

The recognition and development of rural women's agricultural labor in Indonesia: determinants of participation using a *logit* model

Reconhecimento e desenvolvimento do trabalho agrícola feminino rural na Indonésia: determinantes da participação utilizando um modelo logit

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Abstract: The contradiction between the fact of the highest women's participation in domestic work and their productive activities has the lowest social recognition in the role of women in the agricultural sector, and it is still continuing. According to employment data, the development of women workers in agricultural household could be accomplished effectively. Hence, the aims of this research are (1) to interpret the men's and women's labor input in agricultural and non-agricultural sectors based on social recognition perspective; (2) to analyze the correlation between women's participation in work and household income; and (3) to analyze the contributing factors to participation and development of the women workers. This research used a case of study located in rural areas of the potato production center in Pasuruan Regency. Determination of the research subject used purposive sampling of 240 samples of agricultural households. Data analysis used descriptive statistics analysis, Pearson correlation, and logistic regression. The result of research shows that women are able to participate in any types of working sector, and it build positive recognition from the community, although the men's labor input are still more dominant. Women's participation in work has a significant and positive correlation of 0,9 with household income, and it is clearly explained by the highest value of recognition level. The age factor of the head of the family, number of dependents, land areas, income from other family members, and the expenditure level of the household are the entire elements that become the contributing factors to participation of the women workers. The development of women workers includes the establishment of relevant development goals, giving socialization, and work training by providing them with financial support and guidance.

Keywords: potato farmers household, recognition, women's participation in the labor force.

Resumo: A contradição entre a elevada participação feminina no trabalho doméstico e o baixo reconhecimento social do papel da mulher no setor agrícola persiste. De acordo com dados de emprego, o desenvolvimento das trabalhadoras rurais poderia ser alcançado de forma mais eficaz. Assim, os objetivos desta pesquisa são: (1) interpretar a contribuição de homens e mulheres para o trabalho nos setores agrícola e não agrícola sob a perspectiva do reconhecimento social; (2) analisar a correlação entre a participação feminina no trabalho e a renda familiar; e (3) analisar os fatores que contribuem para a participação e o desenvolvimento das trabalhadoras. Esta pesquisa utilizou um estudo de caso em áreas rurais do centro de produção de batata no distrito de Pasuruan. A amostra foi selecionada por amostragem intencional, com 240 famílias de agricultores. A análise dos dados utilizou estatística descritiva, correlação de Pearson e regressão logística. Os resultados da pesquisa mostram que as mulheres são capazes de participar de diversos setores de trabalho e conquistam reconhecimento positivo da comunidade, embora a contribuição masculina para o trabalho ainda seja predominante. A participação das mulheres no mercado de trabalho apresenta uma correlação positiva e significativa de 0,9 com a renda familiar, o que se explica claramente pelo alto nível de reconhecimento. A idade do chefe da família, o número de dependentes, a área de terra, a renda de outros membros da família e o nível de despesas da família são elementos que contribuem para a participação das mulheres no mercado de trabalho. O desenvolvimento das mulheres trabalhadoras inclui o estabelecimento de metas de desenvolvimento relevantes, a socialização e a capacitação profissional, além do apoio financeiro e da orientação.

Palavras-chave: domicílio do agricultor de batata, reconhecimento, participação das mulheres no trabalho.



1 Introduction

The reality about a male and female who are standing nowadays as one of the human resources in the agricultural household sector in Indonesia is represented as a normal phenomenon. The development of women's labor force participation in the agricultural sector in 2023 is 13.709 million, or 34.7% and it is growing to 14.563 million, or 35.7%, in 2024 (Statistic Indonesia, 2024a). On a global scale, most women often do their work to fulfill their needs in their households that thing is aligned to rural economic development and rural socio-economic changes (Dalchiavon & Mello, 2015; Food and Agriculture Organization, 2019; Huang & Li, 2025; Salari & Javid, 2019; Tewari & Wang, 2021).

The phenomenon in many rural areas shows that most women do not contribute in the agricultural sector only but also in the non-agricultural sector to earn additional income for their household. This role is crucial dealing with uncertain economic conditions due to the dependence on unpredictable seasonal agricultural products (Bedemo et al., 2013). Women's strategic role in this sector will strengthen their households and ensure daily needs are fully provided, although have to deal with uncertain conditions in the agricultural sector. The agricultural sector becomes the primary source of income for 45,34% of society, which lived in rural areas (Global Business Guide, 2016). In 2024, the agricultural sector absorbed 28,18% of workers from the total of workers in Indonesia and contribute approximately 12,98% of Indonesian Gross Domestic Product in 2023 (Statistic Indonesia, 2024b).

The reliability phenomenon in the agricultural sector is found in many rural areas, such as in the same location where the research is held in Tosari District, Pasuruan Regency. The households are familiar with the relocation of workers during the economic crises. The women workers not only become financial providers but also achieve higher social recognition around their community. This dynamic aligns with the discourse of rural development in Latin America that emphasizes the importance of productive inclusion and social recognition of the workload of women workers in rural areas (Perazza et al., 2014; Salazar et al., 2024).

Pasuruan Regency is known as one of the centers of potato production (*Solanum tuberosum* L.) in East Java Province, Indonesia, which significantly contributes as the main supplier of agricultural products nationally or regionally. Tosari District is located in a strategic area that contributes the biggest potato production. It is located in the plateau area with a height of 1,600 meters above sea level. The agroclimatic condition in Tosari District is ideal for dryland horticulture, especially for potato (Devaux et al., 2014; Hijmans, 2001). Consider a vital role as a center of potato agriculture; Tosari District becomes a relevant and representative research site to examine the recognition and development tests of women workers in the agricultural sectors in this rural area. To achieve comprehensive understanding, it is important to explore the history and geographical condition of potato cultivation.

