Determinants of Contractual Choice and Relationship Sustainability in Organic Fruits and Vegetable Supply Chains: Empirical Evidence from Stakeholder’s Survey from South India

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Supply chain stakeholders for local organic food face uncertainties. In the present study, the empirical relevance of relationship types, farmers contracting choice and several determining factors which potentially influence both choices of contract types and the relationship with sustainability was tested. The study draws the Williamson’s governance contractual structure of formal and non-formal relationship prevailing between chain actors to see what kind of contractual relationship is prevalent in the chain drawing on transaction cost theory. Data were captured by conducting a survey of 155 respondents (127 farmers, 11 processors and 17 retailers) belonging to Karnataka state in India. The analysis was both quantitative and qualitative and used binary choice models and Structural Equation Modelling (SEM) to analyse the key determinants. The analysis revealed that informal relationships were prevalent in the market. Market, sector and enterprise specific characteristics were found to influence the choice of the contract while dyadic, firm level factors influence relationship sustainability in the organic fruits and vegetable supply chains. Results have implications for agribusiness management and policy makers in relation to organic agribusiness development in the study area.

Keywords: Organic Fruits & Vegetables Supply chains, Relationship Sustainability, Binary Regression, Structural Equation Model, India

INTRODUCTION

The dynamics of agri-food supply chains and the globalisation process which has spread fast in recent years have resulted in dramatic changes in supply chains of developing countries, including India. The demand for environment-friendly food products such as organic food has significantly increased due to increasing awareness of health, food safety, and environmental concerns (Briz & Ward 2009). Consumer quality perceptions are based on individual evaluative judgments (Bredahl 2004). Quality traits are highly focused upon in the marketing of organic food products (Zanoli 2016). Consumers expect the food to be of high standard in terms of physical attributes, while process characteristics such as animal welfare, fair trade, and environmental ethics are also gaining importance across the globe. Furthermore, confidence in food safety is an important condition for consumers’ buying decisions. Consumers’ perceptions and concerns on food safety, quality, and nutrition are becoming very important across the world. One of the most accredited explanations assigns the main responsibility of the emerging interest in

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quality and safety issues to the various food scares, and the consequential food scares that have emerged throughout Europe (Naspetti & Zanoli 2009). This has provided growing opportunities for the market of organic products in recent years. The untapped potential market for organic food in a developing country like India needs to be realized through organized marketing (Nandi et al. 2016). Marketers should be and obviously become became careful when claiming health benefits in order to motivate consumers to buy organic food because of the lack of evidence for this assumption (Lairon & Huber 2014). Despite this fact, beliefs related to health benefits are still revealed among consumers (e.g. Talamini & Révillon 2016). Addressing these consumers' needs calls for coordinated actions by companies throughout the chain (Ménard & Valceschini 2005). Therefore, the market success of products depends not only on each distinct stage of the supply chains but seem to be increasingly determined by collective strategies involving businesses throughout the whole chain. Thus, enhanced coordination among primary producers, processors, and retailers gains importance and the quality of their relationships is identified as a potential source of competitiveness, but more importantly, they expect the long-term relationships would increase their competitiveness over the years (Schiemann 2007). This is as a result of well-developed vertical coordination and can help to reduce business uncertainty, including that relating to food safety obligations, improve access to essential resources and result in higher business productivity (Dyer & Singh 1998). Therefore, there is an increasing acknowledgement that competition in the agri-food sector no longer takes place between individual companies but between entire chains or networks. The establishment and maintenance of relationships between partners are crucial, and it is increasingly important that partners build stronger and longer-term relationships in the supply chains to remain competitive because of the ever changing competitive environment (Parsons 2002).

Considerable research efforts have already been undertaken in the agriculture sector around the world to gain a better understanding of business relationships and thereby enabling their more effective management (Naspetti et al. 2011). For instance, (Schulze et al. 2006) investigated business relationships in the German pork sector and revealed a relatively low level of vertical coordination within this chain. Furthermore, (Alboiu 2012) investigated relation types and determinant factors in Romanian vegetable supply chains and revealed that informal contractual relationships are prevalent in the market, and the contractual enforcement is at stake. The study also highlighted the crucial roles of communication and personal relationships in the chain. Power imbalance and information asymmetry posed obstacles for the development of trust between chain actors in the Netherlands (Lindgreen et al. 2004). In India, about 60 per cent of food quality is lost in the supply chains from farm to the final consumers. Consumers end up paying approximately 35 % more than what they could be paying if the supply chains were improved, because of wastage due to improper handling as well as multiple margins and higher transaction costs in the current supply structure. The farmer in India gets around 30 % of what the consumer pays at the retail store. Compare this with the situation in the USA, where farmers can receive up to 70 % of the final retail price, and wastage levels are as low as 4-6 % (GOI 2013). This clearly demands supply chains research and from emulating those practices and tapping that expertise for supply chains in India. Although several studies were carried out in order to study the various agri products supply chains in India (Deliya et al. 2013; FAO 2013; Reddy et al. 2010; Sharma et al. 2013), there are no empirical evidence studying the contractual relationships in organic fruits, and vegetables supply chains in India. India is the second largest producer of fruits and vegetables in the world. The Indian fruits and vegetable farm structure is characterised by a very large number of small holdings (about 80%) and a small number of large-scale farms.

The Indian organic food sector is in the early phase of its development. Presently, there are 0.55 million organic producers cultivating 1.10 million hectares in India (Willer et al. 2013). The area under organic farming is relatively small as compared to the total cultivable area in the country. Currently, fresh produce (fruits and vegetables) are the highest demanded organic food categories in the country. The organic fresh produce market is highly fragmented, and it is only concentrated in the big cities of India. As stated by the CEO of a large retail company ‘there are problems with the supply chains of organic products in India, since all products are not always available.

Moreover, the price premium, which can be 50 -70 per cent of regular prices, is certainly deterring consumers’ (Mukherjee 2013). Designing and managing local organic food supply chains is complex, and it faces socially bound uncertainties such as poor collaboration, communication and information sharing (Kottila et al. 2005; Stolze et al. 2007). Improving organic supply chains is becoming of increasing interest to developing country like India, since the demand for organic products is growing steadily, providing market opportunities and premium prices for producers who comply with organic certification standards (Santacoloma 2012). The newly emergent organic produce supply chains around the globe have also been found to be excluding small producers due to reasons of high certification costs, smaller volumes they produce, and tighter control by chain leaders in the absence of local market outlets for the organic producers (Raynolds 2004). With this, the background aim of our study was:

1. To study the existing relationships types and contractual issues in organic fruits and vegetables (F\&V) supply chains in Karnataka state, India.

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2. To identify the key determinants of smallholder farmer contracting choice
3. To identify determinants of sustainable relationships between partners in organic F&V supply chains.

