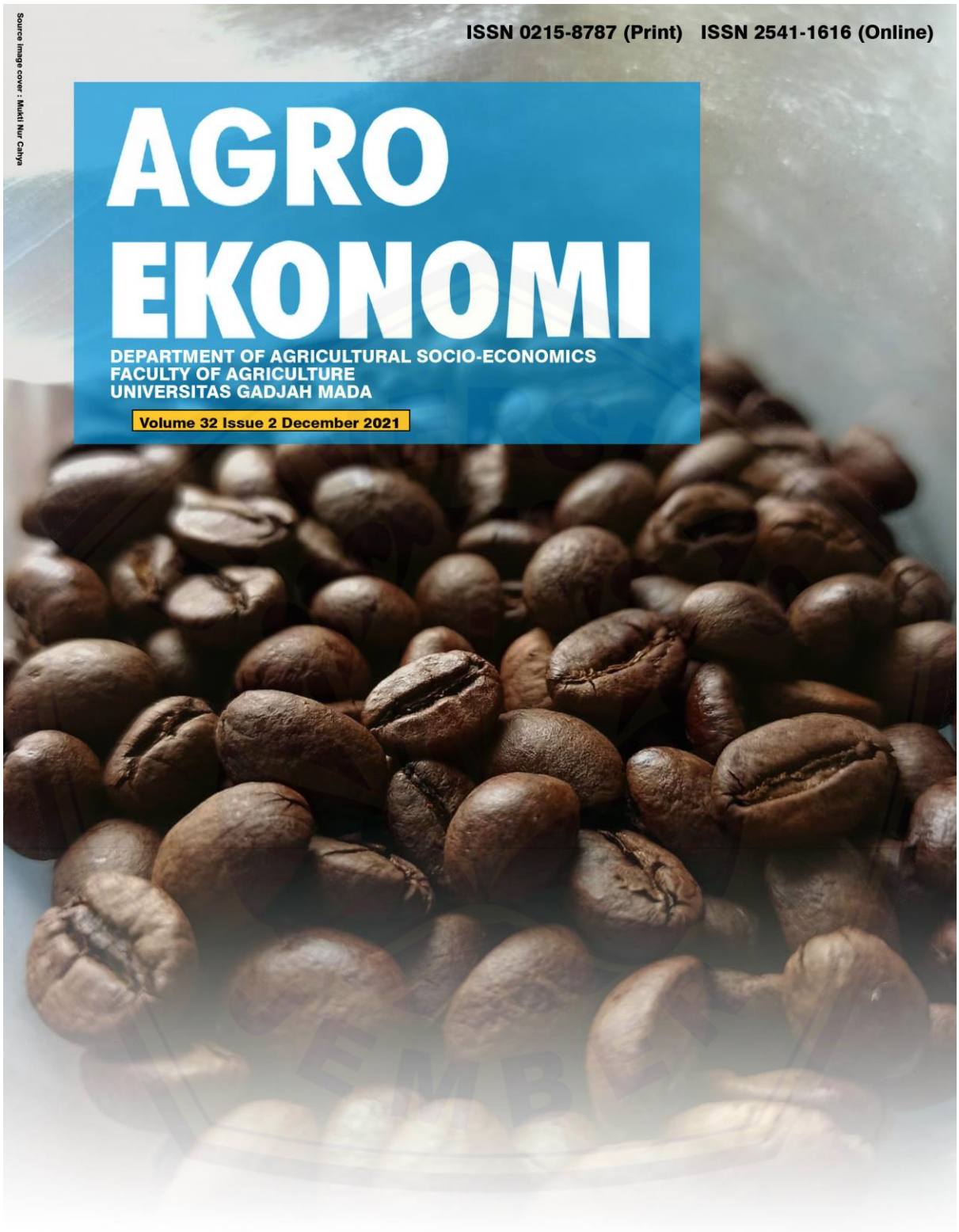

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Asymmetric Information, Transaction Costs, and Farmer Decision to Participate in Tobacco *Voor-Oogst Kasturi* Contract Farming

