The Robustness of Agribusiness Supply Chains from a Smallholder Perspective: Case Studies in Nepal

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This study aims to identify effective ways of improving chain robustness from a smallholder perspective. The study developed a model based primarily on theories of New Institutional Economics. This model was used to identify factors that constrain choices in modes of engagement available to smallholders, limiting the chain's robustness from their perspective. A qualitative, multiple case study method was used to gather and analyse data on four agribusiness chains in Nepal; organic and conventional vegetable chains, and ginger and large cardamom spice chains. The analysis followed the approach of searching for patterns in the data and comparing or contrasting observed patterns with those predicted by theory. Individual case studies were analysed separately to identify transaction specific determinants of the observed modes of engagement. Cross-case comparisons within the vegetable and spice chains were then made to identify the effects of external attributes on the observed modes of engagement.

The organic vegetable chain was characterised mainly by relational contracting and informal markets. There was also evidence of vertical integration. The conventional vegetable chain was characterised mainly by spot markets and informal markets. Informal market trading was the only form of smallholder engagement in the large cardamom and ginger chains. However, smallholders had previously engaged in relational contracts in the ginger chain, and in 'captive' relational contracts in the large cardamom chain. There was no evidence that smallholders had ever engaged in conventional contracts in any of these chains. The 'captive' relational contract observed in the large cardamom chain was unanticipated, and hence informed a revision of the conceptual model.

Among the external attributes, market product attributes, market structure, access to information and credit, and collective action were found to alter the modes of engagement available to smallholders. Extension services and the formal legal system had little impact on

modes of engagement, possibly reflecting inadequacies in the extension system and high costs of using the legal system to enforce small contracts.

The study showed that products possessing only search attributes were traded in either spot or informal markets, whereas products with both search and credence attributes were exchanged via relational contracts. The long export chains with many intermediaries did not favour spot markets or contractual arrangements because farmers' perceptions of asymmetric information discouraged investment in value-adding assets and deterred efforts to establish and comply with grades and standards. The case studies also demonstrated that the expansion of mobile telephone services and the emergence of rural financial institutions opened more beneficial modes of engagement to smallholders. While traditional cooperatives can and do help smallholders to acquire more bargaining power, and to address high unit transaction costs, the study revealed that the traditional cooperative model is unlikely to sustain modes of engagement for value-added products because it discourages member investment and undermines compliance with relational contracts.

Although the study chains sustained smallholder engagement in at least one mode of engagement, the vegetable chains were more robust than the spice chains as they offered smallholders a choice in selecting a portfolio of engagement modes that better satisfied their risk-reward preferences. The analysis suggests that improvements in the flow of information, introduction of grades and standards, a switch to more innovative cooperative models, a market-oriented extension service and access to more affordable ways of resolving contract disputes would help smallholders to achieve better utility outcomes in existing modes of engagement, and also could provide them with new modes of engagement. In this regard, the evidence pointed strongly to the role of investor-friendly marketing cooperatives capable of sustaining value adding activities, and the provision of credible information to promote the development and uptake of quality standards.

Keywords: Vegetable chains, spice chains, farmer-buyer dyads, transaction costs, collective marketing, case study

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Abbreviations

CSFs	-	Critical success factors
HEC	-	Human Ethics Committee
ISCs	-	Investor-share Cooperatives
NGCs	-	New Generation Cooperatives
NGOs	-	Non-governmental Organisations
NIE	-	New Institutional Economics
NPR	-	Nepalese Rupees
PGS	-	Participatory Guarentee System
PRA	-	Pest risk analysis
SCM	-	Supply chain management
TCE	-	Transaction Cost Economics

Chapter 1

Introduction

This chapter gives context to the research and explains its purpose and significance. The research methodology is outlined, and the chapter concludes with a description of the structure of the thesis.

1.1 Brief context of Nepal

Agriculture is the principal source of food, income and employment for the majority of people in rural areas of Nepal. The agriculture and forestry sector employs more than 73 per cent of the population aged 15 years and over (CBS, 2009), and contributes 33 per cent to the gross domestic product (CBS, 2010). The agriculture sector has been consistently accorded high priority in government plans and policies with an emphasis on agricultural growth through improved agricultural productivity, crop diversification and commercialisation of high value agricultural commodities (APROSC & JMA, 1995).

