systems under Empower project. This project has been implemented in the area since 2018. Data collection was applied in three stages using multiple methods, as presented in Table 1.

Table 1. List of methods to collect data on the potential impacts of diverse agroforestry interventions to gender dynamics in Pagar Alam district.

Information	Detail Information	Method	Resources
Analyzing the coffee farming systems trajectory and identification of the existing coffee farming practices	Existing coffee farming systems in Pagar Alam Existing coffee farming practices in Pagar Alam	In-depth individual interview	Empower staffs, village leader, a local champion
Confirmation/ development of the theory of change and the stage of farmers' changing process from existing coffee farming systems to expected coffee agroforestry systems	Expected coffee agroforestry systems Stages of transformation from their current practices to the expected coffee agroforestry systems based on farmers perception Potential impacts received by households by changing from the existing coffee farming systems to expected agroforestry systems	In-depth individual interview Group Discussion	Key farmers that have received training in various aspects of agroforestry
Identification of the gender dynamics and household decision-making process at each stage of the change process, and its potential risks to gender relations	Household income division and access to generated income Task division on growing and marketing crops – coffee and intercropped Access to training on coffee and other intercropped crops	Role Play Game FGD Individual interview (in-depth and structured interview through a survey)	Community

2.2.1 Individual semi-structure interview

We interviewed 125 respondents (Table 2), consisting of four selected villages in two sub-districts in Pagar Alam. Those villages were selected based on its major ethnicity, i.e. local ethnicity (Besemah) in Muara Siban Village, Dempo Utara Subdistrict, and Padang Temu Village, Dempo Tengah Subdistrict; and migrants (Javanese) in Burung Dinang Village, Dempo Utara Subdistrict and Candi Jaya Village, Dempo Tengah Subdistrict. Some of the farmers in those villages have received training from Empower project. Respondents were selected based through purposively random sampling. Two criteria were used to identify possible respondents, i.e. occupation (coffee-farmers) and residential status (migrant/transmigration family and local, using ethnicity for identification). We also targeted respondents from participants in the Empower project trainings.

Table 2. Sampling of respondents

	Dempo Tengah						Dempo Utara						Range	
	Male		**Female**		**Total**		**Male**		**Female**		**Total**		**Range**	
Age range (years)	21 - 76		20 – 67		20 - 76		24 - 76		27 - 60		24 - 76		20 – 76	
Average age (years)	44.28		37.18		40.44		48.28		45.47		35.47			
Residential status														
	N	%	n	%	n	%	n	%	n	%	n	%	N	%
Local/Native	15	12	17	13.6	32	25.6	19	15.2	14	11.2	33	26.4	65	
Migrant	14	11.2	17	13.6	31	24.8	17	13.6	12	9.6	29	23.2	60	
Education Level														
Not school/Not passed elementary		4.8		1.6		6.4		5.6		2.4		8		14.4
Elementary School		4.8		7.2		12		11.2		4.8		16		28
Junior High School		3.2		3.2		6.4		5.6		4		9.6		16
Senior High School		8.8		12.8		21.6		4		9.6		13.6		35.2
Higher education		1.6		2.4		4		2.4		0		2.4		6.4
Empower Training Participation														
Participant	8	6.4	8	6.4	16	12.8	2	1.6		0	2	1.6	18	14.4

2.2.2 Focus Group Discussion (FGD)

Group discussions were conducted in each village, with separate gender specific groups (1 female group, 1 male group). Ethnic status, native or migrant to the local area of the group discussion participants was also considered (Table3).

Table 3. Participants in the Focus Group Discussions

Village	Male			Female			Total
	Local/Native	Migrant	Total	Local/Native	Migrant	Total	
Burung Dinang	3	4	7	1	5	6	13
Candi Jaya	1	5	6		6	6	12
Muara Siban	4	2	6	7		7	13
Padang Temu	6		6	6		6	12
Total	14	11	25	14	11	25	50

2.2.3 Individual in-depth interview

Individual in-depth interviews were conducted with 8 key informants, e.g. farmers who have participated in agroforest training, women farmers, empowerment staff, and village opinion leaders. The list of questions for the in-depth interview as in Annex 1.

2.2.4 Role-play game

Two role-play games were conducted to understand decision-making dynamics between males and females at the household and community level. The first game tried to understand how male and female make decisions and who is more dominant in making specific decisions. This game was also useful to gather basic information on the people's preferences and the reason behind their choice of shade trees. The second game sought to understand the dynamics of males and females' decision-making and bargaining positions in the community. How male and female make decisions and bargain with their partners or neighbors in any community development program.

2.3 Data analysis

Data analysis of this study utilized a qualitative approach. Tabulation using pivot tables and descriptive statistical analysis was used to understand the data related to gender relations, trends, and patterns of gender differences. Those data used scale and ranking mostly generate from Individual semi-structured interview and Focus Group Discussion.

Role Play Game results were analyzed with the bargaining power index, i.e. an index to measure capability and capacity in the household bargaining process in agricultural decision making. Role Play Game results were categorized as domination of decision making (K1) and cooperation level (K2). The cooperation level is the desire to have a discussion or consultation before making a decision. Bargaining Power (BP) highest value (K0=1) indicates the most favorable situation when people are willing to discuss and respect others and have a high confidence in expressing their opinion while making decisions. The formula of BP is $BP = \frac{K1+K2}{2} \times K0$.

3. Results and discussions

3.1 Coffee-based farming systems in Pagar Alam

The survey showed nearly 76% of farmers cultivate simple shaded coffee systems, with an average area of 0.77 ha (0.25 2 ha) and 1 – 2 plots/HH. The other respondents cultivate complex agroforest with an average area is 0.81 ha (0.2-2 ha) and 1 – 2 plots/HH. Only one farmer practices monoculture full-sun coffee systems. In Pagar Alam, coffee has been cultivated since the Dutch period (the mid-1800s). The use of shade trees has been known for decades, though only using one or two varieties, classified as simple coffee agroforestry.

Shade trees are planted between coffee trees and along the plot borders. The preferred shade trees are *gamal* (*Gliricidia sepium*), *sengon* (*Albizia falcataria*), *bambang* or commonly known as *cempaka* (*Magnolia champaca*) (Table 4). Recently, farmers have planted more trees in their coffee systems, any trees species that serve as shade and provide additional benefit or income. As a result, many coffee systems are evolving to become diverse agroforestry systems. The common fast-growing multipurpose trees used as pepper stakes are *johar* (*Cassia siamea*), *bambang/cempaka*, afrika (*Maesopsis eminii*), gamal, and sengon. Fruit trees that have become common in the community and coffee plots include avocado (*Persea americana*), durian (*Durio zibethinus*), jengkol (*Archidendron jiringa*), petai (*Parkia speciosa*) (Table 4).

Table 4. The most common shade trees species

Tree species (local/latin name)	Average number of trees per HH	Percentage number of HH owned the trees (n=125 HH)
Gamal/*Gliricidia sepium*	138	94.4%
Avocado/*Persea Americana*	6	48.0%
Jackfruit/*Artocarpus heterophyllus*	8	32.0%
Bambang/Cempaka/*Magnolia champaca*	10	26.4%
Sengon/*Albizia falcataria*	10	24.0%
Kayu Afrika/*Maesopsis eminii*	12	23.2%
Durian/*Durio zibethinus*	7	22.4%
Pepper/sahang/*Piper nigrum*	78	12.8%
Jengkol/*Archidendron jiringa*	14	12.0%
Petai/*Parkia speciosa*	22	8.8%

(Source: Household survey)

Y-axis: Percentage of FGDs participants preferences to plant each shade trees species based on species grouping

X-axis: Plot distance from the main road (close, medium, far)

Legend:
- Commercial fruit
- Commercial timber
- Commercial commodities
- Shade trees
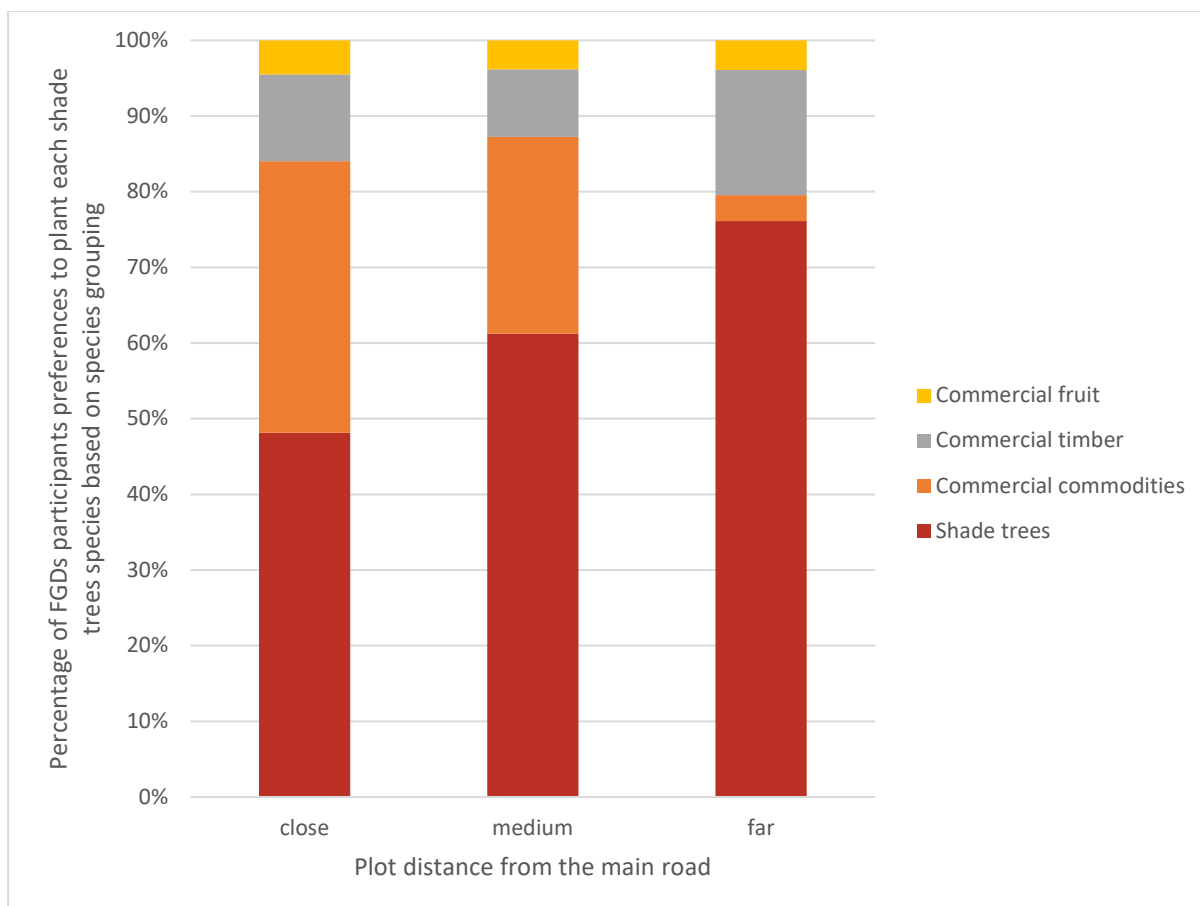
(Source: FGD)