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ABSTRACT
Contract farming is a vital tool to connect farmer and industry. However, contracts participation between tobacco farmers and tobacco leaf supplier (TLS) was still low even though the benefit of the contract is enormous. The low participation was related to factors that affect the contract, demographics, farm characteristic, and other related factors. However, farmer participation on the contract was still low. Besides, contracts initially became a tool to prevent market failure since it regulated how economic actors acted against others causing transaction costs (TC) due to asymmetric information that made the contract not function ideally. Therefore, this study attempts to (1) explain factors underlying farmer decision to participate in contract farming (CF), (2) explain asymmetric information. Respondents in this study were 100 respondents consisting of 50 tobacco contract farmers, and 50 independent farmers. This study applied logistic regression analysis to analyze factors affecting farmer participation in CF. Besides, the New Institutional Economy approach was exerted to analyze asymmetric information on product transfer from farmer to TLS. The results showed that factors that significantly influenced tobacco farmers' decision-making to participate in CF are farming experience, land size, risk aversion level (RAL), the certainty of price, and source of capital. Asymmetric information caused adverse selection and moral hazard. About 30% of farmers had sold products to other parties (other TLSs and middleman), and 8% of farmers had applied pesticides that TLS prohibited. Contracts that were not ideal due to asymmetric information must be re-enforced by using additional costs called transaction costs, divided into three types, (1) search and information costs, (2) cost to design, negotiate and conclude and (3) the monitor and contract enforcement costs. Monitoring costs had the potential to absorb the most considerable portion compared to the other types of transaction costs. The greater the asymmetric information generated, the greater the transaction costs incurred.

Keywords: asymmetric information, contract farming, transaction cost, risk aversion level.

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INTRODUCTION

Contract farming (CF) is an essential tool in the agricultural value chain (AVC) (Bellemare & Lim, 2018) and being part of agricultural development (Reardon et al., 2009; Reardon & Timmer, 2014). Contract farming can potentially integrate small-scale farmers and agribusinesses in developing countries towards a modern economy (Kirsten & Sartorius, 2002). Besides, contract farming is an essential component in alleviating poverty and boosting rural development (Bellemare & Bloem, 2018; Eaton & Shepherd, 2001).

Many benefits are generated by CF, both for smallholder farmer and processor (integrator). Small-scale farmers who actively participate in contract farming can earn higher income and increase productivity (Poku et al., 2018). In most cases, the farmer gains better access to inputs and new technologies, credit channel, technical and market information (Mishra et al., 2018). In many cases, CF can lead to a safer market (Bellemare & Lim, 2018).

CF has been applied by processors (integrator) to ensure raw material supplies' stability and quality standards (Lee et al., 2012). However, although the processor can procure raw material through the spot market, the raw material quality from the market is relatively varied and inconsistent. Besides, procurement through vertical integration requires high investment and technical resources (Rueda et al., 2016).

There are three main courses of CF discussion: the shape of CF, the approach to CF, and the determinant of smallholder farmers participating in CF. **First**, based on the design specifications, the shape of CF is divided into two: production contracts and marketing contracts (MacDonald et al., 2004). A production contract gives more right to a processor in controlling production inputs applied by a farmer. In comparison, a market contract gives more right to a farmer: to control land use, to manage fertilizer and labour use (MacDonald & Korb, 2012).

The production contract is applied to those who require both production input and market guaranty, while the market contract is applied to those who require market guarantee only. Some researchers have discussed the contract choices in several commodities (Minot & Sawyer, 2014; Nandhita & Rondhi, 2018; Putri & Rondhi, 2020), poultry (Putri & Rondhi, 2020), horticulture in Jember (Nandhita & Rondhi, 2018).

The second discussion is related to incentives on contract farming. The incentives theory mentions that farmer and producer has incentives for participating in a contract (Hueth et al., 1999; Saenger et al., 2013). The incentives come before and after the contract decided (Laffont & Martimot, 2002). After a contract has been decided, the grower and processor have incentives to play a role based on the contract, leading to the transaction cost.

