

## Influence of Communication Openness, Information Exchange, and Intra-organisational Ties on Farmer–Buyer Relationship Continuity : Evidence from Indonesian Vegetables Supply Chains

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# Influence of Communication Openness, Information Exchange, and Intra-organisational Ties on Farmer– Buyer Relationship Continuity



## Evidence from Indonesian Vegetables Supply Chains

Fanny Widadie, Jos Bijman, and Jacques Trienekens

**Abstract** This study investigates the direct and indirect effect of open communication, information exchange, and intra-organisational ties on the quality (trust, satisfaction) and continuity (commitment, dependence) of the vertical relationship between farmers and their buyers. Data were collected through interviews with two groups of vegetables producers—members of a producer organisation (PO) and independent producers—in Central Java and Yogyakarta provinces of Indonesia. The results demonstrate that open communication and information exchange improve relationship quality, while intra-organisational ties (only relevant for PO members) improve both relationship quality and relationship continuity. Moreover, open communication, information exchange, and intra-organisational ties indirectly influence relationship continuity through relationship quality. The paper adds to the literature by distinguishing between relationship quality and relationship continuity in the value chain and by investigating the impact of intra-organisational ties in a PO on the vertical buyer–farmer relationship.

## 1 Introduction

Supply chain management literature has shown that supply chains can become more efficient and effective if sellers and buyers maintain close relationships (Fawcett et al. 2012; Dania et al. 2018). High quality relationships among partners reduce

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communication barriers (Power 2005), provide frameworks for mutual learning (Krause et al. 2007), and lower transaction costs (Arana Coronado et al. 2010). High quality relationships also imply lower uncertainty and higher commitment of the partners to the relationship, allowing improvement of business exchange routines and stimulating consistent supply (Somogyi et al. 2010; Damme 2012). However, research also shows that relationships between farmers and buyers are often not sustainable, as parties abandon contract schemes and violate contract agreements (Andersson et al. 2015; Romero Granja and Wollni 2018; Minot and Sawyer 2016).

Vertical coordination is the alignment between the decisions and activities of sellers and buyers, more generally of the parties in a value chain (Peterson 2001). Such alignment may relate to prices, quality and quantity of produce, logistics, packaging and innovation activities. Vertical coordination in food chains refers to alignment between farmers and their buyers (such as traders and processors), between traders and retailers, or between all parties of the value chain. Effective vertical coordination requires communication and information exchange between actors in the chain (Gaudreault et al. 2009). Communication and information exchange has been found to be key to successful partnerships (Tuten and Urban 2001; Simatupang and Sridharan 2004). Our research examines how two mechanisms of vertical coordination, notably open communication and information exchange, between contracted farmers and buyers influence the quality and continuity of their relationship.

Next to vertical coordination mechanisms in the value chain also the horizontal coordination among farmers impacts the buyer–farmer relationship (Lazzarini et al. 2001). Jointly selling products, for instance through a producer organisation (PO), requires coordination among all members to produce the same products or follow the same production methods (Cechin et al. 2013). Producer organisation (PO) is the generic term for an economic organisation that is owned and democratically controlled by farmers (Bijman et al. 2016). A PO supports the economic well-being of its member-farmers through joint purchasing of inputs, providing services such as market information and technical training, and jointly selling farm products (Penrose-Buckley 2007). In many countries, a PO has the legal form of a cooperative, while in other countries a PO is an association or a limited liability company.

We assume that the intra-organisational ties among the members of a PO affect the scope of horizontal coordination which in turn influences the effectiveness of the vertical alignment in the value chain (Bijman et al. 2011). For instance, a contract arrangement between a farmer and a buyer is often implemented through a PO that acts as an intermediary connecting the buyer with multiple farmers (Fischer and Qaim 2012; Mugwagwa et al. 2018; Widadie et al. 2021). Our research examines whether the intra-organisational ties in a PO influence the business relationship between contracted farmers and their buyer.

For contract arrangements to be effective, parties need to refrain from opportunistic behaviour. In addition, there is an economic incentive to make contracts repetitive. Because setting up contracts involves high initial costs, making contracts durable will reduce the fixed contracting cost per unit of product. In addition, strengthening the continuity of the business relationship will lead to a more reliable

supply, higher potential for product adaptations and innovation, consistent product quality, and reduced uncertainties (Somogyi et al. 2010; Wilson and Nielson 2001).

In the literature there is little attention for the combined influence of vertical and horizontal coordination on value chain performance [Martins et al. (2019) being the exception]. Our study aims to examine the effect of vertical coordination (operationalised with open communication and information exchange) and intra-organisational ties (in the PO) on the business relationships between contracted farmers and buyers in Indonesian vegetable value chains. Buyers implement contracts through POs or with individual farmers. This study examines the relationships between contracted farmers and buyers in two samples: farmers contracted through POs and farmers contracted individually.

This study contributes to the literature on the determinants of a sustainable farmer–buyer relationship and provides new insights into supply chain management networks and business relationships. The outcomes offer managerial recommendations for buyers to better understand their suppliers' perception of the bilateral relationship and to use that understanding to build high quality supplier relationships.

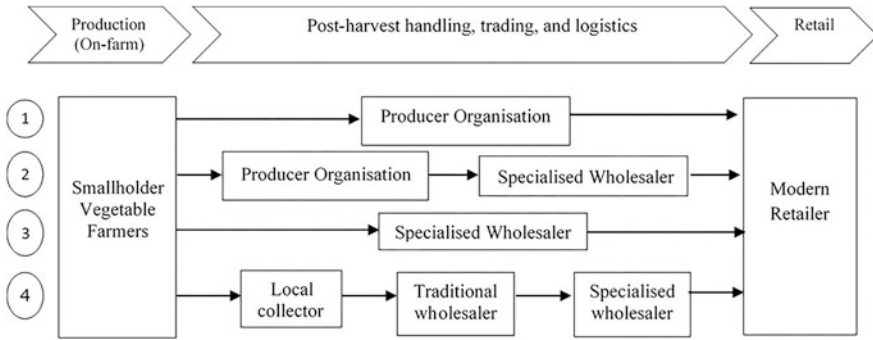
The paper is organised as follows. Section 2 discusses the background of the Indonesian vegetable supply chain in current retail markets. Section 3 presents the literature review and hypotheses. Subsequently, Sect. 4 contains methodology, followed by the results and discussion in Sect. 5. Finally, Sect. 6 presents the conclusion, limitations, managerial recommendations, and suggestions for future research.

