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**FARMER-TRADER RELATIONSHIPS IN THE INDONESIAN CHILLI  
MARKETS: THE ROLE OF RELATIONSHIP QUALITY IN MODERN  
AND TRADITIONAL SUPPLY CHAINS**

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# **Farmer-trader relationships in the Indonesian chilli markets: the role of relationship quality in modern and traditional supply chains**

by

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## **Abstract**

*A decade of strong economic growth, rapid urbanization and liberalization of foreign direct investment (FDI) are transforming Indonesia's food retail sector. Modern retail markets are reorganizing how food chains operate: requiring product homogeneity, grading, sorting, packaging, and supply consistency. Current literature suggests that improving relationship quality among food chain actors enhances efficiency. In Indonesia, chillies are a priority crop commonly produced by small holders and like many other cash crops several farmer-trader issues emerging in chilli supply chains. This paper attempts to segment chilli farmers according to their perception of the relationship quality with their buyers. Data was collected through a survey of 602 chilli farmers selling to the traditional market channel or supermarket channel in West Java, Indonesia. The segments/clusters are developed based on the perceptions of chilli farmers to three variables in relationship quality: trust, satisfaction and commitment. Price satisfaction and socioeconomic attributes are analyzed to provide further insights. Four distinct clusters are identified. The largest cluster (45% of respondents) considers they have a high level of relationship quality with their buyers/traders.*

**Keywords:** farmer-trader relationships, relationship quality, cluster analysis

## **1. Introduction**

Strong economic growth, rapid urbanization and liberalization of foreign direct investment (FDI) are driving Indonesia's food retail sector transformation (Natawidjaya, et al., 2007). In particular, modern retail markets are reorganizing how food chains operate: requiring product homogeneity; specific standards in sorting, grading and packaging; and consistency in supply (Neven and Reardon 2004; Reardon, et al., 2003; Reardon, et al., 2009). This transformation changes market conditions facing small farmers since modern markets have higher product specifications compared to

traditional markets (Hernández, et al., 2007; Reardon, et al.,2009). Small farmers have an opportunity to participate in modern markets as price incentives and may be higher relative to traditional markets (Reardon, et.al, 2009). However, they also face several constrains (i.e. capital constrains, time constrain and knowledge constrains) to meet' product specifications and requirements posed by modern markets (Dries, et.al., 2009; Boselie, et at., 2003; Kaganzi, et al., 2009; Weatherspoon and Reardon, 2003).

Current literature suggests that improving relationship quality among food chain actors enhances efficiency (Ellram and Hendrick, 1995; Kalwani and Narayandas, 1995). Since modern markets face high transaction costs of exchange with a lot of small farmers and difficulty in monitoring quality, modern markets tend to deal with a few bigger suppliers or directly with larger farmers (Dries, et.al., 2009; Reardon and Timmer, 2007). However, some studies confirm that small farmers may participate in supermarket supply chains via intermediaries, i.e. specialized wholesalers/agents, large wholesalers or farmer organizations (Kaganzi, et al., 2009; Moustier, et al., 2010; Natawidjaya, et al., 2007; Reardon and Timmer, 2007). Through a closer relationship between small farmers and their buyers may enable them to coordinate supply and demand in the markets, exchange information with respect to price information; and specific requirements in modern markets. This will reduce transaction costs and increase opportunity of small farmers to compete in markets.

In Indonesia, chillies are a priority crop commonly produced by small farmers. Chillies are an important cash flow income for small scale producers and an essential ingredient in the Indonesian daily diet. The rise of modern market chains allows chilli farmers to

sell their produce not only to traditional market channels but also to modern market channels via modern markets' agents. Like many others cash crops<sup>1</sup>, among the farmer-trader issues emerging in chilli supply chains include weak bargaining position of farmers; limited commitment of farmers to provide consistent supply due to price volatility; and payment delays (White, et al., 2007).

An extensive literature pioneered by Reardon et al. focused on restructuring and the implications of modern retail chains in developing and transition economies. However, it did not consider the quality of relationship between farmer-trader under the rapid rise of modern market penetrations. Many studies measure determinant factors and the level of farmer-trader relationships, but perceive that the perceptions of farmers on the relationship quality variables are identical. In fact, previous studies which focus on the farmers' marketing behavior find the differences of attitude among farmers (McLeay, et al., 1996; Poole, 2000). Hence, different perceptions of individual farmers with respect to the level of relationship quality with their buyers may exist. A number of farmers may perceive high level relationships for the period of transaction with their buyers, but others possibly are still in the low or moderate levels. In these situations, different policies and strategies are needed in order to serve different types of farmers, thereby enhancing their efficiency and their ability to compete in modern markets.

This paper contributes to this literature. We attempt to understand how chilli farmers differ in their perception of relationship quality with their buyers. Cluster analysis is used to develop the perceptions of chilli farmers to three variables in relationship

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<sup>1</sup> For example the studies by Batt (2003); Coronado, et. al., (2010); Fabella (1992); Kaganzi, et al., (2009); Kottila, and Rönni (2006); and Lyon (2000) cite regarding to some issues in relationships between farmers and traders.

quality: trust, satisfaction and commitment. To provide further insights, we also incorporate price satisfaction dimensions and socioeconomic attributes in the analysis.