The third course in CF discovers the determinant of smallholder to participate in CF. This issue is essential since farmer participation in the contract is still low (Rondhi et al., 2020). There are three factors affecting farmers participation in CF: (1) demographic characteristic factors, (2) farm

operations factors, and (3) physiological factors (risk aversion level (RAL) and risk preference (RP) (Pennings & Leuthold, 2000; Vassalos & Li, 2016). Risk aversion level is the degree of a person's behaviour in avoiding risk (Binswanger, 1981; Pennings & Garcia, 2001). In addition, risk preference is a person behaviour in facing risk, including risk-averse, risk-neutral, and risk-averse (Pennings & Garcia, 2001; Vassalos & Li, 2016).

Although many discussions have been conducted upon the CF, plenty of the rooms' research topic needs to be explored. For example, there are several commodities developed under contract farming; one of them is tobacco. Tobacco, especially the *Voor-Oogst* Kasturi, is the primary raw material for cigarettes. Therefore, tobacco farms must be managed using a better system that benefits the two parties, farmer and processor. Furthermore, the purposes of this study were (1) to find out the factors affecting tobacco Voo-Oogst Kasturi farmer's participation in contract farming, (2) to reveal the asymmetric information among farmer and TLS in tobacco Voo-Oogst Kasturi CF.

The novelties of this research are (1) applying the RP and RAL variables to farmer participation on tobacco Voor-Oogst Kasturi CF which domestic market oriented, while previous research (Rondhi et al., 2020a) focused on Na-oogst tobacco which was export-market oriented, (2) the asymmetric information that arises based on CF among farmer and TLS in tobacco Voor-Oogst Kasturi CF.

METHODS

This research employed mixed-method (quantitative and qualitative method) using a sequential explanatory approach (Creswell, 2013). In the first step, a quantitative approach was conducted to understand farmers' choice to participate in farm contracts. The second step qualitative approach was applied to discover asymmetric information and transaction cost in contract farming.

This research was conducted in Kalisat Village, Kalisat Sub-district, Jember District, the largest tobacco-producing region of *Voor-Oogst* Kasturi in Jember Regency (BPS Jember, 2019). Due to limited information on population and specific research purposes, which classifies farmers based on participation contract, quota sampling was employed (Lohr, 2010). Due to a statistical analysis tool being employed which is logistic regression, this research selected 100 farmers to be interviewed (Long, 1997, p. 54). Because this research addressed CF and non-CF, and assuming farmer participation probability is the same, the sample was divided into 50 contract farmers and 50 independent farmers (Daniel, 2012).

In the qualitative approach, an in-depth interview with 50 tobacco contract farmers was conducted. The fieldwork was conducted from December 2018 to January 2019. Processor (TLSs) in this study were PT. ABC and PT. XYZ which were a tobacco Voor-Oogst Kasturi leaf supplier (processor) company, one of the well-known national cigarette companies.

Variables affecting farmer participation on CF consisted of age (year), household size (person), education (year), farming experience (year), land size (hectare), risk preference, risk aversion level, price certainty, and source of capitals. In addition, the model of logistic regression was adopted in this analysis as detailed below (Hosmer & Lemeshow, 2000).

$$P(Yi = 1 \mid X) = \frac{e^{\beta 0+\beta 1X1+\beta 2X2+\beta 3X3+\beta 4X4+\beta 5X5+\beta 6X6+\beta 7X7+\beta 8D1+\beta 9D2}}{1+e^{\beta 0+\beta 1X1+\beta 2X2+\beta 3X3+\beta 4X4+\beta 5X5+\beta 6X6+\beta 7X7+\beta 8D1+\beta 9D2}}$$

Y was the farmer's decision to participate in CF (1 = participant; 0 = non-participant), X_{1-7}: household size, education, farming experience, land size, risk preference, risk aversion level, D_{1-2} was dummy variable 1 (price certainty), dummy variable 2 (source of capital). b_{1-9} was the coefficient of each independent variable. Before interpreting the results of a logistic analysis, the Omnibus test of model coefficients and -2 log-likelihood were employed.

