The 84th Annual Conference of the Agricultural Economics Society

Edinburgh

29th to 31st March 2010

The Insertion of Small-scale Farmers into market auction, Can it really improve the Indonesian gurem farmers' welfare?

The perspective of the auction price formation and farmers' motivation factors

Dwi Winarsih[1], Sutanto[2] and Laurent Augier[3]

Abstract

The condition of small-scale farmers in Indonesia is getting worse that is caused by an unfair low price that reflects to the low level of revenue for their income. This happens either because the dependency on trader/middlemen for selling the produce and the low accessibility of farmers to the market. The existence of auction mechanisms created by the Indonesian government auctions is still dominated by traders/middlemen, so that the increasing of prices have not affected to the farmers. Alternatively, by linking directly farmers to the auction mechanism will be analyzed in a descriptive and a qualitative ways from the point of view of price formation in the auction and the farmers' determining factors to participate in the auction. The analysis conducts policy recommendations for ongoing agricultural auction development with the direct participation of small-scale farmers in the mechanism.

Keywords: Small-scale Farmers, Auction mechanism, price formation, farmer's motivation

[1] PhD student at Centre de Recherche sur l'Intégration Economique et Financière (CRIEF), Université de Poitiers, France. E-mail : dwi.winarsih@etu.univ-poitiers.fr

[2] Sebelas Maret University, Surakarta, Indonesia. E-mail : sutanto@uns.ac.id

[3] Université de La Rochelle, France. E-mail : laugier@univ-lr.fr

1. Introduction

Data from Indonesian Census of Agriculture BPS in 2003 indicates that the number of Indonesia small-scale farmers (petani gurem) was increasing 2.4 % per year, with 10.8 million in 1993 to 13.7 million in 2003. With have a very small landholding, less than 0.5 Ha, they only cannot increase their welfare. This condition is become worst when they get low income which is leaded by low prices for their product. Factors that may put small-scale farmers, on this situation include: increasing difficulties for market access and dependency of famers on traders or middlemen for selling their product. Also, the structure market of the agricultural products in the village level have problems facing the weak bargaining position of farmers, which always low in price level, low quality and distribution chain length, so the damaged goods quickly so that the accumulation of waste. In most case, market price establishment is determined by the direct negotiation between individual farmers and individual traders and often puts farmers on the weak position because of the limited information owned.

Therefore, the Indonesian government is now giving effort to rearrange the agricultural market facilities by establishes Sub-Terminal Agribusiness in all off province, with the auction mechanism. Formally, this institution market facilitates a direct trading between farmers, as a seller, and buyers to create a transparent pricing mechanism, marketing point cut, boost quality and production, and improving farmers' bargaining position that in turn can increase income of farmers. Thus, the auction mechanism can set the good price for the commodities. But in fact, the auction is dominated by traders, the middlemen and again they are the ones earning a good price and a good profit margin, while the farmers struggle with their farm-gate prices.

Giving farmers direct entry to the auction market will put farmers in direct contact with buyers and put them in a stronger bargaining position. But on the other hand, the cost of participating in the market gives the other question, whether the farmers earn higher profit margin than if they sell their commodities on the farm gate, even they could receive a higher prices.

Auction performance and the direct participation of small-scale farmers, into the mechanism will be analyzed from the price formation's point of view and farmer's incentive. The descriptive and qualitative analysis will allow us to conduct policy

recommendations for ongoing development of efficient agricultural auction mechanism and the farmer's direct participation to the auction mechanism.

2. Market Mechanism and price formation

2.1. Study area

The study concentrated in the Central Java province and we concentrated the study on the vegetables farm production location at Karanganyar district, specifically in the village of Tawangmangu on hilly plateau Lawu Mountain. Vegetables commodities are sold on many markets in the province. In this area there is one main market as the place where the commodities are mostly traded. To obtain the data for this study, the survey focused on farmer respondents in the around of the village main market within 15 kilometers radius.

The auction mechanism which was used in the study is Soropadan Agro-Auction market in the province of Central Java, which is located about 125 kilometers from Tawamangu and it began operations in October 2003. The transaction is held by a mechanism; buyers hold open bidding, the price is the highest bidding as price realization transaction. Institutions who developed this market are the Department of Industry and Trade of Central Java Province, the Department of agriculture and local government of Central Java province.