These objectives seem to be very relevant based on the existing literature, industry reports and experts opinions, as far as we know, there is no empirical work that has been undertaken with these specific objectives in the case of organic F&V supply chains’ organisation in the Indian context and specific to Karnataka state which is one of the leading states in the country for organic food production.

This paper tested a set of hypotheses, and the first hypotheses deal with those factors that influencing the choice of relationship (contract) types in organic F&V supply chains and the second were about those factors that lead to sustainable relationships among chain actors in organic F&V supply chains. To achieve the latter objective, a model is developed in which the main components that define the relationship of sustainability and communication quality and the important factors explaining the sustainability of relationships are defined.

The paper is organised as follows: Section II presents the theoretical background and hypotheses and includes contractual governance structure and transaction cost theory. Section III explains the background of the study area and the organic fruits and vegetable Sector in India. Further, section IV presents the methodology, and Section reveals empirical findings & discussions followed by conclusions.

CONCEPTUAL ARGUMENTS AND THE EMPIRICAL EVIDENCE

Contractual structure governance and Transaction cost theory

According to Humphrey & Schmitz (2004), the main components of contractual governance structure refer to ‘what to produce, how to produce, how much to produce and when to produce’. Hence, the governance structure refers to the relationship between firms/companies and the institutional tool using governance mechanism the explicit coordination is made, and the activities in the chain are performed. Vertically integrated markets may offer farmers the opportunity to produce and sell differentiated products with high value added (Gyau & Spiller 2008). However, the high standards of vertically coordinated markets impose challenges and barriers to farmers who do not meet the production and marketing systems’ standards. Transaction costs (TC) are always associated with the exchange process, and the size of exchange determines the organisation form of the economic activity. Also, transaction costs are determined by the information asymmetry which may lead to the limited rationality and/or opportunistic behaviour of one of the parties in the chain. Contractual relationships may offer some relaxation principles for these problems (Nadvi & Waltring 2004). As a result of positive transaction costs and limited rationality, the contract is suggested as an analytical frame (Hobbs 1996; Hobbs 2004; Williamson 2000). Hobbs (1996 & 2004) argued that in the case of traditional retail chains, cooperation and information exchange may contribute significantly to transaction cost reduction. Williamson (2000) reflected that the way a transaction is organised (e.g., spot or coordinated market) depends on ‘rational economic reasons’. He suggested three main dimensions of these reasons: a) asset specificity; b) uncertainty; and c) frequency. Asset specificity refers to the degree to which a particular asset can have alternative uses; uncertainty is usually given by the incompleteness of contracts and given imperfect information, which can lead to the opportunism of one of the parties to an agreement; and frequency refers to the rate of repetition of a transaction.

Choice of contract types by smallholder farmers

Economic research indicates that, under certain circumstances, both suppliers and buyers can benefit from using contracts. The production, handling, and marketing of organic products follow different processes, as specified by the respective country standards. For products to sell as ‘organic’, their production and handling processes must be certified by an authorised certification body. Production and marketing activities between firms often require investment decisions by the parties involved. The policy makers are concerned about the protection of expected rents needed to compensate for incurred costs. Conditions in the organic sector suggest that chain actors may potentially benefit from contracts, given the growth in demand for organic products, inconsistent and short supplies, and the need for certification. In the present study, the four relation types mentioned above were grouped into two major contract types as a) Formal relationship (explicit) and b) informal relationship type (implicit).

Factors affecting relationship (contract) choice

Except for direct sales, farm products generally move along the supply chains with the assistance of handlers in the study region. Information asymmetry between stakeholders in organic food markets may exist due to highly differentiated supply chains, as a result of increasing competition and heterogeneity of consumers’ demand. With respect to the product and process qualities of food products uncertainty may exist, as many quality characteristics are credence attributes that cannot be measured, even after consumption (Young & Hobbs 2002). The relation between contract type choice and product quality in agri-food chains has been provided in several empirical studies (Boger 2001; Raynaud et al. 2005). The
conceptual arguments and the empirical evidence lead to the inclusion of the following hypotheses

H1. Higher product quality and food safety influence the choice of formal (explicit) contracts.
H2. Quantity and delivery frequency influences the choice of formal (explicit) contracts.
H3. The price premium and payment mechanism influence the choice of formal (explicit) contracts.
H4. History and trust between the buyer/seller influence the choice of formal (explicit) contracts.
H5. The contractual penalties influence the choice of formal (explicit) contracts.
H6. The long-term oriented investment decisions influence the choice of formal contracts

Sustainability of contractual relationships

Recent empirical studies across the world suggested that sustainable relationships encompass qualities such as mutual trust, satisfaction and commitment (Lages et al. 2005). In addition, dynamic aspects (the evolution of repeated interactions and transactions over time) and consider non-coercive as well as coercive behaviour and past chain experiences (Lai et al. 2005). According to ‘theory of repeated games’ (Kandori 2008), one of the explanations of mutual trust is the interest of transacting parties in preserving the value of a reputation of honouring past promises. The value of such reputation increases with the time horizon of a relationship, and with the number of repeated transactions taking place between parties. Thus, more sustainable relationships require repeated transactions with a high frequency of interaction being essential for their success.

Determinants of Relationship Sustainability

There are different factors which potentially influence the relationship sustainability in the chain. Fischer et al. (2010) and Fritz & Fischer (2007) suggested that external factors as well as chain-internal, dyadic factors may be of relevance. The socio-economic and regulatory environment in which agribusinesses are embedded also exerts a significant influence on chain relationships (Hughes 1996). The existing literature on relationships in agri-food chains have cleared revealed the importance of communication, defined by the two dimensions, quality and frequency is an important influencing factor. Communication can be defined as the ‘glue’ that holds a relationship together (Mohr et al. 1996). Fischer et al. (2010) and Schulze et al. (2006) showed that access to up and downstream information enables retailers and suppliers to adapt to supply problems, and market changes more rapidly, thereby communication positively influencing relationship sustainability. From a TCE perspective, information sharing counteracts opportunistic behaviour and reduces adverse selection as well as moral hazard (Simatupang & Sridharan 2007). Taking into consideration of the above findings the seventh hypothesis is defined as follows:

H7. Higher communication quality along the chain positively influences the relationship sustainability.

Several social phenomena have increasingly been acknowledged as factors affecting economic success. In agri-food chains, both business (prices, costs, and markets) and inter-personal (personal bonds, trust and friendship) aspects of relations were seen as being vital for chain performance (Hinrichs 2000; Winter 2003). Fischer et al. (2010) also revealed that factors affecting relationship sustainability are the existence of personal bonds and equal power distribution between buyers and suppliers. Furthermore, (Rodríguez & Wilson 2002) found how personal or social bonds influence relationship-building. They defined personal bonds characterised by familiarity, friendships and personal confidence which are incorporated in the relationship. These inter-personal ties are a form of social capital that enhances the maintenance of relationships. Therefore, the following hypothesis is defined to cover the relevance of social structures in a more general sense:

H8. Stronger personal bonds among chain partners positively influence the relationship sustainability.