The paper then is organized as follows. The second section describes the current market situations of chilli in Indonesia. Section 3 reviews the literature of relationship quality and its dimensions. Section 4 discusses the methodology used in this research. Section 5 discusses the results of the while section 6 contains conclusions and implications for future research.

## **2. Current markets of chilli in Indonesia**

Indonesia produces more than one million tons of chillies per year since 2003<sup>2</sup>, making it as the fourth largest chilli producer after China, Mexico and Turkey<sup>3</sup>. On average between 2003-2009 chilli production in Indonesia increased annually by about 4.7 percent. As an essential ingredient in the Indonesian daily diet, it is expected that the production of chilli will continue to increase.

Chillies are mainly sold in domestic markets to wholesale markets; retail wet markets; food processors and supermarkets. The wholesale markets and retail wet markets are categorized as traditional marketing channels while the two later markets are considered modern marketing channels. The traditional marketing channels still dominate since 95% of chillies are marketed through traditional channels (White, et al., 2007). Only around five percent of chillies are supplied to consumers through modern markets

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<sup>2</sup> [http://www.bps.go.id/tab\\_sub/view.php?tabel=1&daftar=1&id\\_subyek=55&notab=15](http://www.bps.go.id/tab_sub/view.php?tabel=1&daftar=1&id_subyek=55&notab=15). Viewed 17 August 2009

<sup>3</sup> <http://faostat.fao.org/site/339/default.aspx>. Viewed 17 August 2010

(generally supermarkets). This is still small number but it likely to grow in parallel with the estimated raise in supermarket penetrations.

In traditional channels chillies are collected by small traders before being distributed to wholesale markets, wet markets or middlemen. Modern marketing channels obtain chillies from wholesale markets or their agents, i.e. specialized wholesalers or preferred suppliers (White, et al., 2007). Because of high transaction costs, the agents prefer to build contracts (including oral or written contracts) with other trader/s rather than buying chillies directly from farmers. For example, in West Java Province, the management of Carrefour (one of the big supermarket channels operating in Indonesia) has a contract with “Bimandiri Company”. This company has a role as a specialized wholesaler delivering fresh vegetables (including chilli) to Carrefour. Bimandiri Company then makes contract with local trader/s or farmer groups who then purchase directly from farmers. In such situations the role of trader/s is important since they link chilli farmers to either traditional or modern markets. However, as has been explained previously, issues in respect to the relationship quality between farmers and their traders appear. Therefore, it is important to evaluate farmers’ perceptions on their relationship with their buyers in order to improve their long-term relationship performance in traditional and modern marketing channels.

Chilli commodity exhibits large price fluctuations with limited knowledge of selling prices since chilli prices are determined by demand and supply interactions in the major wholesale markets. This price volatility creates more risk for farmers. The traders in the major wholesale markets set chilli prices based on daily situation of demand and supply

of chilli in these markets. Similar situations happen in modern marketing channels where price information in the wholesale markets is utilized as a baseline for determination of chilli price. Chilli prices increase significant coincidentally with major Indonesian celebration, but reduce significantly when there is an over supply. Farmers or buyers can do nothing in respect to the absolute price of chilli in the markets. However, by building a good relationship between farmers and traders, farmers will accept correct price information, price transparency and good price quality ratio for their chillies from their buyers.

### **3. The literature review**

Relationship quality refers to joint cognitive evaluation of business interactions by significant individuals in both firms in the dyad (Holmlund, 2008). The quality of a relationship is a critical point in the achievement of long-term success for their business (Morgan & Hunt, 1994; Claassen, et al.; 2008; Kwon and Suh, 2004). Building closer relationship between trading partners will increase efficiencies (Ellram and Hendrick, 1995; Kalwani and Narayandas, 1995), reduce transaction costs (Kwon and Suh, 2004) and raise competitive advantage (Bejou, et al., 1996). Through better relationship quality, trading partners will consider maintaining ongoing transactions (Caceres and Paparoidamis, 2007; Bejou, et al., 1996; Garbarino and Johnson, 1999; Easton, 1994).

Current literature indicates that there is no common consensus in measuring the level of relationship quality between exchange partners. However it seems that commitment, trust and satisfaction are the most common variables to quantitatively measure relationship quality together with one or several antecedents or consequences

(Holmlund, 2008; Morgan and Hunt, 1994; Kwon and Suh, 2004; Wong and Sohal, 2002; Sergeant and Lee, 2004) utilize two variables i.e. commitment and trust in modeling relational quality. Bejou, et al., (1996); Ashnai et al. (2009); and Parsons (2002) propose relational quality as a composite measure of trust and satisfaction. However, some authors (e.g. Caceres and Paparoidamis, 2007; Smith, 1998; Lang and Colgate 2003) combine the three variables – satisfaction, trust and commitment- in evaluating the level of relationship quality. In those studies, the variable of commitment is the highest construct in the relational quality model. It is followed by trust and satisfaction.