## 2 Overview of the Indonesian Vegetable Value Chain in Modern Retail Markets

The market share of modern retail rapidly increased after 1998, when the Indonesian government allowed foreign companies to operate supermarkets in Indonesia (Neven and Suleiman 2007; Suryadarma et al. 2010). In 2019 there were approximately 36,500 modern retailers in Indonesia with different outlet formats<sup>1</sup> consisting of 333 hypermarkets (an increase from 266 in 2013), 1428 supermarkets (from 1268 in 2013), and 34,780 convenience stores (from 21,942 in 2013) (USDA 2020). Between 2004 and 2019, the share of modern retail in grocery sales increased from 7 to 18% (USDA 2020). The expansion of modern retailers in Indonesia is driven by the growth of income, urbanisation, the number of middle-class citizens, the entrance of foreign investment, and a growing awareness of food safety (Reardon

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<sup>1</sup>Modern grocery retail formats are categorised by physical size. Hypermarkets are chain retail outlets larger than 27,000 ft<sup>2</sup>. Supermarkets are outlets between 4300 and 27,000 ft<sup>2</sup>. Convenience stores are smaller outlets of less than 4300 ft<sup>2</sup>. The modern grocery retailers sell food, beverages, and non-grocery items such as clothing and household goods.



**Fig. 1** Indonesian vegetable value chains in modern retail markets (reproduced from Widadie et al. 2021)

et al. 2016; Minot et al. 2015). Modern retailers in Indonesia are concerned about food quality and safety standards (Minot et al. 2015; David 2017). Fresh foods in modern retail are associated with high quality, safety, freshness, and convenience (Umberger et al. 2015).

In the procurement of vegetables, modern retailers often use contracts with specialised wholesalers and producer organisations (POs). Because traditional wholesalers are not able to deliver a consistent supply of uniform and high quality products, specialised wholesalers have seized this opportunity by setting quality standards, controlling suppliers and supplies, and organising customised packaging, to be able to supply modern retail with high quality vegetables.

In an exploration of modern retail markets in the Central Java and Yogyakarta Provinces, Widadie et al. (2021) have identified four vegetables value chains (Fig. 1). In chain 1 and 2, the smallholder farmers link with modern retail markets through a PO. In chain 3, the specialised wholesaler links the smallholders to the modern retailers. In chains 1, 2, and 3, the modern retailers and specialised wholesalers use contract schemes for procuring vegetables. Contracted farmers in these chains closely coordinate with the buyers to meet contract agreements on the quality of products, the quantity ordered, and the delivery process. In chain 4 the transactions between farmers and buyers are performed in spot markets which are characterised by low vertical coordination. Farmers and local collectors engage in farm-gate transactions, without any agreement on quality or quantity. The local collectors sell the produce to traditional wholesalers.

The farmers in chains 1 and 2 do not have a contract directly with the final buyer (modern retailer or specialised wholesaler) but they receive information about the contract arrangement through the PO. The PO communicates with its members about the agreed price, quantity ordered, quality standard, and other delivery requirements that the farmers must comply with. In chains 1 and 2, the PO plays a vital role by acting as an intermediary between the buyer and individual farmers. While most information exchange is organised through the PO, sometimes the buyer meets and communicates with farmers directly. The horizontal coordinates within the PO

include coordinating production, providing services to improve the quality of the vegetables, and arranging logistics. In contrast, the farmers in chain 3 have a direct contract with a specialised wholesaler, who communicates directly with the farmers.

The majority of vegetables farmers who supply to the modern retailers are smallholders with less than 0.5 ha of land (Kementan 2012). These farmers have several kinds of vegetables, grown in an intercropping system. Many of these farmers are member of a producer organisation (PO), organised on a village level, with the task to support the members' farming business. The PO provides services to its members, including market information and technical training, and sometimes organic certification. According to the Agricultural Extension Centre of the Indonesian Ministry of Agriculture,<sup>2</sup> the number of POs was 643,710 in 2020. POs on average have a membership of 30 farmers and they carry out three main functions: (1) to help farmers improve their knowledge and skills; (2) to build cooperation between farmers and other parties such as buyers, governments, and NGOs; and (3) to help farmers develop their farms.

### 3 Literature Review and Development of Hypotheses

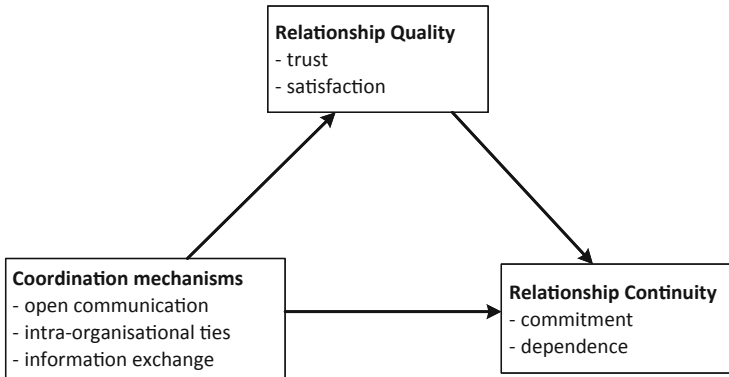
#### 3.1 Conceptual Model

Transaction cost economics (TCE) has been widely used to explain the governance of transactions in value chains. The basic unit of analysis in TCE is the transaction between two companies (Williamson 1999). Companies in the chain select the appropriate governance structure that will economise on the transaction costs that are related to the bounded rationality and potential opportunistic behaviour of transaction partners (Rindfleisch and Heide 1997). Governance structures are ordered on the continuum from spot market to hybrid to hierarchy (Williamson 1998). Contracting is a hybrid governance structure that has been often used in food chains to govern the transactions between farmers and buyers (Mugwagwa et al. 2020; Ton et al. 2018). Contracts act both to safeguard against the risk of opportunism and to minimise the coordination cost in food chains (Bijman and Wollni 2009). Information exchange and communication between value chain actors support the effectiveness of contracting arrangements in keeping transaction cost low and allowing strong coordination among the actors.