Figure 2. Shade trees preferences (based on species type, i.e. commercial fruit, commercial timber, commercial commodities, and non-commercial commodities or shade trees) for planting niches related to proximity of farm to the main road.

Figure 2. illustrates farmers' preferences of shade trees species based on proximity of their farm to the main road. Farms that have limited access (far from main roads) are dominated by shade trees (*gamal*), with few commercial commodities (pepper, clove, and rubber), and some commercial timber (*bambang, sengon, afrika, mahoni*). On farms close to the road, commercial commodities are more common. The table demonstrates that the cultivation of commercial commodities is significantly influenced by road access. Commercial timber is common in areas of limited access due to the long rotation age. Commercial fruit is equally common in all areas. Although farmers are used to plant shade trees in their coffee systems, they still use any available germplasm (often low-quality seedlings) and plant at irregular spacing. They replace harvested or unproductive trees with commercial commodities, targeting only on economic benefit.

Currently, more than 90% of farmers of Dempo Tengah and Dempo Utara cultivate improved coffee varieties through vegetative propagation techniques. In the last seven years, these techniques have gradually become widely adopted by the community. In 2011, the Forestry and Plantation Agency of Pagar Alam District implemented a program to improve coffee productivity, considering land limitation and the declining trend in coffee productivity. Extension, training in high-quality planting materials, and vegetative propagation were key components of the program provided to several sub-districts, including Dempo Utara and Dempo Tengah. About 30% of farmers have started experimenting with these options.

Over time, more and more farmers have adopted trials on their farms to test the options. The practices have now spread to other villages. Farmers who practice the techniques report improved coffee production and ease of maintenance. The local government now supports a coffee improvement program in cooperation with SCOPI (Sustainable Coffee Platform of Indonesia). Within the last two years, the government disseminates one million high-quality coffee seedlings that will also provide vegetative material for grafting in the future. The coffee improvement program also promotes coffee pruning, which has been adopted by about 75% of the farmers in Dempo Tengah and Dempo Utara. Some farmers are reluctant to practice pruning due to the misperception that the new branch will not produce coffee.

In conclusion, coffee agroforestry systems are not something new to farmers in Pagar Alam; farmers have been practicing agroforestry for long periods. Some programs, mainly from the local government, were implemented in the area before the Empower project, supporting the diversification of coffee agroforestry farms to increase farmers' livelihood diversification.

Farmer's knowledge of coffee and other intercropped crops

Men and women have similar perceptions and knowledge of shade trees' role in coffee systems (see Figure 3). They agree that shade trees help maintain soil moisture and fertility by shielding the soil from direct sun and wind. This shielding effect provides good climate conditions that support the best coffee growth. Shade trees are also identified as useful to control soil erosion, particularly in sloping land. Men and women also agree that shade trees have a low function for biodiversity and pest/disease control. There is a slightly different perception of shade trees' function as fertilizer sources; while men perceive this as a good function, the women do not.

Figure 3 plot content (axis labels and data point labels):

Male (y-axis), Female (x-axis)

- Coffee growth
- Soil moisture
- Climate
- Shade control
- Wind control — Soil fertility
- Soil erosion
- Fertiliser source
- Coffee quality
- Nutrition source
- Weed control
- Coffee production
- Pest and disease
- Biodiversity
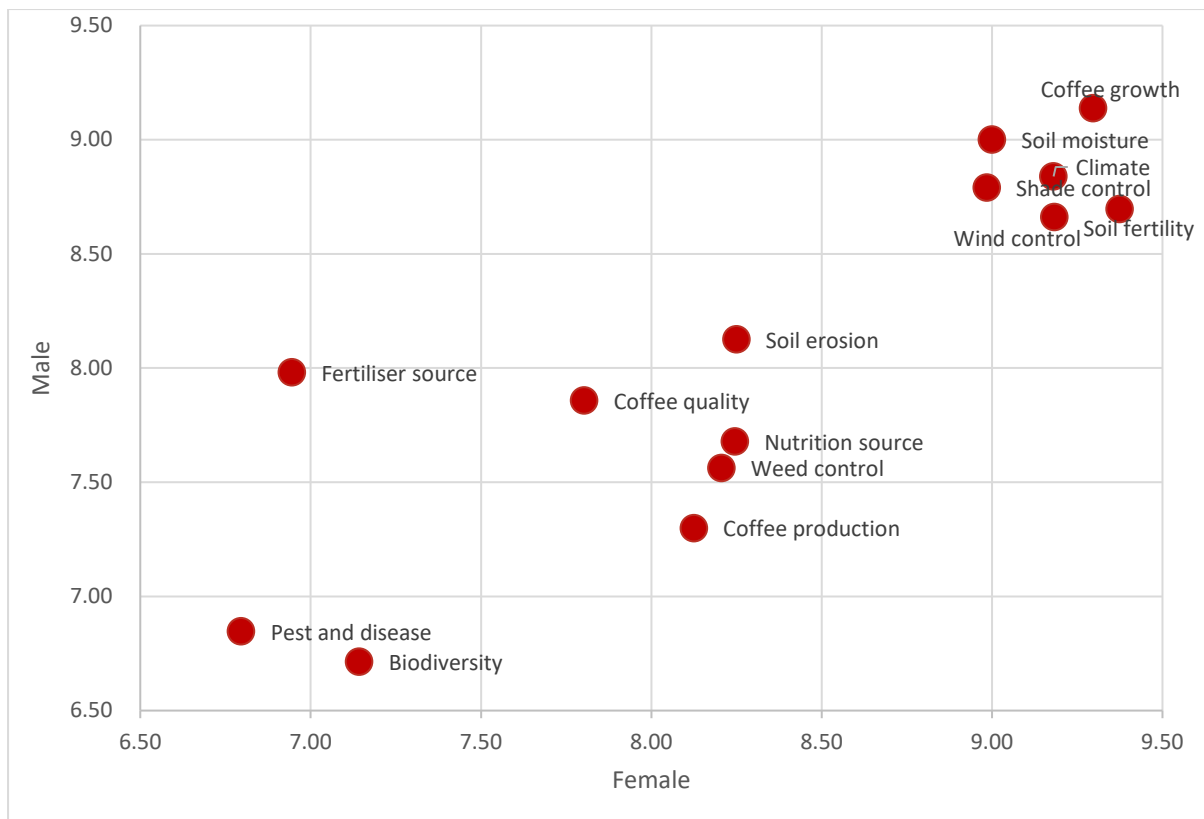
(Source: Household survey)

Figure 3. Shading and shade tree function for coffee-based systems

Bambang, *afrika*, and *sengon* trees are perceived as having similar functions and contributions for soil fertility improvement, good shade value, improving coffee productivity, as pepper stake, with similar timber value for commercial or household use (Figure 4). Gamal trees is recognized as providing shade, more than its benefit for timber or as a stake. For fruit tree species, avocado and jengkol are recognized as having similar function and contributions. Farmers do not perceive durian as improving coffee production, while jackfruit does. Both durian and jackfruit timber are valuable for commercial or household use. Petai has economical value, but few households plant it in their garden. Pepper is cultivated only as a commercial crop, not for household consumption. Those perceptions illustrate that most community members still focus on coffee production and have not given much attention to shade trees for commercial purposes.