Key people within an organisation are individuals who possess specific knowledge about their own business and the relationships with one or several important business partners. As such, it could be considered that the development of personal bonds by key people reflects a willingness to invest in a specific asset (human asset specificity) and hence signals a desirable trading partner. Therefore, concerning social structures, they play an important role. Key people leaving the firm to create a problem for many small and medium scale food enterprises and farms where appropriate succession arrangements have not been made (Fischer et al. 2010). In such a situation, successful continuation of commercial relationships with the partners may be a hindrance. Thus, we considered the following hypothesis to unveil the relevance of personal bonds in relationship sustainability:

H9. Key people leaving the firm negatively affect relationship sustainability.

Equal power distribution among chain partners increases the probability that commercial rewards will be distributed fairly among the partners. Boger (2001) revealed that, within the contractual arrangements of the Polish pig chain, farmers prefer to conduct business with buyers who cannot exercise bargaining power. In addition, Fischer et al. (2010) and Gracia et al. (2010) showed the importance of equal power distribution in the chain and its influence on relationship sustainability. Then the next hypothesis was defined as:
H10. An equal distribution of power among chain partners positively influences the relationship sustainability.

Organic products have been frequently associated with attributes such as traceability, local origin, and supply, small-scale units of production. In addition to prescribed standards for organic foods from organic certification standards, there are additional attributes like locally, and small-scale production is important attributes of organic foods. The degree of embeddedness of business in its local environment may support the development of sustainable relationships between this business and other local businesses (Lähdesmäki et al. 2009). Thus, to sustain organic food supply chains for a longer period of time, it has to consider the local environment. Thus, the hypothesis was defined as:

H11. The higher the degree of embeddedness in the local environment in which chain and its partners operate, the higher the sustainability of relationships

Background of the Study Area and Organic Fruits and Vegetables Sector in India

India produced around 1.34 million metric tons of certified organic products and exported 135 products during 2012-13 with total volume of 165262 MT. The organic products export realisation was around US $ 374 million registering a 4.38% growth over the previous year. Organic products were exported to EU, US, Switzerland, Canada, South East Asian countries and South Africa (APEDA 2014). The Indian domestic market for organic food has developed rapidly over the past few years. New processing firms, suppliers and organic stores are coming up on a monthly basis. Branded organic products have now made an entry into many conventional retail stores. However, most supermarkets and even many organic stores still do not sell fresh organic fruits and vegetables, either because of the logistical hurdles and high risks of selling perishable products or because no supplies are available (Osswald & Menon 2013). Farmers are practising sustainable small-scale agriculture lack adequate market access that allows them to sell their products profitably. At the same time, demand for fresh organic produce is highest among all product groups (Osswald 2010; Rao 2006).

Indian agriculture is the home of small and marginal farmers (80%), and there are about 121 million agricultural holdings in India, out of which 99 million were small and marginal. Therefore, the future of organic agriculture growth and food security in India is connected to the fate of this category of actors (Dev 2012). The smallholder farmers contribute around 70% to the total production of vegetables, 55% to fruits against their share of 44% in land area in the country (Dev 2012). Presently, there are 0.55 million organic producers cultivating 1.10 million hectares in India (Willer et al. 2013). The area under organic farming is relatively small as compared to the total cultivable area in the country.

Our study area, which is Karnataka state, is India’s eighth largest state in a geographical area covering 1.92 lakh km² and accounting for 6.3% of the geographical area of the country. The state ranks fifth in India in terms of total area under horticulture. It stands fifth in production of vegetable crops and third in fruit crop production. It is also the largest producer of spices, aromatic and medicinal crops and tropical fruits. Karnataka is also the second largest producer of grapes in the country and accounts for the production of 12% of total fruits, 8% of total vegetables and 70% of the coffee in the country. It is the third largest producer of sugar and ranks fourth in sugarcane production. Karnataka is highly progressive with regard to vegetable production and enjoys this advantage because of favourable climatic conditions without any extremes in temperature. Agriculture remains the primary activity and main source of livelihood for the rural population in the state (Bende 2013). Karnataka state the first state in the country to implement an organic farming policy. Realising the benefits of organic farming in contrast to conventional cultivation, farmers in Karnataka are increasingly becoming part of the organic movement. Benefits like a reduction in the use of external inputs, improvement in soil fertility, lower soil degradation, biological pest control and above all protecting the environment have become the driving force of this movement. Following is the information on the status of organic farming and organic stakeholders in Karnataka State as per the available data collected by Research Institute on Organic Farming, Bangalore during 2014 (Devakumar, 2014).

Table 1: Status of Organic farming in Karnataka state, India

<table>
<thead>
<tr>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area under organic certification (2010 - 11 data)</td>
<td>80,706 ha</td>
</tr>
<tr>
<td>Total number of certified organic farmers</td>
<td>16,432</td>
</tr>
<tr>
<td>Number of operators/processors and exporters of organic produce/products</td>
<td>47</td>
</tr>
<tr>
<td>Number of Private Organic Outlets/Retailers</td>
<td>83</td>
</tr>
<tr>
<td>Number of organic Restaurants in Bangalore</td>
<td>10</td>
</tr>
<tr>
<td>Marketers of Organic Produce/Products</td>
<td>19</td>
</tr>
<tr>
<td>Number of NGOs involved in the promotion of organic farming in the state</td>
<td>129</td>
</tr>
<tr>
<td>Number of organic Farming Research Institutes</td>
<td>08</td>
</tr>
<tr>
<td>Number of certified Organic Operators</td>
<td>246</td>
</tr>
</tbody>
</table>

The market for organic produce only concentrated in major cities of India. In Karnataka, Bangalore is a major market for organic products. Fresh produce is transported to the

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1 1 Lakh = 100000

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city from the peri-urban areas of Bangalore. The city was purposively selected for the study based on the report by Oswald (2012) in collaboration with International Competence Centre for Organic Agriculture (ICCOA) in 2012. This report revealed that ‘among the three urban organic markets analysed, Bangalore is the largest urban organic market in India, and there is no sufficient information about organic stakeholders and their role in supplying products to megacities of India.’