2.2. Vegetables Marketing channel

As analyzed by Shepherd and Schalke (1995), Indonesian marketing channel for vegetables vary by commodity and province, but the most common marketing's model occurring are:

a. Farmers go to the local assembly market, either with their own or a rented vehicle, where they sell to traders who supply wholesale markets;
b. Traders buy the field (standing crop purchase) and deliver to wholesale market;
c. Traders collect from farmers at or close to farm gate and deliver to wholesale markets;
d. Field traders collect from farmers and sell to the retail market or to traders for delivery to wholesale markets, and;
e. Farmer sells, either through an agent directly, to a packing house which prepares shipments to buyers, supermarket or export.

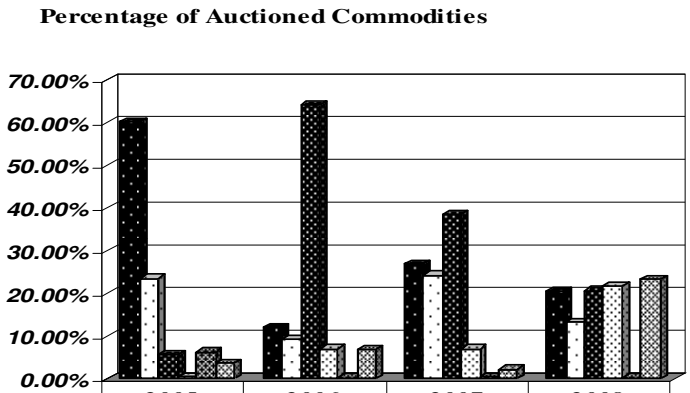
In the case of small-scale farmer in the Central Java province, the model (e) is rarely occurred. Having specified the commonly model of the vegetables marketing in Indonesia, this study now introduce other alternative model to sell the vegetables, that is Agro-auction market which the Indonesian government has developed.

2.3. Auction Market

Implementation of the Agro-auction market is generally once every 2 months; with the level of diversity of products those are very diverse. According to the index data, there are 792 commodities items which traded on this market. But not all products are sold in each auction. Based on the market implementation data from 2005 to 2008, every year has the different trend of the commodity that was traded in. On 2005's auction section, Cereals became most traded commodity in while this year, with the average percentage in each auction was 44.6 % of the total average transaction per auction and dominated by rice's transaction. Central Java is the second biggest province producer of rice in Indonesia, and on several region, rice still became the ***most wanted*** commodity, that's make it taken the most interest commodity to traded on this market. For 2006's auction series, trend of the commodity that was traded in changed. There was in average 40.4 % of the total average transaction that traded for sugar commodity. Cereals commodities have been dominated again during 2007 - 2008 auction season.

The types of commodities that were traded can be grouped into 6 kind product of agricultural field, to get a diversity tendency of commodity. Trend of the percentage of the commodities per year traded, give a tendency for commodities diversity during auction has been held. From the trend in figure 1 can be seen that transactions were no longer dominated by one type of commodity.