The main commercial commodities remain coffee and pepper, with fruit trees still serving an ancillary role. This might be related to the uncertainty associated with the market prospects for shade tree species' products. Avocado is recognized as having a good prospect in the market. However, according to some respondents, planting avocado with coffee does not always succeed. In certain areas of Rimba Candi, avocado was cultivated but the trees did not bear fruit, because of the high elevation of the village (>1000 m asl). Petai is recognized as difficult to grow in Rimba Candi. These cases indicate that more attention is required to select species based on site conditions and ensure good market prospects.
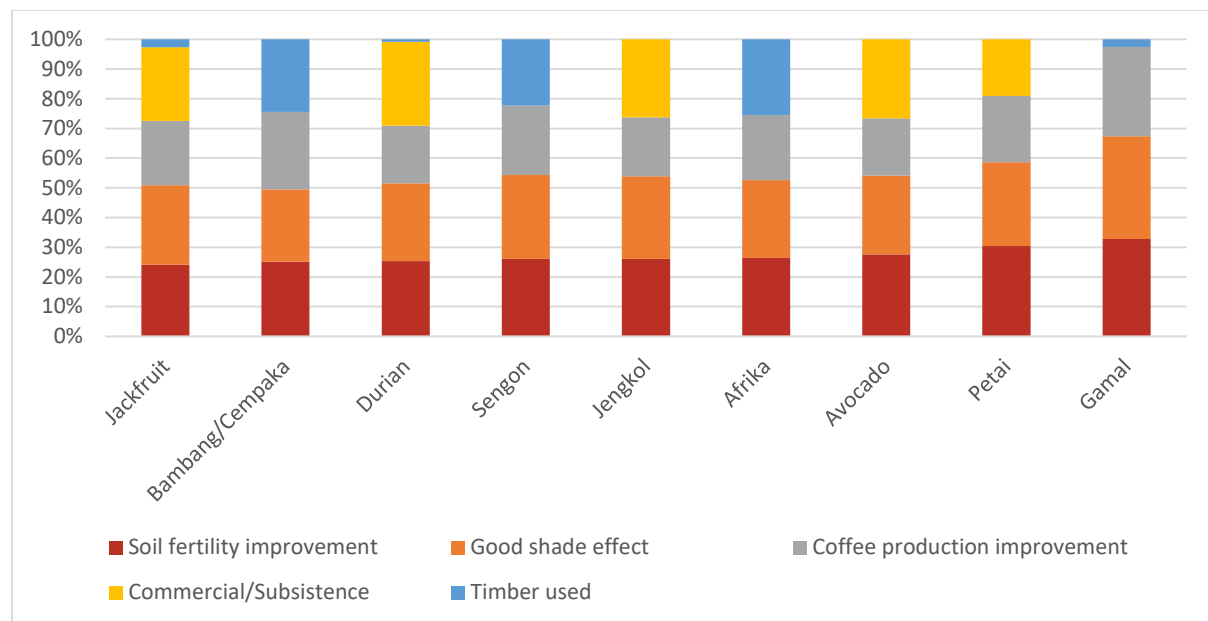
(Source: Household survey)

Figure 4. Shade tree species function based on farmers perception

As with the overall shade tree function, there was no difference in perception between men and women regarding the function of each shade tree species. For all species, men and women hold similar perception and concerns. More gender-related analysis related to coffee agroforestry management in Pagar Alam are elaborated further in the following sections.

3.2 Gender task division on growing and marketing crops from coffee agroforestry systems

Coffee production activities in Pagar Alam are dominated by men, with women making significant contributions for particular activities. This situation is similar to other agroforestry practices in some areas in Lampung (Pasaribu 2019). Most coffee production activities are conducted collaboratively by men and women. They usually go to their farms together and divide the work based on needs. Men usually performing heavy labor, dangerous and skillful work, while women conduct routine work, like weeding and land clearing.

Figure 5 indicates that women allocated more time to harvesting and drying coffee. From this data, it is clear women are responsible for the activities that need more labor such as harvesting and drying coffee. For planting materials preparation, including selecting quality materials and filling polybags, men and women equally share the responsibilities. Farmers state that pruning shade trees is men's work that requires skills to cut the high branches of shade trees; this has caused women to be less involved in shade tree maintenance. Women's involvement in pesticide application is limited, as men claim the work is dangerous for women, and women prefer not to work with pesticides. Women claim, with men confirming, to have low skill in pruning and vegetative propagation of coffee trees. However, some women are recognized as having good skill in pruning and vegetative propagation. Overall, females have higher time allocation than men on planting materials, weeding, coffee harvesting, and coffee drying beans.
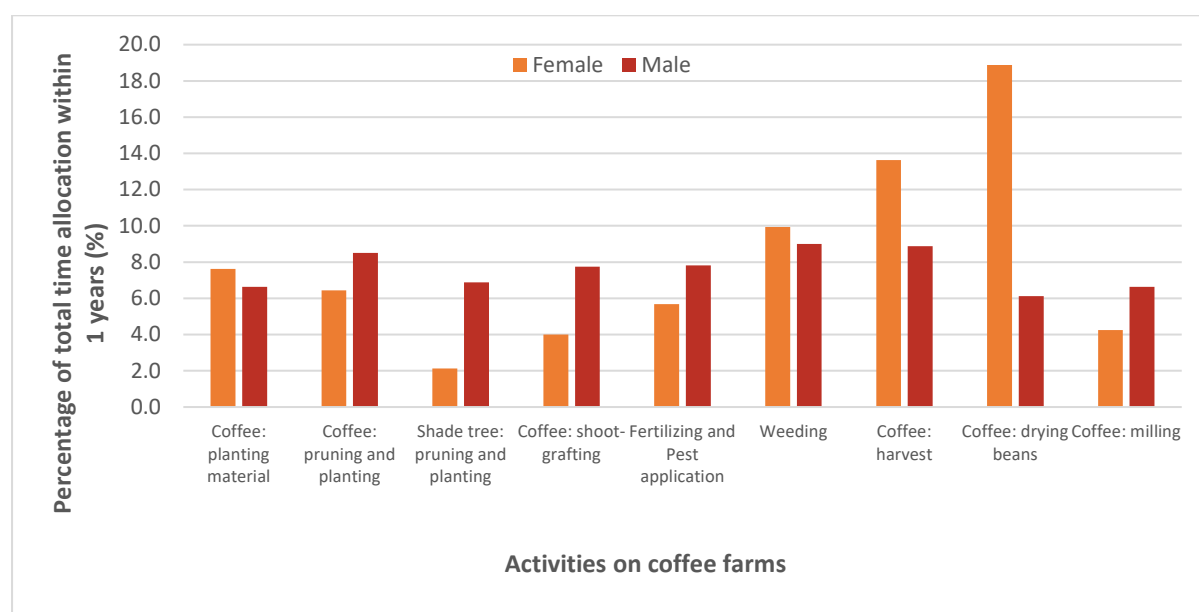

(Source: FGD)

Figure 5. The proportion of male and female time allocation of the overall farming activities in coffee-based systems

3.3 Coffee farmers' household income division and access

The main source of livelihood in Dempo Tengah and Dempo Utara sub-districts is from coffee production. Another important source of livelihood is vegetable farming. Coffee dominates income generation for the communities during the harvest period from April to September. In the remaining months, coffee farmers rely on vegetable and rice paddy cultivation and off-farm income. Coffee is important as annual cash income, while off-farm income is considered important as daily income. Vegetables provide daily subsistence needs and additional income. Priority vegetables include chili (*Solanaceae* sp.), carrots (*Daucus carota*), onions (*Allium cepa var ascalonicum*), shallots (*Allium fistulosum* L.), potato (*Solanum tuberosum*), mustard greens (*Brassica rapa*), and cabbage (*Brassica oleracea*). Farmers can cultivate their own coffee plot or sublease to other farmers. Self-managed coffee plot size varies from 0.2 – 2 ha, with an average is 0.78 hectares per farmer. Subleased coffee plots are similar in size, varying from 0.5 – 1 ha. Some farmers also cultivate black pepper in their coffee systems using the shade trees as stakes. Pepper also provides annual income, with the harvest season similar to coffee. Pepper is a new crop in Pagar Alam, only 7% of the total respondent currently cultivate pepper in their coffee systems, this is because of the altitude (700-1500 masl) of Pagar Alam which results in slow growth and low production of pepper.

As the main source of livelihood, the management of commercial commodities such as coffee are dominated by men, with only 36% of coffee farmers being women (Figure 6). Coffee and pepper cultivation and harvesting require a lot of labor, with women usually contribute to help men. This has resulted in the number of women being paid as labor to be slightly higher than the number of men. Interestingly, data shows that the number of women who work on food crop cultivation is slightly fewer than men. This case in Pagar Alam is different with the general trend where women dominate food crop cultivation. Cattles ownership (primarily goats) in the community is 20 – 25% of total respondents, while the ownership of poultry (chicken) is near to 90%. Cattle farming is dominated by men, while women dominate poultry production.
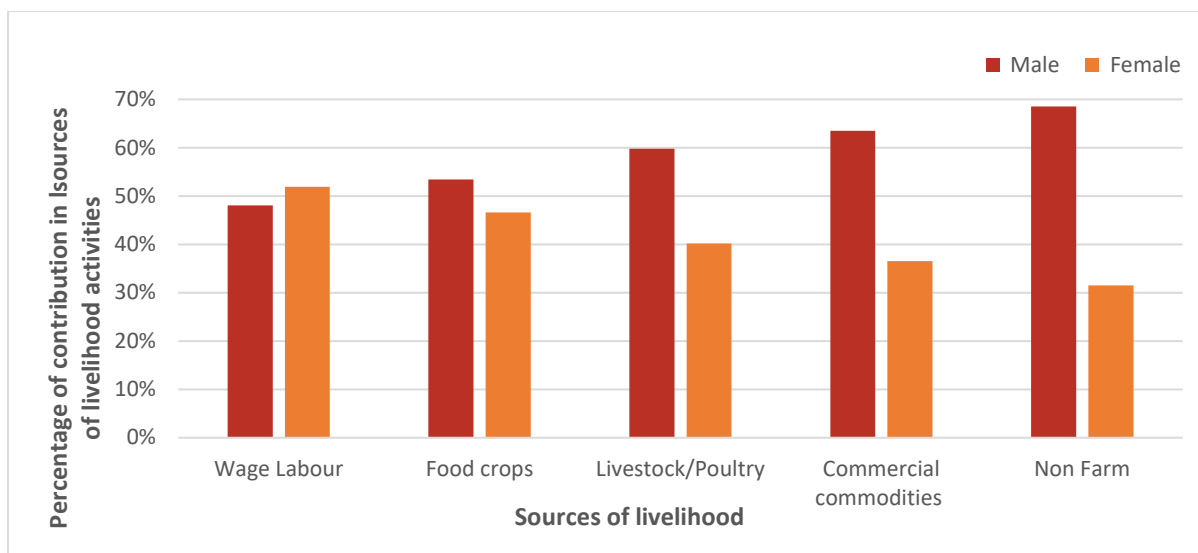
(Source: Household survey)

Figure 6. Gender contribution to the main sources of livelihood

3.4 Coffee farmers' household budget management

Aside from coffee, daily agricultural wage labor, livestock/poultry production, and annual crop production are other main livelihood sources. Preliminary survey results from ICRAF's Indogreen project in Pagar Alam suggest that women contribute 31-36% of income from agriculture through their labor. This is consistent with our findings that women contribute 33.8% of labor for agriculture.