The organisation of the organic supply chains does not differ much from the conventional chains; however, to maintain the organic quality attribute, stronger vertical coordination with sustainable relationships among the actors, as well as clearly defined actors roles and responsibilities are very much needed. Organic F&V supply chains in study area range from very short ones where farmers market directly to local consumers, to more complex chains where a number of different actors are involved in bringing organic products from farm to fork while keeping the organic quality attributes. The network (map) of the domestic organic fruits and vegetable supply chains in the study area are as shown in Figure 1.

**METHODOLOGY**

To test the hypotheses, the relationship situation between the chain actors in the organic fruits and vegetable supply chains in the study area were analysed. Here, fruits referred to only selected ones (Banana, Mango, Sapota, Grapes, Guava Papaya, Watermelon, and Jackfruit) which are grown by the certified smallholder organic farmers in the study area. The reason for selecting above mentioned fruits was that these are the most common organic fruits grown and available in the market and as organic food market is in the early phase of its development in the region, there is no statistics regarding the share of individual fruits in total production of fruits production in the State. The relationship in the chain studied divided into two chain stages. The first chain stage represents the upstream between smallholder producers and processors; the second stage is the downstream relationship between processors and retailers. Processors here refer to fresh produce handlers who procure fresh produce from the smallholders and grade them on the basis of quantity, quality, and size, packing, labelling and branding of produce. Branding is done in only selected fruits and vegetables.

**Data collection**

The paper is based on data provided by 127 smallholder certified organic farmers, 11 processors and 17 retailers/supermarkets located in and around Bangalore city, Karnataka state, India. The source of information used in this study was mainly obtained from personal interviews based on the structured interview schedules, carried out on the total of 155 sample respondents (127 farmers, 11 processors and 17 retailers). Purposeful random sampling was drawn from an official list from the state department of agriculture during Nov. – Dec. 2013. The validity of the interview schedules was assessed by a panel of experts from the state department of agriculture, experts from NGO and industry experts in the state. Reliability of the scales of the questionnaire was also computed by Cronbach’s Alpha method and the coefficients of Cronbach’s Alpha, which are appropriate for the study (Gliem & Gliem 2003). Farmers selected for the survey were smallholders having less than 2 ha of agricultural land and cultivating fruits and vegetables. Regarding the interviews with representatives of supermarkets/retail chains, they were selected randomly based on their willingness to answer questions related to

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**Figure 1:** Simplified organic fruits and vegetable supply chain in Karnataka, India.
issues regarding the procurement method and the structure of contractual governance with reference to product quality & quantity, frequency of delivery, organic food standards, price and payment mechanism, premium for organics, contractual penalties were asked. Before random selection of representatives based on the willingness to answer the questions, supermarket/retailers are randomly selected from the city, and then representatives were approached from the randomly selected supermarket/retail chains. The analysis was both quantitative and qualitative and took into consideration stakeholders responses to the questions asked concerning the relationship type and contractual aspects along with the set of questions about producers contracting choices. Open comments were also introduced in the interview schedules. The questionnaire design and responses were analysed by employing the structure proposed by Williamson. Further, the binary logistic model was used in order to identify the determinants of organic farmers’ contracting choice.

To assess the factors which potentially influence the contracting choice of smallholder organic farmers a five-point Likert scale was used, where 1=total disagreement and 5=total agreement. The statements (variables) included are the ‘importance of the fulfilment of organic food standards’, ‘the importance of price premium and payment mechanism’, ‘the importance of frequency and quantity delivered’, ‘the importance of trust in the chain partners’, ‘the investment decision’ and ‘the role of contractual penalties’.

The statements selected were based on the previous literature (Alboiu 2012; Fischer et al. 2010; Gracia et al. 2010; Lähdesmäki et al. 2009) after having discussion with panel of experts formed by industry experts, researchers and technicians from the Agricultural University and independent research organization in the state, in order to decide on the relevance of questions to be included in the final questionnaire for the survey. We used as the dependent variable, the type of contract they used. The dependent binary variable uses the value one if the contract is formal and 0 otherwise.

In order to find out the probability of selecting a certain type of contract, the frequency and quantity delivered was used as an independent variable in the model. The quantity delivered has an important role in selecting a type of contract. Normally, large commercial farms, which produce in bulk, prefer to have written contracts, while small farmers prefer informal/oral contracts. Price and payment mechanism is next independent variable used in the model, and it is very important as farmers usually choose the type of contract based on the price premium for organic products and payment mechanism i.e. on the same day or some days after delivery. Further, food safety and organic quality standards represent important conditions mentioned in the formal/written contract, and these conditions are also taken into consideration in oral contracts. The contractual penalty is another important variable taken into consideration in the model. Normally we see this in written contracts. According to institutional and transaction cost theory, a contract is not considered complete due to limited rationality. Furthermore, the trust and investment decision by farmers are important variables considered in the model. Long-term oriented producers who plan investments are likely to select a formal contract, and it is an important step to creating a reliable relationship (Alboiu 2012). Generally, history and trust between the partners influence the more informal contracts.

Binary Logit Model

A binary logit model (Cramer 2003) was used to determine the factors influencing farmer’s contractual choice. In the present study, the observation unit is the individual farmers. Empirically the logistic model represented as:

$$
\log \left( \frac{p_i}{1-p_i} \right) = \beta_0 + \sum_{j=1}^{k} \beta_i x_{ij};
$$

(1)

where, $p_i = \text{prob}(y_i = 1)$ and the left hand side corresponds to the logit or the log of the odds ratio. In the present context, the noticed $y’$ dummy variable can be defined as desire or probability to choose formal contract, farmers contractual choice as a dependent variable on the left-hand side and it is measured by dichotomous variable which takes the value one for formal contract and zero otherwise. The final model was presented as follows:

$$
\log \left( \frac{p_i}{1-p_i} \right) = \beta_0 + \beta_1(\text{Quality} & \text{& safety}) + \beta_2(\text{quantity} & \text{& delivery frequency}) + \beta_3(\text{price premium} & \text{& payment mechanism}) + \beta_4(\text{trust} & \text{& history}) + \beta_5(\text{Penalty}) + \beta_6(\text{investment decision});
$$

(2)

Structural Equation Modelling (SEM)

SEM in its most general form consists of a set of linear equations that simultaneously test two or more relationships among directly observable and/or unmeasured latent variables (Bollen 1998; Fischer et al. 2010). In technically it can be defined as

$$X = \Lambda \cdot \xi + \delta,$$

(3)

Where $x$ is a vector of indicator variables, $\Lambda$ is a matrix of factor loadings, $\xi$ a vector of latent factors and $\delta$ a vector of measurement errors. Under suitable and fairly general assumptions, the Covariance matrix $\Sigma$ of the observed variables $x$ can be expressed by the three parameter matrices, $\Lambda$, $\Phi$ and $\Theta$:

$$\Sigma = \Lambda \Phi \Lambda’ + \Theta;$$

(4)

Where $\Phi$ and $\Theta$ are the covariance matrices of factors $\xi$ and measurement errors $\delta$, respectively.