Figure 1. Percentage of Auctioned Commodities

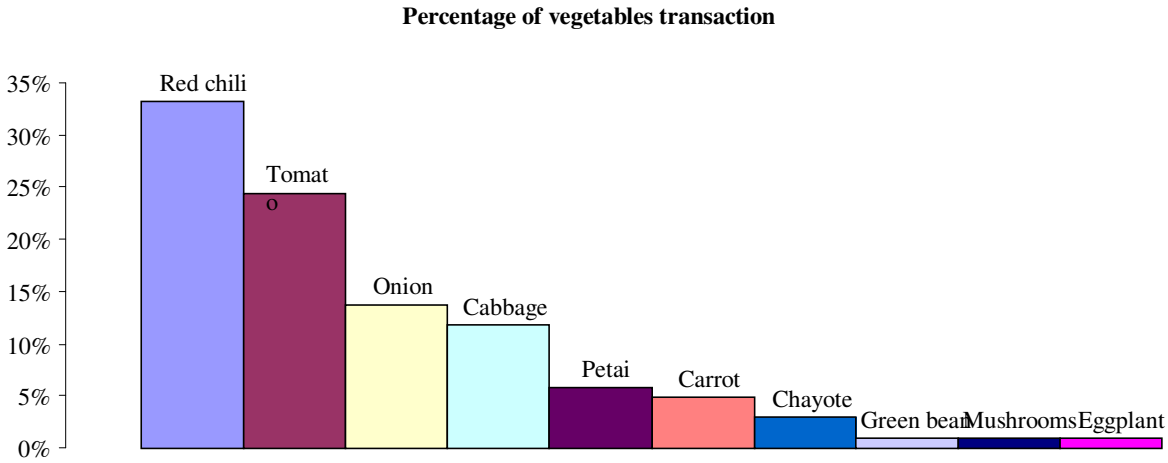


	2005	2006	2007	2008
food corps	*60.18%*	*12.27%*	*26.88%*	*20.62%*
Horticultural corps	*23.54%*	*9.41%*	*24.39%*	*13.42%*
Plantation corps	*5.67%*	*64.16%*	*38.63%*	*20.79%*
Livestock	*0.48%*	*7.09%*	*7.15%*	*21.63%*
Fisheries	*6.32%*	*0.28%*	*0.66%*	*0.31%*
Other commodities	*3.81%*	*6.78%*	*2.29%*	*23.23%*

This shows an indication that the auction market has been reaching each fields of agriculture's market.

Since the study was concentrated in the vegetable market, then the analysis was emphasized on vegetables commodities. As the second commodities traded in the auction, the historical transactions data presented on the Figure 2 shows the percentage of the vegetables traded in the auction during 2005 – 2008:

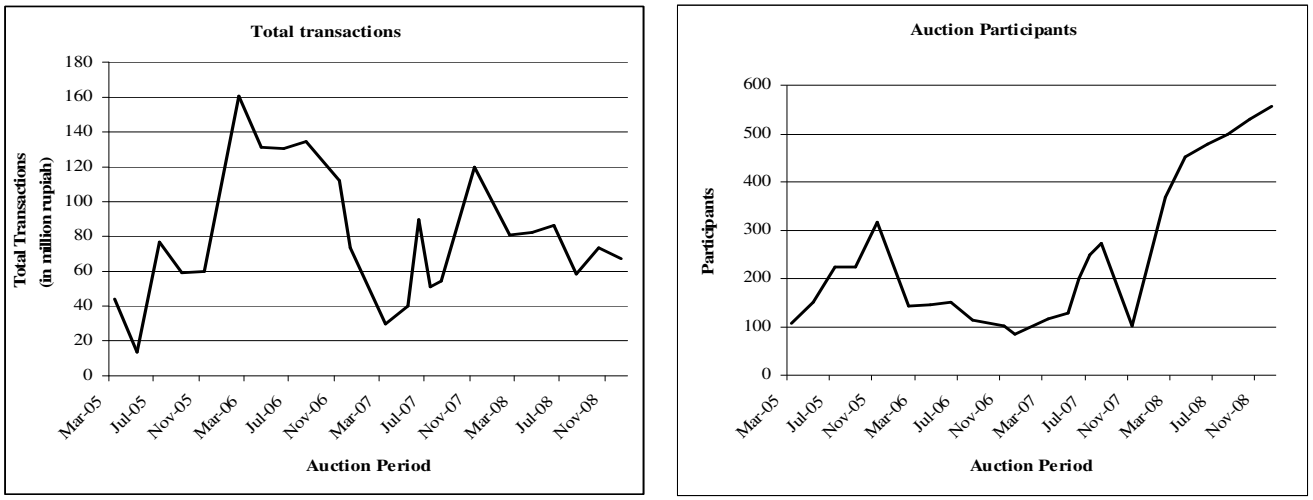
Figure 2. Percentage of vegetables transaction



As red chili is an important food ingredient for Indonesian, thus the graph shows us how red chili gives the greatest percentage to the total auction transaction of vegetables commodities.

Membership of this market was dominated by farmers' association, main market traders 'cooperative in Java and individuals trading company. But such increases in the number of members who participate didn't have a significantly effect on the total of auction transactions. It can be seen from figure 3, although the number of participants increased, the total transaction tends to decrease. This indicates that the decrease of trade transactions for some of commodities which have most contribution to the total transaction. This tendency can also be caused by some traders who switch on others commodities that are considered potential, even though the commodity was a new entry in the market. Even then, some of traders were come to discover some new commodities. It is commonly for products derived from primary commodities.