Previous studies found a positive relationship between information exchange and relationship quality (Nyaga et al. 2010). Other studies found communication to be a key determinant of successful partnerships (Tuten and Urban 2001). Open communication builds trust between parties (Batt et al. 2010; Smith 1998) and reduces conflict (Ayoko 2007). Previous investigations also revealed that intra-organisational ties among members of a PO or a farmer network improved the

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<sup>2</sup><https://app2.pertanian.go.id/simluh2014/index.php>



**Fig. 2** Conceptual model

quality of the relationship with buyers (Lu et al. 2012). A recent study by Martins et al. (2019) investigated the vertical and intra-organisational ties using a single model to examine their impact on supply chain performance in the Brazilian pork chain.

Ng (2008) explained that business relationships go through several stages, including pre-relationship, early and development, before they become sustainable. In this paper we focus on relationship continuity as our main outcome variable (Fig. 2). Relationship continuity is operationalised by commitment and dependence in farmer–buyer relationships (Somogyi et al. 2010; Damme 2012). Literature suggests that relationship continuity is affected by the quality of the relationship (Somogyi et al. 2010), which can be operationalised by the variables trust and satisfaction (Nyaga and Whipple 2011).

We assume that open communication, intra-organisational ties (in the PO), and information exchange all function as coordination mechanisms that influence both relationship quality and relationship continuity. While these coordination mechanisms may affect relationship continuity directly, we also conjecture that they have an indirect effect, with relationship quality as the mediating variable. Below we will discuss each of the hypotheses individually.

### 3.2 *Communication Openness*

Open communication is a critical strategy for enhancing supply chain performance (Su et al. 2013). Studies on buyer–seller relationships found that open communication had a positive impact on relationship quality. For example, Smith (1998) found open communication to be the most crucial predictor of trust and satisfaction. Mohr et al. (1996) defined communication as the glue that holds a relationship together. They revealed that collaborative communication had a positive impact on relationships, as measured by satisfaction, commitment, and coordination.

Miscommunication leads to conflict and confusion among supply chain partners, resulting in partnership failure (Tuten and Urban 2001). Our study suggests that open communication increases relationship quality and increases relationship continuity between farmers and buyers:

- H1a: Open communication positively influences relationship quality.
- H1b: Open communication positively influenced relationship continuity.

### ***3.3 Information Exchange***

Information asymmetry can be reduced by information exchange such as sharing data on production, inventory, sales, and planning and forecasting (Patnayakuni et al. 2006). Martins et al. (2019) discovered that information exchange between pig farmers and buyers on technical assistance and production practices positively influenced relationship quality. Ghosh and Fedorowicz (2008), by exploring multiple case studies, found that information exchange influenced the building of trust between retailers and suppliers. Previous studies also found that greater information sharing reduced uncertainty and improved trust in relationships (Kwon and Suh 2005). Concerning the relationship between information exchange and commitment, Nyaga et al. (2010) revealed that collaborative activities, such as information sharing and mutual investments between supply chain partners, led to long-term commitment. The following hypotheses are therefore proposed:

- H2a: Information exchange positively influenced relationship quality.
- H2b: Information exchange positively influences relationship continuity.

### ***3.4 Intra-organisational Ties***

Supply chain network research has postulated that relationships are not only vertical but also horizontal, between actors at the same stage of the chain (Lazzarini et al. 2001). Intra-organisational ties refer to the collaboration and networking among actors of the same stage of the chain, such as farmers collaborating in a PO. Scholars have identified various forms of intra-organisational ties in terms of collective action (Fischer and Qaim 2012; Markelova et al. 2009). Intra-organisational ties between farmers may influence relationship quality. Lu et al. (2012) revealed that the strength of guanxi networks in China influenced farmers' satisfaction with their relationship with buyers. Moreover, Martins et al. (2019) found that intra-organisational ties among pig farmers in a farmers' association in Brazil influenced the quality of the relationship these farmers had with buyers. A strong network among members enables joint learning, frequent communication with partners, stable and long-term business relationships, and easy handling of conflicts and uncertainty (Uzzi 1997; Lu et al. 2012; Tefera and Bijman 2019). Based on this literature, we expect that



intra-organisational ties lead to higher relationship quality and relationship continuity, prompting the following hypotheses:

- H3a: Intra-organisational ties positively influence relationship quality.
- H3b: Intra-organisational ties positively influence relationship continuity.

### **3.5 Relationship Quality**

Relationship quality is a term that has been commonly used to describe the health of an inter-firm partnership (Osobajo and Moore 2017). Improving relationship quality between transaction partners is important to enhance efficiency and reduce transaction cost (Arana Coronado et al. 2010). Relationship quality refers to the trust in the relationship, more specifically to the trust of one partner in the behaviour of the other partner. The trust of one partner is his/her perception that the other partner will fulfil the expectations, desires, and goals of the partnership (Gyau and Spiller 2007). Several studies have confirmed that trust has a pivotal role in the success of a relationship (Corsten and Kumar 2005; Chen et al. 2011; Whipple and Frankel 2000). Trust in partners reduces opportunistic behaviour and uncertainty and encourages openness and goal sharing (Nyaga and Whipple 2011). Several studies have shown that trust has a positive influence on commitment in a business relationship (Morgan and Hunt 1994; Kwon and Suh 2004; Wu et al. 2004).