The objective of SEM is to estimate the unknown elements of these matrices (i.e. the missing model parameters) such that the covariance matrix generated by the model:
\[ \sum' = \sum(\hat{\lambda}, \hat{\Phi}, \hat{\Theta}) \]  

Reproduces the empirical covariance matrix as exactly as possible. We used the STATA 12 software package with unbiased covariance as the input matrix. Given the existence of missing values in the dataset, maximum likelihood estimation was applied.

As mentioned above, the statistical analysis of data consisted of two parts. The first part, factors affecting the smallholder farmer's contract choice was identified, using a binary logit model. Logit regression allowed the prediction of a discrete outcome, such as group membership, from a set of variables that may be continuous, discrete, dichotomous, or a mix of any of these (Cameron & Trivedi 2005). Second, factors which influence relationship sustainability were analysed using Structural Equation Model (SEM). SEM approach is used to empirically test the influence of communication quality and other four predictors on relationship sustainability in organic fruits and vegetable supply chains.

This approach is chosen because of the analysed concepts, relationship sustainability and communication quality cannot be directly observed, but can be considered unobserved (latent) variables measured by one or more indicators. However, SEM permits the analysis of simultaneous relationships between dependent and independent variables affecting relationship sustainability. Structural equation modelling consists of an entire family of models where the multiple and interrelated dependence relationships are estimated, and unobserved concepts are represented in these relationships (Hair et al. 2001). The data analysis procedure consists of a principle component analysis (PCA) to assess the measurement model and the SEM analysis to examine the overall relationships among the constructs (Hair et al. and Black 2001).

Two constructs (communication quality and relationship sustainability) were used in this analysis. All other variables were measured as single items (see Table 7 for a description of employed variables and items), Construct reliability (Anderson & Gerbing 1988; Fischer et al. 2010), as assessed by Cronbach’s alpha (0.81), was regarded as satisfactory. Construct validity was assessed using principal component analysis (PCA) on the four items. Only one principal component could be extracted (representing 61% of total original variabilities), thus demonstrating the construct’s uni-dimensionality. For the ‘communication quality,’ construct two items were used, with the Cronbach’s alpha 0.86, this construct was also regarded as satisfactory. Knowing the only two items in this construct, PCA is not meaningful for this construct. Upon performing PCA on both the constructs (six items) resulted in two components extracted. The first constructs four relationship sustainability items, accounting for 39 per cent of total variability, and the second construct consisted of two communication quality items, representing 31% of the original variability.

RESULTS AND DISCUSSION

Contractual relationship types

Williamson (1991, 2000) categorised relationship types into two, namely formal and non-formal. The merits of formal relationship (written type) have been identified by many scholars (Bullington & Bullington 2005; Young & Hobs 2002). Their findings revealed that they help to secure high product and process quality and to implement food safety standards and controls. Effective business relationships can help to reduce uncertainty along the chain by securing a more stable flow of orders, and it contributes to better access to important resources results in higher productivity (Dyer & Singh 1998). In the present study certified smallholder organic fruits and vegetable growers were asked to present what type of contractual relationships they used in their business. Table 2 shows the relationship types for the two chain stages. The result revealed that the percentage of the formal/ written relationship was extremely low at both the stages (farmer-processor, processor-retailer). Comparatively, a higher percentage of the formal relationship was observed at the downstream (Processor-retail level) of organic F&V supply chains. Supermarkets/retailers are likely to select more formal relationship type with processor or supplier, in comparison with the farmer. Showing that, downstream businesses are more likely to organise their relationships more systematically and in a standard way. The results were in line with studies in Romania, Europe and USA (Alboiu 2012; Dimitri 2010; Fischer et al.2008) but the difference is the per cent of formal relationships at farmer’s level in the present study were much lesser than those mentioned. This may be due to the early phase of the organic market in India and organic supply chains from a smallholder’s perspective not yet organised or linked to the market. The majority of the smallholders are being excluded from the supply chains due to the reasons of high certification cost, smaller volumes they produce, and tighter control by the chain leaders in the absence of adequate retail outlets for organic (Raynolds 2004).

Table 2: Relationships choice by smallholder organic fruits & vegetable farmers

<table>
<thead>
<tr>
<th>Relationship Type</th>
<th>Supply chain Stakeholders</th>
<th>Average %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stage I</td>
<td>Stage II</td>
</tr>
<tr>
<td></td>
<td>Farmer</td>
<td>Processors</td>
</tr>
<tr>
<td>Formal</td>
<td>-- &gt;</td>
<td>-- &lt;</td>
</tr>
<tr>
<td></td>
<td>(8.66%)</td>
<td>(25%)</td>
</tr>
<tr>
<td>Informal</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(91.33)</td>
<td>(75%)</td>
</tr>
<tr>
<td>Total (n)</td>
<td>127</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>(n=155)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Based on the field survey 2012/13

Factors influencing the choice of contract types

In order to analyse the determinants of the relationship type choice, the binary logit model was used, where the
formal relationship was 1, and the informal relationship was 0. The farmers were asked to rank from 1 to 5 on a Likert scale, 1 being total disagreement and 5 being a total agreement to scale statements referring to quantity and frequency of delivering, price premium and the mechanism of payment, quality standards requirements, trust and history of relationship in the partners, contractual penalties and farmers investment decision. The model included six variables, each one associated with the hypotheses as discussed above. For a detailed description of the variables see Table 6. The results are as shown in Table 3. From the variables hypothesised to identify the determinants of choice of contractual type, five variables had statistically significant effects. Negative (positive) parameters estimated indicate that an increase in the value of the independent variables corresponds to decreasing the (increase) probability of choosing a formal/written contract type instead of an informal type. As per our expectations, organic fruits and vegetable quality and safety orientation (H1) seems to increase the likelihood to choose a formal/ written contract. One of the most important factors driving Indian urban consumers towards organics is food safety and assured quality for organic products (Ravi 2014). Thus, to get certified organic fruits and vegetables, supermarkets encourage the use of a written contract with producers. However, Raynaud et al. 2005 have revealed, depending on the quality assurance scheme (private brand or a public certification process such as a Protected Geographical Indication) the preferred governance structure might well be different (more spot markets in the case of PGIs and more formal/explicit contracts in the case of private brands). So, from this point of view, our results were in support of private brands. Further, quantity and delivery frequency have an important influence upon formal contract choice, and it was highly significant, thus confirming H2. Generally, larger farmers were more likely to choose written contracts than smaller ones, in the case of organic food production, due to niche market it always advantages for the producers to have assured demand from the supermarkets to produce in bulk and supplied it to buyer frequently. The estimated parameter coefficient for the price premium and payment mechanism was positive and significant, indicating that the higher price premium and more convenient payment mechanism, higher the probability of signing a written contract, hence confirming H3. It was found that at present situation, supermarkets/specialised retailers normally make payments for the farmers 7-15 days after the transaction takes place without providing any incentives for them. This situation makes difficult for the smallholders to manage their livelihood as most of the cases agriculture is the only source of income for them. Contrary to our expectations, history and trust between farmers and their partners play a significant role in selecting informal contracts. Longer history and higher trust among the partners lesser the probability of selecting formal contract, thus rejecting our hypotheses (H4). The variable contractual penalty was not statistically significant, but the sign of the estimated coefficient is as we expected (H5). Finally, variable investment decision by the farmer was positive and significant, thus confirming the hypotheses H6. Generally, long-term orientation has vital step to creating a reliable formal contractual relationship for planning and securing future supply or sales. In other words, longer-term oriented organic farmers who plan investments are more likely to choose a formal contract. Our results support the findings of Schulze et al. 2006 for Germany and Fischer et al. 2010 for European agri-food chains, Gracia et al. 2010 for Spanish wheat to bread chain and Lindgreen et al. 2004 for the Netherlands. All these studies focused on conventional food chains as against organic F&V chain in our case. However, as per our knowledge, there are no studies with similar objectives in India for organic food supply chains, making our study relevant for the development of organic fresh produce market in the area.