Figure 3. Total Transactions and Number of Auction Participants



3. Data and variable

The case study presented here is focused on determining the major factors which are probably influence a farmer of making a decision to participate in the auction. First, we identity and analyze two different price determination, in the market and auction. Second, we obtained the market prices data and closing prices at the auction to describe the evidence from price comparisons. By doing so, we identify the final price under which determination environment is likely to evolve as the preferred environments for price

determination. The prices data on both mechanisms are secondary data which are collected during 2005 – 2008. Using the evidence on the second step; we provide a-priori hypothesis and develop a set of questionnaire instrument to assess farmer's incentive to participate in the auction. Third, we summarize the results of the earlier analysis that compares the price of vegetables sold through the market and auction mechanism.

Onion and red chili have been chosen as the commodities are studied, as both of the commodities are represented the different characteristic of vegetables commodities, on the point of view perishable level and market price dynamics. Hence, the comparison's evidence would be obtained.

The auction price determination was analyzed by the data of the winning bids (auction's closing price); the reservation price and the market price are measured in Rupiah/kg. The quantity is measured in tons. The qualitative variables which defined as the date when the auction is held correspond to crops season of the commodity. The data variables for two commodities are summarized in the following table

Table 1. Summary Statistics

Quantitative Variables
Red Chili

Variables	Mean	Standard Deviation	Maximum	Minimum
Bid	10954.69	7060.937	26000	2250
Reservation Price	11634.38	6726.062	26000	2250
Market Price	8341.84	2446.549	13611	3375
Quantity	131.06	132.140	500	4

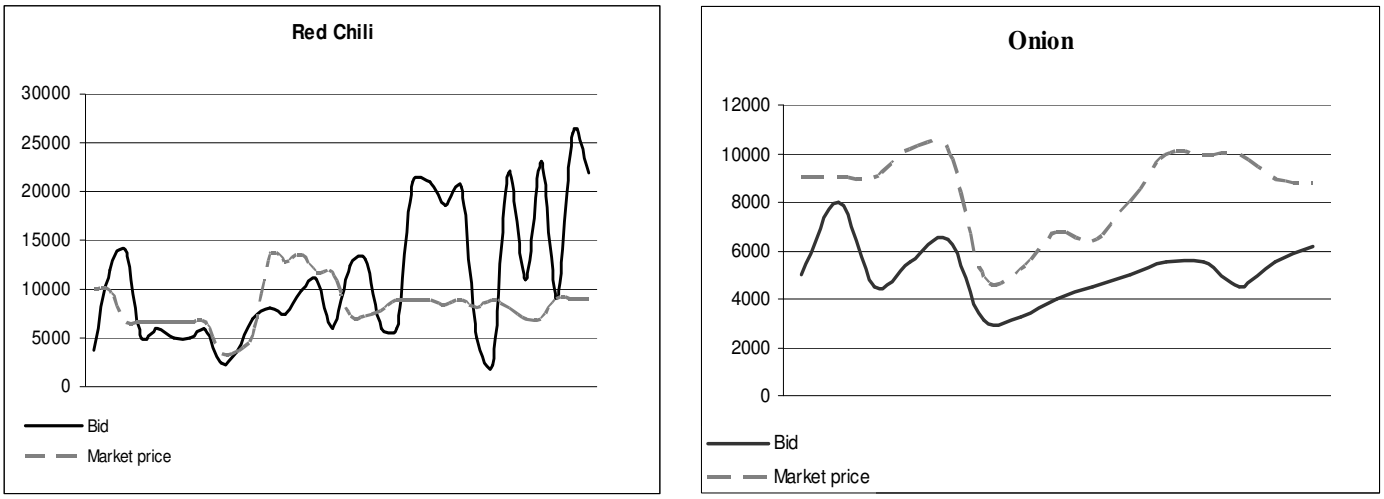
Quantitative Variables
Onion

Variables	Mean	Standard Deviation	Maximum	Minimum
Bid	5106.67	1246.977	8000	3100
Reservation Price	5706.67	1486,831	8000	3100
Market Price	8420,93	1789,888	10167	4889
Quantity	370,67	512,786	1500	30

The objectives of the implementation of this auction market is the place for the establishment of a transparent price and to increase price in the level of producers, with the indicator that is the

difference between the prices formed in the auction market with market prices become closer. The comparison between the selling price and market price can be seen in figure 4.