Another element of relationship quality often mentioned in the literature is satisfaction (Eggert and Helm 2003). Satisfaction with the relationship reduces uncertainty and increases the likelihood of future transactions (Ulaga and Eggert 2006). Thus, satisfaction is also expected to support relationship continuity.

### **3.6 Relationship Continuity**

To achieve a stable buyer–supplier relationship and to allow a contract farming arrangement to pay-off, the relationship between the partners should be sustainable, which means that it should not prematurely terminate (Somogyi et al. 2010; Wilson and Nielson 2001). Relationship continuity is based on partners' commitment, which is their attitude to make the relationship a success, their willingness to make short-term sacrifice for maintaining the relationship, and their belief in a sustainable relationship (Morgan and Hunt 1994). Continuity reflects the likelihood of continuing collaboration between parties (Kumar et al. 1995).

Previous studies have advocated that relationship quality also has a mediating effect on the impact of communication mechanisms and relationship continuity (Kwon and Suh 2005; Ulaga and Eggert 2006). On the interaction between coordination mechanisms, relationship quality, and relationship continuity, the following hypotheses were formulated:

- H4a: Relationship quality positively influences relationship continuity.
- H4b: The impact of open communication, intra-organisational ties, and information exchange on relationship continuity is mediated by relationship quality.

## 4 Methods

### 4.1 Data Gathering

To gather the data, face-to-face interviews with smallholder vegetable farmers were conducted across five sub-districts in the Central Java and Yogyakarta provinces in Indonesia. To supply vegetables to modern retail markets, buyers enter into contractual agreements with farmers individually (in chain 3) or with farmers collectively (in chains 1 and 2). Because of the different chains and relationships, this study distinguishes between two samples: farmers supplying through POs (sample A) and farmers selling directly to specialised wholesalers (sample B). Samples A ( $n = 97$ ) and B ( $n = 41$ ) were selected through snowball sampling based on information lists provided by the POs and the specialised wholesalers. The selection of the POs and specialised wholesalers was based on information provided by modern retailers, using convenience sampling. This study focused on the farmers' perceptions regarding their relationships with buyers in supplying vegetables to modern retail markets.

### 4.2 Measurement

To enhance the validity of the constructs in this study, variables were chosen based on the literature and cross-checked through interviews with POs and specialised wholesalers. Before distributing the questionnaire among the farmers, we piloted 30 farmers. We dropped some variables that did not meet validity. All the items used a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The constructs and sources of the items are presented in Table 6 in the Appendix. We now discuss each of the variables and constructs of our conceptual model.

#### 4.2.1 Open Communication

Open communication refers to the extent to which buyers and sellers communicate openly, sincerely, and substantively, either formally or informally (Smith 1998; Anderson and Weitz 1989). Open communication involves easy conversation between the parties (Ayoko 2007). The construct of open communication includes openness and honesty, the way buyers communicate with their suppliers (farmers), and transparency and frequency of communication. All measurement items were taken from Smith (1998).

### **4.2.2 Information Exchange**

Information exchange refers to sharing strategic and tactical information with partners in the supply chain (Mentzer et al. 2001; Kembro and Näslund 2014). The instrument comprises information exchange about quality requirements, production planning, technical assistance, and buyers' feedback regarding product quality. The items concerning information exchange about quality requirements, production planning, and buyers' feedback were adapted from Martins et al. (2019) and Arana Coronado et al. (2010). The item on technical assistance was adapted from Schulze et al. (2006) to assess communication and services provided to suppliers and from Martins et al. (2019) regarding buyers providing production manuals to farmers.

### **4.2.3 Intra-organisational Ties**

In this study intra-organisational ties refers to the collaboration and networking between farmers in a PO. Based on Martins et al. (2019) and Wardhana et al. (2020), we developed a four-item instrument to assess intra-organisational ties: the involvement of the farmer in PO meetings; the extent of communication with other farmers in the PO; the willingness to share knowledge with other farmers in the PO; and the trust in other farmers in the PO.

### **4.2.4 Relationship Quality**

Many studies have measured relationship quality as a high-order dimension (Nyaga and Whipple 2011; Bennett and Barkensjo 2005), including both trust in the relationship and satisfaction with the relationship. We follow this custom, by measuring relationship quality with the variables trust and satisfaction. The construct for trust was developed from Nyaga et al. (2010), Smith (1998), and Kwon and Suh (2005). The construct for satisfaction is based on Eggert and Helm (2003), Smith (1998), and Ulaga and Eggert (2006).

### **4.2.5 Relationship Continuity**

To measure relationship continuity, our study used the constructs of commitment and dependence. Both of these constructs have been used by Damme (2012) and Somogyi et al. (2010) to measure the durability of the relationships between farmers and buyers. Commitment refers to the desire to continue a relationship (Morgan and Hunt 1994). This study used items for commitment based on Kwon and Suh (2004) and Nyaga et al. (2010). The dependency in a supply chain relationship refers to the producer's need to maintain the relationship to achieve its goals. The items used to

measure dependency were developed by Damme (2012), who took into account farmers' perceptions of the importance of partnership continuity and the availability of other (trustworthy) buyers.

### 4.3 Data Analysis

Structural equation modelling with partial least squares (SEM-PLS) was employed to examine the hypotheses. This method allows researchers to deal with multiple independent and dependent variables simultaneously. PLS is a component-based modelling method that concurrently examines an outer (or measurement) model and an inner (or structural) model. The measurement model specifies the relationship between indicators or items and a latent or construct variable, while the structural model specifies the relationship between latent or construct variables (Sholihin et al. 2011).

PLS can handle small sample sizes and make less stringent assumptions for normal distribution and multicollinearity between independent variables than other types of SEM (Chin 1998; Chin and Newsted 1999; Henseler et al. 2009). The study employed SEM-PLS software (SmartPLS version 3.2, SmartPLS GmbH) to analyse the data.