Trust is an important variable since it can reduce the risk that the trading partner will act opportunistically (Bradach and Eccles, 1989). In a relationship with a high level of trust, the trading partners feel confidence in sharing information and in believing information which they receive. Trust exists when the participants feel confidence with the reliability and integrity of their exchange partner (Morgan and Hunt, 1994). Formally, Moorman, et al. (1986) and Sargeant and Lee (2004) divided the definition of trust into two categories, i.e. (1) a belief or expectation related to trustworthiness of a partner resulting from expertise, reliability, or intentionally and (2) a behavioral intention that reflects a reliance on a partner and involves vulnerability and uncertainty.

When a participant in the relationship feels satisfied with the past performance of his partner, he will approach the future transactions with trust so the quality of their relationship will improve. Bejou, et al. (1996); and Geyskens, et al. (1999. p.224) divide the concept of satisfaction into two categories (1) economic satisfaction which refers to



‘a channel member's positive affective response to the economic rewards that flow from the relationship with its partner, such as sales volume and margins and (2) non economic satisfaction which is defined as ‘a channel member's positive affective response to the non economic, psychosocial aspects of its relationship’.

Morgan and Hunt (1994) define commitment as ‘an exchange partner believing that an ongoing relationship with another is so important as to warrant maximum efforts at maintaining it; that is, the committed party believes the relationship is worth working on to ensure that it endures indefinitely’ (p.23). This definition has its parallels in the definition of commitment from Hennig-Thurau and Klee (1997) which defines commitment as ‘a customer’s long-term ongoing orientation toward a relationship grounded on both an emotional bond to the relationship and on the conviction that remaining in the relationship will yield higher net benefits than terminating it’ (p.752). Once commitment exists, loyalty in the business relationship will increase (Caceres and Paparoidamis, 2007).

In the agricultural economics and business literature many studies have been conducted mainly to analyze antecedents of relationship quality variables. The studies by Batt (2003) conclude there is a positive relationship between satisfaction and trust. Gyau and Spiller (2007) divide the satisfaction into two constructs, i.e. non economic satisfaction and price satisfaction and both constructs have positive impact on trust. Other studies, for instance, by Batt and Rexha (1999) report the positive relationship between satisfaction and trust; and between trust and commitment in the seed potato industry in Asia. Schulze, et al., (2006) describe relationship quality as a higher-order construct

containing of all three variables, i.e. satisfaction, trust and commitment to evaluate the level of relationship quality in the German pork and dairy sectors.

A few studies have been reviewed the role of relationship quality variables between farmers and their buyers in a certain chain and confirmed the differentiation perceptions among the farmers. Kottila and Rönni (2006) report a strong mistrust between farmers and the milling factory in muesli chain while in the case of yogurt chain the level of trust between organic farmers and the brand owner is varied. Österberg and Nilsson (2009) find differences in farmers' commitment and their trust with the agricultural cooperatives in Sweden. This study also concludes that older farmers have lower trust than younger farmers. Batt (2003) finds that on overall potato farmers feel satisfied and trust with their buyers.

#### **4. Methodology**

##### ***Study design and operation of the relationship constructs***

The data was collected through a survey of 602 chilli farmers selling to the traditional market or supermarket channels in West Java Province, Indonesia. This province represents the largest chilli production zone in Indonesia with numerous supermarkets and food processors active buying, processing and marketing chillies. The sample consists of 489 chilli farmers as a representative sample of chilli producers (traditional channel) and 113 chilli farmers as a representative sample of those supplying through the supermarket channel. However, it must be noted that it was necessary to exclude two respondents in the traditional channel and one respondent in the supermarket channel due to inadequate data.

A multistage procedure was conducted prior to conducting the formal survey particularly to determine the efficacy of the traditional channel sample. Three districts in West Java, i.e. Ciamis, Garut and Tasikmalaya were selected based on reasoned judgments: Garut represents the major production zone in West Java while Ciamis and Taskimalaya are new emerging areas with substantial modern sector activities. Then eight sub-districts in Garut and three sub-districts in each the new emerging area were chosen following the accepted procedures in systemic random sampling (based on the data of average chilli production in 2004-2008) in the three districts. This procedure allows us to select every  $k^{\text{th}}$  element after we generated a random start (Churcill, et.al., 2005, p.439):

(1) The average production of chilli from 2004 to 2008 in each sub-district was calculated and sorted from the highest to the lowest. Then the cumulative of average production was calculated as a basis for sub district selection.

(2) The interval of the average production was determined by dividing the total average production and the number of sub-districts to be selected in the district.

(3) A “random starting point” was generated to determine initial level production of first sub-district to be selected. The second sub-district was selected by adding that starting point plus one interval and the third selected sub-district is chosen on the basis of the starting point plus two intervals. In each of these sub-districts, three villages were selected randomly and in each of these villages, 12 (plus an additional eight for backup) chilli producers were drawn randomly from a list provided by the Extension Office and the Land Tax Office.

In respect to the supermarket channel sample, a list of chilli producers whose chillies end up in supermarket was collected from various sources, i.e. supermarket suppliers, local agricultural staffs and other contact persons in the field. The 113 farmer supplying to supermarkets were identified and it was discovered that, without exception, they all live in Ciamis District. All farmers were interviewed during the field survey.