Table 3: Binary logistic regression results: Estimated Factors influencing smallholder farmer’s contractual choice

<table>
<thead>
<tr>
<th>Variables</th>
<th>Parameters Estimated (B)</th>
<th>Hypothesis status</th>
</tr>
</thead>
<tbody>
<tr>
<td>constant</td>
<td>-10.90***</td>
<td></td>
</tr>
<tr>
<td>Organic quality and safety standards</td>
<td>1.05**</td>
<td>Accept H1</td>
</tr>
<tr>
<td>Quantity and delivery frequency</td>
<td>1.44***</td>
<td>Accept H2</td>
</tr>
<tr>
<td>Price premium and payment mechanism</td>
<td>1.08***</td>
<td>Accept H3</td>
</tr>
<tr>
<td>History and trust with partners</td>
<td>-1.4***</td>
<td>Reject H4</td>
</tr>
<tr>
<td>Contractual penalties</td>
<td>0.46</td>
<td>-</td>
</tr>
<tr>
<td>Investment decision</td>
<td>0.91***</td>
<td>Accept H6</td>
</tr>
</tbody>
</table>

Model statistics

- Percentage of formal contractual type correctly predicted: 48.4
- Percentage of informal contractual type correctly predicted: 91.7
- Overall percentage correctly predicted: 81.10
- Nagelkerke $R^2$: 0.50
- Cox & Snell $R^2$: 0.33

Notes: Formal contract type=1, Informal contract type=0, statistically significant at the 1 %(***), 5% (**) and; sample size: 127

Relationship Sustainability Index

Relationship sustainability index (RSI) scores are mentioned for the organic F&V supply chains for two chain stages. Respondents were asked to rate their opinions, on a scale from 1= very poor, to 5= very good. The following statements concerned with the quality and stability of their important supplier/buyer relationship were used:

* Our trust in our supplier/buyer. * Our commitment towards our buyer/supplier.

* * Our satisfaction with our buyer/supplier and * our collaboration with our buyer/supplier in the past.
These scores related to the respondent’s relationships with their important suppliers or buyers only. The RSI scores were as shown in Table 4. RSI was calculated as an unweighted average of the scores obtained for the above mentioned four statements. RSI scores were calculated only when valid data on each statement were available. As reported in Table 4, Relationship sustainability scores are higher in the downstream relationship (Processor-Retailer) with a mean score of 3.49 as compared to upstream (Farmer-Processor) which was 3.10. The differences between downstream and upstream relationships were statistically significant (at $p< 0.05$). Relationships sustainability varies between the chain stages with downstream relationships being generally perceived as more sustainable than upstream. These results were in line with Fischer et al. (2010) and Gracia & Albisu (2010), who analysed sustainable relationships in four pig meat and cereals supply chains in four European countries, and RSI scores differ mainly across chain stages and only to a limited extent between the different agri-food chains.

![Figure 2](image)

**Table 4:** Relationship sustainability Index scores in organic fruits and vegetable supply chain in Karnataka State, India.

<table>
<thead>
<tr>
<th>Chain stages</th>
<th>Farmer-processor</th>
<th>Processor-Retailer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic F&amp;V supply chain</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Farmer-processor</td>
<td>3.10</td>
<td>0.80</td>
</tr>
</tbody>
</table>

**Source:** Based on the field survey 2012/13

**Factors which influence relationship sustainability**

The factors which potentially influence relationship sustainability in organic F&V supply chains were analysed by estimating the standard structural equation model (SEM), which was used to examine the general fit of the model proposed and to test the hypotheses formulated. The SEM estimated results for the data are presented in relation to the hypotheses concerning the relationship sustainability in organic F&V supply chains. The pooled SEM estimation results are shown in Figure 2. Furthermore, a numeric summary of the results from the structural equation model are presented in Table 5. The model fitted the data well, with all goodness-of-fit measures below (above) the recommended acceptance levels (CMIN/DF = 1.78, RMSEA = 0.045, CFI = 0.93 and TLI = 0.98). Bollen (1998); Hair (2009) reported, CMIN/DF values should be between 1 to 3 (closer to 1 is better), root mean square errors of approximation (RMSEA) must be less than 0.05 and TLI/CFI (Turker Lewis Index/Comparative Fit Index) should be ≥ 0.90. 60. Overall 61 % of the variance in the observed relationship sustainability construct can be explained by the determinants identified. In the structural model, five variables were found to have a positive and statistically significant impact on the relationship sustainability construct: communication quality, personal bonds, effects of key people leaving the firm, equal power distribution between chain partners and local embeddedness. Thus, confirming our hypotheses H7, H8, H9, H10 and H11 explained in section 2.5. The path diagram for the estimated model is as shown in Figure 2. This figure represents the latent variables as oval and indicators as rectangles.

![Figure 2](image)
Products, whether the firm’s suppliers were from the local area, whether their buyer was from the local area and whether the firm participates in the local community (Revoredo-Giha et al. 2010). Equal power distribution between the chain partners was the fourth factor (0.38). Power distribution plays a significant role in the nature of economic relationships; power distribution in economic relationships is determined by many factors, such as relative market share, information asymmetry (Lähdesmäki et al. 2009). Finally, the variable key people leaving the firm (-0.17) had a negative significant influence on relationship sustainability. The variables existence of personal bonds and key people leaving firm were positively and significantly correlated with each other, suggesting that key people are those who develop personal bonds with business partners. Further, the existence of personal bonds and equal power distribution are also positively and significantly correlated with each other. From a theoretical perspective, there is no reason to believe that when key people leave a company the power distribution between that company and its buyer or suppliers changes. There could be a deterioration of communication quality as a result of key people leaving the firm.