## 5 Results and Discussion

### 5.1 Measurement Model Analysis

The measurement model assesses the reliability and validity of indicators or items in explaining a particular construct (Sholihin and Pike 2009). The reliability of a reflective construct<sup>3</sup> is determined by loadings of construct items and composite reliability (CR); the loading and CR coefficients should be at least 0.6 (Chin 1998; Hair et al. 2011). The analysis revealed that all loadings of items exceeded 0.6, except item OC2 in sample B (Table 1); therefore, this item was excluded from the analysis. Additionally, because the PO is not involved in the chains in sample B, the latent variable of intra-organisational ties was not included in the analysis of this sample. The construct validity of a reflective construct is governed by the average variance extracted (AVE), which specifies the total variance explained by the construct and the discriminant validity. The construct should have an AVE of at least 0.5 (Chin 2010). Table 1 presents the AVEs for all constructs of samples A and B exceeding 0.5, indicating adequate validity. Discriminant validity is treated as

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<sup>3</sup>This study uses the model of reflective constructs which represent the indicators depicting the constructs (Wetzels et al. 2009).

**Table 1** Reliability, convergent validity, and mean comparisons

Latent variable	Sample A					Sample B					<i>t</i> -test
	CR	AVE	Mean	SD	Loading	CR	AVE	Mean	SD	Loading	
Open communication	0.86	0.61				0.76	0.52				
OC1			4.34	0.74	0.81			4.02	0.71	0.87	2.31
OC2			3.49	1.34	0.63			n/a	n/a	n/a	n/a
OC3			4.29	0.66	0.83			3.73	0.82	0.60	2.25*
OC4			4.05	0.79	0.83			3.70	0.80	0.67	1.98*
Information exchange	0.85	0.60				0.91	0.73				
IE1			4.35	0.57	0.83			3.95	0.85	0.82	1.44
IE2			4.34	0.67	0.78			3.75	0.87	0.80	1.84
IE3			4.27	0.70	0.83			3.87	0.91	0.90	1.97
IE4			3.99	0.78	0.64			4.12	0.73	0.88	2.73***
Intra-organisational ties	0.80	0.50				n/a	n/a				
HR1			4.47	0.55	0.73			n/a	n/a	n/a	n/a
HR2			4.41	0.55	0.83			n/a	n/a	n/a	n/a
HR3			4.42	0.57	0.63			n/a	n/a	n/a	n/a
HR4			4.51	0.52	0.61			n/a	n/a	n/a	n/a
Trust	0.85	0.59				0.88	0.66				
TR1			4.49	0.52	0.73			4.24	0.61	0.85	2.26
TR2			4.30	0.58	0.71			4.14	0.68	0.73	1.32
TR3			4.53	0.53	0.79			4.19	0.63	0.83	2.98
TR4			4.45	0.55	0.81			4.12	0.70	0.83	2.65
Satisfaction	0.84	0.65				0.84	0.64				
S1			4.44	0.62	0.81			4.04	0.62	0.85	3.36**
S2			4.36	0.50	0.81			4.09	0.65	0.76	2.27
S3			4.43	0.65	0.79			4.14	0.52	0.78	2.70***
Commitment	0.79	0.56				0.78	0.55				
C1			4.53	0.49	0.75			4.22	0.60	0.62	2.92
C2			4.42	0.53	0.84			4.09	0.65	0.78	2.77
C3			4.21	0.69	0.63			3.97	0.74	0.80	1.74
Dependence	0.75	0.50				0.86	0.68				
D1			4.45	0.51	0.70			4.17	0.53	0.77	2.83**
D2			4.06	0.85	0.73			3.92	0.77	0.83	0.51
D3			4.15	0.67	0.67			3.70	0.89	0.87	2.42*

CR composite reliability, AVE average variance extracted, SD standard deviation

n/a = the item of OC2 and the construct of intra-organisational ties in sample B were excluded from the model because the loading was less than the rule of thumb of 0.50 for the OC2 items, and the chain in sample B is not involved in horizontal coordination in supplying vegetables

\*\*\* Significant at  $p \leq 1\%$ ; \*\* Significant at  $p \leq 5\%$ ; \* Significant at  $p \leq 10\%$

achieved when the square root of a construct's AVE (the italic number in Table 2) is higher than the correlations between constructs (Chin 2010). The results in Table 2 show that the square root of the AVE exceeded the correlations between constructs, representing adequate discriminant validity. Overall, the analysis revealed that the model used in this study was reliable and valid. In addition, a *t*-test comparing the mean scores showed that the sample means are significantly different for some items, while they are similar for other items.

This study uses second-order constructs to measure latent variables of relationship quality and relationship continuity. Based on the CR values, both constructs scored higher than 0.5 and all path coefficients from the second to the first order (reflective constructs) were significant (Table 3). Therefore, the second-order construct of relationship quality—constructed from satisfaction and trust—and the second-order construct of relationship continuity—constructed from commitment and dependence—could be applied in the analytical model.

## 5.2 Structural Model Analysis

The structural model was employed to test the hypotheses (direct and indirect effects) on relationships among the construct variables. Bootstrapping of 500 resamples was used to derive the path coefficient, standard error, and *t*-statistics of the PLS estimation (Chin 1998). The path coefficient ( $\beta$ ) is the degree to which exogenous variables explain the endogenous variables. The validity of the structural model can be seen in the variance explained if  $R^2 > 0.10$  (Falk and Miller 1992). The outcomes show that the three endogenous variables reached  $R^2$  values higher than 0.1 in both samples, ranging from 0.44 to 0.63 (see the Appendix, Figs. 4 and 5). The goodness-of-fit (GoF) index was 0.56 in sample A and 0.57 in sample B, which exceeded the cut-off value of 0.36 and confirmed the model fit (Wetzels et al. 2009). The structural model estimation is presented in Table 4 for the direct effects and in Table 5 for the indirect effects.