A structured questionnaire provided information on household characteristics, assets, agricultural land, chilli production, input costs, chilli marketing, changes in chilli production and marketing arrangement over the previous five years. Perceptions of and experience with modern channels, cash income activities and perception on relationship and price satisfaction with their buyers were also sought. A-five-point Likert scale from one (strongly disagree) to five (strongly agree) was utilized to rate the level of relationship and price satisfaction.

The study utilizes variables of trust, satisfaction and commitment as the main construct in the relationship quality. We sought to explore “commitment” through three items by following those used by Kwon, I. G (2004) and (Morgan, 1994). “Trust” is explored through three items based on study by Batt (2003) and Gyau and Spiller (2007). Four items related to “satisfaction” consist of two items related to general price satisfaction and two items directed towards non-economic satisfaction. They are adapted from Geyskens, et al (1999), Batt (2003) and Gyau and Spiller (2007). Major modifications were, however, required to adapt those statements to the context of farmer-buyer relationship in chilli commodity. The three variables-commitment, satisfaction and trust- were employed as the basis of the group in cluster analysis.

In addition, five price satisfaction dimensions were incorporated in the analysis in order to provide further description of the clusters. We adapted five dimensions of price satisfactions i.e. relative price, price transparency, price quality ratio, price fairness and price reliability based on the work of Matzler, et al. (2006) and Matzler, et al. (2007). We referred to definition of each dimension in those studies by Matzler but, of necessity, modified each definition with respect to the farmer-buyer relationships in the chilli commodity.

“Relative price” provides a clear, comprehensive, current and effortless overview of buyers quoted prices and it was assessed through two items. “Price-quality ratio” is a ratio between chilli qualities and price paid by the buyers and it was explored through two items. “Price fairness” is defined as the farmer’s perception of whether the difference between the socially accepted prices is reasonable, acceptable or justifiable and it was evaluated through two items. “Price reliability”, defined as awareness of price changes, is assessed through a single item. Finally, still based on Matzler (2007) “relative price” is that price which farmers receive from their buyers when compared to that price which was offered by other buyers: it was explored through two items.

### ***Statistical procedures***

Multiple stages were involved in segmentation analysis as outlined in Gloy & Akridge, (1999); Gyau, et al., (2009); Onyango, et al., (2006). The analysis is conducted by using “Stata” statistical software version 10.

Initially principal component analysis with varimax rotation was used in relationship quality constructs. The reliability of the measurement scale of the relationship quality variables was tested using Cronbach Alpha. Next, a two stage cluster analysis was applied to identify clusters of chilli farmers which express similar views on their relationship with buyers. We used hierarchical procedure to find the number of clusters utilizing “Ward’s hierarchical clustering” method. By examining the dendogram, we identified four of cluster numbers. We combined the dendogram result with Calinski and Harabasz pseudo F value. This computation indicated that the four-group solution is the most distinctive from other group solutions (appendix 1). Next, the four-group of clusters was set into k-means cluster analysis in order to obtain the final cluster solution. The Euclidian distances were employed in “Ward’s” and” k-means” clustering in measuring the similarity. Besides relationship quality variables, we evaluated price satisfaction dimensions and socioeconomic attributes in the analysis. The ANOVA and chi-square tests were applied to investigate the heterogeneity among the four-group clusters. Following those tests, a “Tukey’s honestly significant differences (HSD)” test was utilized to examine further significant differences across the clusters.

## **5. Results and discussion**

### ***Description of sample characteristics***

The assimilated data of respondents with respect to household and chilli production characteristics are shown in Table 1. The average age of the respondents is 46 years, and the average amount of schooling of the respondents was 7 years. With this level of education, the respondents not face serious literacy problems. Typically the household

has 5 members, with average of 3 persons as productive laborers. Mobile phone ownership appears more common than motor bike ownership amongst respondents.

Over survey period, only a small area was dedicated to chilli production (0.36 ha); therefore it is not surprising that the farmers only obtained a small income from chilli (7.54 million IDR). About 0.17 ha of household's land is allocated to chilli production in the rainy season since it is easier for households to manage irrigation issues. The average of years spent by the respondents in chilli production is about 9 years. The respondents seem not pay enough attention on sorting activities during transactions. Only 14% and 22% of respondents sort the chillies on the basis of size and color, respectively, before being delivered to traders. About 19% of respondents are selling their production through supermarket channels.

Table 1 here

#### ***Dimensions of relationship quality: factor analysis results***

Table 2 presents the factor loading from the principal component factor analysis to the three-variables of relationship quality, i.e. commitment, trust and satisfaction. The factor loading for all items in each variable is above 0.5 except one item on trust; therefore we exclude this item in our analysis (Nunnally, 1978). With Cronbach's alpha on commitment and trust equal to and above 0.7 respectively, the variables were on the recommended threshold (Nunnally, 1978). However, satisfaction which was explored through four items has a Cronbach's alpha result of 0.65, which is below the minimum adequate value of 0.7 (Nunnally, 1978). However, following the example of Batt (2003)

in which he permits a variable of goal compatibility with a Cronbach's alpha result of 0.659, the satisfaction variable in our study was considered acceptable. Moreover, some studies consider the any resultant value which yields a Cronbach's alpha values above 0.6 as acceptable and sufficient for further analysis (Garbarino, 1999; Smith, 1998; Gyau, 2009).

