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# Asymmetric Information And Farmer's Participation In Tobacco Contract Farming

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## *Abstract*

*Contract farming (CF) is an important tool to initiate structural transformation of agricultural sector in developing countries. However, one of pertinent problems in its establishment is asymmetric information. This problem creates a condition of mutual distrust between the contracting parties and decreases farmer's participation in it. Thus, this study aimed to explain the asymmetric information problem in CF and find the correlates of farmer's participation in it. As one of important industrial crops, this study focused on tobacco CF. This study was conducted at two villages (Antirogo and Nogosari) on two different sub-district (Sumbersari and Rambipuji) in Jember. A sample of 113 farmers were interviewed to collect the data. A descriptive analysis was used to explain the contract arrangement and asymmetric information in tobacco CF. A probit estimation was used to identify the coorelates of farmer's participation in tobacco CF. The results showed that asymetric information does exists in tobacco CF and can be minimized through intense monitoring and increased transparancy. Both of these are possible when the company contracting directly with farmers. Meanwhile, younger farmer and those with more land are more likely to participate in CF. Furthermore, participation in CF is highly correlated with the increases in farm income. Finally, policy aimed to fostering CF should focused more on regulation that minimize the transaction cost of CF. In addition, in the long term, the policy should focused on incentivize young farmers and encouraging youth to enter agriculture.*

**Key words :** contract farming, tobacco, asymmetric information, moral hazard, adverse selection

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## INTRODUCTION

The institution of contract farming (CF) has oftenly been used to vertically coordinate agricultural value chains (AVCs) by agro-processors to procure raw material, the other forms of institution are spot market and vertical integration (Elms and Low, 2013). The establishment of CF is motivated by the need of the processors to have more control over quality, quantity, and the manner in which raw material is produced (Aiello, Enea and Muriana, 2015). The control over raw material cannot be obtained through traditional spot market. On the other hand, although vertical integration provides more control over raw material, establishing and maintaining the operation of vertically integrated value chain require substantial amount of capital and technical resources (Rueda, Garrett and Lambin, 2016). Moreover, in the vertically integrated AVCs, the processors assume full responsibility of production risks. Thus, it leaves CF as the most efficient mechanism for agro-processors to design their value chains.

In the context of economic development, CF has an important role in providing favorable farming conditions. It reduces market, price, and production risks (Mishra, Kumar, Joshi and D'Souza, 2018). Participation in CF makes farmers able to predict the quantity of produce they can sell and the price they will receive. CF can also reduces production risks by providing quality input and extension services (Bellemare, 2010). Furthermore, in the broader context, CF is a precursor of agricultural transformation from a semi-subsistence to a more comercially-oriented and industrialized agriculture (Bellemare and Lim, 2018). Agricultural transformation is characterized by the increases in agricultural productivity and highly coordinated value chains. To increase agricultural productivity, the intensive use of improved farming technologies and high quality non-labor inputs is required. Both of those requirements can be fulfilled through the chanel of CF (Timmer, 2009; Wang, Wang and Delgado, 2014).

However, although CF has an important role in modernizing AVCs and transforming agricultural sector in developing countries (Restuccia, Yang and Zhu, 2008), the rate of farmer participation in CF is relatively low across commodities in Indonesia[1]. The reason farmers choose not to participate in CF has been attributed to the high priority farmers put on independency in managing their farm (Key, 2005). On the other hand, from the company perspective, the main problem arising from CF is the asymetric information problems in the form of moral hazard (non-compliance behaviour of farmer) and adverse selection (farmer choose to participate in CF because of their inherent risk characteristics)[2](Roberts, O'Donoghue and Key, 2014; Zhao et al., 2017a). Both of these problems increase the transaction of cost of CF. To minimize the moral hazard problem, the company must continually monitor farmers, thus it increases monitoring cost. Thus, we hypothesized that the company requires high monitoring cost to minimize asymmetric information effect.

Jember has an agriculture-dependent economy. In 2018, agriculture contributes 27% of the region gross domestic product (GDP) (BPS Jember, 2019a). There are various agricultural commodities grown in Jember.

[1] Percentage of farmers participating in CF, Livestock: broiler (55,69%), dairy (12,15%), cattle (0,28%) (BPS, 2014); Horticulture: Chili (7,67%), Chili sauce (8,03%), onion (3,05%), manggo (6,24%), banana (5,09%) (BPS, 2015a). Plantation crop (2,9%) (BPS, 2015b).

[2] Adverse selection means that farmers participate in CF because they have potential risks, and participating in CF would make them protected from those risks.

Plantations, food, livestock, and horticultural crops are present in Jember. However, Jember agriculture is dominated by plantations crops. Plantation sector contributes 35% to the sector GDP and 9% to the region GDP. The second largest contributor to agricultural sector is food crops which contributes 23% to the agricultural sector GDP and 6% to the regional GDP. The third sector is livestock which contribute 18% to the sector GDP and 4% to the regional GDP. The fourth is horticulture which contributes 10% to agriculture GDP and 2% to the region GDP. The rest subsector in agriculture are forestry, fishery and agricultural services provider which accumulatively contribute 12% to agriculture GDP (BPS Jember, 2019b). These figures illustrate that agriculture, especially tobacco, is crucial to Jember economy.