Gender work division in the household is presented in Figure 7, showing that 43% of women's time is dedicated to household management. The data on time allocation shows that women's active daily contribution is 13.0 hours, while men's contribution is 10.8 hours. Women focus their activities on domestic responsibilities, while men focus a larger portion of their time on agricultural production activities.
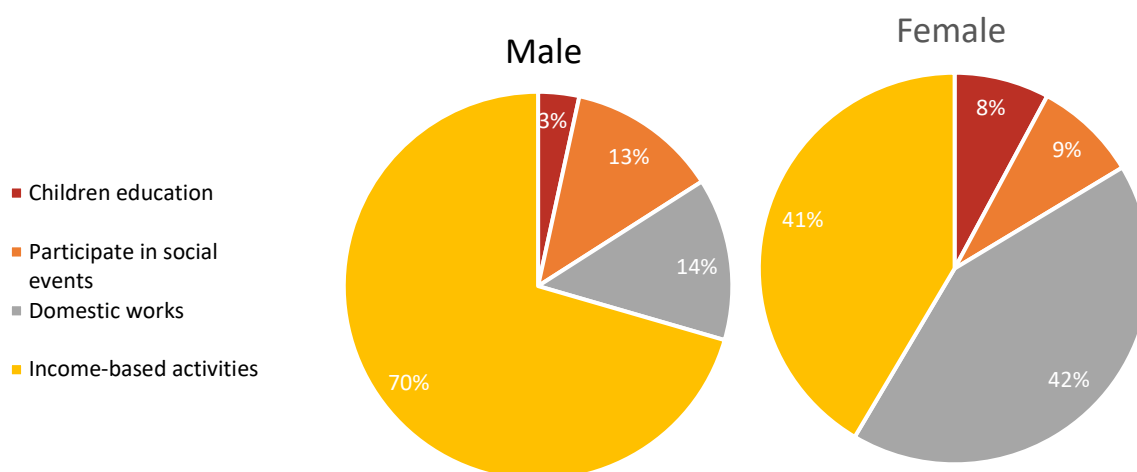
Figure 7. Proportion of time allocation between male and female in household activities

Figure 8 illustrates household responsibilities. Women are primarily responsible for the management of household expenses and budgets. However, the data also demonstrate that the decision-making of most household expenses, particularly related to agriculture, remain men's responsibilities. The decision-making rate for men is 0.909 while for women it is 0.827, in contrast, budget holder responsibility by women is 0.844 and for men 0.817. These rates are the scale of decision-making in the households as perceived by the respondents, where the highest rate is 1.
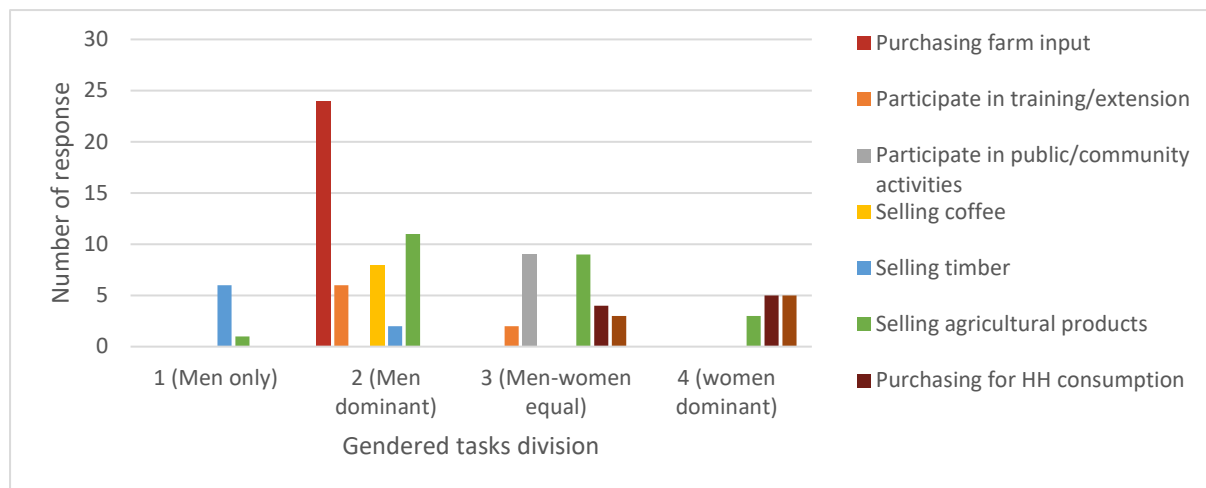
Figure 8. The gendered division of main responsibilities in the agroforestry-based household activities

Managing coffee farmers' household finances require special attention because their largest income source is annual. The household needs to be very carefully saving their income so that it covers all annual expenses. To supplement coffee income, family members find off-farm employment as wage laborers from October to March when coffee-related management is low. This may include travel outside the village. Income from coffee is used for major annual needs, while income from wage labor or working as craftsmen, in workshops, or motorcycle drivers are allocated to daily consumption.

After selling coffee, households buy fertilizers, pesticides, and herbicides for their coffee plots. The remainder of the money is given to the household budget manager to be used for household needs. Most of the remainder is used for consumption, with some funds set aside for anticipated non-family labor costs.

The presence of shade trees yielding marketable products provides households with alternative income sources for savings. A limited number of households have paddy fields, upland rice fields, or vegetable gardens. Households that lack those alternative sources of income may be vulnerable to biophysical and market shocks. In those cases, economic shade trees can be one solution. Those species do not require additional or specific management, occur in existing coffee fields, and provide additional income.

A traditional method of managing household expenses is the artisan system, a rotating savings and credit mechanism. When there is a celebration or misfortune, all *arisan* members share the expenses for these occurrences. Communities form *arisan* groups as a cooperation system to help members manage the large expenses associated with celebrations and unexpected developments.

Figure 9 illustrates the major expenses for most households are consumption, followed by school expenses. Contributions to *arisan*/rotating savings are also high. Expenses for farming materials and cigarette are the next highest and are managed by the men. There is a common joke that husbands sometimes put 'extra expenses' in the agriculture expenses to cover the cost of cigarettes.

Pie chart values: 5.62, 7.29, 8.62, 10.15, 10.16, 10.29, 10.33, 15.38, 26.74

Legend:
- Credit debt
- Saving and asset
- Communication
- Transportation
- Farming materials
- Arisan/Rotating Savings and Credit
- Cigarette
- School needs/fee
- Daily consumption
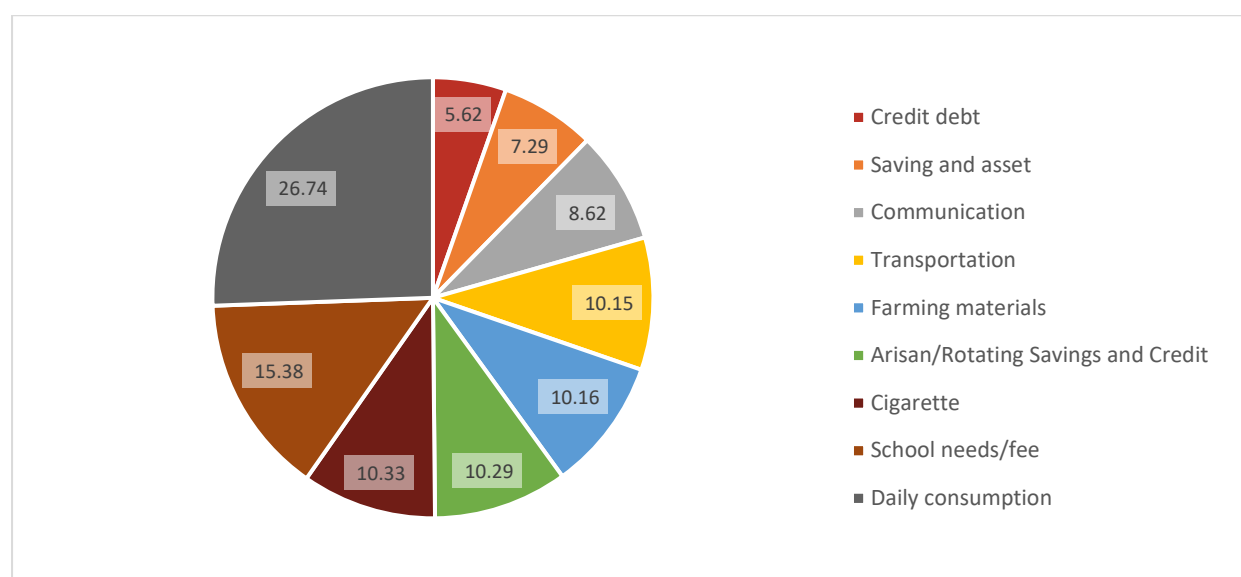
Figure 9. Expenditure streams of coffee farmer's household in Pagar Alam District

3.5 Access to training on coffee agroforestry crops

The Pagar Alam local government fully supports the development of coffee farming, realizing that Pagar Alam coffee was previously unknown. Nowadays, the prestige of Pagar Alam coffee has started to rise. The local government has some capacity building programs to improve community capacity in producing high-quality coffee; however, not many farmers were involved in those capacity building programs. Most of the farmers' skill originates from self-learning through the discussion between the farmers, informal farmer sharing, and sometimes from the media (television, radio, and the internet). Of the total respondent to the surveys, the number of the male who has been trained is 23.2%, while for female it is 16.8%. The other respondents received their skill and knowledge from informal sharing and media were about 60% (male is about 28.8% and female 31.20%).