Table 2 here

### ***Cluster analysis results***

Four groups were identified with respect to chilli farmers' opinions in respect to their relationships with traders. The data in Table 3 demonstrates the mean, standard deviation and the number of the sample in each group. The results of the "Anova" and the "Tukey HSD" tests show strong and significant heterogeneity at 5% between these three variables of relationship quality across the clusters.

**Cluster 1:** This cluster is comprised of 14% of respondents. It is characterized by lack of satisfaction and commitment. Farmers in this cluster report that they believe that they do not receive reasonable prices from their buyers. Further the respondents indicate that their buyers do not care about farmers' welfare: in that sense that if buyers believe that they have already purchased sufficient quantities of chillies any given time, then the buyers will not purchase any further supply from farmers. Moreover if farmers have complaints (e.g. regarding chilli prices, grading systems etc) the buyers give a slow response in respect to these grievances. In this cluster, such low levels of satisfaction seem to lead to low levels of commitment: i.e. if chilli farmers can find alternative



buyers, they exhibit little hesitation in selling their chilli to the new buyer. Although they have a low level of satisfaction and commitment, the farmers in this group partly agree with two items in the trust variable.

**Cluster 2:** This is the smallest group in this study and constitute only 11% of total respondents. Relative to the three other relationships, chilli farmers in this group have the lowest levels of agreement on trust, but relatively moderate in respect in the areas of commitment and satisfaction. The response of chilli farmers in this group suggests that buyers are less likely to keep promises and seem less willing to provide timely payment. Similarly to cluster 1, they are concerned about the issue of the buyers' tardiness in handling farmers' complaints. Regarding general price satisfaction, chilli farmers in this cluster would consider abandoning their relationships if they could obtain a higher price from alternative buyers.

**Cluster 3:** There are 272 respondents (45%) in this cluster, making it the largest of the groups. It is characterized by the highest levels of satisfaction, trust and commitment relative to the other clusters. Respondents are very satisfied with their buyers and believe that their buyer can be trusted. Consequently, the farmers wish to maintain their relationships with their buyers.

**Cluster 4:** This group, the second largest in this study, comprises 29% of respondents. The farmers indicate that they experience high levels of trust with the exchange since the buyers always keep their promise and provide payment in a timely fashion. Although farmers indicate that feel reasonably satisfied with the prices offered by their

buyers, they would still consider choosing other buyers if they could find others who were offering higher prices. It is perhaps not surprisingly that these farmers have only moderate levels of commitment. Again, in similarity with other clusters, price satisfaction is the primary factor in the relationship between farmers and their buyers.

Table 3 here

### *Characterizing the clusters*

#### *Perception of respondents on price satisfaction dimensions*

The clustering results indicate that majority of farmers are dissatisfied with price offered by buyers. In this study we attempt to explore further which the price dimensions might either reduce or improve general price satisfaction and hence overall satisfaction. Table 4 presents the mean and standard deviation in each of the price dimension statements. The “Anova” tests indicate that there are significant differences among all clusters with respect to all price satisfaction dimensions.

The perception of relative price differed across the clusters. Respondents in cluster 3 agree that their buyers offer a satisfactory price than other buyers; cluster 4 tends to agree moderately with this item whereas cluster 1 and cluster 2 show moderate agreement with this item. In general, all clusters (except for cluster 3) have a moderate agreement with a comparison of prices received among the farmers from similar buyers. As would be expected, cluster 3 tends to agree to all items in price transparency whereas cluster 2 shows the least agreement. Members in cluster 2 perceive that their buyers provide inaccurate price information.

Moreover, respondents in the cluster 1 and 2 show the least agreement with regards to the price quality ratio, price fairness and price reliability items. For the members of those two clusters, they believe that there is an imbalance between the price provided by their buyers and the quality of chillies offered by farmers. Moreover, buyers are perceived to have a tendency to take advantage of farmers through offering unfair prices, e.g. the buyers sometimes hide components such as transportation costs, which results the real price received by the farmer being lower than the price which he believed he had negotiated and on which he had agreed. In turn, farmers in cluster 1 and 2 are less willing to believe in the willingness of buyers to inform them of price escalation.

Due to low or moderate levels in most price satisfaction dimensions, respondents in cluster 1 and 2 demonstrate low levels of relationship with their buyers. In general, respondents in cluster 4 report moderate agreement within the price satisfaction dimensions. Even cluster 3 which is characterized by a “good relationships”, farmers assess price satisfaction items a lower level than relationship statements.

### ***Socioeconomic characteristic***

Table 5 and Table 6 contain the characteristics of households and chilli production synthesising all clusters. It is clearly demonstrated that household characteristics do not differ between the clusters. In turn, this implies that good or poor relationship quality is not determined by the household characteristics.

However, chilli production characteristics can, it seems, be used to characterize the clusters identified. There are some differences among the clusters that are significant (at 5% and 10% levels). Respondents in cluster 3 have the highest net chilli income (Table 5) probably because some members (25%) are selling to supermarket channels. Therefore, the members in this cluster concern to sorting activities. In contrast, by about 98% of respondents in cluster 1, which is characterized by the lowest net chilli income, are selling to traditional channel. They are somewhat the least concern to the sorting activities (Table 6).