Figure 4. Auction Prices and Market Prices Comparison



The data set was used to provide the simplest approach of the auction empirical analysis by estimating the observed closing price, as the highest bid (b_l) among all the bids of the buyers for each auction (l). The empirical analysis begins by assuming that the observed price, depends on these following characteristics (Z_l):

a. Commodities Characteristic

   $Z_{l,1}$ = Reservation price

   $Z_{l,2}$ = Market price reference

   $Z_{l,3}$ = Quantity of offered commodities

b. Market Characteristic

   $Z_{l,4}$ = Crop seasons, is a dummy variable which takes the value 1 for the auction on the harvest season, 0 otherwise.

We assume that the bid (b_l) is a linear function of four kinds of variables above: $b_l = \Phi(Z_l)$. So the function linear (Φ) can be written:

$$b_l = \beta_0 + \beta_1 Z_{l,1} + \beta_2 Z_{l,2} + \beta_3 Z_{l,3} + \beta_4 Z_{l,4} \quad (1)$$

Assuming that the closing price is a random variable and has a normal distribution $N(E(b_l), \sigma(b_l))$, the ordinary least squares method is used to estimate the expectation $E(\tilde{b})$ from the statistical model $\tilde{b}_l = \beta_0 + \beta_1 Z_{l,1} + \beta_2 Z_{l,2} + \beta_3 Z_{l,3} + \beta_4 Z_{l,4} + \tilde{u}$, where $\tilde{u} \approx N(0,1)$.

From the figure 3 can also be seen that Red Chili has the market price volatility more dynamics than onion. Thus it is assumed that red chili's paper might be more affected by the factors of harvest season. Therefore we estimate red chili by considering the harvest season while onion is estimated without harvest season's variable as the independent variable. Hence, the model linear for onion is presented as follows

$$b_{l_o} = \beta_0 + \beta_1 Z_{l_o,1} + \beta_2 Z_{l_o,2} + \beta_3 Z_{l_o,3} + \tilde{u} \quad (2)$$

Then, each commodity is estimated using three models: the model 1, with all the all exogenous variables, then the model 2 with only the reservation price and the model 3 without the reservation price, we obtained the results in table 3.

The probability of whether farmer will decide to participate in the auction was analyzed by logistic regression. According Gujarati (1988), logistic regression, is used to predict a categorical (usual dichotomous) variable from set of predictors or explanatory variables. The predictors are mix of continuous and categorical variables. Then the technique was employed for the data collected by randomly survey for the small-scale producers, as respondent, in the study area. A set of structured question was designed to collect the information about the factors which determined the decision to participate in the auction. Hence, the following information was utilized and hypothesized as the factors included in the empirical model the decision:

1. Characteristic of the farmer regarding gender, age, education. The data collected indicates a 90 percent of the small-scale farmers not go beyond the level education at elementary school. Thus, we assumed that the farmers in the same perception about the knowledge market. Hence, the *age* and *education* variables were not included in the model and the *gender* variable was determined as the only characteristic variable included in the model.
2. Access to Income such as landholding, scale of production and the commodities characteristic. We hypothesized a positive relationship between landholding, scale of production and the decision. The larger of landholding's number and scale of production reflect the level of capitalization that lead their orientation on the searching of the better market demand, as to allocate the commodities. On the other hand, the commodities characteristics, as perishability's level and seasonal factor, are negatively associated with the decision. Since vegetable is the commodity with the very low of the perishability level, the farmer is likely to find the buyer as rapid as possible to reduce the risk of loss their income opportunity. This evidence has confirmed by 95 percent of the farmers sold their commodities to the buyers who come to the farm gate.

3. Access to market was observed in terms contact with the specific buyer and the cooperatives membership. Many of the farmers sell their commodities to the traders who come to the farm; thus, it is more profitable for the farmer, as they could distribute as soon as the commodities harvested and reduce the transportation cost. Hence, the data shows majority the farmers have the contacts with the traders that assumed be negatively relationships with the decision. Mean while, the cooperatives membership facilitate the access to the auction, as the auction mechanism is provided by empowering the cooperatives role among the farmers.