The use of CF to coordinate agricultural production in Jember is growing rapidly. Many studies have reported that several primary agricultural commodities in Jember are grown under contract farming. For example, the case of broiler contract at four sub districts (Balung, Kalisat, Pakusari, and Tempurejo) in Jember (Widjayanti and Rizal, 2016); chili contract farming between farmers and farm cooperative in Ambulu, Jember (Nandhita and Rondhi, 2018); peanut contract farming in Meru Betiri National Park, Jember (Urip, 2009); and sugarcane contract farming in Semboro, Jember (Lestari et al., 2016). To date, there is no study focusing on tobacco CF in Jember. Thus, this study contributes to fill this gap.

Currently, the type of crop which popularly grown under contract is tobacco. As an internationally traded commodity, tobacco is significantly affected by global macroeconomic risks. Moreover, the global health issue regarding tobacco exacerbates the regulatory effect on tobacco farming, including the issue on child labor and the level of pesticide use. All of these problems create a new challenge for tobacco industry to tighten the control on the production of tobacco at farm level. Thus, many companies which previously obtained tobacco leaf from spot market started to develop their own CF schemes with farmers. This development of CF usually preceded by the acquisition of those companies by multinational tobacco company.

Based on those background, CF is an essential instrument if a company plan to penetrate international tobacco market. However, the persistence of information asymmetric problems and other issues hindered the development of CF in tobacco. Thus this paper attempted to explain the problem of asymmetric information problems and the correlates of farmers participation in CF. The previous literature on CF mainly discussed the effect of CF participation on farmer income (Lestari et al., 2016), farm risks (Fanani, Anggraeni and Syaukat, 2015), and production (Sumartono, 2015). These studies shown that CF has positive effect to farmers in the form of risk reduction and production improvement. However, a nationwide survey conducted by World Bank on tobacco farmers indicates that the perceived benefit of contract farmers is lower than independent farmers (Drope, Li, Edson C. Araujo, et al., 2017). Different from those studies, in this study we specifically aim to explore the contractual arrangement of tobacco CF, explain the asymmetric information existed in CF, and identify correlates of farmer's participation in tobacco CF.

**The globalization of tobacco value chain**

Tobacco is a highly sensitive industry. Tobacco product manufacturers are receiving much pressure from public and health professionals, not only on the safety of the products but also on how the leaf material was produced (Moyer-Lee and Prowse, 2015). Thus,

to maintain a decent public relations, the manufacturers set a strict standard to their leaf suppliers. The manufacturers require that the leaf suppliers comply with their standard regarding the use of chemicals (fertilizers and pesticides), good agricultural practices, labor practices, and guarantee that there is no Non-Tobacco-Related Material (NTRM) in the supplied leaf (Ahmad and Dutra, 2019). The leaf suppliers must have strict compliance with the manufacturers' standard. Otherwise, the manufacturers will stop buying leaf from the supplier.

Apart from compliance, the manufacturers also require that the leaf suppliers ensure the traceability of the leaf (Moyer-Lee and Prowse, 2015). The manufacturers wish to have a comprehensive knowledge of the tobacco they purchase. Consequently, the manufacturers want to know where the production and who produce the tobacco they purchase. To maintain a positive image from the public, manufacturers have also invested heavily in corporate social responsibility (CSR) programs (McDaniel, Cadman and Malone, 2016). The programs mainly aimed to create a more sustainable farming community and were conducted in the community where they source the tobacco.

To meet the compliance and traceability requirements from manufacturers, the leaf suppliers need more control over the production process. Contract farming has been used extensively by the leaf suppliers to control the tobacco farming process (Prowse and Grassin, 2020). The leaf suppliers can exercise precise control over the farming process to ensure farmers' compliance with the manufacturers' standard. Additionally, CF is a useful instrument for the suppliers to ensure the quantity and quality of the product.

However, establishing CF is costly to the suppliers. The suppliers require significant investment to ensure greater compliance with manufacturers' standards. It is estimated that the suppliers need a cost of at least US$ 6.3 per farmer per season to manage contract farming (Moyer-Lee and Prowse, 2015). The associated costs of tobacco contract farming are: (1) the hiring of agronomists and field extension workers, (2) farm inputs sourcing, (3) and associated costs with establishing a relationship with banks. Additionally, leaf suppliers need further costs to meet traceability requirements. On occasion, leaf suppliers outsourced this task to a private company for providing data on crop estimates, chemical uses, monitoring child labor, and non-tobacco residue material (NTRM). The compliance standard has varied observability. Some standards are easier to detect, such as chemical use, where the company can mitigate by providing fertilizers and pesticides to farmers. The other standards are more difficult to monitor, such as the use of child labor. The conditions where the supplier cannot thoroughly observe farmers' compliance behavior is called asymmetric information (Prowse and Moyer-Lee, 2014).