Interestingly, respondents in cluster 3 have the least experience in chilli farming while cluster 1 which characterised by low level of relationship quality is the most experience. This finding is similar to Batt (2003) who indicates that the longer the duration of relationship with the buyers, the lower the farmer's trust level with the buyers examined. In such situation when the farmers become increasingly familiar with their buyers, the farmer's experience suggested that at the some point in time, the buyers would take advantage on them. Moreover, members in cluster 3 are living close to the sub-district market allow them to get more access to market information and communication.

Table 5 and 6 here

## **6. Conclusions and Implications**

We segment the nature of relationship quality between chilli farmers and their buyers from the farmers' perspective. Similar to the studies in the area of farmer's strategic behavior (McLeay, et al., 1996; Poole, 2000); there are some important differences

among farmers regarding to relationship quality issues. In this study, chilli farmers are categorized into four clusters; each with differing perceptions on relationship quality, price satisfaction and chilli production characteristics. The differences across the clusters suggest that targeted strategies are required to optimize farmer-trader relationships.

Cluster 1 is characterized by a low level of satisfaction, commitment and a moderate level of price satisfaction dimensions. Cluster 1 farmers have the most experience in chilli production; however they are much less interested in sorting values than other clusters. This cluster has the least net chilli income compared to other groups. Considering these situations, respondents in cluster 1 are typically satisfied by selling at current market prices and price transparency. Traders may encourage farmers to sort and grade their chillies by providing price incentives based on chilli quality. Moreover, traders might consider providing quick responses in handling farmers' complaints and concerns to improve long-term relationship with the farmers.

Farmers in cluster 2 have low levels of trust; satisfaction and price transparency. This cluster also has moderate levels of commitment with their buyers. Farmers in this cluster are relatively more interested in sorting activities, probably because a number of this cluster are already involved in supermarket channels. To improve relations, traders should provide timely payment; follow through with their promises; provide correct price information; and offer quick responses in handling farmers' complaints.

Unlike the three other clusters, farmers in cluster 3 have a relatively high level in their relationship with their buyers. It is similar to study by Batt (2003) that finds a very positive relationship between potato farmers and traders in the Red River Delta, Vietnam. Although respondents in this cluster have the least experience in chilli farming, they obtain the highest net chilli income among all clusters. Similar to cluster 2, a number of respondents in cluster 3 are selling their chillies to supermarket channels. However, the perceptions of farmers related to the correctness of price information and to the comparison between chilli qualities and price offered by traders are as not high as with the perception on other items in price satisfaction dimensions. Therefore, when dealing with cluster 3, traders should provide more accurate price information; offer prices based on chilli quality; and spend maintaining their relationship.

Respondents in cluster 4 perceive high levels of trust, but moderate levels of commitment, satisfaction and price satisfaction dimensions. Similar to cluster 1, farmers in cluster 4 are not as interested in sorting activities. With respect to this cluster, traders should encourage farmers to sort and grade their chilli and provide price transparency.

This study only examines farmer-buyer relationship from the farmers' perspective. Future study should consider incorporating methods to measure the same perceptions from the buyers' perspective. Moreover, we also exclude a number of factors that have a significant influence on trust, commitment, satisfaction and the question as to what extent price satisfaction dimensions impact on satisfaction. Therefore, future research should incorporate those issues in order to provide more holistic information concerning the farmer-buyer relationship in chilli supply chain.

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Table 1. Summary of respondent characteristics

Characteristics	Description	Obs	Mean	Std. Dev.
<b>Household (HH)</b>				
Age of respondent	Years	599	45.79	11.04
HH member	Number of persons living in HH	599	4.52	1.57
Education of respondent	Years of education	599	6.74	3.02
Literacy	1=yes, can read local or national language, 0=no	599	1.04	0.19
Productive labor	HH members between 15 and 65 years (persons)	599	3.01	1.19
Unproductive I	HH members below 15 years (persons)	599	1.40	1.09
Unproductive II	HH members above 65 years (persons)	599	0.11	0.34
Mobile phone	Number of mobile phone owned by HH (unit)	599	1.26	1.14
Motor bike	Number of motorbike owned by HH (unit)	599	0.65	0.72
<b>Chilli production</b>				
Net chilli income	Net chilli income over the last year (million IDR)	599	7.54	15.20
Chilli area	Area planted with chillies over the last year (ha)	599	0.36	0.51
Dry season I	Area planted with chillies around April 2009 (ha)	599	0.12	0.30
Dry season II	Area planted with chillies around July 2009 (ha)	599	0.07	0.20
Rainy season	Area planted with chillies around Sept 2008 or 2009 (ha)	599	0.17	0.35
Experience	Years of producing chilli	599	8.93	6.77
Distance	Distance from the house to the nearest sub-district market (km)	599	5.95	5.16
Sort chillies by size	Farmers sort chillies by size (%)	599	14	
Sort chillies by color	Farmers sort chillies by color (%)	599	22	
Channel	Percent of farmers selling chillies to supermarket channel	599	19	