A shift from subsistence to commercial agriculture is viewed as the main challenge for rural development in Nepal. However, average landholding size is 0.8ha with 45 per cent of households owning less than 0.5ha and only eight per cent owning more than two hectares of land (CBS, 2004). The combination of low productivity and small farm size is viewed as the principal cause of widespread poverty in rural Nepal (ANZDEC, 2002). A large proportion of the agricultural population in Nepal has serious problems in sustaining their livelihood from agriculture.

Moving to high-value agriculture from subsistence farming is an important option to increase income for smallholders (Joshi, Gulati, Birthal & Tewari, 2004). Nepal possesses favourable

agro-climatic conditions that offer opportunities to grow a variety of high value crops and to exploit seasonal differences between the hills and the plains. Development of new road networks and the expansion of telecommunication facilities are facilitating linkages with markets by reducing transport and information costs. Many farmers have responded to market opportunities by switching from traditional cereal crops to high value crops as shown by a 58 per cent increase in the area under fresh vegetables and a 53 per cent increase in the area under fruit in the ten years preceding the 2009/10 season (MOAC, 2010).

This shift can be viewed as an outcome of the interaction between the pressure on farmers to extract a cash return from their limited land resources and increasing demand for high value crops. Shrestha and Shrestha (2000) contend that agribusiness marketing in Nepal is inefficient due to a lack of price information and the weak bargaining position of small farmers. Pokhrel and Thapa (2007) found that access to information and the availability of alternative buyers enabled farmers to get a fair share of benefits in mandarin marketing and encouraged their participation in the value chain. Khanal (2012) also found a positive relationship between information symmetry and chain coordination in Nepalese vegetable supply chains. While these studies highlight the role of information in promoting agribusiness chains in Nepal, little attention has been given to the robustness of these chains from a smallholder perspective.

1.2 Smallholder inclusion in supply chains

There has been a general trend of linkages between producers and markets becoming increasingly coordinated to meet growing demands for high quality, safe food (Reardon, Timmer & Berdegue, 2005; Shepherd, 2007; Woods, 2004). However, such shifts are seldom beneficial to smallholders who struggle to meet the costs imposed by these demands. Constraints hindering smallholder inclusion in modern supply chains have been widely discussed in the literature. These constraints include; lack of information on prices and

technologies (Markelova, Meinzen-Dick, Hellin & Dohrn, 2009); high unit transaction costs due to small volume of marketable surplus (Poulton, Kydd & Dorward, 2006); high compliance cost of meeting quality and food safety standards (Dolan & Humphrey, 2000; Pingali, Khwaja & Meijer, 2005; Vorley, Lundy & MacGregor, 2009); poor access to agricultural extension services (Pingali et al., 2005; Shepherd, 2007), smallholders' inability to invest in lumpy assets for processing and marketing (Poulton & Lyne, 2009); credit constraints (Markelova et al., 2009; Poulton et al., 2006); and the absence of an enabling environment that offers institutional and infrastructural support (Trienekens, 2011).

Shepherd (2007) notes a typical marketing paradox in thinly traded agricultural markets where buyers complain about inadequate supply while farmers complain about the lack of buyers. Pingali et al. (2005) describe a cyclical pattern of high and low prices in less developed agricultural markets where seasonal high prices lead to oversupply and the consequent collapse of prices. When markets are inefficient, increased production often leads to declining prices that offset the benefits of productivity gains and discourage investment by producers (Diao, Dorosh & Rahman, 2003). Such market inefficiencies and smallholder exclusion are important causes for concern as agriculture remains a major source of livelihood for most of the rural poor in developing countries (World Bank, 2007), and efficiently linking them to markets will be crucial in sustaining their livelihoods and promoting both rural and urban food security (Wheatley & Peters, 2004).