**Asymmetric information in contract farming**

Asymmetric information in CF is a condition when the parties participated in the contract cannot thoroughly observe each other parties' behavior (Wang, Guo and Wang, 2017). Several studies reported a relatively high rate of contract failure despite the growing opinion that CF is a win-win strategy for both the company and farmers (Barrett et al., 2012; Minot and Sawyer, 2014). Contract breaching, input diversion, and side-selling are the most frequent cases observed in CF failure (Key and Runsten, 1999). These conditions are referred to as moral hazard. Information asymmetry and incentive compatibility are the primary causes of these failures. Explanations on the determinants of farmer participation in CF and farmers' capacity

to participate in the CF is needed to understand the nature of information asymmetry issues in CF (Reardon et al., 2009).

Farmers' capacity to participate in CF is related to several factors such as ownership of land, labor, and access to credit, farmer organizations, and extension services. The company often necessitate farmer to have access to land in order to participate in the contract. Additionally, the company may require that the land has access to farm infrastructures such as irrigation or road. On some occasions, the company is willing to contract only with farmers who are a member of a farmer group, cooperative or farmer association (Wang, Wang and Delgado, 2014).

On the other hand, farmers are motivated to obtain economic incentives from CF participation. Price premium and market guarantee are the most common incentive farmers sought from CF. Price premiums from CF protect the farmer from market price fluctuation. This feature enhances farmers' ability to predict their farm revenue and income stability. Additionally, the market guarantee facilitates the selling of farmers' produce in case of an imperfect output market (Masakure and Henson, 2005; Maertens and Vande Velde, 2017).

Furthermore, the company often supply farm inputs, totally or partially, to the farmers. This provision of farm inputs is beneficial to farmers in the case of the imperfect market of inputs. The provision of farm inputs also benefits farmers in case the cost of input is significantly high. In that case, the farmers are willing to pay even higher input prices and commonly paid by deducting the revenue at harvest (Ba et al., 2019).

Unqualified farmers, those who cannot participate in CF, often engage in some actions so that they are eligible for the contract. This behavior of farmers is called adverse selection. Adverse selection is a condition when a farmer who does not qualified for participating in CF takes particular actions to make him/herself eligible for the contract (Zhao et al., 2017b). The primary motive of the farmer's adverse selection behavior is to receive the economic incentive of CF. Both moral hazard and adverse selection are problems that must be handled by the company (Roberts, O'Donoghue and Key, 2014). Both of these actions incur costs to the company. One of the ways to minimize such costs is by establishing a monitoring mechanism for the farmers.

Despite the growing debate regarding the pros and cons of CF in agricultural production, many studies stated that CF is the precursor of agricultural transformation from a subsistence to a more commercial agricultural production. Thus, the next section will review the role of CF in transforming agricultural sector in developing and developed countries.

**Contract farming & agricultural transformation**

Many studies have reported that CF has several features that drive agricultural transformation. These features include risk management, cost reduction, solutions for imperfect output and input market, quality and quantity assurance, the transfer of agricultural technology and knowledge, and improving farmers' welfare.

The primary beneficial feature of CF is risk management (Mishra, Kumar, Joshi and D'Souza, 2018). Agricultural production is characterized by market and production variability. Both of these conditions expose farmer to risks. Farmers in developing countries usually manage these risk by diversifying on-farm and off-farm incomes, accessing credit

markets, or buying crop insurances. However, farmers in developing countries typically do not have adequate assets to diversify their revenues.

Moreover, the absence or limited access to credit or crop insurance market limit the availability of risk management tools for farm production (Bellemare, Barrett and Just, 2013). CF provides farmers with a price premium that is independent of market fluctuations. The price premium makes farmers able to predict the selling price of their products and improving their income stability. Additionally, the company in CF sets the quantity of product that will be bought. Hence, the farmers receive assurance that their products will be purchased and adjust their production according to the specified quantity. A simulation conducted by Knoeber and Thurman (1995) on broiler CF indicates that CF reduces farm income variability caused by both production and price risks.

The next beneficial feature of CF is cost reduction. Under spot market transaction, farmer has to find supplier of farm inputs and the buyer for their products. Both of these activities incur transaction costs to farmers. Similarly, the company needs higher cost in searching for reliable farmers that meet their quantity and quality standards. CF reduces the transaction costs both to farmers and the company (Gray and Boehlje, 2005).

Furthermore, CF is cheaper compared to vertical integration for the company. CF farming improve the efficiency of resource allocation for the company. Through CF, the company does not need to buy or rent the farm land in contrast to vertical integration. Buying or renting land require huge investment costs. Even, it is almost impossible for foreign company to own or rent land due to social and legal problems. Additionally, CF reduces labor risks for the company in two ways. (Oya, 2012) First, the company does not need labor costs since the farmer provides the farm labor. Second, the company does not need to confront any pressure from the labor association.