Self-assessment through group discussion indicates that farmers have low to medium level of skill and knowledge on the good coffee farming practices. Farmers agree they still need more assistance, particularly for women farmers regarding shoot-grafting and pruning technique. Their gendered capacity building priorities are provided in Figure 10.
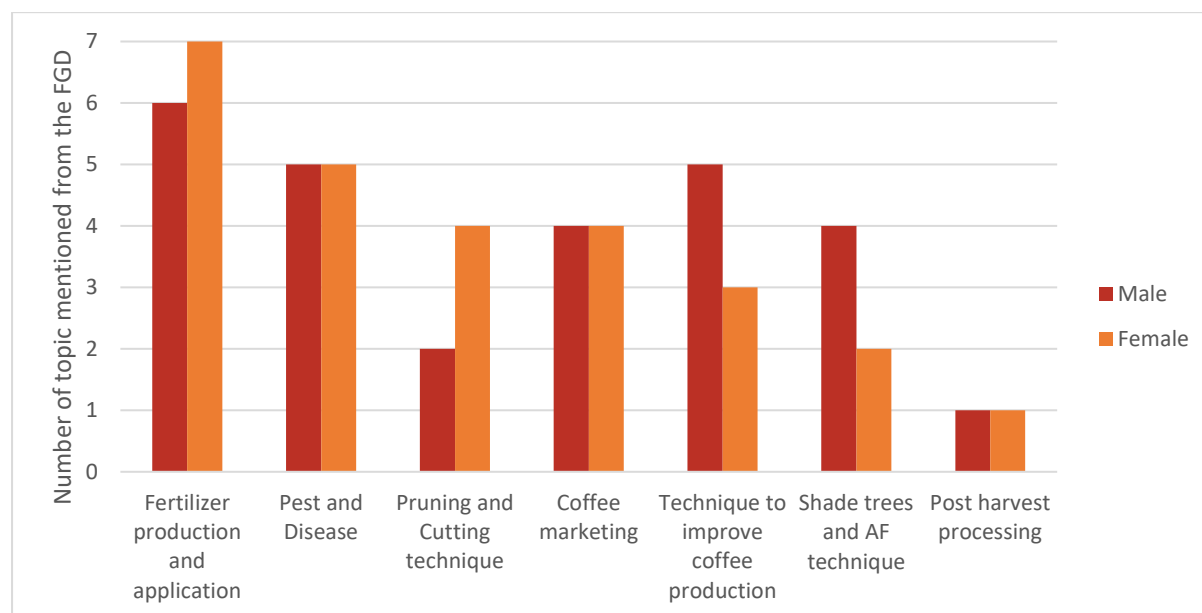
Figure 10. Gendered coffee management training topics of prioritized by the farmers

3.6 Decision making and power relations in coffee farmers household

The data from the household survey demonstrate that most of the decision-making power is with men. That includes the decision making for farm production, household management, as well as accessing financial services. Also, as already mentioned, men still dominate the decision making for household expenses and budget. The study results show that men dominate and are persistent in all decisions, particularly those related to productive work. Women tend to adjust their decisions after intra-household discussions, incorporating their spouse's preference into their decision (Table 5). Only a few women argue with their husbands and negotiate their preference. This demonstrates that men control power relations in all decisions regarding farming, in minor cases women do provide input.

Table 5. Role Play Game result in decision making before and after intra-household discussion

Scenario	Responses	Male	Female	Total
People decision after the intra-household discussion				
	Persistence with their choice	36.53	13.87	50.40
	Prefer to change their decision	15.47	34.13	49.60
Still expected further negotiation before making a decision				
	Yes	11.11	6.06	17.17
	No	35.02	47.81	82.83
Bargaining power		0.67	0.41	

The men and women agree that the household head makes decisions and that men are the household head (Figure 11). The men sometimes make decisions without intra-household consultation, as they feel such discussions are not important, and as the head of the household, the decision is theirs. This indicates that social norms remain firmly rooted in the community. Results indicate only 6% of women affirmatively request more negotiation with their husbands before making decisions.
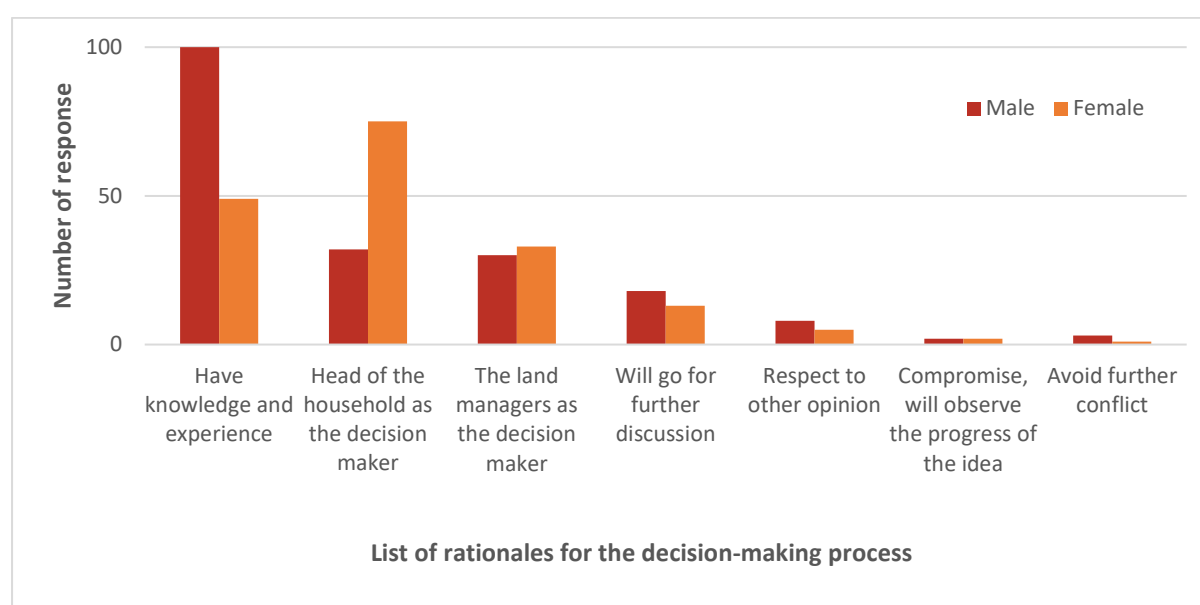
(Source: Role play game)

Figure 11. List of arguments for the decision-making process at household level

Women, who are persistent in negotiating their choice have high confidence levels, feel they have important knowledge and experience in managing their coffee field. Their knowledge and experience in decision making are equally valid. However, the number of women who persistent is low. Overall, the game demonstrates that the bargaining power of both men and women is low, and that of women is exceptionally low. Only a few men were found to be willing to negotiate and accept their spouse's opinion.

3.7 Discussions

Do changes in coffee farming practices impacted gender dynamics?

Shaded-coffee systems are well-known and have been widely practiced by Pagar Alam coffee farmers for many years. Shade tree selection practices have varied over time. While the primary selection criteria are shade value, pepper stake utility, and timber production, new criteria have evolved to include income generation. More recently, farmers have recognized that high-value fruit trees, such as avocado, can serve as shade trees and yield products that can generate additional income. The more diverse the shade tree in the coffee systems, the greater the additional income generation potential. Similarly, intensifying coffee cultivation through the adoption of vegetative propagation, pruning, and other practices increases coffee productivity. The adoption of these management practices has become common in the last ten years.

Initially, only a few farmers tested vegetative propagation and pruning. Those farmers were pleased with the practices and experienced increased coffee yields. These impacts were not unnoticed. Encouraged by the evidence in their neighbors' plots, many other farmers began to learn and adopt these improved practices in their coffee plots. Some of these farmers ask their neighbors for assistance, while others experimented and adopted the practices by themselves.

Most group discussions confirmed that gender roles in both household and agricultural management are quite similar. Men and women work together in the field, sometimes on the same task and sometimes different tasks, depending on conditions, needs and the available times (Quote 1). Although men generally have the skills and responsibility for vegetative propagation and pruning, women can also be involved (Quote 2). As the primary land managers, men have the opportunity and responsibility to learn new techniques; subsequently, women often learn the techniques.

Quote 1: I am going to the garden every day, together with my husband. Usually, we work together, if one person does the pruning, the other will do the same. But if my husband sprays the pesticide, I rarely work with him. When my husband was spraying pesticide, I cut the grasses. In the garden, there are many things we can do. If we need to go to the far gardens, we usually go together, but if the gardens are close, usually my husband goes first, I take care of the household work and cooking before following him to the garden.