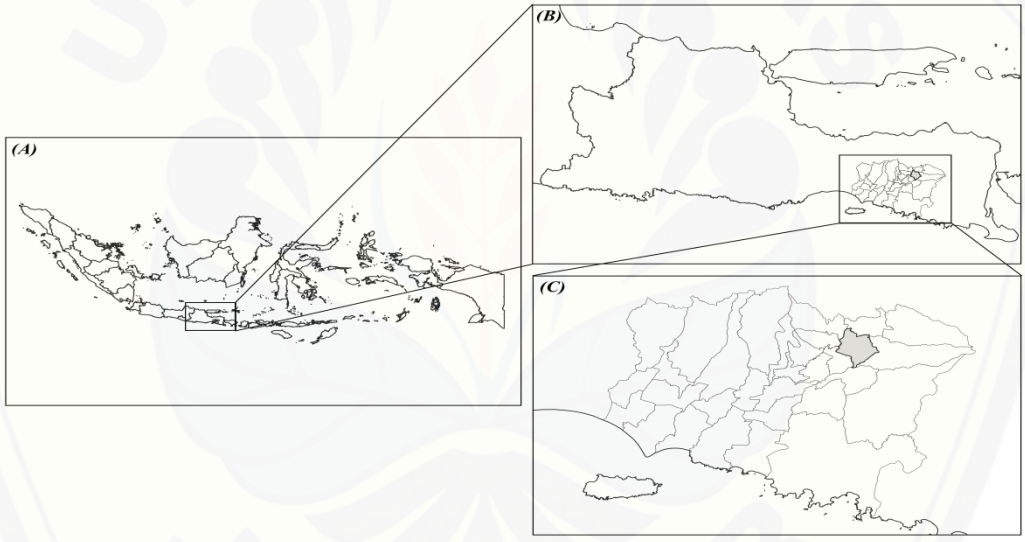

Figure 1. Research area. (A). Province of East Java relative to Indonesia, (B) District of Jember relative to East Java Province. (C). Village Kalisat relative to District of Jember.

The risk aversion level (RAL) was analyzed by using the simulation method. The simulation is carried out by illustrating a question based on the risk preference elicitation question (Vassalos & Li, 2016). For example, a high risk-averse farmer tends to participate in CF. A farmer is illustrated to have 5 ha farmland and then are given several choices:

1. Register all of the land size for participation in CF, 5:0.

2. Register some of the land size to participate in CF with the ratio of land size for participation and not is 4:1.
3. Register some of the land size to participate in CF with the ratio of land size for participation and not is 3:2.
4. Register some of the land size to participate in CF with the ratio of land size for participation and not is 2:3.
5. Register some of the land size to participate in CF with the ratio of land size for participation and not is 1:4.
6. Not register all of the land sizes for participation in CF, 0:5.

Based on the simulation, the farmers' answers were collected using the form of criteria. The criteria were denoted in ordinal level, indicating the farmers' dislike of risk or being risk-averse. Number 1 indicates extremely high risk-averse; 2: severe risk-averse; 3: intermediate; 4: moderate; 5: slightly neutral; 6: neutral to negative. In the logistic regression analyses, the number transferred to the interval scale by the method of successive interval (MSI). Transferring the data to interval is applied to analyze the parametric approach (Edwards & Gonzalez, 1993).

The risk preference (RP) of tobacco farmers was explained in the Likert scale as the response of four statements being asked to farmers, two statements related to output price risk, and another related to uncertainty (Pennings & Garcia, 2001). The higher risk preference (number 4) means farmer is strongly agree to the statement, 3 (agree), 2 (moderately agree), 1 (mildly agree), 0 (neutral), -1 (mildly disagree), -2 (moderately disagree), -3 (disagree) or -4 (strongly disagree) was given on each statement. The scale divided into three groups, farmers who are being risk-averse, risk-neutral, and risk-seeking. The average value of farmers determine the preferences of farmers in taking risks. If the average value is positive, the farmers are classified as risk-averse; if the average value is = 0, the farmers are classified as risk-neutral, and if the average value is negative, the farmers are classified as risk-seeking.