The imperfect or missing market that supports agricultural production is a crucial problem in developing countries. Generally, farmers have weaker access to the credit market compared to the other actors in the economy (Simmons, Winters and Patrick, 2005). Lack of access to credit market weakened farmers' capability to purchase quality inputs and make investments in farm technology that enhance farm performance. Besides, the market for crop insurance in developing countries is less developed compared to other insurance types. CF provides a solution to these problems. The provision of inputs is the main feature of the production contract. In a production contract, farmers receive partial or total farm inputs from the company (Bellemare, 2010). For example, in broiler CF, the company provides feed, day-old chick, and medication to the grower. Similarly, in tobacco CF, the company supplies fertilizer and pesticide to farmers. The purpose of input provisioning is to control the quality of agricultural products.

Another feature of CF is its contribution to food safety. The company sets a specific quality standards for farmers' product (Lee, Gereffi and Beauvais, 2012). In case of tobacco, the company requires that the tobacco leaf is free from any NTRM (Non-Tobacco Residue Material) and has a low residue of chemicals. The use of CF makes it easier for the company to control the quality of the products. Several studies have reported that the food products traceability are higher for those produced under CF. Moreover, a study in Nepal stated that CF promotes the adherence to food safety measures.

The transfer of agricultural knowledge and technology is also the essential feature of CF (Bellemare, 2010). The company in CF employed field technicians functioning both as extension

officer who provide knowledge to farmers and as monitoring officer who ensure that farmers' adhere to the contract rules. Several studies have reported that the provision of extension services from private company significantly improve farm yield. Furthermore, extension service officers from the company has greater technical knowledge in enhancing farm productivity.

The last feature of CF is improving farmers' welfare. The mechanism by which CF improve farmers' welfare has been studied in several studies. CF improve farmers' welfare through improving farm productivity (Khan, Nakano and Kurosaki, 2019), reducing farm transaction costs (Bellemare, 2018), mitigating production and price risks (Mishra, Kumar, Joshi and D'Souza, 2018), and giving farmers access to recent agricultural knowledge and technology (Murthy and Bindu Madhuri, 2013). In general, CF improve farm income through improved productivity, price premium, and market guarantee.

All of these features of CF is the precursor of the transformation of agricultural sector from subsistence agriculture toward market-oriented and technology-driven agriculture.

## RESEARCH METHODS

This study was conducted at two different villages in Jember. Jember is one of the major tobacco-producing region in Indonesia. The first village is Antirogo located in Sumbersari Sub district. While the second village is Nogosari located in Rambipuji sub district. Figure 1 shows the location of each study areas.

Both of these villages are the major tobacco-producing villages in Jember (BPS-Statistics of Jember Regency, 2017). As presented in Table 1, in each village, two groups consisted of contracts, and independent tobacco farmers were selected as a survey respondent. In total, there are 113 farmers sampled in this study, comprised of 11 and 46 contract farmers in Antirogo and Nogosari, respectively, and also 35 and 21 independent farmers in Antirogo and Nogosari.

**Table 1.** Survey respondents by village and CF participation

| Village | Sample group | | Total |
|---|---|---|---|
| | Contract | Independent | |
| Antirogo | 46 | 11 | 57 |
| Nogosari | 35 | 21 | 56 |

*Source*: Primary Data

The contract farmers interviewed in this study were those who contracted with PT Mayangsari Tobacco (Heretofore regarded as company). Currently the company sell their tobacco leaf to foreign buyer. Consequently, it has to meet the requirements the buyer sets. Primarily, the requirements spanning from the type and the amount of pesticide used and also the problem of child labor in tobacco farming, both on and off-farm. Thus, the company need more control over the production of its tobacco leaf. One way to efficiently meets these requirements is by establishing contract farming.

The data was collected using survey questionnaire. The data collection conducted on January to April 2018. The questionnaire was developed to collect information regarding socio economic characteristics of farmers and general farming conditions. The final questionnaire consisted of three parts. The first part contains information regarding farmer characteristics while the second part contains information regarding farming cost, production, and revenue. The final part consisted of

information regarding the mechanism contract farming.

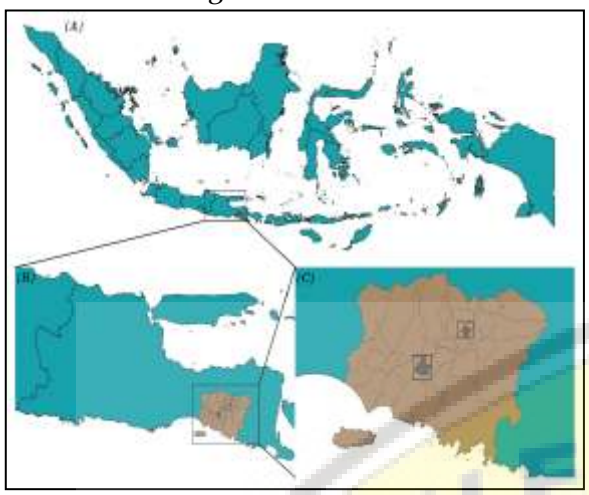

**Figure 1.** Map of the study area, (A) The province of East Java relative to Indonesia, (B) The District of Jember relative to East Java, (C) The location of Antirogo Village (upper) and Nogosari village (lower)

The analysis consisted of both descriptive and correlational analysis. The descriptive analysis used to explain the contractual arrangement of tobacco contract farming and the type of asymmetric information problems occurred and also the means in which these problems were addressed. The correlates of farmer's participation in CF was analyzed using probit estimation. A probit model was used to calculate the probability of a correlation between farmer's decision to participate or not to participate in CF. Equation 1 shows the estimated probit model:

$$Y_{ij} = X_{ij}\beta_j + \varepsilon_{ij} \quad \text{(Eq. 1)}$$

Where Yij is farmer's participation in CF (1 if farmer participates in CF and 0 if farmer does not participate in CF), Xij is the vector of factors that correlate to farmer's participation in CF, βij is the coefficient of estimates, and ε is the error term. The descriptive statistics of variables used in this estimation are presented in Table 2.