Saya ke kebun terus tiap hari, bareng-bareng dengan bapak. Biasanya kami kerjanya sama, satu merempel, ya merempel semua. Tapi kalau nyemprot, ibu2 jarang. Kalau bapak nyemprot ibu nyetek. Tiap hari berangkat ke kebun. Pasti selalu ada yang dikerjakan. Kalau kebun yang jauh berangkat bersama, tapi kalau kebunnya yang dekat,

biasanya bapak duluan yang berangkat, saya ngurus rumah dan masak dulu (Ibu W1, Female, Talang Darat)

Quote 2: In the past I still could not do vegetative propagation, my husband taught me slowly, now I can assist him with grafting of our coffee trees. When my husband is busy and cannot go to the garden, I can replace him to do the grafting. In the past, most women were unable to graft. Now many women have learned the techniques and can help their families with grafting. However, some women still do not have the skills to graft, but I am sure that they can do it if they have the chance to learn.

Dulu saya masih belum bisa nyetek, bapak ajarin pelan-pelan saya bisa, sekarang saya bisa bantu nyetek. Jadi kalau bapak sibuk dan gak bisa ke kebun, saya bisa menggantikan. Tapi dulu banyak perempuan yang tidak bisa nyetek, kalau mereka rajin ke kebun dan belajar, akhirnya mereka bisa nyetek. Sekarang sudah mulai banyak perempuan yang bisa menyetek seperti saya. Namun, saat ini belum banyak perempuan merempel, tapi kalau diajarin pasti bisa (Ibu W2, Female, Padang Temu).

Group discussion also identified information on what coffee management practices women should not do. Interestingly, women are encouraged not to spray pesticides due to dangerous chemicals. Also women are not encouraged to practice pruning due to low skill levels (Quote 3). Women have low skill in pruning, many males I believe they are unable to prune, yet some women do engage in pruning. It is important to note that, contrary to their colleagues, some believe women can learn pruning and other skills to help men improve coffee management systems.

Quote 3: Women should not conduct pruning because their pruning methods are wrong. Occasionally, they do not prune the young shoots but rather the productive stems.

Hal yang tidak boleh dilakukan perempuan adalah merempel, karena kalau merempel (memangkas) mereka masih suka salah. Kadang, bukan tunas muda yang di pangkas, tapi justru batang yang produktif yang dipangkas (Bapak T, Male, Candi Jaya)

The positive change described in previous paragraphs were enabled by men and women gaining new skill and capacity. The chance to participate in extension and capacity building program activities conducted by the local government or other organizations are still focused on the men as the primary land managers in each household. Women often learn from their husbands at a later time. However, there are still cases where women are not given a chance to improve their skills because it is believed women cannot learn skills related to certain coffee management practices. We can see that gender dynamics could change depending on conditions and attitudes in each community. In community where gender-based cooperation in coffee management prevail, skill and knowledge transfer are facilitated, although not in all

households. Table 4 indicates that the gender cooperative households were 17.2% of the total households in the study. While the other 82,8% households still have large gaps on its gender cooperation. There is a need for extension programs that focus on women, encouraging them to be more involved in training events to improve their capacity. These extension programs should not be exclusively for women. They should also engage and inform men, as both men and women conduct coffee plot management.

Do transformations of the coffee agroforestry systems empower the community?

Coffee-based systems in Pagar Alam are evolving towards more efficient and effective management in terms of pruning and vegetative propagation application and the integration of shading trees that yield commercial products. This positive progress is enabled by the positive mindset of the local communities. The discussion in women groups portrayed women's desire to be involved in any development programs regarding coffee-based systems improvement. Moreover, women also indicated that they could help disseminate the knowledge and skill to other passive community members. Therefore, the impact of the program can be scaled out.

From the study data, it can be concluded that the division of work/contribution to farming or productive activities are relatively balanced between the genders and are based on choices made by women and men. Men and women agree that women conduct less physically demanding but more laborious work, while men perform heavy labor, dangerous and skillful tasks. However, women are eager to learn coffee production skills to improve farm productivity (Quote 4). Although, to date, women have comprised a small number of participants in the training or capacity building programs held for the communities.

Quote 4: In the season when agriculture activities and income are limited, husbands work outside the village to earn additional income, because coffee income is insufficient to last all year. If we (women) can learn vegetative propagation and pruning, we can help our husbands and households. Our coffee will grow and produce better. If we only rely on our husbands, what will happen when they go out of town? So, yes, women need to learn to manage our coffee gardens well also.

Kalau di musim paceklik kan suami harus bekerja di luar desa untuk mendapatkan tambahan pendapatan, karena kalau mengandalkan dari kebun kopi saja mungkin masih kurang. Kalau kita (perempuan) bisa belajar setek dan memangkas (merempel) kita bisa bantu pekerjaan suami juga, dan hasil kebun kita akan lebih bagus. Kalau hanya mengandalkan suami saja, gimana pada saat mereka pergi keluar kota? Jadi ya kita harus pintar mengelola kebun kopi kita (Ibu W2, Female, Padang Temu).

However, there was still a stigma in the community, that women should not join training activities. Some male participants made the points as documented in Quote 5 and 6. These cases were encountered during discussions in Muara Siban and Candi Jaya, but not in the other villages.

> **Quote 5:** Women do not need to be involved in training, because women's coffee-management involvement is limited. They only help with drying coffee, so they do not need training.
>
> *Perempuan tidak perlu dilibatkan dalam pelatihan, karena keterlibatan perempuan dalam berkebun cuma sedikit misalnya membantu dalam menjemur kopi, sehingga tidak memerlukan pelatihan. (Bapak M, Male, Muara Siban)*

> **Quote 6:** Is it necessary or not for women to attend training? It may be necessary because women could gain knowledge and become smarter. However, it is unnecessary because women gain enough knowledge from the husband; making it unnecessary for women to attend training. If women participate in training activities, we are worried that domestic work in the household will be neglected.
>
> *Perempuan itu antara perlu dan tidak perlu mengikuti pelatihan. Perlu karena perempuan bisa mendapatkan ilmu dan menjadi pintar. Tidak perlu, karena perempuan cukup mendapatkan ilmu dari Bapak-bapak sehingga perempuan tidak perlu mengikuti pelatihan sendiri. Kalau mengikuti kegiatan pelatihan, khawatir pekerjaan rumah tangga akan terabaikan. (Bapak S, Male, Muara Siban)*

This stigma is unavoidable in the community. Most men feel women should not attend training; most women present a case to attend training but based on cultural norms, they will accept their husband's preference.

Men in specific communities have a perception that women should not join the training. On the other hand, some men acknowledged that women play important roles in coffee management and that building their capacity will complement men's effort and increase coffee system yields. Study results verify that women have different strategies in agricultural production that support men's agriculture work. Women also could support the household by conducting vegetative propagation, pruning, or other coffee activities while men are absent for off-farm work. Further investigation is required to identify why this difference in man's perception occurs between communities. It is postulated that men who do not want women joining training activities come from villages where traditional social norm remain strong. From the study results, it is clear that both men and women still need empowerment in terms of gender issues. Women need to be empowered in terms of skill and capacity. In contrast, men need to be empowered to understand gender relationships and roles, recognizing why women's empowerment in terms of skill and capacity enhance agricultural management and household income.

The role-play game results demonstrate that women still need to obey the head of the household, to the point that they are ignoring their own preference or assuming roles and responsibilities that enhance family income. There is a lack of forum for discussion or negotiation at the household level before decisions are made. Besides that, there remains the view by many men that women are fully responsible for domestic affairs. Community development efforts need to consider empowerment for both men and women to be more effective. This may require men contributing to household management activities.

What are the gender differences in income streams and household work division?

Coffee farmers in Pagar Alam demonstrate gender dynamics when their roles in agricultural production are complementary. However, women continue to have less power in decision-making in the household and regarding agricultural production. Women's contribution to agricultural production is 33% of their total work contribution to livelihood generation (both agriculture and household management); this is in line with their contribution to agriculture income generation through labor, i.e. 31-36%. Most of the agricultural income (including animal production) usually goes to women as the primary household budget managers. However, the decision regarding how to spend the money are made jointly by husbands and wives. In many ways, the husbands retain the key or full control over the decisions. In some cases, women may have full control over domestic expenses.

Income from coffee and other land-based work is categorized as joint income, while income from non-farm and wage-labor is more easily defined as women's or men's income due to the clear work effort and payment system. Non-farm income has become an important livelihood source for both men and women, after coffee harvest, when agriculture management requirements and income are limited. This study was implemented after coffee harvests to assure that men and women farmers were available and focused on non-farm or agricultural wage labor opportunities. Women were perceived to have a considerable contribution to income from non-farm and agricultural wage-labor activities. Non-farm income contribution by women is from trading, with the key products being vegetables, cloth, and coffee.

The introduction of pruning and vegetative propagation technique has had a good impact on most farmers. These techniques improve coffee production as many farmers have verified. There is similar verification evolving that the adoption of more diverse agroforestry systems (with intercropped shade trees) enhance livelihood options, particularly when systems include fruit species with high economic fruit value, such as avocado or *jengkol*. In terms of income, most farmers agree that the contribution of diverse agroforestry systems is positive in providing alternative income during the off-

coffee season. However, in some areas, farmers still struggled to identify tree species for their village that can reliably yield quality commercial products. However, even in those cases the introduction of more diverse complex agroforestry systems did not negatively impact farmers' income.

In summary, it is acknowledged that women's income generation is strengthened by enhancing their agriculture management skills and capacity, which can be used on-farm or for wage labor. This development likewise improves household income and livelihood conditions. Unfortunately, data from the government statistical bureau rarely include or disaggregate women's contribution to agriculture production. Thus, women's contribution to income is documented as low. Women's real contribution to household income and livelihoods is underreported and under-appreciated. More accurate recognition of women's roles and contribution to agriculture production and household income would improve the effectiveness of development planning and extension activities, further improving agriculture production and household incomes.