While larger farmers are better equipped to address the challenges of modern supply chains, small farmers can also benefit from the modernising market if they work collectively and have access to key infrastructure (Reardon, Barrett, Berdegue & Swinnen, 2009). Zylberberg (2013) argues that working with smallholders can provide a flexible labour force that can absorb market fluctuations and eliminate the fixed costs incurred by companies that integrate into

production. According to Markelova et al. (2009), collective marketing can help to alleviate high unit transaction and marketing costs, missing credit markets and the problem of lumpy processing assets. However, farmer organisations have not been universally successful in linking farmers to markets (Shepherd, 2007).

Smallholder inclusion is feasible but requires interventions and investments that help smallholders to overcome the costs and risks imposed by modern supply chains (Preckel, Gray, Boehlje & Kim, 2004; Vorley et al., 2009), including information and power asymmetries that disadvantage producers. It is therefore important to identify ways of maintaining and promoting smallholder engagement in food supply chains. However, literature relating to chain performance (Aramyan, Ondersteijn, Oude Lansink & Van Kooten, 2006; Chan & Qi, 2003; Gunasekaran, Patel & McGaughey, 2004; Lohman, Fortuin & Wouters, 2004) focusses on whole chain issues and seldom considers performance from a smallholder perspective.

This study draws primarily on theories of New Institutional Economics (NIE) to develop a model explaining modes of engagement between smallholders and their buyers. This model is used to analyse four agribusiness supply chains in Nepal in order to assess their robustness from a smallholder perspective.

1.3 Research objectives and questions

The existing literature does not consider chain performance from a smallholder perspective. This study takes a smallholder view and specifically examines the ability of supply chains to sustain smallholder engagement. The aim of this study is to identify effective ways of improving chain robustness from the perspective of smallholders. The objectives are:

- To identify and characterise modes of engagement that are used or not used by smallholders

- To explain why these modes of engagement are used or not used
- To assess chain robustness from a smallholder perspective using this understanding of engagement or non-engagement
- To recommend ways of promoting sustainable smallholder engagement in supply chains.

In order to meet these objectives, it is necessary to have an understanding of modes of engagement and chain robustness. Modes of engagement refer to different forms of contractual relationship between farmers and buyers. This is distinct from a dyad which is the interface between two exchange partners. Multiple dyads do not necessarily mean multiple modes of engagement.

The study focusses on the dyad between growers and their immediate buyers. A chain is defined as robust if it has one or more modes of engagement that sustain smallholder engagement in the farmer-buyer dyad. A chain that offers smallholders multiple modes of engagement, each with its own risk-reward profile, is considered to be more robust than one that offers smallholders few marketing choices. It is plausible that a single, resilient mode of engagement could provide all farmers with a superior risk-reward outcome. However, empirical study would be required to establish whether or not this is true when such outcomes are encountered.

It follows that an assessment of chain robustness must examine modes of engagement available to smallholders, their sustainability and factors that constrain alternative modes of engagement. Previous studies have attributed closer vertical coordination to transaction characteristics or the drivers of transaction costs (Hobbs, 1996; Williamson, 1979). These transaction cost drivers could ultimately be influenced by products, markets and the enabling environment (Dorward, 2001; Hobbs & Young, 2001; Jaffee, 1995a). However, none of these studies empirically examined relationships between external attributes, transaction cost drivers and the availability

of different modes of engagement between small producers and their buyers in a holistic way. Therefore, specific research questions to guide this study are:

1. How do the drivers of transaction costs influence modes of engagement in the smallholder-buyer dyad?
2. How do product attributes and market structure influence modes of engagement in the smallholder-buyer dyad?
3. How do attributes of the enabling environment influence modes of engagement in the smallholder-buyer dyad?

The supply chains for organic vegetables, conventional vegetables, ginger and large cardamom were studied in Nepal during May to July 2011 to address the research objectives and questions.

1.4 Significance of the research

The findings of the study are expected to generate a range of policy, managerial and theoretical implications about smallholder engagement in agribusiness supply chains. Nepalese agriculture is predominantly characterised by smallholder farming and hence gives a rich context for the study. The findings and recommendations arising from this study should be relevant in many developing and emerging economies that share a similar context.