Table 2. Factor analysis of relationship quality variables

Variables and items	Factor Loading
<b>Commitment</b>	
I would not sell to other buyers because I like being associated with my buyer.	0.7184
Our relationship is something that we are very committed to.	0.8197
I care about the long-term success of the relationship with my buyer.	0.8188
Cronbach Alpha: 0.70	
<b>Trust</b>	
My buyer always keeps his promises.	0.8988
I receive payment on time.	0.8988
I believe the technical and market information provided by my buyer <sup>a</sup> .	
Cronbach Alpha: 0.76	
<b>Satisfaction</b>	
The buyer offers me satisfactory prices for my chilies.	0.7058
Based on the price my buyer offers me, I will not change buyers.	0.6988
My buyer cares about my welfare (e.g. he will buy any volume I have).	0.6673
My buyer is quick to handle my complaints.	0.7218
Cronbach Alpha: 0.65	

<sup>a</sup> Item deleted due to low factor loading

Table 3. Mean and standard deviations of each item of the relationship quality variables

	Cluster 1		Cluster 2		Cluster 3		Cluster 4		F-Stat
	n=84/14.02%		n=69/11.52%		n=272/45.41%		n=174/29.05%		
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	
<b>Commitment</b>									
I would not sell to other buyers because I like being associated with my buyer.	2.45 <sup>a</sup>	0.83	3.09 <sup>b</sup>	0.97	4.03 <sup>c</sup>	0.50	3.28 <sup>b</sup>	0.91	112.03*
Our relationship is something that we are very committed to.	2.79 <sup>a</sup>	0.81	3.72 <sup>b</sup>	0.71	4.08 <sup>c</sup>	0.38	3.88 <sup>b</sup>	0.47	131.79*
I care about the long-term success of the relationship with my buyer.	2.48 <sup>a</sup>	0.67	3.45 <sup>b</sup>	0.81	4.13 <sup>c</sup>	0.38	3.50 <sup>b</sup>	0.78	162.02*
<b>Trust</b>									
My buyer always keeps his promises.	3.88 <sup>a</sup>	0.50	2.57 <sup>b</sup>	0.78	4.15 <sup>c</sup>	0.38	3.98 <sup>a</sup>	0.25	250.82*
I receive payment on time.	3.88 <sup>a</sup>	0.50	2.41 <sup>b</sup>	0.77	4.07 <sup>c</sup>	0.44	4.01 <sup>ac</sup>	0.28	252.08*
<b>Satisfaction</b>									
The buyer offers me satisfactory prices for my chilies.	2.90 <sup>a</sup>	0.82	3.12 <sup>b</sup>	0.85	4.06 <sup>c</sup>	0.44	3.61 <sup>d</sup>	0.69	93.06*
Based on the price my buyer offers me, I will not change buyers.	2.09 <sup>a</sup>	0.43	2.88 <sup>b</sup>	0.93	3.96 <sup>c</sup>	0.48	2.87 <sup>b</sup>	0.92	197.22*
My buyer cares about my welfare (e.g. he will buy any volume I have).	2.81 <sup>a</sup>	0.90	3.58 <sup>b</sup>	0.86	4.12 <sup>c</sup>	0.46	3.58 <sup>b</sup>	0.76	84.85*
My buyer is quick to handle my complaints.	2.71 <sup>a</sup>	0.78	2.93 <sup>b</sup>	0.81	3.96 <sup>c</sup>	0.43	3.29 <sup>d</sup>	0.84	102.35*

Note: \* significance at the 5%. Superscript letters indicate the result of Tukey HSD test ( $\alpha=0.05$ )

Table 4. Mean and standard deviations of each item of price satisfaction dimensions

	Cluster 1		Cluster 2		Cluster 3		Cluster 4		F-Stat
	n=84/14.02%		n=69/11.52%		n=272/45.41%		n=174/29.05%		
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	
<b>Relative price</b>									
In comparison to other buyers, I am satisfied with the price my buyer offers.	3.40 <sup>a</sup>	0.85	3.22 <sup>a</sup>	0.91	4.02 <sup>b</sup>	0.56	3.70 <sup>c</sup>	0.76	33.13*
The prices I received from my buyer are similar to the prices other farmers get.	3.57 <sup>a</sup>	0.81	3.39 <sup>a</sup>	0.93	3.84 <sup>b</sup>	0.64	3.52 <sup>a</sup>	0.82	10.26*
<b>Price transparency</b>									
Price information from my buyer is understandable and comprehensive.	3.45 <sup>ac</sup>	0.83	3.28 <sup>a</sup>	0.92	3.94 <sup>b</sup>	0.57	3.63 <sup>c</sup>	0.80	21.73*
The chili price information from my buyer is complete and correct.	3.25 <sup>a</sup>	0.94	2.87 <sup>b</sup>	1.03	3.63 <sup>c</sup>	0.86	3.33 <sup>ac</sup>	0.89	15.15*
<b>Price quality ratio</b>									
I receive a good price-quality ratio.	3.47 <sup>a</sup>	0.90	3.64 <sup>ac</sup>	0.79	3.98 <sup>b</sup>	0.42	3.83 <sup>bc</sup>	0.54	18.22*
I know that the price I received depend on the quality of my chillies.	3.02 <sup>a</sup>	1.05	3.41 <sup>b</sup>	0.93	3.61 <sup>b</sup>	0.91	3.30 <sup>ab</sup>	0.98	9.22*
<b>Price fairness</b>									
The chili prices I receive are fair.	3.20 <sup>a</sup>	0.93	3.22 <sup>a</sup>	0.86	3.96 <sup>b</sup>	0.52	3.65 <sup>c</sup>	0.76	37.15*
Regarding to the price I receive, my buyer seems does not take advantage on me.	3.55 <sup>a</sup>	0.72	3.61 <sup>a</sup>	0.75	3.99 <sup>b</sup>	0.44	3.71 <sup>a</sup>	0.61	18.68*
<b>Price reliability</b>									
The buyer always communicates properly if the price changes.	3.18 <sup>a</sup>	1.03	3.43 <sup>b</sup>	0.98	4.06 <sup>c</sup>	0.56	3.75 <sup>d</sup>	0.69	36.77*