4. Conclusions

The role of men and women in coffee farming are complementary and mutually supportive, resulting in synergism. This study shows that, under the existing conditions in Pagar Alam, farmers who have received capacity building interventions on transforming their coffee systems into diverse agroforestry systems, have not experienced any negative potential impacts in their household's gender dynamics.

Key findings from this study are that in Pagar Alam:

- the baseline for women's participation in training and capacity building activities is 16.8%.

- the baseline for women's bargaining power in household decision making is 0.41, while men is 0.67; this shows that men retain higher bargaining power.

- Women's income contribution to household total income is approximately 31% of all contribution, while the acknowledgement of women's roles by Pagar Alam coffee farmers' household, in general, being 30%.

Regarding the gender dynamics in coffee farming households, most of the decision making remains under the control of men, before and after the interventions regarding diverse coffee agroforestry systems. Men's dominance in the decision-making risks exacerbating the imbalanced relationship between men and women in agricultural activities. Addressing the imbalanced relationship requires attention to the gender gaps in roles and responsibilities. The intervention regarding diverse coffee agroforestry systems needs to enhance cooperation and effective communication between men and women at the household level. More opportunities should be given to women to increase their access and participation in capacity-building programs. This is extremely important as women and men are both important actors in agricultural production. Not recognizing women's essential role in agriculture or limiting the opportunities to enhance their knowledge and skills restricts prospects to increase household agricultural production and income. Enhancing women's opportunities and capacity is not solely about women's empowerment, but more importantly, about household empowerment through increasing agricultural production and household income.

Recommendations for gender-sensitive approaches in project activities related with introduction of diverse coffee agroforestry systems.

This study's recommendations may be applied to other locations with local contexts that are similar to Pagar Alam. Recommendations regarding gender-sensitive activities and the introduction of diverse coffee-agroforestry systems can be grouped into two categories: i) designing the gender-sensitive activities, and ii) monitoring plans.

1. Activities that can enhance women's involvement in interventions regarding diverse coffee agroforestry systems are:
   - Continue day-to-day activities with more emphasis on involving women farmers, e.g. in all capacity building activities set aside 30-50% of women farmers' participation.
   - Identify existing female, male or couple champions to assist the program in attracting more women participants and other communities.
   - Hire women facilitators to work closely with women farmers and building trust.
   - Develop a Gender Action Plan that contains specific guidelines for programme design and implementation, include example d activities and evaluation metrics.
   - Develop a Gender Safeguard to help in guiding field facilitator in mainstreaming gender approach
   - Develop specific program activities for women to improve their awareness and confidence in their skills and capabilities (particularly where their knowledge differs from men's knowledge),
   - Include gender awareness building in all community assistance activities, not only for women but also for men. This can be achieved through gender awareness training for both men and women, leadership training, or other soft skill capacity building.

   A key justification for these activities is that capacity building: i) empowers both women and men; ii) increases agriculture productivity; and iii) increases household income and livelihoods.

2. Recommendations for monitoring achievements of a gender-sensitive interventions that supports diverse agroforestry systems, are summarized in the table below:

Activities	Means of verifications	Benchmark	Targeted outcomes
Develop the capacities of implementing staff and field facilitators on gender-sensitive approaches	Field staff and local facilitators have been trained	No to low capacities, and no gender related training yet	Most of the field staff have started to use a gender-sensitive approach in facilitating local communities
Encourage active and effective participation of women in community trainings and meetings	Percent of female participants in trainings and meetings	0 to 10% of participants have been women	Female participation increases to 10 – 20%
	Women have confidence to express their ideas in the meeting	Only few women who have the capability to talk in public meetings	Women who participate in the program have confidence to express their opinions
Development of women's capacities to adopt coffee-based agroforestry management techniques	Training modules (materials) were designed with gendered-disaggregated information and in consultation with gender experts	Training/modules did not consider gender sensitive issues	Gender-sensitive training/modules
Support communities (both men and women) in practical business skills to enhance their participation in coffee-based agroforestry business activities	Series of business skill training courses	Limited business skill training was conducted	Business skill training course that involving both men and women
	Women involvement in all courses	Low involvement of women in past trainings	Female participation increases to 10 – 20%
	Gender-sensitive modules included in courses	Trainings and modules did not consider gender sensitive issues	Gender-sensitive training/modules

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Acknowledgments

Annex 1. Questionnaire for in-depth interview

Checklist Question (Individual In-depth interview)

1. What are the types of land-use systems in your village, and what kind of coffee farming systems exist in the community?
2. What is the history of coffee farming in your areas? How many people are practising monoculture coffee farming? How many people are practising agroforestry?
3. What are the land-based livelihood systems in the local community, how many people depend on each livelihood sources, and how do they depend on it?
4. How productive is each coffee practice? If the informant could compare, please compare the differences between each coffee practice?
5. How is the process of transformation from your current coffee farming practices to more complex coffee-based agroforestry from your perception? What are the reasons behind your decision? Do you think the process went well? Do you think that would have success? Give the reason for your answer.
6. What is your perception is the use and the role of shade trees in your coffee-based systems?
7. What kind of shade trees do you prefer to plant in your coffee systems and why you choose them?
8. What kind of shade trees do you think are good to be planted in your coffee systems, but don't plant it? Why do you think it's good? Why you don't plant it? Do you think you will plant it in the future?
9. If you plant shade trees, but others are not planting them, could you please explain why they don't plant them? Do they have specific reasons?
10. Do other coffee farmers not agree with the transformation from current practices to agroforestry? Why they don't agree? Do you understand their reasoning? Do you think the transformation would have negative or positive impacts? Please explain
11. What are the gender divisions of work in your current agricultural systems? What usually men do? Women do? Boys and girls do? Mother and father do? Who is more dominant with each task?
12. How do men and women contribute to household income? What do women usually do to earn money? Also, what do the men do? Is women's income taking into account in the family?

Specifically for informants who have previously received the following training

1. What kind of training/capacity program have you received? Nursery, organic fertilizer, coffee business program, etc?
2. Do you think the training was important for your future? How was the training important?
3. Have you or do you plan to utilize the knowledge gained from the training? How will this affect the division of work in the household between all of the family members? How will this affect the division of work between group members in the community?
4. Do you have plans regarding how to arrange benefit-sharing mechanisms?

Annex 2. Questionnaire for the structured individual interview

Research purposes

This research activity aims to determine the life of the people in Pagar Alam, especially those who depend on coffee plantations. The life that they want to understand is how women and men contribute to coffee farming and manage the shade trees in their gardens. We hope you can help answer questions because the results of this study will be very useful to provide input on how to get a good approach in dealing with the community managing coffee gardens.

A. Detailed respondents' information

QUESTIONS	Response	Answer (Write the code)
1. Interviewer		
2. Date of interview		
3. Village		
4. Sub-district		
5. District		
6. Coffee systems	Monoculture-coffee (1) Simple-Agroforestry (2) Complex-Agroforestry (3)	
7. Household code		
8. Name		
9. Sex	Female (1) Male (2)	
10. Age (year of birth)	(year of birth)	
11. Education	No school (0) Elementary School (1) Junior High School (2) Senior High School (3) Academy/University (4) Others (5)	

QUESTIONS	Response	Answer (Write the code)
12. Marital status	Have been married (1) Married (2) Single (3)	

B. (1) Number of the plot, location, shade trees species, and the use of the shade trees

B.01 The number of the coffee garden plot:	Area size	Distance from the main road (1) Close (0 – 300m) (2) Medium (300m – 1km) (3) Far (>1km)	Mention 5 main shade trees planted? Rank based on the most important/preferable (use the card)	A number of the planted trees?
	B.02	B.03	B.04	B.05
Identified the most important coffee plot			1.	1.
			2.	2.
			3.	3.
			4.	4.
			5.	5.

Re-write 5 shade trees	B.06 Indicate the main use of each shade tree species. Rank from the most important.	Rank based on the most important
1.	a) Increase soil humidity b) A good shading c) Improving coffee productivity d) Prevent pest and disease of the coffee tree e) Others, ... f) Others, ...	
2.		
3.		
4.		
5.		

B. (2) Knowledge and preferences of shade trees

B.07	The effect of shade trees grown in farmer-owned garden systems	Value: Good (1) Neutral (2) Bad (3) Don't know (4)
a) Coffee growth		
b) Coffee productivity		
c) Coffee bean quality		
d) Soil humidity		
e) Soil fertility		
f) Soil erosion		
g) Fertilizer application		
h) Weed control		
i) Plant and animal biodiversity		
j) Local climate regulator		
k) Wind control		
l) Pest and disease control		
m) Light control		
n) Source of nutrition		

C. Decision making of agricultural productivity

		Who decides on the following activities? Respondent (1) Spouse (husband/wife) (2) Another family member (3) Other condition (4) Together (10)	How you think you have power in deciding each following activities No (1) Moderate (2) Very much (3)
	ACTIVITIES	C.01	C.02
1	Decide the main tree commodities		
2	Decide shade trees species		
3	Decide the planting materials		
4	Decide chemical types and dosage		
5	Decide when to do the weeding		
6	Decide how the coffee will be harvested? The time and the type of bean products		
7	Decide how the post-harvest processing?		