The potato came from the Andes, a region in South America, where the traditional society, especially for women played crucial role in the domestic work, selection, and cultivation activities for a thousand years (Molina et al., 2022; Thomas & Sansonetti, 2009). Following that, this plant was introduced in Indonesia during The Dutch colonial period (VOC era) in the end of the 18th century as a strategy to secure the food supply (Boomgaard, 2003). Over the centuries, potato has adapted to plateau conditions in Indonesia, such as in Tosari District. By drawing a line from Andes plateau to the mountainous region in East Java Province, Indonesia, this research acknowledges the same agricultural heritage. The gender division of labor currently is observed in potato cultivation in Indonesia and could be analyzed in a larger transcontinental dialogue about rural areas and family agricultural development, which is derived from Latin America. This context is discussed about the recognition and development of women workers in the agricultural sector in rural areas in Indonesia that are worth exploring.

The more women are active in many kinds of economic activities, the bigger their role and impact for the family and environment that will affect the social norm changes that are linked to gender (Food and Agriculture Organization, 2019). The women's participation in the working sector is not only related to the economic aspects but also to the wider social changes. Their involvement in non-agricultural sectors will help their household to survive in the lean season and contribute to strengthening long-term economic resilience. Besides, the women's contribution into their families could enhance their independence and their role in making decision that will ultimately contribute to developing the rural areas in general (Chen & Ge, 2018; Doss, 2018; Huang & Li, 2025). Women's participation as workers is in line with the Sustainable Development Goals (SDGs) achievement, particularly in gender equality. The improvements of women's roles in the economic sector, both formal and an informal will minimize the gender inequality, increase the financial independence, and also strengthen their position in the community (recognition). The recognition impact of women workers in rural areas is important to improve their wellbeing and establish an equal community (Honneth, 2009).

The recognition phenomenon and women's participation, which has been revealed above, are aligning with the research result declared by Deere & León (2001) about women's empowerment in Latin America. Even though most of the women in the research area (in Pasuruan Regency) have been actively participating as women workers to cover the cost of farming, the recognition of women's status will remain vulnerable if they do not have power making decisions over their land. That thing is similar to the agrarian condition in Latin America, where the female workers are considered as crucial, while the land ownership has historically been and still is weak. The recognition of women's in Indonesian agricultural households must be developed from seeing this gender as the solution to labor shortages. It has become a paradigm that sees and legitimizes their positions and women's roles as equal partners in all agricultural activities. The fact shows that women's roles in agricultural households are still unequal with recognition and response which is growing in Indonesia nowadays, so that this research contributes to expand knowledge and making public policy decisions become more strategic.

2 Theoretical Foundation

2.1 Recognition Theory

The recognition theory by Axel Honneth shows the importance of recognition in any aspects such as love, law, and solidarity that become the basic needs of human beings to self-actualize, create equitable societies in shape the identity and also build social connection. The recognition is not about formal or legal acknowledgements only but also includes an individual process and/or certain group to get validation and appreciation for their existence or contribution in society. The recognition theory has a strong amplifier in politics since equitable acknowledgement and inclusivity has become a key for social democracy and inclusive development. Minimum recognition might result in feeling of powerlessness, unfairness, and create social conflicts. The women workers' recognition refers to the acknowledgement and appreciation for their contribution and role in many aspects of working fields. This includes the ability, skill, and their presence of their effort to ensure gender equality in work place. This recognition is crucial to push their participation within economy development, create inclusive, and equitable working environment. Some aspects are significant related to the recognition of women workers: gender equality, increasing women's participation, breaking the stereotype, enhancing of working quality, strengthening their economic household, achievement and respect, training and development, maternity leave, work flexibility, education and socialization, multiple roles and workload, minimum appreciation, and also the influence of culture and tradition.

Based on Lucas & Oberto (2010), Díaz & Quiroga (2006), and Ribas (2018), explained Nancy Fraser's perspective in the context of recognition in social justice about redistribution, recognition claims, and representation. The redistribution claim is based on the sources and wealth. The recognition is telling about the form of acknowledgment and appreciation of identity, the differences, and dignity for each individual in society. The representation is about the equality in political participation and inclusivity that could be seen in the shaping of social decisions. These claims are to ensure that all the voices are involved during the process of politics and aspiration from all the communities that are represented not only to serve certain elite group. In this way, a comprehensive social justice will represent the social needs without sacrificing the gender participation dichotomy.

Zanin & Lemke (2017) have done the research on several models and theories of multiculturalism, which have been applied to recognition politics in several countries. Indonesia develops a unique multiculturalism process that is suitable for the social characteristics, history, and political systems. The relationship between society and country is not in certain process, but is a dynamic process that has a *Pancasila* and *Bhinneka Tunggal Ika* basis as the social imagination. The attitude of recognition, appreciation, and promotion of the diversity of art, culture, and identity from any cultural groups in Indonesia is expected able to create an inclusive and harmonious society.

Spinelli (2018) examined potential conflict in mining projects, dam construction, and similar projects such as land acquisition issues. The conflict settlement, it causes the disagreement to be identified so that the consensus is able to provide the stability and social integrity. The solution indirectly aligns with the recognition theory of Axel Honneth which explained that attitude and appreciation factors are the most crucial part in daily social life. The absence of recognition will create social conflicts. The process of adapting to the values is adopted by the conflicting group that builds tolerance and open mindedness in the process of conflict resolution.

Herrera et al. (2024) reported women's role in the productive initiation of rural organization, leading the activities related to the production and sales. That role enhances the potential of making decisions and management in their family. The leading productive initiation becomes the access to gain and the only way to get recognition of women's role. Therefore, the women workers have not had fully access to agricultural resources, nor the authority or ability to make decisions. The women workers experience the benefit from the changes by working in the agricultural sector. The changes in women's role are caused by economic issues, the large numbers of men who are switching their professions and the changes in worker demands. Women workers could increase the family's welfare and have multiple roles in domestic and public works. In liberal feminism, most of the women seek gender equality and avoid exploitation. Santika & Yusuf (2024), study the issue about Indonesian female migrant workers both domestically or destination countries, showing that they are at risk of violence. Most of the female migrant workers are employed in the informal sector, such as domestic workers and low-skill care workers. As a consequence, they are vulnerable to discrimination and even violence. This is the result of the absence of recognition of political rights, which restricts access to the policy assurance that will protect them.