Analysing supply chain performance from a smallholder perspective is itself an original approach. This study develops an analytical framework to assess chain robustness and applies it to examine four agribusiness chains in Nepal. This framework could be used as a tool to assess chain performance by government and development agencies in countries characterised by small farms.

Increasing the financial return from agriculture has been given high priority as a mean of improving rural livelihoods in many developing countries. Identifying the factors that determine the range and type of contractual relationships available to smallholders will help development agencies to tailor their support for market linkages. In addition, identifying attributes of the enabling environment that give smallholders more options to engage with markets will help policy makers to formulate strategies that improve rural livelihoods.

1.5 Outline of methodology

A qualitative, multiple case study research strategy was adopted as the intention was to generalise the findings of the study to propositions rather than to a population, and because the propositions address 'how' and 'why' questions about smallholder participation in supply chains (Yin, 2009, pp. 1-24). Four agribusiness supply chains were purposively selected to capture diversity in farmer-buyer dayds while controlling for certain product, market and environmental attributes. Farmer-buyers dyads were the primary unit of analysis. Producers and buyers were treated as sub-units in the embedded, multiple-case design. Semi-structured interviews were conducted with producers, buyers, potential buyers and local service providers. The analysis followed the approach suggested by Yin (2009, pp. 136-144) of searching for patterns in the data and comparing or contrasting observed patterns with those predicted by theory. This process can confirm or reject theoretical propositions. Alternative propositions may emerge, shifting the focus of the analysis to 'theory building', when theoretical propositions are rejected. Individual case studies were analysed separately, followed by a cross-case comparison aimed at isolating the effects of external attributes on the observed dyads.

1.6 Outline of the thesis

This thesis comprises of six chapters. Chapter 2 reviews relevant literature and draws primarily on the NIE to develop a model explaining modes of engagement between smallholders and their buyers. The model extends the traditional vertical coordination continuum to incorporate missing dyads and informal markets. A generalised theoretical framework posits linkages between external attributes of supply chains, drivers of transaction costs, modes of engagement and chain robustness.

Chapter 3 rationalises the qualitative case study method and the multiple case study design adopted in the study. This chapter explains the replication logic used in the selection of case studies and respondents, and describes the methods used to collect and analyse data before concluding with remarks on human ethics.

Chapter 4 uses the model developed in Chapter 2 to analyse modes of engagement available to smallholders in the four supply chains studied. Sections 4.1 to 4.4 present and analyse the case studies of the organic fresh vegetable, conventional fresh vegetable, ginger and large cardamom chains respectively. Section 4.5 revises the conceptual model drawing on the findings of individual case studies.

Chapter 5 makes cross-case comparison between supply chains to examine the effects of external chain attributes on modes of smallholder engagement. Section 5.1 presents a cross-case comparison of the spice chains. Section 5.2 compares the vegetable chains.

Chapter 6 discusses the findings of the study. Comparisons are drawn with international literature. The research objectives are addressed and policy implications are discussed. This chapter also presents limitations of the study and potential areas for future research.

Chapter 2

Literature review and theoretical framework

Chapter 1 introduced the research context and its rationale. It also presented the research objectives and research questions to guide the study. This chapter briefly reviews supply chain management concepts and characteristics of agribusiness supply chains. It also outlines smallholder marketing linkages and considers theories that seek to explain modes of engagement and their mechanisms of sharing risk and rewards. The roles of horizontal coordination and the external enabling environment in linking farmers to markets are reviewed. The chapter then introduces a theoretical framework to analyse modes of engagement between farmers and buyers from a smallholder perspective.

2.1 Relevant supply chain management concepts

Supply chain management (SCM) takes its origin from logistics literature and, until recently, was not considered distinctly different from logistics management (Lambert, Cooper & Pohlen, 1998). SCM used to be viewed as logistics outside the firm to reach customers and suppliers. However, the understanding of SCM has been broadened to include integration and management of business processes across the supply chain. Logistics is now considered only a part of SCM.