Based on the measurement model, relationship sustainability construct and communication quality performed well, with all factor loadings being greater than recommended level 0.50 (Hair et al. 1998) and communalities also being greater than 0.50 except for the variable commitment, which was 0.08. In the relationship sustainability construct, the most important components are a positive collaboration with partners, satisfaction, and trust. Collaboration can be direct or indirect. Firms may interact indirectly by sharing a common infrastructure (e.g., market), or collaborate directly through establishing contact with a potential partner and receiving a reaction. Here, the focus is on direct interactions. Collaboration history comprises all positive and negative experiences made with the exchange partner and is used as a basis for deciding on future actions with the exchange partner. When firms transact for the first time, they generally have no experience with an exchange partner and are limited in their evaluation possibilities (e.g., with regard to a partner’s trustworthiness). This may not be important for arm’s-length transactions, such as in spot markets, adverse selection can cause severe hold-up problems at critical phases in longer-term relationships. Firms which have a positive collaboration history are characterised by economically rewarding transactions, for all involved parties, successful, productive endeavours, and critical phases which have been endured and successfully resolved. Therefore, a positive collaboration history influence to the sustainability of relationships by reducing.

Table 5: SEM estimation results with standardized parameters and significance levels.

<table>
<thead>
<tr>
<th>Structural Model</th>
<th>Relationship sustainability</th>
<th>Communication quality</th>
<th>Relationship sustainability</th>
<th>Existence of personal bonds</th>
<th>Relationship sustainability</th>
<th>Equal power distribution</th>
<th>Relationship sustainability</th>
<th>Key people leaving organization</th>
<th>Relationship sustainability</th>
<th>Local embeddedness</th>
<th>Frequency</th>
<th>Communication quality</th>
<th>Quality of information</th>
<th>Communication quality</th>
<th>Key people leaving organization</th>
<th>Existence of personal bonds</th>
<th>Equal power distribution</th>
<th>Existence of personal bonds</th>
<th>Relationship sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Relationship sustainability</td>
<td>Communication quality</td>
<td>Relationship sustainability</td>
<td>Existence of personal bonds</td>
<td>Relationship sustainability</td>
<td>Equal power distribution</td>
<td>Relationship sustainability</td>
<td>Key people leaving organization</td>
<td>Relationship sustainability</td>
<td>Local embeddedness</td>
<td>Frequency</td>
<td>Communication quality</td>
<td>Quality of information</td>
<td>Communication quality</td>
<td>Key people leaving organization</td>
<td>Existence of personal bonds</td>
<td>Equal power distribution</td>
<td>Existence of personal bonds</td>
<td>Relationship sustainability</td>
</tr>
<tr>
<td>Estimates</td>
<td>0.43***</td>
<td>0.69***</td>
<td>0.38***</td>
<td>-0.17**</td>
<td>0.42***</td>
<td>0.89***</td>
<td>0.78***</td>
<td>0.11***</td>
<td>0.21***</td>
<td>0.61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Notes: 1 In the structural model, <-- are regression weights and --> are correlation coefficients; in the measurement model <-- are factor loadings, --> are regression weights and --> are correlation coefficients. R² are squared multiple correlations in the structural model and communalities in the measurement models. *** (**) means statistically different from zero at the 1% (5%) significance level.
the probability of partners switching to other buyers or suppliers (Anderson & Weitz 1989; Bejou et al. 1996). Further, the ability to achieve high levels of relationship satisfaction has been considered an essential ingredient of business success (Morrissey & Pittaway 2006), because satisfaction will affect the morale and subsequent intentions of business partners to participate in joint activities (Schul et al. 1985). Thus, building a satisfactory relationship between buyer and seller is crucial for both farmers and buyers. Trust may be that quality assurance and safety procedures, along with an acknowledgement of competence in such matters, contribute to the development and importance of such trust (Lindgreen 2003). Finally, the frequency of communication and quality of information are equally important for the ‘communication quality’ construct.

CONCLUSIONS

In this paper, existing contractual relationship types, determining factors for relationship choice and factors influencing relationship sustainability in organic fruits and vegetables supply chains in the Karnataka State of India were analysed. The results were based on both quantitative (majorly) and qualitative analyses on 155 respondents along the organic F&V supply chains.

Knowing the fact that Indian organic food market is in an early phase of its development, our results about existing relationship (contract) type among the chain partners revealed that, there is a high degree of uncertainty between stakeholders both in terms of contractual relationships and contract enforcement along the supply chains. Number of formal contracts are lesser (31.40%) than informal ones (68.52%). In addition, the share of formal relationships is higher in downstream level (processor-retailer) as compared to the upstream (farmers-processors) level. This situation may lead to higher uncertainty at the producer level.

The relationship choice determining factors are majorly quantity & delivery frequency, as smallholder farmer considers their role only when they allow the security of their sales, specifically from the point of investment to produce higher quantity. Based on the price premium and payment mechanism hypotheses, they influence positively to formal relationship choice. When the price, quantity, frequency, and payment conditions are fixed in the contract, an increase in market price will increase the benefits for the producers as compared to selling in the conventional market (an open market which is outside of contract). Further, safety and quality are the main attributes of the organic products. When producers fail to deliver the prescribed quality of products due to the absence of a formal contract with fixed conditions, it will deteriorate the downstream level relationships. The chain partners having long-term relations and trust influences the informal relationship. Thus, the formal contract may ensure consistent quality, supply, secure products in limited supply and more investment by the stakeholders this ultimately leads to the development of the sector under study.

Several factors have been identified as important determinants of relationship sustainability in organic fruits and vegetable supply chains, all of which can be managed at the organisation level. Regarding the relative importance of the relationship sustainability determinants, the SEM estimation found out chain local embeddedness as being crucial followed by communication quality. Communication quality was the most important in most of the studies mentioned here, but in our case, local embeddedness being most important. Thus, considering strong regional or local identity of produce and local activities outside the business operations positively affects the relationships sustainability.

The market power asymmetries between business partners, often due to differences in the scale of the firms, can create a feeling of insecurity and vulnerability among small partners in the chain. Therefore, power asymmetries can reduce trust and commitment and can be harmful to the relationship sustainability. Hence, it is acknowledged that where there is fair treatment, the effect of unequal power distribution may be reduced. In addition, the effect of key people leaving the firm is from a theoretical point of view related to the importance of personal bonds, and these two factors are positively and significantly correlated with each other. This indicates that key people generally are those who maintain business relations and develop personal bonds with the partners. The effect of key people leaving on relationship sustainability has been consistently estimated as negatively influenced, but it is not always significant and normally low in magnitude.