D (1). Access to production modals/capitals/input

		Who owned these items? Respondent (1) Spouse (husband/wife) (2) Another family member (3) Other condition (4) Together (10)	Who decides to sell these items? Respondent (1) Spouse (husband/wife) (2) Other family members (3) Other condition (4) Together (10))	Who decides to purchase these items? Respondent (1) Spouse (husband/wife) (2) Other family members (3) Other condition (4) Together (10)
Items		D.01	D.02	D.03
1	Coffee garden			
2	Livestock: cow, buffalo			
3	Small Livestock: goat			
4	Poultry			
5	House and home garden			
6	Vehicle			
7	Input: planting material			
8	Input: chemical			
9	Input: tools			

D. (2). Credit access

		Who decides to get and find credit sources? Respondent (1) Spouse (husband/wife) (2) Other family members (3) Other condition (4) Together (10)	Who decides to use the money get from the credit? Respondent (1) Spouse (husband/wife) (2) Other family members (3) Other condition (4) Together (10)
Source of credit		D.04	D.05
1	Bank or formal financial sources		
2	Credit scheme (NGOs, and other schemes)		
3	Informal credit scheme		

D (3). Market access

		Who decides how the post-harvesting of coffee production? Type of coffee to produce? Respondent (1) Spouse (husband/wife) (2) Other family members (3) Other condition (4) Together (10)	Other question
Decision		D.06	
1	Who decides where they will sell the coffee?		1. Where and to whom they sell the coffee?
3	Who decides the price?		
4	Who usually does the selling?		

D.(4) Group membership and any other public activities

ACTIVITIES		Who usually become the member or active in these group? Respondent (1) Spouse (husband/wife) (2) Other family members (3) Other condition (4) Together (10)	How active you involved in these groups? Not active (1) Just active in a while (2) Quite often following the groups (3) Group administrator (4) No answer
	Group types	D.07	D.08
1	Farmers group		
2	Forest farmer group		
3	Other groups, mention ………………………………………………………		
4	Other groups, mention ………………………………………………………		
5	Others, mention ………………………………………………………		

D. (5). access to information

No	Questions	Answer
D.09	Who decides to follow any capacity-building activities	Respondent (1) Spouse (husband/wife) (2) Other family members (3) Other condition (4) Together (10)
D.10	Are you discuss the thing that you learn from any capacity-building activities	a. No b. Discussing some issues c. Discuss and applied
D.11	Who usually access the information on agricultural-related things from any information media, as tv, radio, and others?	Respondent (1) Spouse (husband/wife) (2) Other family members (3) Other condition (4) Together (10)

E. (1) Decision making in livelihood sources and household income

		Using 10 buttons, put the button to indicate how you decide for each livelihood sources	Using 10 buttons, indicate how are your contribution to these livelihood sources	Using 10 buttons, indicate how are your spouse contribution to these livelihood sources
Code	Description	E.01	E.02	E.03
a)	Crops			
b)	Commodity: coffee			
c)	Commodity: shade trees (non-coffee)			
d)	Livestock			
e)	Non-farm activities			
f)	Wage labor			
g)	Migration, still in the same province			
h)	Migration, out of the province			
i)	New livelihood sources e.g nursery business, the organic fertilizer business			
j)	Other activities, mentioned …………………………….			
k)	Other activities, mentioned …………………………….			

E.04. Additional questions for any livelihood sources

1. Source of livelihood out of the village but still in the same province:
   a. Where? _____
   b. Description?
      _____

2. Source of livelihood out of the village, out of the province:
   a. Where? _____
   b. Description?
      _____

3. Others,
   a. Where? _____
   b. Description?
      _____

E. (2) Decision in managing family expenses

		Imagine the total expenses will be 100 buttons, how many from the 100 buttons you use for this below expenses? The total should be 100
Code	Description	E.05
1	Daily consumption	
2	School needs	
3	Farm input: planting materials	
4	Farm input: chemical	
5	Cigarette	
6	Transportation	
7	Communication	
8	Saving	
9	Arisan/traditional money rotation	
10	Vehicle	
11	Assets	
12	Others, ………………………………	
Total		100

Code	Deskripsi pengeluaran	Who holds the money for these expenses? Respondent (1) Spouse (husband/wife) (2) Other family members (3) Other condition (4) Together (10) No expenses (98) Don't know (99) E.06	Who decides for taking these expenses? Respondent (1) Spouse (husband/wife) (2) Other family members (3) Other condition (4) Together (10) No expenses (98) Don't know (99) E.07
1	Daily consumption		
2	School needs		
3	Farm input: planting materials		
4	Farm input: chemical		
5	Cigarette		
6	Transportation		
7	Communication		
8	Saving		
9	Arisan/traditional money rotation		
10	Vehicle		
11	Assets		
12	Others, ………………………………		

Annex 3. Role Play Game 1

The following questions are to understand how people manage coffee gardens and the various choices in managing their coffee gardens. These questions are simulated questions or games, where the same questions are given to you in several different situations.

For enumerators: Questions are given in order, situation 1 first and situation 2.

Situation 1
1. Which coffee garden management system is preferred?
A. Monoculture-coffee (coffee plant only)
B. Simple-Agroforestry (consisting of 1-2 types of shade trees with a total of only 10 trees in 1 ha)
C. Complex-Agroforestry (more than 3 types of shade trees with a total number of more than 10 trees in 1 ha)

2. Preferred shade tree types on your farm:
A. Gamal
B. Avocado
C. Kapok

3. How many shade trees did the Respondent think would be best in their coffee system and explain why
A. Only 1-2 species
B. Better many species

Situation 2.
The following questions are the same as the previous questions, but before answering, you need to discuss with other families/household members, in this case, the spouse. However, the answers of other family members or your spouses are not the same as yours. I wonder, did your answer stay the same as your answer in situation 1, or did it change.

For the enumerator: If the husband is interviewing, assume that the Respondent needs to discuss with the wife, and vice versa. Negotiation activities do not need to be carried out, what is asked is the conclusion of the results of the discussion between the Respondent and the spouse, and what kind of answer the Respondent ultimately chooses. If the Respondent does not have a Spouse, it can be other family members, such as their parents. Prioritized are family members of the opposite sex, for example, if it is Male, the other members who are imagined for the discussion are the mother or female child, and vice versa.

Pay attention to the previous Answer Respondent
1. If the previous Respondent's Answer was A, then in this situation, it says that the Answer Spouse Respondent is B (not the same Answer as the Respondent's Answer), then ask what both of them decided, is the Answer still A, a B or C?

Which coffee garden management system is preferable?
A. Monoculture-coffee (coffee plant only)
B. Simple-Agroforestry (consisting of 1-2 types of shade trees with a total of only 10 trees in 1 ha)
C. Complex-Agroforestry (more than 3 types of shade trees with a total number of more than 10 trees in 1 ha)

Explain why the Respondent changed the previous answer or not
....

2. If the previous Respondent's Answer is A, then in this situation, it says that the Answer Spouse Respondent is B (not the same Answer as the Respondent's Answer), then ask what both of them decided, is the Answer still A, a B or C?

Types of shade trees that you like on your farm:
A. Gamal
B. Avocado
C. Kapok

Explain why the Respondent changed the previous answer or not
....

3. If the previous Answer Respondent is A, then in this situation, it says that the Answer Spouse Respondent is B (not the same Answer as the Respondent's Answer), then ask what both of them decided, is the Answer still A, or does it become B?

How many shade trees did the Respondent think would be best in their coffee system and explain why
A. Only 1-2 species
B. Better many species

Explain why the Respondent changed the previous answer or not
....

Annex 4. Role Play Game 2

The purpose of these questions is to understand how people decide to manage a coffee garden. This question is a simulation, in which there are several conditions to be described but those conditions do not occur, only presuppositions. Mr / Ms please answer the following questions while imagining if the conditions described in these Questions occur and influence the decisions made. What is exemplified in these Questions is not a promise, it is only a presupposition.

(1) You have a 1 ha coffee garden with lots of shade. If there was a program, and in that program, you were asked to cut down the shade trees on your land, what would your options be?

a. Clear all trees and follow the program

b. Maintain shade trees, as you believe shade trees are beneficial to increase coffee production

c. Maintain shade trees because you believe that shade trees can provide additional income

d. Maintain shade trees, because you don't have the labor or money to cut them down

e. Others, ...

(2) You have a 1 ha coffee garden. A program introduces agroforest gardens by distributing 40 shade tree seedlings to be planted on your land and your neighbors (2 households). You and your neighbor have to divide 40 seedlings, and you will be asked to state how many shade tree seeds to plant in your land. The following is a selection of the number of shade tree seeds that you want. The total number of trees that will be planted on your land and the number of trees that your neighbors will plant should not be more than 40 seeds, if more then you and your neighbors will not get the seeds. So the total amount they are asking for must be exactly 40 or less. What number of seeds do you want for yourself?

Enumerator: To answer this question, Respondent can only guess how many choices the Respondent's neighbours have. Use the card to see the Answer option given and the consequences for the Answer Respondent.

a. 30

b. 25

c. 15

d. 10

Explain why it was your choice:

....

(3) You have a 1 ha coffee garden. A program introduces agroforest gardens by distributing 40 shade tree seedlings to be planted on your land and your neighbors (2 households). You and your neighbor have to divide 40 seedlings, and you will be asked to state how many shade tree' seeds to plant in your land. The following is a selection of the number of shade tree seeds that you want. The total number of trees you ask for and the number of trees your neighbors ask for should not be more than 40 seeds, if more then you and your neighbors will not get the seeds. How many seeds do you want for you if your neighbor asks for 25 seeds?

Enumerator: To answer this question, the Respondent can imagine negotiating with the Respondent's neighbor who asks for 25 seeds. Use the card to see the Answer option given and the consequences for the Answer Respondent.

a. 30

b. 25

c. 15

d. 10

e. Ask your neighbors to reduce their demand

Explain why it was your choice:

....

Role-play conclusions:

The role play will show how the community's characters, both Female and Male, decide which garden management model they want and how they interact with each other to achieve their goals.