There is often confusion between the terms ‘supply chain’ and “value chain’. One useful way to view the distinction is that a supply chain is a set of activities and processes by which consumers are supplied with a desired product. On the other hand, the value chain tends to highlight the contribution of functional parts of the chain to the development of customer value across the chain (Woods, 2004). The concept of the value chain was first introduced by Porter

(1985, pp. 33-61) as a tool to analyse competitive advantage of the firm. He described the value chain as a process where a firm performs various primary and secondary activities to produce a product, adds its profit margin and sells to the buyer. The linkage of the firm's value chain with supplier and buyer value chains constitutes the overall value system. Current understanding of the value chain is similar to Porter's value system. Apparent differences between the understanding of supply chain and value chain are disappearing, and SCM is increasingly understood as the integration of business process management and value creation.

Boehlje (1999) conceptualises 'supply chain' as value creating activities in the production-distribution continuum and the linkages among these activities or processes. In his view, key processes in a supply chain are input supply, production, processing, wholesaling, and retailing. He further elaborates five critical dimensions of a supply chain; a set of processes that create the product demanded by consumers, the flow of products from producers to consumers, the flow of money from consumers to producers, the flow of information across the chain, an incentive system to reward performance and share the risk, and a chain governance or coordination system. The term 'supply chain management approach' is often used to refer to the managed coordination of these critical supply chain dimensions. This contrasts to what is sometimes referred to as a 'commodity approach', which refers to the coordination of these dimensions through the market. Van Der Vorst, Da Silva and Trienekens (2007) define supply chain management as the integrated planning, implementation, coordination and control of all business processes and activities necessary to produce and deliver, as efficiently as possible, products that satisfy market requirements.

The supply chain management concept has been increasingly applied in agribusiness. Traditional marketing channels are being replaced by coordinated supply chains between farmers and markets. Woods (2004) argues that this trend is mainly driven by competition to

grab a bigger share of consumer expenditure. Other key drivers of supply chain management in agribusiness are: increased demand for and availability of differentiated products (O'Keefe, 1997; Woods, 2004), advances in technology (Ortmann, 2001; Woods, 2004), sensitivity of consumers to food quality, safety and non-food values (O'Keefe, 1997; Woods, 2004), and more competitive markets as a result of globalisation and trade liberalisation (O'Keefe, 1997; Ortmann, 2001). The need to convey precise information regarding product attributes (such as quantity, quality and timing) increases when consumers are more demanding and competition is more intense, ultimately leading to the emergence of more tightly coordinated supply chains (Boehlje, 1999).

Some inherent characteristics of agricultural products create special challenges in applying the SCM approach to agribusiness. They include: variability in quality and quantity due to the biological nature of production, perishability of products, sensitivity of consumers towards food safety and environmental issues, large numbers of primary producers, volatile prices, and lags in production response to market signals due to seasonality and long production cycles (Aramyan et al., 2006; Jaffee, 1994; O'Keefe, 1997; Woods, 2004). These challenges suggest that agribusiness products require more coordinated sharing of information on product quality and quantity across the chain and synchronisation of production, harvesting and marketing than do other products. Although all products pass through a supply chain to reach consumers, not all chains are sufficiently coordinated to command improved efficiency, customer value and competitiveness (Woods, Wei, Singgih & Adar, 2002). The ability of producers to benefit from market opportunities therefore depends on how effectively the supply chain links them to markets.

2.2 Smallholder linkages to markets and chain performance

Shepherd (2007) describes common marketing channels used by small farmers including; farmer to domestic traders; farmer to agro-processor; farmer to retailers; linkage through a leading farmer; linkage through cooperatives; farmer to exporter; and contract farming. This list is not an exhaustive list of possible marketing linkages, and these channels are not mutually exclusive. Vorley et al. (2009) cluster marketing linkages into three business models; a producer-driven model, a buyer-driven model and a model of intermediation. In the producer-driven model, forward integration of the supply chain processes is achieved through cooperatives or farmer-owned businesses. In the buyer-driven model, the buyer integrates backward and organises production to reduce the number of intermediaries and to improve product quality and consistency of supply. However, complete forward and backward integration by producers and buyers is rare due to costs and capabilities, and linkages between farmers and markets usually come through intermediaries (Vorley et al., 2009).