2.2 Female Workers in Agricultural Household

The result of the research based on Yuliati et al. (2019) found that the economy of a farmer's household from their resources of workers, production, and management of production, the management of consumption is integrated into the decision-making. The increasing household income is based on food consumption and non-food consumption as the consequences of modern life style.

The incomes from agricultural and non-agricultural sectors are complementary to fulfill the household needs. Most of the same researchers in the past explained the participation of women workers in their households that aims to describe the women's labor input and/or their contribution in the households. It contrasts with the past research that examined specifically econometrics models by using binary logistic regression analysis to test the determinant of women's participation in agricultural households related to economic stabilization. This result shows the researcher's goal is to find out the important factors as the consideration and/or solution to increase the women's role in the effort to stabilize the household economy.

The quantity and quality of women's labor input are closely related to workforce development. Arfan et al. (2025) defines the amount of working hours are referring to the number of labor inputs in farming activities. The number of working hours is divided into the amount of men's and women's labor input (Álvarez & Miles, 2006). The total working hours will affect family income. The income in the agricultural sector is bigger than the other economic activities per working hour. In contrast, the agricultural activities have the potential to provide income that tends to be small, and then the household workers will allocate their time and energy to work in non-farming activities. Lima Erazo et al. (2020) stated the numbers of working hours are carrying out the activities inside and outside the agricultural sector. The labor input is influenced by the age factors, the older a person, the bigger the demands. Meanwhile, at a certain point the demand will decrease as a person gets older.

The labor input refers to the amount of working hours that spent on agricultural activity, non-agricultural activity, and also outside the agricultural activity (Yuliati et al., 2019). According to Bryant (1990) working hours are classified into three categories: the labor market, the households, and the spare time. The activities in the market are used for individuals to do some work to earn some wages. Working in the household is doing the daily routine activities such as cooking, washing, maintaining the house, vehicles and yard, caring for children, and other activities. The amounts of working hours are influenced by several factors, including education, working experiences, the number of family dependents, and managing the land areas (Analia et al., 2024).

The labor input in the agricultural sector is influenced by various factors: (1) natural factors including rainfall, climate, fertility, soil type, and topography; (2) land type factors including rice fields, dry fields, and yards; and (3) areas, location, and distributions. There are three possible labor inputs for someone who works based on their time: (1) working at home; (2) working outside the house; and (3) resting time. These three types of labor input produce the three types of activities: the results of working at home, including cooking, taking care of the children, and cleaning the house. The results of work outside the house are form of compensation or wage that is used to cover the necessities and utilities that are obtained from rest time (White, 2012).

3 Methodology

This research was held in Tosari District, Pasuruan Regency, East Java Province, Indonesia. The geographical location of the study area is presented in Figure 1. The research location is selected on purposively by considering the majority of the household depend on the potato farming sector as the primary activity as the source of living, and also this place has an active Farmer Group Association, which facilitates the data collection and describe the characteristic of potato farmers household in that region. An on-site survey was conducted in June and October 2023, including one potato planting season during 4 months. During this period, primary data was collected through the structural interview with potato farmers households.

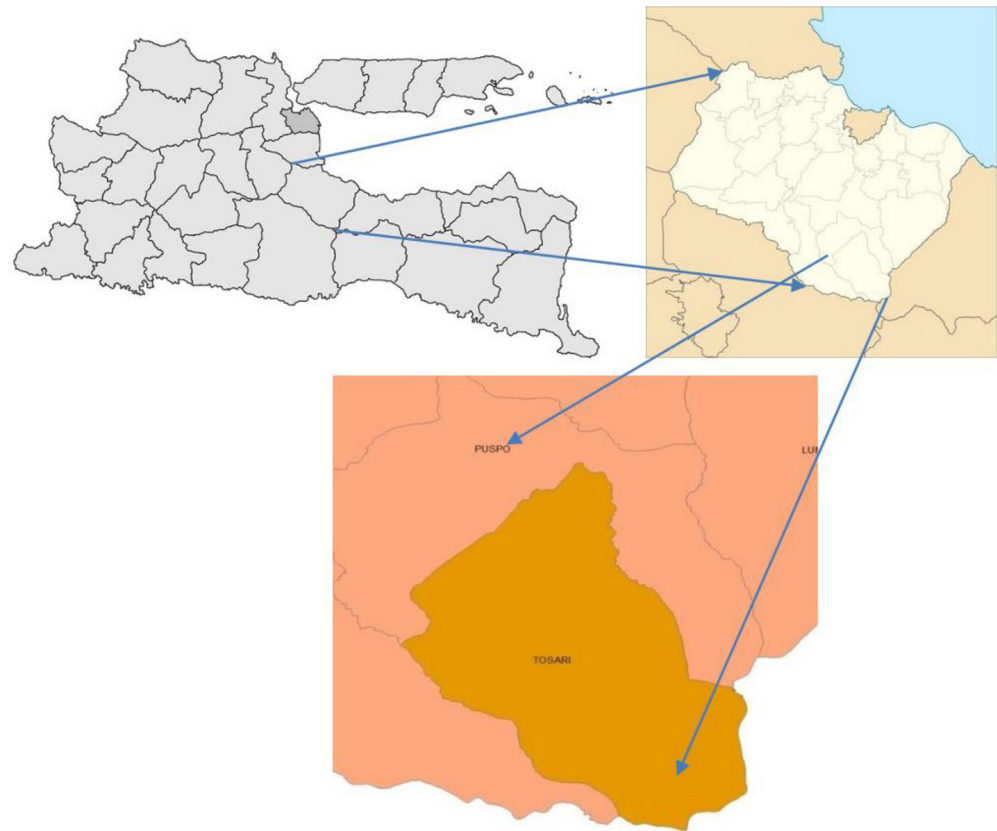


Figure 1. Research Location

3.1 Sampling Method

The population of potato farmers in Pasuruan Regency consists of 595 farmers who are spread across Tosari District. The respondents are selected based on using a purposive sampling method, focusing on the potato farmers' households that are matched with the research criteria and also actively growing potato farming and living in the research area during the research period. The number of selected samples is determined using Slovin's formula with a 5% margin of error. This is the sample calculation where the value of n is the sample size, N is the total population, and e is the margin of error:

$$\begin{aligned}
 n &= \frac{N}{1 + N(e)^2} \\
 n &= \frac{595}{1 + 595(0.05)^2} \\
 n &= \frac{595}{2.4875} \\
 n &= 240
 \end{aligned} \tag{1}$$

The sample size calculation resulted in 240 households' samples. The data tabulation shows from 240 household samples, there were 144 women's participation in the labor force and the other 96 had no women's participation in the labor force.

3.2 Data Collection and Structural Questionnaire

Primary data is collected using structural questionnaire through direct interview. The questionnaire consists of four parts as below:

1. The characteristic of social-economic household, including the age of the head of the household, the number of family dependents, land ownership, household income, and household expenditures.
2. Women's participation in the labor force, including the working time, types of work (agriculture, non-agriculture, and outside agriculture sector), and also wage pattern.
3. The structure of household income, including the income from on-farm activities, off farm, and non-farm activities, such as trade and serve a business outside the agricultural sectors.
4. The household consumption and expenditure, including food and non-food expenditures.
5. The women's participation in labor force activities are defined as their participation in wage-earning and/or unpaid work both in agricultural sector (on-farm), agricultural-related activity (off farm), or non-agricultural activity (outside the agricultural sector, trade or service).

3.3 Data Analysis

This research used three analysis approaches: descriptive statistical, The Pearson Correlation analysis, and binary Logistic Regression (*Logit* Analysis). As the consequences the research title and objectives, the analytical exploration is interpreted and/or linked to the concept of recognition.

3.3.1 Descriptive Statistical Analysis

The descriptive statistical analysis is used to examine the allocation formula and women's participation in agricultural households. This analysis focuses on the labor input through working hours, wage, and wage pattern of potato farmers in 24 hours to increase their household income. The implementation of descriptive analysis is used to know how potato farmers allocate their work schedule and wage to do their business activities, *on-farm*, *off- farm*, and *non-farm activities*, and also the wage pattern with the purpose to fulfilling the economic needs of the farmers' household.

3.3.2 The Pearson Correlation Analysis

The Pearson Correlation analysis is used to test the correlation between women's participation in the labor force and the household income. This statistical method is used to measure the strength and linear direction between the two quantitative variables (Gujarati & Porter, 2009; Wooldridge, 2016). In this research, women's participation in the labor force are refer to women's involvement in income earning activities in agricultural household, including the participation of agricultural sector, non-agricultural, and outside the agricultural sector. The household income represents the total income has earned from agricultural and non-agricultural activities. The Pearson correlation coefficient (r) rages from -1 until +1. This value is close to +1 that explains strong positive relation, a value close to -1 examines the strong negative relation, and the value close to 0 shows no linear relation among the variables (Gujarati & Porter, 2009; Wooldridge, 2016). A strong correlation is the high positive correlation that reflects the highest level of achievement of women's participation so it is natural if they achieve the high recognition.

The analysis begins with the measurement of farm income, and then is followed by evaluation between women's participation in their work activity and the household income.

1. Total Cost of Production or Total Cost (TC)

$$(TC) TC = FC + VC$$

Details:

TC = Total Cost (Rp/Planting Season)

FC = Fix Cost (Rp/Planting Season)

VC = Variable Cost (Planting Season)

2. Total Revenue (TR)

$$TR = P \cdot Q$$

Details:

TR = Total Revenue (Rp/Planting Season)

P = Price (Rp/Kg)

Q = Total Output (Kg/Planting Season)

3. Revenue

$$\pi = TR - TC$$

Details:

π = Revenue (Rp/Planting Season)

TR = Total Revenue (Rp/Planting Season)

TC = Total Revenue (Rp/Planting Season)

The total of household income and the household expenditure of farmers household are measured as follows:

$$I_{rt} = |_{on\ farm} + |_{off\ farm} + |_{Non-farm}$$

Details:

|_{rt} = total revenue of farmers' household (Rp/month)

|_{on farm} = revenue of potato farm activities (Rp/Planting season)

|_{off farm} = Revenue from off-farming activities (Rp/Planting season)

|_{non-farm} = Revenue from non-farm business activities (Rp/Planting season)

$$C1 = Ca + Cb + + Cn$$

Details:

C1 = Total of Household Expenditures (Rp/Planting season)

C2 = Food Consumption Expenditures (Rp/Planting season)

C3 = Non-Food Consumption Expenditures (Rp/Planting season)

Cn = Other Expenditures (Rp/Planting season)

The labor input is identified based on working hours, wage, and wage pattern of women workers in 24 hours. This description is directed to know the working schedule and potato farmer's wage in carrying out the agricultural activities, both on farm, off farm, and non-farm activities including the wage pattern.

Eventually, Pearson correlation analysis is used to analyze the relationship between women's participation in the labor force and the household income.

$$r = \frac{\sum (xi - \bar{x})(yi - \bar{y})}{\sqrt{\sum (xi - \bar{x})^2 \sum (yi - \bar{y})^2}} \quad (2)$$

The Hypotheses of Study:

H0: there is no correlation between women participation in the labor force with the household income

H1: there is a correlation between women's participation in the labor force with the household income

3.3.3 Logistic Regression Analysis (*Logit Analysis*)

The logit regression is used to identify the determining or contributing factors to the participation of women workers in agricultural households. This model is selected as the dependent variable is a binary variable, which is representing the women's participation in economic activities or not. Logistic regression is suitable to be used in economic-social studies and the participation of workers when the result of the variable has two possible categories (Chen & Ge, 2018; Doss et al., 2015; McGuire et al., 2022).