Furthermore, to find out asymmetric information among farmer and TLS, descriptive analysis with the new institutional economy (NIE) approach is applied. The NIE is a branch of the economy that focuses on economic performance and institution, institutional structure and production, and transaction cost economics (Menard & Shirley, 2008). Especially for the transaction cost approach, farmer participation in CF depends on contract cost (searching cost, negotiation cost, and monitoring cost) (Allen & Lueck, 2002; Menard & Shirley, 2008; Williamson, 1996). In-depth interviews with farmers carried out asymmetry information data collection by comparing contract documents (Hudson & Lusk, 2004) and field condition. The description explained the implementation of the contract, problems that arise due to asymmetric information and the effects that arise with the presence of asymmetric information. Simply asymmetric information between farmers and TLS could be detected by compliance with the substance of the agreed contract (Suli et al., 2013). If farmers and TLSs obey the contract agreement, there is no asymmetric information that can arise transaction costs.

RESULTS AND DISCUSSION

Tobacco Voor-Oogst Kasturi farmer was generally divided into two types of farmers: contract farmer and independent farmer. A contract farmer is a farmer who participates in CF, while an independent

farmer is a farmer who does not participate in CF. The descriptive statistics show in Table 1. Contract farmer had younger age and higher education than an independent farmer in CF. But, independent farmers had larger household size, farming experience, and land size than contract farmers.

Table 1. Descriptive statistics of variables in the model

Variable		Contract farmer		Independent farmer	
		Mean	Standard deviation	Mean	Standard deviation
X_1	Age (years)	45.840	12.030	50.350	9.760
X_2	Household size (person)	3.960	1.350	4.350	1.050
X_3	Education (years)	11.920	7.080	10.240	5.840
X_4	Farming experience (years)	14.960	9.830	20.960	8.780
X_5	Land size (hectar)	0.570	0.520	0.680	0.380

Source: Data analysis (2018)

Factors affecting farmer participation in CF

Table 2 shows that the logistic analysis results show the Omnibus Test of Model value is 109.226 by a significance value of 0,000. Therefore, it can be concluded that the model was declared as fit. Furthermore, the output classification table is 94%, which means the equation model applied for the analysis is feasible. Therefore, the model could predict the actual conditions at the research location. In other words, the model's accuracy in determining the farmers' decision to partner with TLS had a high degree of accuracy, 94%.

There was a decrease in the Likelihood value from block number 0 to block number 1, which means that the regression model performed better at predicting farmers' decision to participate in CF. In other words, the addition of independent variables to the model significantly improved the model. The model was good and appropriate to describe the factors affecting farmers' decision to join CF.

The result of the analysis of regression logistics was presented in Table 2.

Table 2. The logistics regression output of factors contributing to farmers' decision to participate in CF.

Variabel	B	S.E.	Wald	dF	Sig.	Exp(B)
Age (X_1)	-0.016	0.075	0.046	1	0.830	0.984
Household size (X_2)	-0.050	0.442	0.013	1	0.910	0.951
Education (X_3)	-0.120	0.207	0.335	1	0.563	0.887
Farming experience (X_4)	-0.156*	0.092	2.886	1	0.089	0.856
Land size (X_5)	-4.961*	2.932	2.863	1	0.091	0.007
Risk Preference (X_6)	-0.276	0.774	0.128	1	0.721	0.759

Risk Aversion Level (X_7)	-1.884**	0.803	5.507	1	0.019	0.152
Price certainty (D_1)	-4.687***	1.420	10.891	1	0.001	0.009
Source of capitals (D_2)	2.881*	1.543	3.483	1	0.062	17.825
Constant	13.615	5.613	5.883	1	0.015	818,000.920
Omnibus Test of Model Coefficient			109.226 (0.000**)			
Nagelkerke R Square			0.886			
-2 Log Likelihood (step 0)			138.620			
-2 Log Likelihood (step 1)			29.400			
Classification Table			94%			

Source: Data analysis (2018)

Notes: ***: significant at 1%, ** significant at 5%, * : significant at 10%.