**Table 2.** Variables in the probit estimation

| Variable | Mean | | Unit |
|---|---|---|---|
| | Contract | Independent | |
| Age | 45 | 46 | year |
| Education | 9 | 10 | year |
| Farming experience | 15 | 15 | year |
| Family size | 4 | 4 | people |
| Land area | 4 | 2 | ha |
| Income | 47.832.183 | 28.107.213 | Rp/ha |

*Source*: Primary Data

## RESULTS AND DISCUSSION

The first part of the descriptive analysis in this paper aimed to describe the arrangement of contract farming for tobacco. The framework used to describe the arrangement adapted from Bellemare and Lim (2018). Table 3 presents the general characteristics of the contract.

**Table 3.** General characteristics of contract

| The General Characteristics of Contract | |
|---|---|
| What is contracted ? | Plot |
| Who contracts with whom? | Farmers with the company |
| Nature of contracts | Written and notarized |
| Type of price paid | Not fixed, depended on leaf quality and the price at harvest |

*Source*: Primary Data

The information above indicates that the contract set a spesific plot to be contracted with each farmer. However, to be eligible for contract, farmer's plot should be in the same area with the other contract farmers. Thus, although the contract set a spesific plot, in essence the company seems to consolidate the plots into one area.

This spesification is important to the company, especially for minimizing the transaction costs. By consolidating farmer's land into one area, the extension services provided by the company is more efficient, since it reduces the costs and shortening the time of transportation for extension workers. In addition, the company can also reduces the transportation costs of inputs (since the majority of farm inputs are specified and supplied by the company). However, the most important benefit of consolidating land lies in the harvesting of tobacco leaf. By making the plot into one area, the cost is reduced and the efficiency of harvest is increased. Moreover, by shortening the time of harvest and the distance of farmland to warehouse, the loss of harvest during transportation is significantly reduced. This description is in line with the findings of previous literature. In Maharashtra, India, the contract farming for potatoe is an instrument used by the company to get the cultivation right of the land (Vicol, 2017). While in Mozambique, contract farming is used to reorganize the agricultural production, since the contract specify an area and company determine the type of crops and the manner in which the production is conducted (Veldwisch, 2015).

The second characteristics of contract is the relation between farmers and the company. In this contract, the company directly contracted to farmers. Although in the process the company firstly visit the farmer's group, its purpose is only to identify the potential farmers. Thus, the farmer's group doesn't directly involved in the contract. By contracting directly to farmers, it is possible for the company to intensely monitor and supervise the farmers both on and off the farm. Previously, the company contract directly to farmers' group and the farmers' group manage the production of their farmer member. Diagrammatically, figure 2 illustrates the shift in relationship between the company, farmers' group, and farmers.

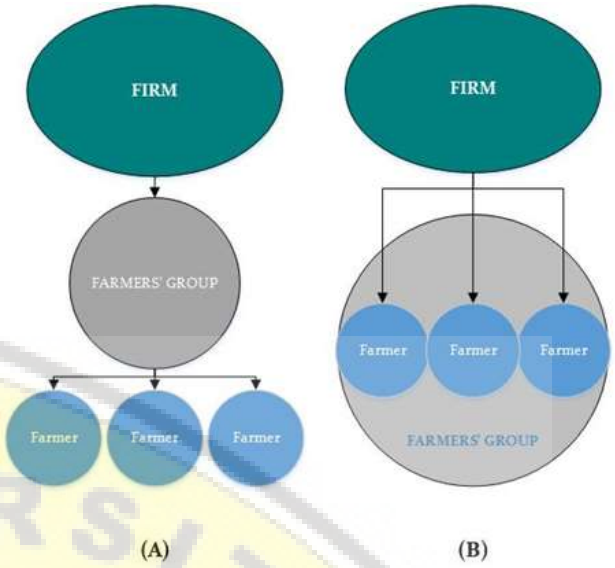


**Figure 2.** The shift in relationship between the company, farmers' group, and farmers in the previous CF (A) and the current CF (B)

The on-farm supervision mostly related to the use of pesticides. Since the company needs farmers to apply spesific type and amount of pesticide, the on-farm monitoring is strict. The monitoring of pesticides uses is supervised by the extension workers. On the other hand, the off-farm monitoring mostly related to harvesting. This form of contract is billateral-monopolies in which the processing company contracted with a single grower and is the typical form of private-sector contract farming (Bellemare and Lim, 2018). This same type of contract is also found in many developing countries (Barrett et al., 2012).