In this research, women's participation in domestic work is identified as their contribution to any activities that earn any income in the agricultural sector, outside the agricultural sector, or non-agricultural activities. Hence, the dependent variable is coded as follows:

Y = Value of 1, there is women's participation in labor force in agricultural household

Y = Value of 0, there is no women's participation in labor force in agricultural household

The logistic regression allows estimating the probability of women's participation in work activities as the function of several socio-economic characteristics in agricultural households. It is in contrast with linear regression that is more appropriate for these types of analysis because it ensures that predicted probabilities remain in the same interval between 0 and 1.

The independent variable is entered in the selected model based on the theoretical consideration and the previous empirical study about the allocation of household workers and women's participation in agricultural activities. Those variables represent the household demography characteristic and the farmers' household expenditures. The equal logistic regression is as follows:

$$P(Y=1) = \text{Ln} \left(\frac{p}{1-p} \right) = B_0 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + e1 - \quad (3)$$

Details:

Y = 0 : No women's participation in the labor force in farmer's household

= 1 : Women's participation in the labor force in farmer's household

X1 = age (year)

X2 = the number of Family Dependents (person)

X3 = land Areas (hectare)

X4 = Income of other family member (Rp/month)

X5 = Farmer's Household Expenditure (Rp/month)

4 Results and Discussion

4.1 The Respondent Characteristic

The demographic characteristic of respondents as presented in Table 1 show the small scale of farmers profiles in rural areas in Indonesia. The data shows the majority of the respondents are in the older group, with an average age between 49.5 years old for the respondent who have no women's participation and the 51.2 years for the respondents who have women's participation in work. This means, extensive farming experiences, average age of 21 to 24 years old, and the highest experience of 43 years old. The longest farming experience reflects the structural correlation between local societies and potato commodities as the main sources of livelihood passed down from one generation to another. Therefore, the accumulation of these experiences is not equal with the education level, where the majority of respondents have only graduated from primary school. The lowest education level becomes the new challenges to adopt the modern technology and access to managerial information which more complexes (Rosenzweig, 2012). According to the recognition perspective, the lowest education background in formal level of education often makes the farmers, especially for females who are not fully appreciated for their intellectual contribution in rural area development.

Table 1. Respondent Characteristic Data

Characteristics	Mean		Std. Dev.		Min		Max		Total		%	
	Y=0	Y=1	Y=0	Y=1	Y=0	Y=1	Y=0	Y=1	Y=0	Y=1	Y=0	Y=1
Respondent									96	144	40	60
Age	49.53	51.26	10.38	10.39	30	30	69	69				
<40 years									16	16	16.67	11.11
40-50 years									37	51	38.54	35.42
>50 years									43	77	44.79	53.47
Education	7.66	6.9	2.50	1.95	6	6	12	9				
Graduated from primary school									64	116	66.67	80.56
Graduated from junior high school									11	13	11.46	9.03
Graduated from senior high school									21	15	21.875	10.42
Number of family dependents	2.94	2.62	1.04	1.11	1	1	4	4				
<3									23	53	23.96	36.81
3-4 persons									73	91	76.04	63.19
Experiences	22	24	10.05	10.14	7	7	43	43				
< 20 years									43	53	44.79	36.81
20 - 40 years									51	89	53.13	61.81
> 40 years									2	2	2.08	1.39
Land Ownership	0.86	0.99	0.34	0.08	0	0	1	1				
Rent									13	1	13.54	0.69
Private Ownership									83	143	86.46	99.31
Land Area	1.19	0.73	0.46	0.41	0.5	0.2	2	2				
<1 ha									42	118	43.75	81.94
1-2 ha									54	96	56.25	18.06

Details: Y=0 No women's participation in the labor force in farmers households. Y=1 Women's participation in the labor force in farmers households.

Based on Table 1 the access to production factors, most respondents manage small areas ranging from 0,2 hectare to 2 hectare. The limitation of land areas, the number of a family's dependents (the majority of society have 3-4 family's dependents) create a real pressure for farmers' households. This condition pushes the household to optimize all the resources for each family member to secure the food supply. This matter is aligning with the argument that came from Deere & León (2001) who declared that the limited access to production, such as the land, and women's participation in work become a crucial sustainability strategy. The economic pressure caused of the large family dependents encourage the female farmers to push women to work in the productive sector, both in their own land area and as farm laborers. This is done to cover the needs that cannot be fully covered by the head of the family (White, 2012).

4.2 The Women's Labor Input in Social Recognition Perspective

The working time allocation refers to the amount of time that is spent on farm activities, off-farm activities, and non-farm activities. The intensity of men's labor input and female household is shown in Table 2.

Table 2. The Allocation of Men's and Women's Labor Input of Potato Farmers Household in Tosari District per Four Months

Types of Work	Men		Women	
	Amount (person-day/4 Month)	(%)	Amount (person-day/4 Month)	(%)
On farm	84.80	52.62	73.07	68.80
Off-farm	21.23	13.17	9.00	8.47
Non-farm				
- Service	36.53	22.67	4.27	4.02
- Selling	18.60	16.54	19.87	28.71
Amount	55.13		24.14	
TOTAL	161.16	100	106.21	100

Table 2 shows the fact about the allocation of men's and women's labor input in order to earn wages that are similar to those who work in non-farm outside the family business activities and do unpaid farm work. It appears that women are working in any type of works, although the amount of men's labor input of 161,16 person-day is higher than a women's 106,21 person-day. The fact shows that most women are working in all types of work and it could be interpreted that the family and society recognize their participation and ability as workers. If the women are unable to do a certain work, they will not be used on other occasions. A fact shows the amount of women's labor input is lower than men. This phenomenon will not be interpreted directly to the lowest recognition because all the societies are admit the highest women's labor input in unpaid domestic activities including taking care of the children. In addition, in potato farming, men are more dominant, while the women are primarily assisting in planting and harvesting. An opinion based on Adeyonu (2014) explained that men allocate more time than women in agricultural activities which are paid and worked in non-farm sector. Women spent more time doing domestic work in the household.