### 5.2.1 Openness of Communication

The results for the direct effect of communication openness on relationship quality (Table 4) show a positive impact in both samples A ( $\beta = 0.17, p \leq 0.01$ ) and B ( $\beta = 0.39, p \leq 0.01$ ). This finding is consistent with Kwon and Suh (2005) and Smith (1998), who revealed that open communication positively influences trust and satisfaction. Communication transparency can improve the relationship quality between contracted farmers and buyers; however, the influence of open communication on relationship continuity was statistically insignificant for both samples. These findings imply that communication openness between farmers and buyers has a positive impact on the farmers' perception of relationship quality; however, it does not affect the level of perceived relationship continuity.

**Table 2** Discriminant validity

	Sample A							Sample B						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
1. Commitment	<i>0.74</i>							<i>0.74</i>						
2. Dependence	0.54	<i>0.70</i>						0.60	<i>0.83</i>					
3. Intra-organisational ties	0.60	0.52	<i>0.71</i>					n/a	n/a	<i>n/a</i>				
4. Information exchange	0.38	0.29	0.47	<i>0.77</i>				0.52	0.42	0.69	<i>0.85</i>			
5. Open communication	0.23	0.24	0.39	0.13	<i>0.78</i>			0.22	0.41	0.30	0.27	<i>0.72</i>		
6. Satisfaction	0.57	0.49	0.51	0.30	0.25	<i>0.80</i>		0.66	0.61	0.33	0.38	0.41	<i>0.80</i>	
7. Trust	0.62	0.51	0.62	0.44	0.45	0.60	<i>0.76</i>	0.60	0.71	0.42	0.59	0.52	0.69	<i>0.81</i>

Italic numbers represent the square root of the average variance extracted; numbers below the italic numbers show the construct correlations

**Table 3** Second-order construct of relationship quality and relationship continuity

Second-order construct	First-order construct	Sample A			Sample B		
		Path coefficient	<i>p</i>	CR	Path coefficient	<i>p</i>	CR
Relationship quality	Satisfaction	0.86	0.00***	0.87	0.88	0.00***	0.89
	Trust	0.92	0.00***		0.94	0.00***	
Relationship continuity	Commitment	0.90	0.00***	0.70	0.86	0.00***	0.85
	Dependence	0.85	0.00***		0.92	0.00***	

CR composite reliability

\*\*\*Significant at  $p \leq 1\%$

### 5.2.2 Information Exchange

Information exchange influences relationship quality significantly and positively in sample A ( $\beta = 0.13, p \leq 0.1$ ) as well as in sample B ( $\beta = 0.44, p \leq 0.01$ ). The results support hypothesis H2a. This finding is in line with Kwon and Suh (2005) and Martins et al. (2019), who found that information exchange between buyers and sellers (farmers) improves relationship quality. However, the direct impact of information exchange on relationship continuity was statistically insignificant. Maybe information exchange is perceived by the farmers as a short-term activity that is mainly relevant for current transactions.

### 5.2.3 Intra-organisational Ties

Intra-organisational ties between vegetable farmers in the PO positively influence the quality of the relationship between farmers and buyers ( $\beta = 0.56, p \leq 0.01$ ). Additionally, it has a positive effect on relationship continuity ( $\beta = 0.30, p \leq 0.01$ ). These results are in line with Martins et al. (2019), who found that intra-organisational ties among pig farmers improved the farmer–buyer relationship. Lu et al. (2012) also found that guanxi networks (social capital) among Chinese farmers positively impact farmer–buyer relationship satisfaction. A strong guanxi network fosters stable and tighter business relationships, maintains frequent communication with partners, and sustains close contact among partners for an extended period (Lu et al. 2012; Standifird and Marshall 2000). Stronger intra-organisational ties among farmers in POs result in better information exchange about potential buyers and lead to stable relationship with buyers over time. This finding implies that the strong ties among the farmers in the PO are important in achieving the quality and continuity of the relationship with the buyers. The PO has an important role in the value chain as an intermediary between buyers and farmers. The buyers communicate with the farmers through the PO; the PO coordinates with its members for the supply of specific quality and quantity of vegetables. The strong intra-organisational ties in the PO reduce behavioural opportunism and asymmetric information among



farmers, which allows for better coordination in production and logistics (Groot Kormelinck et al. 2019).

#### 5.2.4 Impact of Relationship Quality

Relationship quality positively influences the relationship continuity in sample A ( $\beta = 0.51, p \leq 0.01$ ) and sample B ( $\beta = 0.74, p \leq 0.01$ ). These findings corroborate previous studies' findings that relationship quality has a positive association with commitment (Kwon and Suh 2005; Chen et al. 2011). Our results also confirm Ganesan (1994) assertion that satisfaction with past outcomes is significantly related to a long-term orientation. Our results, therefore, support hypothesis H4a. The trust and the satisfaction in the relationship between buyers and farmers encourage farmers to continue the relationship.

#### 5.2.5 Indirect Effects

A Sobel test was employed to determine whether the indirect effects of open communication, information exchange, and intra-organisational ties on relationship continuity via relationship quality were significant. The statistics for the Sobel tests of the structural paths in both samples were significant (Table 5), indicating that the mediator effect was significant. In other words, relationship quality mediates the relationships between the variables open communication, information exchange, and intra-organisational ties and relationship continuity. Although there was no significant direct effect of open communication and information exchange on relationship continuity (Table 4), a significant indirect effect via relationship quality was observed in both samples (Table 5). This implies that relationship quality fully mediates the relationship between open communication and relationship continuity [ $\beta = 0.08, p \leq 0.01$  (sample A),  $\beta = 0.29, p \leq 0.01$  (sample B)] as well as the relationship between information exchange and relationship continuity [ $\beta = 0.06, p \leq 0.1$  (sample A),  $\beta = 0.33, p \leq 0.01$  (sample B)]. The connection of intra-organisational ties to relationship continuity via relationship quality also shows statistical significance ( $\beta = 0.29, p \leq 0.01$ ). Both the direct and indirect effect analyses are statistically significant, although the path coefficient in the indirect effect analysis is slightly lower than the path coefficient in the direct effect analysis, suggesting that relationship quality partly mediates the connection between intra-organisational ties and relationship continuity. Hypothesis H4b, that relationship quality is a mediator variable in the model, was thus supported. These findings imply that a durable relationship between farmers and buyers can be achieved through the quality of the relationship (i.e. trust and satisfaction). The openness of communication and the information exchange between farmers and buyers have an indirect effect on the continuity of their relationship through relationship quality.