By using logistic regression model will be predicting the logit, that is, the natural log of the 'odds' or ratio of the probability of having made one or the other decision.

$$\ln(ODDS) = \ln\left(\frac{P_n}{1-P_n}\right) = \beta_0 + \sum_{m=1}^{i} \beta_n X_{mn} + u_n , \quad (3)$$

Where:

- P is the predicted probability of the event which is coded with 1 (decide to participate in the auction) rather than with 0 (not to participate);
- $\left(\frac{P_n}{1-P_n}\right)$ is "odd" as the ratio of the probability of an event's occurring to the probability of its not occurring;
- $\ln\left(\frac{P_n}{1-P_n}\right)$ is the logarithm of "odds";
- X is explanatory variables;
- β_0 is the coefficient of the constant term and β_n is the coefficient of the explanatory variables;
- m is the response category,
- n denotes cases $(1,2,3,...,i)$
- u_n is unobserved random effects

The odds ratio is obtained using equation (3):

$$\frac{P_n}{1-P_n} = \exp\left(\beta_0 + \sum_{m=1}^{i} \beta_n X_{mn} + u_n\right) \quad (4)$$

Thus, by equation (3) the probability that the farmer decide to participate in the auction is calculated:

$$P_n = \frac{\exp\left(\beta_0 + \sum_{m=1}^{i} \beta_n X_{mn} + u_n\right)}{1 + \exp\left(\beta_0 + \sum_{m=1}^{i} \beta_n X_{mn} + u_n\right)} \tag{5}$$

For calculating partial effects of continuous variables is denoted by

$$\frac{\partial P_n}{\partial x_n} = P_n(1-P)\beta_m \tag{6}$$

Considering to the study, we use the subjects' decision as the dichotomous criterion variable, with "1" when the farmer decides probably to participate and "0" when the farmer decides not to participate in the auction. Then, the explanatory variables divided into two kind of criterion variable:

- Categorical variables : gender (*gen;* with 0 = female, 1 = Male), trader contact (*tc;* with 0 = no contact, 1 = have contact), Cooperatives Membership (*cm;* with 0 = not member, 1 = member);
- Continuous variables: education (*edu;* scale 1 – 5), landholding (*land;* scale 1 – 5), Scale of production (*sp;* scale 1 – 4), Commodities characteristic (*cc;* scale 1 – 4).

Hence, the following logistic regression model was used for the study:

$$\ln(ODDS) = \ln\left(\frac{P_n}{1-P_n}\right) = \beta_0 + \beta_1 X_{gen,n} + \beta_2 X_{tc,n} + \beta_3 X_{cm,n} + \beta_4 X_{edu,n} + \beta_5 X_{land,n} + \beta_6 X_{sp,n} + \beta_7 X_{cc} + u_n$$

By the data observed, the effect of dependent variables on percentage of decision to participate in the auction, with the total percentage of the decision to participate is only 31.4 % compares 68.8 % of respondents decided not to participate, is presented in the Table 2 below

Table 2. Explanatory variables of farmer's decision

Variable	Decision (Percentage)	
	Yes	No
Gender		
Female	22,2%	77,8%
Male	41,2%	58,8%
Trader contact		
Yes	37,9%	62,1%
No	5,0%	95,0%
Cooperatives member		
Yes	33,3%	66,7%
No	30,8%	69,2%
Education		
< Elementary School	40,0%	60,0%
Elementary School	16,7%	83,3%
Junior high School	28,6%	71,4%
Senior high School	-	-
University	99,0%	1,0%
Landholding		
< 1000 m²	35,0%	63,0%
1000 m² - 2500 m²	25,0%	75,0%
2500 m² - 0.5 Ha	42,9%	57,1%
0.5 Ha - 1 Ha	2,0%	98,0%
> 1 Ha	2,3%	97,7%
Scale of production		
1-5 quintals	35,0%	65,0%
6 quintal - 1 ton	40,0%	60,0%
1 - 5 ton	14,3%	85,7%
> 5 ton	33,3%	66,7%
Commodity Characteristic		
< 1 week	38,5%	61,5%
1 week - 1 month	1,0%	99,0%
> 1 month	14,3%	85,7%

4. Results

Estimation results on the auction prices determination for two commodities are presented in the Table 3.