The highest women's recognition appears in Table 2 which shows a type of work such as selling. It is proven that women's labor input of trading reaches out 19,87 person-days, which is higher than a men's labor input 18,60 person-days. The majority of Tosari District societies are selling vegetables from their own farm; and then going around their area to sell the daily staples and foods.

This thing is supported with the potential region in Tosari District becoming a center of vegetable supply in Pasuruan Regency. Unfortunately, the commercial advantage is still limited to the local areas. Therefore, to develop the policy for women workers, it requires creative public policies to develop the potential.

The working day of potato farmers in Tosari District is six days in a week. On Friday, the farmers seldom go to farm area because for Muslim farmers it is the day where they must do their weekly routine, performing Friday prayer and similar activities such as reading the Quran. While for non-Muslim farmers, it was usually used to enjoy the moment to relax at home. During the evening they are gathering to discuss and share the information related to farm and non-farm sectors. The farmer's working hours is quite diverse, for male farmers starting their work from 05.00 am to 11.00 am. Taking a break to do prayer (for Muslims), having a lunch break and then restarting their activities at 01.00 pm to 02.00 pm. While for female's farmers, they usually begin their activities from 06.00 am to 11.00 am. The female farmers usually do not go back to work meanwhile, they are doing domestic work. This always occurs when the female farmers do not work as laborers for others.

The paradoxical social economy phenomenon is talking about women's labor input into recognition perspective; meanwhile they are unable to stand in the same position as men in the authority of taking an action to make a strategic decision in the agricultural household. This matter becomes a challenge for those who create a public policy and are committed to gender equality.

A relevant public policy implication is to encourage the stakeholders to enlarge the local rural areas developing program of agriculture to increase the awareness and insights of society, especially for farmers about women's recognition that has contributed to farmers' welfare. An example of such a program, "The Agricultural Innovation Competition", is for both men and women as the participations. That competition aims to raise the awareness of men and women are equal in terms of achievement, self-actualization, and recognition. The strength of this program is to educate farmers to become more independent and brave to show themselves through the best innovation in society. This program is also created to express an appreciation for their courage to present themselves and remove the stigma that doing self-promotion is something that breaks the rules.

4.3 The Correlation between Women's Participation and Household Income

The assumption that declares the main supporting factor for women workers for their household is to earn additional income to fulfill their needs in family, and it is a necessity. The household income is an achievement from both men and women as the result of their hard work. To test the correlation of women's participation in household income with the identical correlation analysis is to measure the recognition level of women workers. It is common to notice that the highest women's participation will result a great work achievements and recognition, or vice versa. If the correlation of women's participation in the labor force in the household has a high value, it means the recognition from that work is also achieved as high, and vice versa. The result of this correlation analysis are presented in Table 3.

Table 3. The Correlation between Women's Participation in the Labor Force along with the Income of Potato Farmer's Household

		Women's participation on work	Income
Women's participation on work	Pearson Correlation	1	.907
	Sig. (2 tailed)		.000
	N		144
Income	Pearson Correlation	.907	1
	Sig. (2 tailed)	.000	
	N	144	144

Based on the correlation analysis in Table 3, the significant value of $0,000 \leq 0,05$, means the H_0 is rejected and H_1 is accepted. This means, there is an interconnection between women's participation and the household income. The Pearson correlation value is 0,907 or 90,7% which shows women's participation in work has a positive correlation with farmers' household income. It could be examined that the highest of household income from women workers will be able to create the highest recognition of women's role in household income. In fact, women are more active in the production sector, harvesting, processing, and promoting. Meanwhile, the highest recognition of women's participation becomes less strategic for them due to men's status as the head of the family that both normative and cultural terms hold the authority for making managerial decisions in household and agricultural economy matters.

Previous research from Sánchez Aguilar (2021) in Itaquí, Rio Grande do Sul, Brazil used a descriptive qualitative approach, while the research conducted in Tosari District, Indonesia, utilized a qualitative approach using correlation analysis that tested the relation between women's participation in work and the household income. The results of both studies in Brazil and Indonesia turned out to be similar. Sánchez Aguilar found out the importance of women's role the working sector to build the local family agricultural development in the social sector or other reproductive activities such as working in the agricultural sector, farmer's markets, handcraft products, manufactured goods, and raw materials.

Female's farmers in Ethiopia (Nahusenay, 2017), China (Chen & Ge, 2018; Tewari & Wang, 2021) and USA (Salari & Javid, 2019) have participation in the agricultural sector, not only in agricultural products but also in post-harvest activities, promoting activities, and other sectors that support the stabilization of family finance, the fulfillment of basic needs, children's education costs, and multiplier effects on family welfare and quality of human resources to face the global economic challenges.

Working participation and women's recognition to face the multiple challenges (Ardelia & Pramiyanti, 2025). The public work responsibility on average, most women handle eight hours per day added with domestic work as housewives in households. The other challenges are having limited access to technology and funding, also the term of culture that is not supportive and conducive for them. It seems that unequal participation and achievement with the recognition they receive are reflected in the expression "Women are only there to assist their husbands".

In the research site, women are not only responsible to the agricultural sector but also have to do domestic work such as taking care of the household, educating the children, and serving food for the family. Unfortunately, women's roles in making decisions and agricultural management are lower than men's roles as the heads of the family households that have more authority, which have negative impact on implementation of women's recognition. In some cases, women will face the challenges to own and inheriting the agricultural land, thus the access to agricultural resources is limited.