Age, household size, education, and risk preference did not significantly influence farmers' decision to participate in CF. This result is in line with previous research that stated age, household size, education, and risk preference did not affect farmer participation in CF (Katchova & Miranda, 2004; Paulson et al., 2010). On another side, farming experience, land size, risk aversion level, price certainty, and source of capital had significantly influenced farmers' decision to participate in CF. Farmers experience had a negative influence on farmers' decision making to participate in CF. Farmers having less farming experience are more likely to choose to participate in CF. This finding agrees with previous research stating that farmers with less experience are not very good at haggling prices with intermediaries (Bellemare & Lim, 2018; Vassalos & Li, 2016). On the other side, farmers having farming experience did not tend to participate in CF because they were confident in their abilities.

Land size had a significant effect on farmers decision to participate in CF. The significance value of the land size variable was smaller than the error level (0,091 < 0,10). Land size had a negative value, meaning that tobacco farmers with narrow land size tend to participate in CF (Rondhi et al., 2020b). Kasturi tobacco farmers with a narrow land size chose to participate in CF to maximize income because they did not need more cost to process their tobacco leaves until completely dry (strings), so farmers received a higher price from TLSs.

Risk aversion level had significantly influence farmers decision to participate in CF. Farmers witha high level of risk aversion tended not to participate in the CF. The higher the farmers' risk aversion, the higher the farmer tended to be risk-neutral. Hence farmers did not want participate in CF. Besides, farmers wanted to gain higher revenue due to selling to a TLS buying their tobacco at an occasionally higher price.

Price certainty (dummy variable 1: price guarantee, 0: no price uncertainty) has significantly influence farmers decision to participate in CF. It means farmers obtaining uncertain price had a higher tendency to participate in CF. Marketing guarantees for products, opening access to international markets, and the specific price are essential factors to encourage farmers

participating in contract farming (MacDonald et al., 2004).

Source of capitals (dummy variable, 1: capital from other parties; 0: own capital) affected farmers' CF participation decisions significantly and positively. It means farmers who did not receive capital from other parties will increase the opportunities to participate in CF with TLS. Farmers obtaining capital loans tended to work harder because they must earn higher income to repay the loans. Participation in CF gave farmers a chance to attain higher income as they hda received market and price certainty. This research supports previous research that stated that CF supports farmers to have a network to a particular market (Bellemare et al., 2013; Daryanto, 2016; Miyata et al., 2009). When the CF works effectively, it can reduce transaction. Therefore, the contract farmer's income is higher than the independent farmer.

Asymmetric information between farmers and TLS

The CF between tobacco farmers and TLS can overcome farmers' problems regarding market certainty and price stability and help TLS maintain their quantity and quality stability. However, the contract has some issues, including information, product and cost flow. Those issues are caused by imperfect information called asymmetric information, which means the inability of one party to access all information known to the other party.

The two parties' agreement rules rights and obligations (see figure 2). Farmers should provide tobacco based on good agricultural practices (GAP) and wholly sell the leaf to TLS. Whereas TLSs had obligations to provide access to pesticides, provide GAP assistance, and buy the tobacco leaf.

Asymmetric information arising in the implementation of contract farming has resulted from one party's interests. For example, TLS expected farmers to obey all the regulations listed in the contract agreement. On another side, farmer expects to produce tobacco in an efficient way (less labour).

Besides, the farmer expected to obtain a premium price upon the leaf quality that farmers sell to TLS. However, this tobacco farming pricing was the TLS's authority, so farmers did not have bargaining power because the price provisions had been recorded in the contract agreement. The tobacco price depended on leaf quality. The better quality, the better the price. Each type of leaf was divided into three classifications based on its colour, leaf A (reddish leaf colour), leaf B (yellowish leaf colour) and leaf C (leaf colour besides red and yellow). The leaf A, B, and C were high, medium, and low quality, respectively. The better quality received a higher price.