Our results combined with qualitative analyses suggest that small holders prefer formal contracts because they can deliver larger quantities. But the situation is not favourable as there is less chance of sales for the quantity they are producing leading to selling organically produced fruits and vegetables in the conventional market as this produce are perishable in nature and also price premium they get not satisfactory. An organic quality and safety standards were significantly influences the formal contract choice, and history and trust among the partners were negatively contributed to the selection of formal contract, the investment decision positively contributed to the selection of formal contract.

Overall, results can be concluded that there is an increased uncertainty along the chain and it is more uncertain in upstream level (farmers-processors) in terms of what kind of F&V needs to be produced, how much to be produced and where to sell. Thus it is negatively influencing smallholder revenue and their investment decision. Given the significant differences of relationship sustainability between chain stages, improvements must
be targeted at the upstream level as compared to downstream level. This may be challenging due to farmer’s dispersion over the larger geographical area and lower level use of information and communication technology adoption at farmers level. Further, enhancing technological and human communication capacities may lead to higher information quality and more transmission frequencies may help to build and maintain stronger fresh produce supply chains. From a managerial point of view, personal dimensions that potentially significant for its relationship sustainability. Thus, these dimensions need to be acknowledged by managers as it can help to improve relationship stability by strengthening mutual trust and commitment. From a policy perspective, our results showed that policies that focus on improving business to business communication are likely to have a positive influence on relationship sustainability.

Future research in this area may consider other organic food supply chains that have discrete production periods. In our analysis, we have focused on fruits and vegetables (few selected) which are continuously produced products. Also, large-scale longitudinal studies on the development of vertical and inter-firm relationships in organic food supply chains also are valuable, and it can help to understand how relationship sustainability develops over a period of time.

**Table 6: Variables in the logit model**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Likert Scale (1-5)</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract type*:</td>
<td>Type of contract they used</td>
<td>Likert scale: total disagree…, total agree</td>
<td>127</td>
<td>2.30</td>
<td>0.61</td>
</tr>
<tr>
<td>Formal/informal</td>
<td>Quality and safety standards influence the choice of contract</td>
<td>Likert scale: total disagree…, total agree</td>
<td>127</td>
<td>3.19</td>
<td>0.85</td>
</tr>
<tr>
<td>Organic quality and safety standards</td>
<td>Quantity and delivery frequency influence the choice of contract</td>
<td>Likert scale: total disagree…, total agree</td>
<td>127</td>
<td>2.35</td>
<td>0.75</td>
</tr>
<tr>
<td>Price premium and payment mechanism</td>
<td>Price premium and payment mechanism influence the choice of contract</td>
<td>Likert scale: total disagree…, total agree</td>
<td>127</td>
<td>3.47</td>
<td>0.83</td>
</tr>
<tr>
<td>History and trust with partners</td>
<td>History and trust with your partner influence the choice of contract</td>
<td>Likert scale: total disagree…, total agree</td>
<td>127</td>
<td>3.25</td>
<td>0.79</td>
</tr>
<tr>
<td>Contractual penalties</td>
<td>Contractual penalties influence the choice of contract</td>
<td>Likert scale: total disagree…, total agree</td>
<td>127</td>
<td>3.14</td>
<td>0.87</td>
</tr>
<tr>
<td>Investment decision</td>
<td>Investment decision influence the choice of contract</td>
<td>Likert scale: total disagree…, total agree</td>
<td>127</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Dependent variable is, the type of contract farmers used with the buyer. The dependent binary variable takes on the value 1 if the farmer had formal contract and 0 otherwise.

**Table 7: Items/indicators used in the SEM model**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Likert Scale (1-5)</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal bonds</td>
<td>The relationship between the partners is characterized by strong personal bonds</td>
<td>Likert scale 1 to 5, 1 being totally disagree and 5 being totally agree</td>
<td>155</td>
<td>2.88</td>
<td>0.81</td>
</tr>
<tr>
<td>Communication frequency</td>
<td>Satisfaction with the communication frequency of our supplier/buyer in our important business relationship</td>
<td>Rating scale: total disagree…, total agree</td>
<td>155</td>
<td>3.14</td>
<td>0.84</td>
</tr>
<tr>
<td>Information quality</td>
<td>Satisfaction with the quality of information received from our supplier/buyer</td>
<td>Rating scale: total disagree…, total agree</td>
<td>155</td>
<td>3.12</td>
<td>0.93</td>
</tr>
<tr>
<td>Local embeddedness</td>
<td>Our satisfaction about local embeddedness of our supplier/buyer in our important business relationship</td>
<td>Likert scale: total disagree…, total agree</td>
<td>155</td>
<td>3.10</td>
<td>0.80</td>
</tr>
<tr>
<td>Equal power distribution</td>
<td>We are equal partners in this business relation</td>
<td>Likert scale: total disagree…, total agree</td>
<td>155</td>
<td>3.12</td>
<td>0.81</td>
</tr>
<tr>
<td>Key people leaving</td>
<td>When key person leave our organization/firm, this relationship not continue in future</td>
<td>Likert scale: total disagree…, total agree</td>
<td>155</td>
<td>3.77</td>
<td>1.02</td>
</tr>
<tr>
<td>Collaboration with partners</td>
<td>Our collaboration with buyer/supplier in the past</td>
<td>Rating scale: very poor,……,very good</td>
<td>155</td>
<td>3.26</td>
<td>0.80</td>
</tr>
<tr>
<td>Satisfaction with partners</td>
<td>Our satisfaction with buyer/supplier</td>
<td>Rating scale: very poor,……,very good</td>
<td>155</td>
<td>3.17</td>
<td>0.86</td>
</tr>
<tr>
<td>Trust in partner</td>
<td>Trust in our supplier/buyer in our business relationship</td>
<td>Rating scale: very poor,……,very good</td>
<td>155</td>
<td>3.03</td>
<td>0.77</td>
</tr>
<tr>
<td>Commitment with partners</td>
<td>Our commitment with supplier/buyer</td>
<td>Rating scale: very poor,……,very good</td>
<td>155</td>
<td>2.84</td>
<td>0.76</td>
</tr>
</tbody>
</table>
LIMITATIONS

The questionnaires applied to farmer and producer groups, due to reduced samples, the results cannot be generalised across the country, but they offer significant information regarding the contracting modalities and farmers’ contracting choices. The empirical analysis takes into consideration farmers’ answers regarding their contracting choice. A small geographical area focus for this study was also one of the limitations.

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