**Table 4** Hypothesis testing for direct effects

Hypothesis	Structural path	Sample A		Sample B	
		Path coefficient (SE)	<i>p</i>	Path coefficient (SE)	<i>p</i>
H1a	Open communication → relationship quality	0.17 (0.06)	0.00 <sup>***</sup>	0.39 (0.12)	0.00 <sup>***</sup>
H1b	Open communication → relationship continuity	-0.05 (0.09)	0.51	-0.04 (0.13)	0.73
H2a	Information exchange → relationship quality	0.13 (0.07)	0.07 <sup>*</sup>	0.44 (0.14)	0.00 <sup>***</sup>
H2b	Information exchange → relationship continuity	0.04 (0.07)	0.55	0.12 (0.13)	0.36
H3a	Intra-organisational ties → relationship quality	0.56 (0.09)	0.00 <sup>***</sup>	n/a	n/a
H3b	Intra-organisational ties → relationship continuity	0.30 (0.10)	0.04 <sup>**</sup>	n/a	n/a
H4a	Relationship quality → relationship continuity	0.51 (0.11)	0.00 <sup>***</sup>	0.74 (0.14)	0.00 <sup>***</sup>

*SE* standard error

\*\*\* Significant at  $p \leq 1\%$ ; \*\* Significant at  $p \leq 5\%$ ; \* Significant at  $p \leq 10\%$

**Table 5** Hypothesis testing for the indirect effect

Hypothesis	Structural path	Sample A		Sample B	
		Indirect effect (SE)	Sobel test statistic	Indirect effect (SE)	Sobel test statistic
H4b	Open communication → relationship quality → relationship continuity	0.08 (0.04)	2.41 <sup>***</sup>	0.29 (0.12)	2.76 <sup>***</sup>
	Information exchange → relationship quality → relationship continuity	0.06 (0.04)	1.72 <sup>*</sup>	0.33 (0.10)	2.70 <sup>***</sup>
	Intra-organisational ties → relationship quality → relationship continuity	0.29 (0.07)	3.71 <sup>***</sup>	n/a	n/a

*SE* standard error

<sup>\*\*\*</sup>Significant at  $p \leq 1\%$ ; <sup>\*</sup>Significant at  $p \leq 10\%$

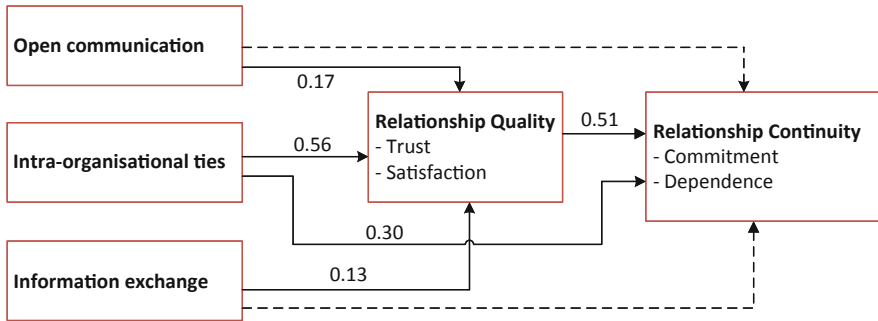
The results, consistent with previous studies, show that open communication increases relationship quality (Kwon and Suh 2005; Smith 1998). Regarding the structural path of information exchange to relationship quality, this study is also in line with the findings of Martins et al. (2019) suggesting that information exchange increases the quality of relationships between farmers and buyers. Concerning the path of intra-organisational ties to relationship quality, this study confirms the reports of Lu et al. (2012) and Martins et al. (2019) that intra-organisational ties positively impact relationship quality. In addition, the intra-organisational ties in the PO also positively influence relationship continuity. Our results confirm what Uzzi (1997) and Lu et al. (2012) had hypothesised, namely that strong network ties enable long-term collaboration. This study also confirms previous findings that relationship quality positively influences relationship continuity (Kwon and Suh 2005; Ganesan 1994).

The indirect effect analysis showed statistical significance for the mediation of relationship quality between coordination mechanisms and relationship continuity. These findings corroborate the findings of Ng (2008) that relationship continuity can be achieved through a variety of approaches. Moreover, our results indicate that relationship continuity could be attained by reinforcing relationship quality.

Figure 3 summarises the statistically significant pathways for sample A (Fig. 5 in the Appendix shows the pathways for sample B). The dotted lines indicate pathways that turned out to be not significant.

## 6 Conclusion and Recommendations

This study examined the nature of the relationship between contracted farmers and buyers by analysing the impact of open communication, information exchange, and intra-organisational ties on the quality and continuity of the business relationship.



**Fig. 3** Statistically significant pathways

The study provides managerial recommendations, particularly for buyers, to build strong relationships with their suppliers. First, open communication with partners increases (the perception of) the quality of the relationship; therefore, buyers should engage in transparent communication with their suppliers. Second, information exchange positively influences relationship quality. For farmers, information exchange is critical to meet the buyer’s quality and quantity requirements. Similarly, buyers should improve information exchange with their suppliers about quality specifications and market information. Thirdly, strong intra-organisational ties among farmers in a PO can enhance the quality and the continuity of the relationship with the buyer. Therefore, the effort a PO in organising meetings, sharing information, and building trust among members should be bolstered. For buyers, exchanging information with a PO does not only relate to meeting quality and quantity of supplies, but also supports intra-organisational ties among farmers in the PO. For instance, the buyers may attend farmers’ meetings and guide PO management. Lastly, to strengthen relationship quality, buyers should promote farmers’ trust and satisfaction.