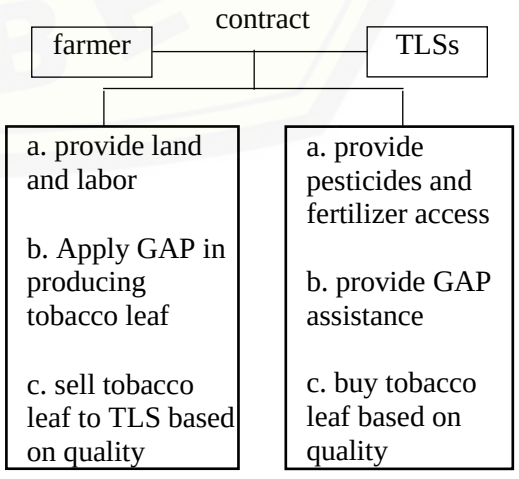

Figure 2. Contract agreement between farmer and TLS

The asymmetric information arose when one party did not obey the contract agreement. Unfortunately, some farmers did not fully obey the agreement, especially applying GAP and selling tobacco to TLS (see table 3). The asymmetric information arising in implementing CF causes transaction cost (TC) (Kirsten & Sartorius, 2002) explained the main problems associated with contract farming in developing countries, which causes many failures and distrust between companies and smallholder families.

In neoclassical economics, the market was assumed to work in perfect information, zero transaction costs, perfect competition (North, 1990). The case of implementation of tobacco Kasturi CF arising asymmetric information, was one example of transaction cost in economics. The TC economics divided costs into three groups, searching cost, negotiating cost and monitoring cost (Menard & Shirley, 2008). From the farmer's perspective, searching and information costs could occur when farmers seek information about the selling price of tobacco through various sources. The cost was the first cost of TC. Farmers compared prices in contracts and prices outside the contract. As many as 93% of partner farmers stated that they had sought information from intermediaries and non-partner farmers regarding developing the selling price of tobacco outside their partners. Secondly, the cost consisted of the cost of designing, negotiating and concluding contracts. The cost of designing and concluding contracts from the TLS's side tended to be greater than the farmers' side. The TLS, as the contracting party, should carry out various series of activities to compile the contract, starting from research and development in modifying the contract material to be considered capable of representing all the rules in partnering. Before arranging a contract, the TLS and farmer had to discuss the contract's content to equalize perceptions. The third cost was contract enforcement costs, costs incurred to ensure that the other party is committed to implementing the contract. Finally, the cost was addressed to make sure the contract works well.

Table 3. Potentially asymmetric information actions by farmers

Actions	Percentage	Information
a. Farmers attempt to sell (partially) the tobacco leaves to other buyers (spot market or to other companies)	30%	This condition is due to sometimes price outside of CF is higher than the price in the CF.
b. Farmers attempt to use pesticides that TLS prohibits.	8%	This condition is due to applying the GAP requires more labour. The market-oriented tobacco product requires more practice in growing tobacco. For example, particular pesticides may not be available in any agriculture shop.

		Therefore, the farmer needs more labour to find pesticides.
c. Farmers do not return the unused production inputs from TLSs (such as pesticide bottles, fertilizer sacks, seedling trays) as a control for input uses.	76%	This condition is due to applying the GAP requires more labour. The farmer usually grows tobacco as their antecedent with no caring unused production inputs. The farmer thinks that caring for the unsued production input requires more labour.

Source: Primary Data (2019)

Furthermore, tobacco leaf quality was an instrument in CF that potentially led to dispute. As explained in figure 2, two parties agreed to sell and buy tobacco based on specific quality. However, due to farmer limitation (knowledge, cultivation skill and, additional input cost) and weather conditions, the quality varied from high quality (A) to low quality (C). Therefore, when selling the leaf to TLS, the farmer perceived that the leaf had higher quality. However, sometimes the leaf was assessed in lower quality by TLS (see table 4). Therefore, farmer perceived that the contract was not fairly implemented.