Table 3. Estimation result

Red Chili			
	Model 1	Model 2	Model 3
Constant	-4896.38	-904.07	- 2200.36
Reservation price	0.985	1.019	1.014
Market price	0.380	0	0.913
Quantity	-0.118	0	0.162
Crops season	- 0.19	0	0
Adjusted R Square	0.959	0.943	0.946

Onion			
	Model 1	Model 2	Model 3
Constant	746.38	1500.17	615.97
Reservation price	0.373	0.632	0
Market price	0.292	0	0.571
Quantity	0.600	0	- 0.853
Adjusted R Square	0.627	0.568	0.568

The result indicated that the auction's closing price is explained by a linear regression on the variables $(\beta_1, \beta_2, \beta_3, \beta_4 \neq 0)$. On the red chili case, the negative constant on three models indicate that when auction is held without four independent variables, the price will be -4896.38, -904.07 and - 2200.36 standard deviation below the mean of their closing price. The quantity and Crops season coefficient are also negative. Although for the quantity coefficient is not significant. It might be explained that the final buyers buy on several offer in the auction, they buy in regarding the interesting price which is offered. So, quantities offered in this market do not affect their willingness to pay. On the other hand, the negative quantity coefficient is significantly affected to the onion's closing price; it means there was an indication that the buyer will reduce their bid as well as the increasing onion's quantity offered. Price determination's behavior is different for two commodities. For the red chili closing price was significantly determined by reservation price posted before the auction while the onion price was more affected by the quantity offered by the seller. The different determining factor might be characterized by market price dynamics of the commodities, as presented on Figure 4. Since the market price of onion is more stable than red chili, thus there is no price speculation from either the seller or the buyer and the negotiation process, presented by bidding process, was occurred by quantity offered. The seasonal

characteristic of the red chili was leaded to instability on the market price. Hence, once the auction was held both of the seller and the buyer consider the actual market price. The level of perishability of the commodities was likely affecting the determination of the prices, as onion is more storable than red chili.

The evidence from the auction price determination would be confirmed concerning the farmer's motivation to participate in the auction. The logistic regression coefficient, and odds ratio for each explanatory variables are presented in Table 4.

Table 4. Logistic regression predicting the farmer's decision

Variable	Coefficient	Partial effect
Gender		
Model 1	1.762	5.824
Model 2	0.904	2.470
Model 3	0	0
Education		
Model 1	- 0.530	0.589
Model 2	- 0.036	0.964
Model 3	0	0
Landholding		
Model 1	- 0.525	0.592
Model 2	- 0.241	0.786
Model 3	0	0
Production Scale		
Model 1	- 0.532	0.587
Model 2	0	0
Model 3	- 0.407	0.666
Traders Connection		
Model 1	22.142	0.000000004
Model 2	0	0
Model 3	0	0
Commodities Characteristic		
Model 1	- 0.746	0.474
Model 2	0	0
Model 3	- 0.926	0.396
Cooperatives Membership		
Model 1	1.323	3.754
Model 2	- 0.281	0.755
Model 3	0	0

The logistic models were constructed by an iterative maximum likelihood produce for three models different and the value of coefficients indicates the change in the predicted logged odds associated with a unit change in explanatory variables.

The model 1 was constructed with seven all explanatory variables that were hypothesized before as the determining factors of the farmers decision. The results show that education level, landholding, production scale and commodities characteristic variables give the

statistically similar significances value while trader connection as the higher significant value explaining the model. Thus, it can be interpreted that the farmer's decision to participate in the auction is characterized by the farmer's connection to trader. Further, it can be explained by the actual selling mechanism occurring which most of the farmer sells their commodities to the traders who come directly to farm gate though provided in reducing transport cost. This evidence has confirmed also in others models constructed model 2 and model 3, without trader connection variable included in the models. Both of the models give the insignificant coefficient for all the variables.

The partial effect coefficient of the continuous variables can suggested us the effect of increment of the level in the respective variable on the probability farmer decides to participate in the auction. Results of the three models show positively partial effect in the all variables employed. It indicates that the increasing in one unit level of variables leads to the increasing probability of the farmer's decision to participate in the auction as well. In more detail, regarding to the model 1 which show us that the one unit increment of education level affects on the improving of participation decision. It is also found that the increasing of the landholding and production scale were the factors to improve the farmer's motivation enter into the auction. And also, more storable of one commodity could encourage farmers to participate.

In the absence of production scale and commodities characteristic variables, as in model 2, the increasing of level of the education have more highly effect to the decision as the landholding number increase as well. Also, the model 3 suggests that improving in the one unit of production scale could improve as well the farmer's decision.