The implication of public authority is required to strengthen the women's recognition that has high participation in work, and one of the examples is shaping "the model unit: the determination of the regional minimum wage of women in the agricultural sector". Based on the perspective theory declared by Honneth, the model unit is aimed at protecting and strengthens the women workers recognition.

4.4 The Contributing Factors to Participation of Women Workers Development Program

The reason or factor for female's potato farmers participating in working the field is the basic factor that is considered in their decision. The contributing factors include the age, the number of family dependents, land area, family income, and the farmer's household expenditures, is presented in Table 4.

Table 4. The contributing factors to participation of Female's potato farmer

Variables	B	SE	Sig
Age	.355	.147	.016**
Number of family dependents	.479	.163	.003***
Land	.669	.309	.030**
Revenue	-.247	.103	.016**
Expenditure	.459	.228	.045**
Constant	3.609	1.18	.002***

Description: *, **, *** shows significant at 10%, 5%, and 1% respectively *Age*

Based on the analysis from Table 4, the age of the head of the household is influenced by women's participation (Sig. 0,016 < 0,05). As the heads of the household are getting older, they tend to delegate and/or collaborate on several responsibilities of agricultural activities with other family member, including the wife. This process always happens along with the physical ability are decreasing, and there is a need to look for another way to keep the agricultural activities working effectively. This moment becomes a challenge and opportunity for women to reach their recognition.

Research from Doss (2018) in Ghana and Chimedza (1988) in Zimbabwe found that as the head of the household is getting older, the bigger tendency to delegate and/or collaborate on several responsibilities of agricultural activities to other family members, especially for women. This matter aligns with findings in Indonesia, the people get older, and they often correlate with the reduction of head of the household and involvement physical work in agricultural sector (Sabar et al., 2023).

The policy implication of women workers' development provides the agricultural training in agricultural guidance with the target of all the household members. The training material covers strategic activities for household development.

4.4.1 The Number of Family Dependents

The bigger of the family member, the higher the possibility for women to participate in agricultural activities (Sig. 0,003 < 0,05). The highest consequences for family memberd are the highest economic needs in the household. Based on that reason, women drive her to participate in productive work to earn additional income for family. Successful women in work participation are able to help them to cover the economic needs that will shape a woman's esteem recognition. This participation could be in the form of direct job in potato farm activity. Women in farmers' household with bigger family members tend to face bigger economic pressure. The financial burden to cover food demand, education, and secondary and tarsier needs increases, it is required to get an additional income to fulfill the needs. Women's participation in the agricultural sector becomes one of the adaptation strategies for household to address economic pressure. Women's decision for work in agricultural sector is also influenced by the labor distribution in the family. The large number of family members allows for a flexible household with other family member, thus the women will have more time to participate in agricultural activities.

The dynamics of women's participation in the agricultural sector are becoming visible within households with more children. The result of observation shows that the elder children often take part to help with household activity or even in farm activities, allowing their mother to be involved actively in farm activities. This phenomenon shows the involvement between women in the agricultural sector is not only related to the economic pressure, but also to the structural aspect in the household, which enables the creation flexibility of work.

Otherwise, for small family members, women tend to have limitations in participating in the agricultural sector because they have the bigger commitment for domestic obligations. The responsibility to take care of children and household becomes the main obstacle for their participation in agricultural sector. This condition shows the bigger family member has the role a supporting factor for women to participate in the agricultural sector. For the small family member is more vulnerable to labor limitations thus, it could restrain the women's participation (Chen & Ge, 2018; McGuire et al., 2022; Sabar et al., 2023).

The public policy implication of women workers' development is the program that provides agricultural household management socialization and creates redistribution programs using household resources (workload distribution) suitable with the theory of Fraser (Sabar et al., 2023). A good understanding of management is expected to give knowledge and skills for all family members to reduce the unbalance domestic workload for women as housewives in households.

4.4.2 Land Area

The larger the land area maintained by the farmers' household, the higher the women's possibility to get involved in agricultural activities (Sig. 0,030 < 0,05). The upgrading land area provides bigger accessibility to women's workforce, thus women help as additional workers to optimize the agricultural products. Women's participation as additional workers becomes the main solution for farmers' households, especially in the limitation of workers outside the family or the limited financial resources to hire workers. The successfulness of addressing labor shortages through women's participation will shape women's recognition. The result of the research generally occurs in any rural area in Indonesia. Rauf & Saputra (2021) found that the larger land area cultivated directly by the farmer's household has a significant positive result on women's participation in paddy farming. Meanwhile, in Bangladesh the land area is not the deterrent factor that significant to women's participation (Chakma et al., 2021). Estanislau et al. (2021) described more about farming feminisms that occurred during the increase in women's participation. This phenomenon shows the changes of gender distribution of roles in the agricultural sector, women will have a dominant role in any type of agricultural activity.

The public authority implication of women workers' development is to provide socialization and social-friendly modern mechanism technology training. Women are given knowledge and skills of modern farming production without shutting out local wisdom.

4.4.3 Income of Other Family Member

The stage of the other family income (besides women) has a significant role in determining of women's participation in the agricultural sector (Sig. 0,016 < 0,05). The household with higher income tends to have lower women's participation in the agricultural sector. This condition occurs in rural areas where the agricultural business still becomes the main community of social livelihoods. The household with the lower income of other family members, the women will work in the agricultural sector to earn additional income for family and fulfill daily needs. Women's participation in the agricultural sector becomes a strategic form to survive in agricultural households. In the moment that income from primary work or family member is insufficient, women tend to take the role as additional workers in the agricultural activities. This involvement might include working on family land, becoming a labor, or running some small business of agricultural basis. The lower family's income will result in the highest interconnection for women's participation in the labor force to keep the stability in economy and households.

The successfulness of women in creating survival strategies or life with a better condition will shape their recognition.