The third characteristics is the nature of contract agreement. The studied contract agreement is in written and notarized form. Each farmer has their own contract agreement signed between them and the company. This spesification gives both the company and farmers a strong legal standing when a particular contracting parties breach the contract.

The fourth characteristics is the type of price paid to farmers. The contract in this study set a non-fixed price for farmers and the price is a function of leaf quality and the market price of tobacco leaf at harvest. The price informed to farmers is in the form of price range. The final price received by farmers is determined by the company representative and is an expert at valuing leaf quality. The use of non-fixed price and basing on leaf quality for price determination enable the company to strictly control the leaf quality they bought. It also incentivize farmers who work harder to maintain their high quality. As long as the quality assesment is fair, this type of contract price would be beneficial for both parties. The company would receive high quality of tobacco leaf. On the other hand, it incentivizes farmers to work harder in increasing the quality of tobacco leaf. Conceptually, this type of contract has been referred as performance-based contract and it can promote improvement in the quality of product (Essig et al., 2016), stimulate innovation (Sumo et al., 2016), and creating long-term contract relationship (Mouzas, 2016).

The next important aspect in CF is the decisions making authority. Table 4 describes the type of decisions and who has the authority over that decisions.

Table 4 shows that company hold the authority in the majority of decisions making. Starting from selecting the plots to be cultivated and the crops to be grown, the provision of seed, fertilizer, and pesticide, to harvesting time of tobacco leaf. On the other hand, farmers have the authority in deciding who and how much labor should be used. However, the company prohibit the use of child labor in any stages of tobacco farming.

This spesification clearly limit farmer's independency in managing their farm. However, this is not unexpected since the tobacco grown under contract is specified for export markets with strict requirements regarding pesticides residue and the health issue of tobacco farmers. As the company largely derive major revenue from export market, it is not surprising that they put a strict control over many aspects of farming.

**Table 4.** Decisions making authority of contract

| **Decisions making authority of Contract** | |
|---|---|
| Plot selection | Farm (subject to company approval) |
| Crop selection | Company |
| Seed provider | Company |
| Fertilizer | Company |
| Pesticides | Company |
| Harvest time | Company |
| Labor | Farm (With company supervision) |

*Source*: Primary Data

The international market for agricultural product demands not only high quality product (Lee, Gereffi and Beauvais, 2012) but also more safety and environtmental-friendly product as well as product traceability (Eaton and Shepherd, 2001). All of these requirement can possibly be met through contract farming. In many developing countries CF makes the products more traceable (Wang, Wang and Delgado, 2014). Furthermore, through CF farmers can be directed to apply good practices of agriculture, as has been shown in Nepal where the food safety practices increasingly applied by contract farmers (Kumar et al., 2016).

Demanding more from farmers necessitate the company to perform strict monitoring to farmer compliance. On the other hand, being demanded more, farmer will be more sensitive toward the incentive they received. In this case, the company need higher monitoring costs and farmers will be more alert to the dishonesty of the company especially in the quality assesment of tobacco leaf. This

problem is addressed in the following subsection.

The second part of the descriptive analysis in this paper aimed to explore the existence of asymmetric information problem in the tobacco contract farming. A condition where information is asymmetrically distributed among individuals in contractual relationship is called asymmetric information (Hartmann-Wendels, 1993). For practical purposes, asymmetric information here defined as the inability of a particular party in the contract to observe perfectly the behaviour of his counterpart, especially in the context of that particular party's interest. For example, the purpose of the farmers is to obtain the highest possible price for his tobacco. Meanwhile, the price received by farmers is determined by the company assessment. Asymmetric information here means farmer's inability to know whether the assesment has been conducted fairly or not. The similar context also true from the company perspective.

In the farmer perspective the potential asymmetric information problem mainly occured in the quality assessment by the company, since it directly affect the price the farmers will receive. To reduce the effect of this problem, the company conducted quality assesment in farmer's warehouse. In addition, the weighing of the tobacco leaf also conducted in the same place. The data on quality and quantity obtained here is the final data used to determine farmer's price. Although it doesnt guarantee that the assesment and weighing conducted fairly, most farmers do not pose a complaint regarding the price they receive. This strategy is important in building farmer trust towards the company, since long term contract relationship can be achieved by maintaianing farmer trust (Fischer and Wollni, 2018).

On the other hand, in the company perspective, asymmetric information occured mainly in on-farm activity. The contract specify that farmers should use only the pesticides supplied and in the amount set by the company. This is important for the company because the buyer in international market put a strict standart regarding the level of pesticide residue. To overcome this problem, the company employed field assistances to control and monitor the pesticide use by farmers. In addition, to verify the actual use of pesticides, farmers should give back the container of pesticides. This strategy is time and resources consuming for the company because the high number of contract farmers. Maintaining close communication between field assistance and farmers is reported to affect significantly the pesticide use behaviour of farmer through rising trust and technical knowledge of farmers (Abadi, 2018).