This study has several limitations. First, the analysis was based on data collected at one side of the seller–buyer relationship as only farmers’ perceptions of the relationship were measured. In future studies, the buyers’ perspective on the relationship with farmers could be addressed. Second, the study analysed the perceptions of farmers who were contracted by buyers either directly or through a PO. We did not consider spot market farmers (chain 4) in the Indonesian vegetable industry. Future studies should involve spot market farmers in order to gain an understanding of the quality of the relationship between farmers and rural traders in spot markets. Thirdly, the intra-organisational ties in this study focused on the relationship among farmers involved in a PO. In Indonesia, the majority of farmers participate in a PO that is more like a community organisation instead of a business organisation. Future research could look into how intra-organisational ties in community-type of PO and business-type of PO may differently affect the business relationship with buyers.

## Appendix

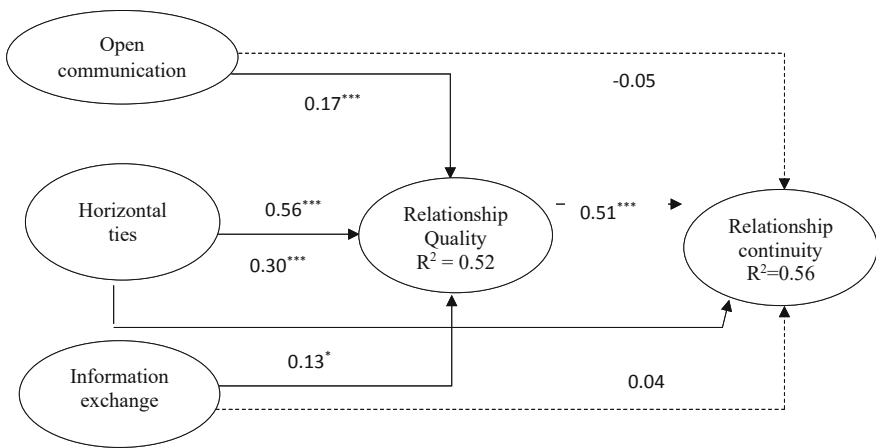
**Table 6** List of measurement items

Dimension	Constructs	Items	Questions	Adopted from
–	Open communication	OC1	Our communication with the buyer is open and honest	Smith (1998)
		OC2	Sometimes the buyer does not tell me everything I need to know (–)	
		OC3	We exchange relevant information with the buyer on a regular basis	
		OC4	We talk candidly with each other	
–	Information exchange	IE1	We are frequently informed about quality requirements	Martins et al. (2019), Arana Coronado et al. (2010), and Schulze et al. (2006)
		IE2	The buyer helps us to plan our production according to the buyer’s needs	
		IE3	The buyer gives us feedback to improve the quality of the vegetables we deliver to him/her	
		IE4	The buyer provides knowledge and technical assistance	
–	Horizontal ties	HR1	I regularly participate in meetings with other farmers in the PO	Martins et al. (2019), Wardhana et al. (2020), and Lu et al. (2012)
		HR2	I regularly communicate with the other farmers in the PO	
		HR3	I am willing to share my knowledge with other farmers in the PO	
		HR4	I trust the other farmers in the PO	
Relationship quality	Trust	TR1	The buyer pays on time	Nyaga et al. (2010), Smith (1998), and Kwon and Suh (2005)
		TR2	The buyer and I trust each other	
		TR3	I am confident that the buyer is telling the truth	
		TR4	The buyer works in our joint interests	
	Satisfaction	S1	We are very satisfied with the buyer	Eggert and Helm (2003), Smith (1998),

(continued)

**Table 6** (continued)

Dimension	Constructs	Items	Questions	Adopted from
Relationship continuity	Commitment	S2	It is a pleasure to have a good sales relationship with the buyer	and Ulaga and Eggert (2006)
		S3	This is the best sales relationship that I have experienced	
		C1	We want this relationship with the buyer to continue for a long time	
	Dependence	C2	Our positive feelings towards the buyer are a major reason for continuing to work with him/her	Kwon and Suh (2005) and Nyaga et al. (2010)
		C3	I will not switch to another buyer, even if the other buyer offers a better price	
		D1	This buyer is important for our future sales	
Dependence	D2	It is difficult to find another buyer	Damme (2012)	
	D3	It is difficult to trust another buyer		



Note: \*P<10%, \*\*P<5%, \*\*\*P<1%  
 GoF index:0.56  
 —————> Significant path  
 - - - - -> Non-significant path

**Fig. 4** Result of SEM-PLS in sample A

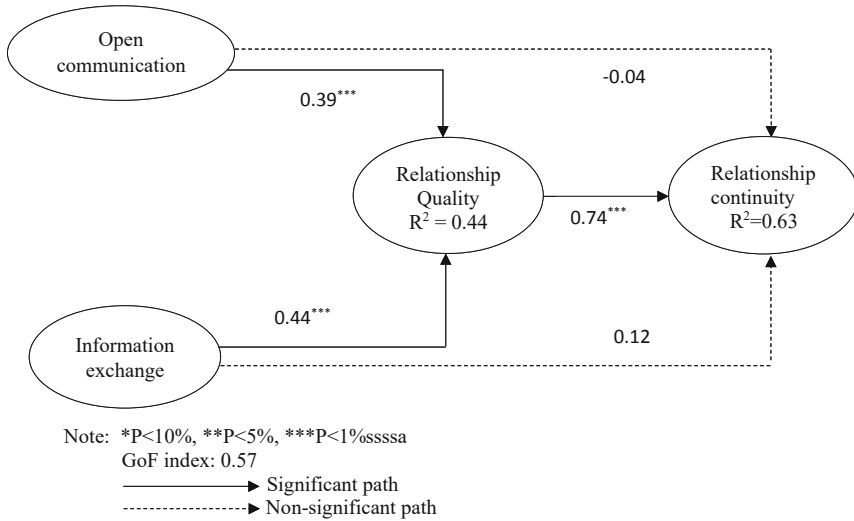


Fig. 5 Result of SEM-PLS in sample B

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