The study in Bangladesh describes women from low income families as being more involved in agricultural activities than women who come from prosperous family (Kabeer, 2016). In sub-Sahara Africa, research found that women become the main workers in agricultural production because the lowest household income, which does not allow them to seek another sector of employment (Doss et al., 2015). Similar research was found by Agarwal (2010), Quisumbing et al. (2014) and Doss et al. (2015).

The public policy implication of women workers' development is to provide on-farm and off-farm training to increase the chance and an opportunity, which are supported by financial access, marketing management, and guidance. The government intervention and the stakeholders are required to support female farmworkers.

4.4.4 Farmer Household Expenditure

The result from Table 4 shows a significant connection between the increase of household expenditure and women's tendency to be involved in the agricultural activities (Sig. 0,045 < 0,05). The financial burden pushes women to participate in agricultural sector to increase household income. The increase of household expenditure occurs due to impact of any factors such as the rising price of daily necessities, education costs, and healthcare expenditure. With this condition, women will participate to do work in the agricultural sector as women workers, maintaining the family's land area, or even doing small business. The successfulness of women gets an opportunity, working chance, and diversification of income to shape their recognition from society or family.

Women's participation in agricultural sectors is more common in households with a high level expenditure rather than in a household with lower expenditure. Some studies were held in some developing countries that show a similar pattern (Sundari, 2019; Ogunlela & Mukhtar, 2009). Moreover, the increase of men's workers has moved to non-agricultural sectors, also strengthening a women's role in agricultural sectors in many developing countries, including Indonesia and Nepal (Gartaula et al., 2010). The similar research in Ethiopia found that women will be more active in agricultural production when the household faces an economic pressure due to the raising price of daily necessities and limited income from the head of the household (Nahusenay, 2017).

The public policy implication of women workers' development is to provide training skills such as backyard area utilization that is used for horticulture cultivation and production systems. This harvest from the backyard garden is expected to reduce the food consumption expenditures.

5 Conclusions

Social or family recognition of women's participation in potato farmers' household in Tosari District is the outcome from the women's labor input in any kind of working field in agricultural and non-agricultural sectors. The qualitative data show women's labor input seems to exist in all types of work, on-farm, off-farm and non-farm activities, although the men's roles are still dominant. The women's participation exists in the form of love recognition, and solidarity based on the theory of Honneth. There is an interesting fact that shows women's participation is higher in the trading sector. The strength refers to the recognition theory by Honneth that is called "social esteem". The women's domination in domestic work could be a burden from

some perspectives, related to gender equality. In this context, Nancy Fraser has mentioned that the redistributive recognition of the human resources in the household is crucial and highly relevant to be implemented.

The level of recognition is determined by the high-low women's achievement in their work participation. A relevant public authority implication is to support the stakeholders in the recognition process to develop the local rural development program to increase the women's recognition insight that is beneficial for farmers' welfare. The insight and discourse of women's recognition, including gender equality are already known in academic circles, yet they remain unfamiliar in their daily lives. Hence, one of the examples of public authority implementation is creating an agriculture innovation competition with both men and women as participants as the expression of equality.

Pearson correlation test analysis has proven significantly that the women's participation has a positive impact on household income with a correlation coefficient of 0,907. This finding should lead the women's position to be more considered from their perspective as part of equality in their contribution when making decisions about the public authority and the process of creating labor and rural development programs. Normatively, that achievement shapes esteem recognition, as the theory of Honneth, the wife's high self-esteem in relation with their spouse and other family members. The significant contribution of women's labor input and their participation to earn the household income through becoming potato farmers in Tosari District should be accompanied by giving them recognition in the context of gender equality. Meanwhile, the fact is quite different. The lack of gender equality and women's recognition are caused by the stereotype that men, as the head of the households perceived as being in the front line while the women as wives, are taking a secondary position, it is leading to invisibly of women's participation in working field especially for those who worked in the family agricultural sector. On the other hand, a low-profile culture, which is embraced by society, also contributes to the lack of recognition for women workers as they strive to reach their actual potential.

The development of women workers is related to the factors that encourage them to participate as women workers to support their household. Logit analysis has significantly proven that the age of the head potato farmer in Tosari District encourages the women to join them in the field to work. Furthermore, the huge number of family dependents and the larger the area for cultivation, the bigger family expenditures have proven to be the contributing factors that push women to get involves in the workplace. However, the higher income of other family members has significantly reduced their incentive to work. The result analysis shows that the involvement of women's role in the households is essential for the existence of potato farmers' households in Tosari District. The strategic role of women's participation should be accompanied by an equal recognition to build the relevant public authority.

The implication of public authority of women workers' development could be implemented by doing socialization, training, and mentoring in collaboration with the community organization, such as the agricultural guidance from the Agricultural Department targeting all the household members and giving a material related to women's recognition and household resources management, such as redistribution theory by Fraser. This program and activity are expected to be able to increase the opportunity and chance and the women's recognition that are also supported by financial access, marketing management, and guidance. The government's and stakeholders' intervention is essential to succeed the development program for women workers in agricultural household. This development could not just rely on women's internal skill. The external support is also essential to accelerate the success of the development program for women as agricultural workers of potato farming household in Tosari District.

The external support or intersubjective recognition to strengthen the women's recognition in Tosari District required the integrative implementation in the three forms of recognition theory by Honneth: love, law, and solidarity. The implementation of the two recognitions has run significantly, namely: the love from family and the agricultural community only has limited impact on maintaining the existence of implicit women's recognition. This could lead to the conclusion that propositions are essential to implement the form of law recognition based on Honneth's theory, so the existence of love recognition and solidarity are synergizes with the law recognition, and in the end the three forms of recognition are explicitly more effective to develop the women workers in agricultural households in Tosari District.

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This study involved human participants (smallholder farmers). All respondents were informed about the objectives of the study, and their participation was voluntary. Informed consent was obtained prior to data collection. The data were anonymized to ensure confidentiality and used solely for research purpose.

Data availability:

Research data is available upon request.

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