The second aspect where asymmetric information problem exist is in the prohibition of child labor. The problem of child labor has became the world issue. Especially in tobacco industry, the exposure of children to tobacco tend to worsen their health (Kuijpers, Willemsen and Kunst, 2018). However, the causes of child involement in farming activity in developing and less developed country are complex and interrelated (Adonteng-Kissi, 2018). Thus prohibiting children to involve in tobacco farming require a strict control. In case of tobacco farming in the studied area, the company controlled child labor by normative monitoring. Moreover, there is evidence of child labor in tobacco farming including during school hours in most tobaccco growing region in Indonesia (Drope, Li, Edson Correia Araujo, et al., 2017). There is a case of contract breaching such as side selling by farmers. However, it only a small proportion of the total

farmers. Contract termination is given to farmers who were found breaching the contract.

From the description above, it shows that the company require a high monitoring costs in the form of field assistance, extension workers, transportaion, and other related exspenses. However, this strategy is work in minimizing the negative effect of asymmetric information problems. This strict monitoring is possible by the nature of billateral-monopolies of contract. This form of contract offer both the company and farmers possibility to build a close communication.

The third part is The correlates of farmer's participation in tobacco contract farming. This subsection deals with the identification of correlates of farmer's participation in CF. Probit estimation was used as the analytical tool. The estimation results are shown in Table 5.

**Table 5.** Probit estimation results

| Variables | Estimates | Sig. |
|---|---|---|
| Age | -0,035 | 0,076* |
| Education | -0,200 | 0,001** |
| Farming experience | -0,029 | 0,138 |
| Family size | 0,056 | 0,675 |
| Land area | 0,035 | 0,379 |
| Farm income | 3,345 | 0,000*** |

***=p<0,01 ; **=p<0,05 ; *=p<0,1

*Source:* authors' analyzed raw data

The estimation results showed that farmers age has a significant negative correlation to participation in CF. The similar result was also obtained for farmers education. Furthermore, participation in CF is highly correlated with the increase in farm income. Meanwhile, farming experience, family size, and land area are not correlated with farmers' participation in CF.

The estimation result shows that age has a coefficient of -0,035 and statistically significant at 90% confidence interval. This results showed that younger farmers is more likely to participate in CF. Participation in CF require adaptability to various rules imposed by the company. Young farmers are easier in adapting to those rules. The average age of contract farmers in this study is 45 years, slightly lower than the average age of independent farmers, which is 46 years.

Previous studies have different conclusion regarding the effect of farmers' age on CF participation depending on study location, the studied commodities, and the nature of contract. Several studies found that farmers; age negatively affect participation in CF. Such as Bellemare and Lim (2018) who found that younger farmers in Madagascar tend to participate in contract farming. Similarly, Simmons, Winters and Patrick (2005) found that young seed corn farmers in Indonesia are more likely to participate in the contract.

Conversely, Katchova and Miranda (2004) who studied soybean contract farming in the United States of America found that farmers' age increase the likeliness of farmers to participate in CF. A positive effect of farmers' age on CF participation was found on maize and potato CF in Pakistan (Khan, Nakano and Kurosaki, 2019). The similar result also found in rice CF in Vietnam, farmers' age significantly increase farmers' likeliness to participate in CF (Ba et al., 2019).

However, in Vietnamese case, farmers' age only significantly increase farmers' participate in total production contract and insignificant to farmers' participation in marketing and partial production contract (Ba et al., 2019). Similar results also found on Chinese broiler CF where farmers' age does not significantly affect farmers' decision to participate in CF whether with a company, cooperative, or combination of both (Huang et al., 2018). It indicates that, the nature of the contract also influence farmers'

participation in CF. Similarly, farmers' age has insignificant effect both on CF entry (participation) and exit in maize CF in Ghana (Lambrecht and Ragasa, 2018).

The estimation result shows that education has a significant negative correlation on farmers' participation in CF. Education has a coefficient of -0,200, and statistically significant at 95% confidence interval. Education negatively correlated with farmer's participation in CF, however it is suspected that the result obtained due to less variation of education variable in the data. In average, farmers has Junior High Schooling (SMP).

The result of this study is in line with the finding of Miyata, Minot and Hu (2009) who found that green onion and apple farmers in China with lower education are more likely to participate in CF with supermarkets, packers, and suppliers. Similar results were also found in poultry CF in India (Ramaswami, Singh Birthal and Joshi, 2009) and in Kenya (Wainaina, Okello and Nzuma, 2012, 2014).

Many previous studies identified the effect of education on CF participation. To date, there is no consensus regarding the significance and direction of the effect of education on CF participation. A study on rice CF in India found that education is insignificant on farmers' participation in CF (Mishra, Kumar, Joshi, D'Souza, et al., 2018). Similarly, Bellemare (2012) found that education has statistically significant effect on CF participation for farmers in Madagascar. Other insignificant results were found in Chinese watermelon (Ito, Bao and Su, 2012) and dairy CF (Holly Wang, Yu and Li, 2017).