Note: \* significance at the 5%. Superscript letters indicate the result of Tukey HSD test ( $\alpha=0.05$ )



Table 5. Mean and standard deviations of respondent characteristics

Characteristics	Description	Cluster 1		Cluster 2		Cluster 3		Cluster 4		F-Stat
		N=84/14.02%		n=69/11.52%		n=272/45.41%		n=174/29.05%		
		Mean	Std	Mean	Std	Mean	Std	Mean	Std	
<b>Household (HH)</b>										
Age of respondent	Years	46.55	10.67	43.04	10.06	45.69	11.43	46.69	10.86	1.96
Member of HH	Number of persons living in HH	4.50	1.43	4.54	1.51	4.60	1.55	4.39	1.69	0.67
Education of respondent	Years of education	7.03	3.43	6.93	2.82	6.59	2.86	6.76	3.14	0.59
Literacy	1=yes, can read local or national language, 0=no	1.01	0.11	1.07	0.26	1.04	0.20	1.03	0.18	1.29
Productive labor	HH members between 15 and 65 years	3.02	1.13	3.04	1.22	3.01	1.17	2.98	1.24	0.06
Unproductive labor I	HH members below 15 years	1.39	1.04	1.45	1.12	1.47	1.13	1.29	1.02	1.01
Unproductive labor II	HH members above 65 years	0.08	0.28	0.04	0.21	0.12	0.37	0.12	0.38	1.16
Mobile phone	Number of mobile phone own by household (unit)	1.13	1.00	1.17	1.18	1.33	1.21	1.24	1.06	0.83
Motor bike	Number of motor bike own by household (unit)	0.64	0.74	0.58	0.67	0.62	0.70	0.73	0.76	1.07
<b>Chilli production</b>										
Net chilli income	Net chilli income in one last year (million IDR)	4.35 <sup>a</sup>	6.74	5.67 <sup>ab</sup>	7.83	9.11 <sup>b</sup>	19.60	7.37 <sup>ab</sup>	12.00	2.56**
Chilli area	Total area planted with chillies during last one year in hectare	0.30	0.28	0.32	0.37	0.46	0.58	0.34	0.53	1.61
Dry season I	Area planted with chillies around April 2009 in hectare	0.09	0.19	0.09	0.13	0.17	0.30	0.10	0.19	1.88
Dry season II	Area planted with chillies around July 2009 in hectare	0.05	0.10	0.09	0.32	0.09	0.20	0.05	0.17	1.72
Rainy season	Area planted with chillies around Sept 2008/2009 in hectare	0.16	0.25	0.13	0.21	0.17	0.30	0.17	0.47	0.23
Experience	Years producing chilli	10.57 <sup>a</sup>	7.79	9.07 <sup>ab</sup>	6.78	8.22 <sup>b</sup>	6.18	9.07 <sup>ab</sup>	6.98	3.35*
Distance	Distance from the house to the nearest sub-district market (km)	6.15 <sup>a</sup>	6.28	9.06 <sup>b</sup>	8.37	5.23 <sup>c</sup>	3.82	5.75 <sup>ac</sup>	4.22	10.75*

Note: \* significance at the 5%; \*\* significant at the 10%. Superscript letters indicate the result of Tukey HSD test ( $\alpha=0.05$ )

Table 6. Percent of farmers doing chilli sorting and channel membership

Characteristics	Description	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Chi-square
		n=84/ 14.02%	n=69/ 11.52%	n=272/ 45.41%	n=174/ 29.05%	
Sort into different groups by size	Yes	6	15	20	9	14.64*
	No	94	85	80	91	
Sort into different groups by color	Yes	12	35	28	13	24.27*
	No	88	65	72	87	
Channel	Supermarket	2	23	25	16	23.09*
	Traditional	98	77	75	84	

Note: \* significance at the 5%

Appendix 1. Analysis of number of clusters based on Calinski and Harabasz procedure

Number of clusters	Calinski/Harabasz pseudo-F
2	270.05
3	259.68
4	319.04
5	278.91
6	259.26
7	309.35
8	292.80
9	291.72
10	306.97
11	286.02
12	277.52
13	284.18
14	289.61
15	279.58

Note: Distinct clustering is characterized by large Calinski and Harabasz (StataCorp, 2005)