Table 4. Farmer perception to TLS in contract implementation

Actions	Percentage	Information
a. TLS's judgment of leaf quality is not the same as farmers' perception.	86%	TLSs overcame the difference in perception by inviting farmers to witness the assessment process in the warehouse.
b. Significant difference between prices in contracts and prices in the spot market.	54%	On some occasions, the price in the spot market is higher than in the contract. Therefore, the farmer tries to sell the product to other parties.
c. Delayed payment.	14%	Many farmers have experienced delayed payment for selling tobacco > 1 ton.

Source: Primary Data (2019)

The perception addressed an adverse selection among farmer and TLS. Adverse selection was hidden knowledge only known by one party, meaning that the party had more knowledge than the other party. In this situation, farmers had some personal information about their products' cost or value. It was called adverse selection or hidden knowledge (Laffont & Martimot, 2002). In this case, farmers had more knowledge about tobacco quality, but this sometimes was assessed differently by TLS due to parameters measurement leaf quality and prices decided by TLS.

Asymmetric information was also explained from the TLS's perspective, stating that the tremendous potential for asymmetrical information problems was when selling tobacco leaf. It was common for farmers to sell their farming products to those who offer higher prices. This reason was why farmers' behaviour to sell their yield to parties other than particular TLS secretly. Some farmers sold part of the tobacco leaf to other parties (middleman, other TLSs) if the price in the spot market was higher than in CF.

The asymmetric information (include moral hazard and adverse selection) caused the unsustainability of CF. It seemed that farmers were carrying hidden actions that were expected to be undetected by the TLS. On another side, TLS responded to the yield (tobacco leaf) in lower quality and lower price. There was a probability for these farmers to take actions that might violate the contract and were generally not or ethically justified.

Based on the transaction cost approach, the asymmetric information required a cost to monitor. However, TLS had limitations in terms of supervising (monitor) the farmer's activities. Monitoring all farmers cultivation and post-harvesting activities requires much labour, such as hiring more Field Technician (FT), which potentially causes cost inefficiencies (Hudson & Lusk, 2004). If the AI run continuously, then it requires high TC. Otherwise, the CF agreement will be discontinued.

CONCLUSION AND RECCOMENDATION

This article explained factors that significantly influenced farmers decision to participate in contract farming. Farming experience, land size, risk aversion level, the certainty of price, and source of capital have a significant effect on farmer participation on CF. In contrast, the farmer's age, household size, education, and risk preference have no significant effect on farmer participation in CF. Experienced farmers tended to reduce their participation in CF. Besides, the more extensive farmer's land size would reduce farmer participation in CF. The risk neutral's farmers were less likely to participate in CF. Then, the farmer receiving an uncertain price tended to participate in CF. Finally, the source of capital had a positive effect on CF.

The different perception among farmers and TLS caused asymmetric information in the CF of tobacco farming regarding farm activities, nexus of tobacco qualities, and price. The impact of such asymmetric information was the emergence of transaction costs that must be paid by all parties involved in the contract. Thus it potentially reduced the optimization of profits. The greater the asymmetric information generated, the greater the transaction costs incurred. In addition, the most considerable portion of transaction costs was the cost of monitoring and enforcement to ensure that the contract runs ideal. Thus, trust among economic actors involved in agricultural contracts must be encouraged because the bonds will minimize asymmetric information. This trust could be created by providing incentives (in-kind, financial, and non-financial incentives) under their capacity.

Also, transaction costs were costs used to address farmers to sell products to TLS based on agreement. Occasionally, some partner farmers sold their products to other TLS. This condition would cause CF failure.

This research finding suggests that selected farmers can increase farmer participation in CF with more experience, land size, and low aversion level. Besides, to reduce the parties' transaction cost, both farmer and TLS obey the agreement. Also, before the contract is assigned, the farmer and TLS need to check the agreement price detailly based on quality.

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