5. Discussion and conclusion

Considering the estimation results of the auction's price determination and the logistic regression analysis for the model of probability the farmer's decision to participate in the auction, suggest us the determining factors whether the small-scale farmer's participation in the auction is effective. From the point of view of the price determination in the auction, the different commodities characteristic were yielded the different significant on determining factor. The lower perishability commodities have dynamically market price, thus the auction price was determined by the reservation price that posted at the beginning of the auction. Hence, the farmer has to set the appropriate reservation price in order to obtain the optimal auction price. That appropriate reservation price should be set regarding the market price reference to avoid inefficiency in choosing the better market place for selling the commodity.

But, unlike in red chili case, the market price of the commodity with high perishability is more stable, though the quantity offered in the auction is the main determining factor which is considered by the auction participants in defining the price.

Regarding the price determining factors in the auction, the logistic model of farmer's decision give the analysis about the efficiency on farmer's participation. Based on the data observed in the study area which represented vegetables farmers in the province, 71.4 % of respondents cultivate the variant of vegetables with the less than 1 week long-life and among these respondents there were only 38.5 % decided to participate. As the farmer's decision model is significantly explained by the trader connection's factor and 83 % of the respondents sell their commodity to the traders who come to them, though the small percentage of farmers who has the decision to participate might be generated by the lack of information on actual market price. Obviously, it can be only understood the reason why the farmer would not to speculate for selling their commodity in the mechanism which they do not know yet, as almost all of them did not get information about the auction.

The next question is whether the farmers earn higher income than if they sell the commodity on the farm gate, even they receive a higher prices in the auction. In fact, the only consideration of farmer for selling the commodity to traders is there is no additional transaction cost incurring, because the traders pick the commodities directly to the farm gate. Since the most of vegetables' farmer are low on the scale of production, reducing in transaction cost was driving their decision where they would to sell their commodity. On the other hand, the profitable revenues might be obtained if they could collect their commodities with the others; therefore the transaction is shared among them. Formally, this collection action should be taken and organized by cooperative, but, in contrast, only 25 percent of the farmers to be member of the village cooperatives. Since, the only one reason of farmer being a member is to get easily the supply of fertilizer. Hence, the marketing commodities role of the cooperatives has not played well.

Finally, small-farmers will only participate in the mechanism in which it doesn't incur additional transaction cost, such as transportation cost. Alternatively, the cost can be reduced by empowering the collective action, in this case cooperative should be re-taking their important role, as commodities marketing agent, because the fact shows the better prices in the auction. By doing so, the farmer have the opportunity to access to the auction and getting better income. The suggestion made in this study as the preliminary result to extent our

analysis of price determination in the auction which is wish useful for developing the policy recommendations in Agricultural Market of Central Java Province.

References:

1. Alexander, J. (1987). *Trade, Traders and Trading in Rural Java*. Singapore: Oxford University Press.
2. Blandon, J., Henson, S., Cranfield, J (2008). Small-scale farmer participation in new agri-food supply chain for fruit and vegetables in Honduras. Journal of International Development, 21: 971 – 984
3. Ferris, J. N. (1998). *Agricultural Prices and Commodity Market Analysis*. USA: The McGraw-Hill.
4. Gujarati, D. N. (1988). *Basic Econometrics.* 2nd ed. New York: McGraw-Hill Publishers.
5. Krishna, Vijay. (2002). *Auction Theory*. San Diego: Academic Press.
6. Klemperer, P. (2004). *Auction: Theory and Practice.* UK: Princeton University Press
7. Laffont, J., Monier-Dilhan, S. and Ossard, H (1995). *Price Analysis of a Vegetable Auction Market*. Acta Hort. (ISHS) 340:375-380
8. Makhura, M. N., Kirsten, J., and Delgado, C (2001). *Transaction costs and smallholder participation in the maize market in the Northern Province of South Africa.* Seventh Eastern and Southern Africa Regional Maize Conference, pp. 463 – 467
9. O'Hara, M. (1997). *Market Microstructure Theory.* UK: Blackwell Publishing.
10. Sheperd, A. W. and Schalke, A. J. F. (1995). *An assessment of the Indonesian horticultural market information service.* Rome, FAO: AGSM Occasional paper No 8. 49p