In contrast, several studies reported a positive and significant effect of education on CF participation. For example, in the study on fresh fruits and vegetables CF in Malaysia, more educated farmers are more likely to participate both in formal and informal CF (Arumugam, Arshad and Mohamed, 2011). A similar result was also found in the US grains industry (Hu, 2012).

The estimation result of this study demonstrates that farming experience has an insignificant effect on farmers' participation in CF. This result indicates that farming experience is not the primary consideration for the company when contracting with farmers. The insignificant effect of farming experience was also found in the study of fresh fruits and vegetables CF in Malaysia (Arumugam, Arshad and Mohamed, 2011). This study was unable to identify a significant effect of farming experience on farmers' participation in CF.

However, several studies reported that farming experience has a significant effect. Bellemare (2012) found that farming experience, measured as the number of years farming certain commodity, significantly increase farmers' likeliness to participate in CF. In contrast, Ramaswami, Singh Birthal and Joshi (2009) found that farming experience decreases farmers' likeliness to participate in CF.

This results indicate that the effect of farming experience on CF participation is nonlinear. Furthermore, the nature and context of contract need to be analyzed thoroughly in explaining the association between farming experience and CF participation.

The estimation result show that family size has insignificant effect on CF participation. Family size is essential to farm household as a source of labor. Larger family size provide farm household with more labor. Since CF and tobacco farming are labor intensive, larger family size increases farmers' likeliness to participate in CF.

However, the result indicates that family size is not the primary consideration for farmer to participate in CF. The possible explanation for this is that farmers do not rely heavily on

family labor. Instead, they use more hire labor for their farming. Insignificant effect of family size was found in Bellemare (2012), who found that family size is not the significant predictors of CF participation in Madagascar. In contrast, Swain (2012) found that family size has a positive and significant effect on CF participation.

Similar to farming experience and family size, land area has insignificant effect on farmers' CF participation. In this study, the company contracted with farmers whose land are located in the same area. Although individually each farmer has varied land area, accumulatively the total area is large enough for the company. Thus, land area does not significantly affect individual farmers' participation in CF. The result of this study is in line with the finding of Wainaina, Okello and Nzuma (2012) who studied poultry CF in Kenya. Similar results were also found in China for watermelon CF (Ito, Bao and Su, 2012), green onions and apples CF (Miyata, Minot and Hu, 2009).

Many studies have identified the effect of farm size (monitored using land area) on CF participation. The majority of studies found that land area increases farmer likeliness to participate in CF. Significant positive effect has been identified in fresh fruits and vegetables CF in Malaysia (Arumugam, Arshad and Mohamed, 2011), CF for various commodities in South Africa (Freguin-Gresh, D'Haese and Anseeuw, 2012), broiler, seed corn, and seed rice CF in Indonesia (Simmons, Winters and Patrick, 2005). These studies concluded that farmers with large farm size are more likely to participate in CF to obtain market guarantee for their products.

However, little studies reported that land area decreases the likeliness of farmers' participation in CF. Setboonsarng, Leung and Stefan (2008) who studied rice CF in Lao PDR found that farmers' likeliness to participate in CF decrease as their land area increase.

Finally, the farm income per hectare of land is significantly higher for contract farmers. The estimation results also show that participation in CF has a strong positive correlation with higher farm income. This result can be used in the effort to foster the development of CF. Many studies have reported the positive effect of CF on farm income. A review on several CF studies made by Ton et al. (2018) concluded that CF significantly improve farm income. Similar review on CF literature also found a positive effect of CF on farm income, such as Bellemare and Bloem (2018) and Otsuka, Nakano and Takahashi (2016) who found that CF improves farm income of smallholder farmers in developing countries.

In the context of policy aimed to foster farmer's participation in CF, the previous results have some important implications. First, the written and notarized nature of contract shown to be effective since it gives the contracting parties a strong legal standing. Thus it is important to enforce the use of written and notarized contract in various scheme of CF. Second, the asymmetric information can be minimized with intense monitoring, but it requires high costs. Thus instead of fostering the normative aspects of CF such as fairness and justice, regulation should focus on a more practical aspects, which is minimizing the transaction costs of CF. It can be achieved by (1) decentralizing the legal aspect of contract farming in district level; (2) enforcing the use of non-cash transaction, since the company contracted with many farmers the use of cash transaction will be costly and time consuming. Third, since younger farmers are more likely to participate in CF, it is important to incentivize young farmers to participate in it. Moreover, in the long term, there should be a ssytematic policy that encourage the youth to enter agricultural sector in on farm activity.

## CONCLUSION

This paper has explored the arrangement of tobacco CF in Jember and also explain the asymmetric information problem in it. It is found that asymmetric information problems in CF increase the monitoring costs for the company. Also, the billateral-monopolies nature of contract has given possibility to minimize the negative effect of asymmetric information through the provision of intense monitoring. Moreover, the written and notarized nature of CF has given strong legal standing for both the company and farmers in case the contract breaching occured. Furthermore, it is important to incentivize young farmer since they tend to participate in CF which is important for the structural transformation of the agricultural sector. Finally, in the long term, it is important to encourage youth to enter agricultural sector in on farm activity.

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