A marketing channel comprises several supplier-buyer dyads until the product reaches final consumers. Each marketing channel includes a farmer-buyer dyad that provides producers a crucial link to the input and factor markets. A dyad is not sustainable unless it generates acceptable levels of risk and reward for buyers and sellers (Lee, 2004; Narayanan & Raman, 2004; Preckel et al., 2004). Gray and Boehlje (2005) argue that different types of risks encountered in alternative chain governance structures, the incidence of risk for chain participants and the sharing of risk and reward among them determine engagement or non-engagement of chain participants. What constitutes an acceptable level of risk and reward depends on the risk aversion of chain actors (Preckel et al., 2004). Some actors are willing to take extra risk for extra income while others are content with a lower but more stable level of income. In their study of the US pork industry, Johnson and Foster (1994) note that risk neutral

producers prefer to sell independently in the spot market whereas risk averse producers tend to choose different kinds of coordinated arrangements. However, the selection of preferred modes of engagement based on individual risk-reward outcomes will arise if there are multiple options available to producers. In many situations, markets may not offer alternative modes of engagement and producers either have to participate via the available mode or completely withdraw from the market.

Trienekens (2011) suggests that the distribution of reward depends on power relationships and information asymmetry between chain actors. On the other hand, Matopoulos, Vlachopoulou, Manthou and Manos (2007) argue that an imbalance in the sharing of risk and reward is promoted by dependence rather than by asymmetric power relationships. Nevertheless, power and dependency are closely related. Woods (2004) argues that power is related to dependency, and that dependency is related to the availability of alternatives. Therefore, a supply chain that comprises several different modes of engagement can offer smallholders more choice in their search for acceptable levels of risk and reward.

Supply chain performance has been widely discussed in the literature. Van Der Vorst (2006) argues that supply chain performance can be viewed as the degree to which a supply chain fulfils end-user and stakeholder requirements. While there is little consensus on measures to analyse chain performance, researchers generally agree that measuring chain performance requires both financial and operational indicators (Beamon, 1998; Chen & Paulraj, 2004; De Toni & Tonchia, 2001; Lohman et al., 2004). Kaplan and Norton (1992) argue that financial measures are the result of action already taken, whereas operational measures are the drivers of future financial performance.

A plethora of performance indicators such as cost, resource utilisation, quality, delivery speed, reliability, flexibility, trust and innovativeness have been suggested (Beamon, 1999; Chan,

2003; Chan & Qi, 2003). Van Der Vorst et al. (2007) categorises performance measures at three hierarchical levels of the supply chain; supply chain network, organisations, and processes. Indicators for the supply chain network relate to the objectives of each member while organisation and process indicators deal respectively with logistic metrics and chain resource utilisation. Gunasekaran, Patel and McGaughey (2004), on the other hand, disaggregate performance metrics in their performance framework into different levels of supply chain activity such as, planning, sourcing, assembly and delivery.

Aramyan et al., (2006) advocate an agri-food chain performance framework with four main categories of indicators; efficiency, flexibility, food quality, and responsiveness. Trienekens, Uffelen, Debaire and Omta (2008) identify critical success factors (CSFs) of performance and innovation in European fruit supply chains and recommend an innovation-performance matrix to assess chain performance. Performance CSFs, they suggest, could also be grouped by efficiency, responsiveness, quality and flexibility, while innovation CSFs could be disaggregated into process, product and marketing categories. Whereas performance indicators measure the current position of the chain in the market, innovation indicators emphasise the chain's future competitive advantage.

Obeth and Dunne (2008) compare the performance of three banana supply chains in Indonesia applying six principles; creating customer value, building chain relationships, establishing an effective communication system, establishing an effective logistic system and sharing risks and rewards. Collins (2006) argues that the fresh produce supply chain is a system driven by the interaction of its technical (production, processing, transport etc.), economic (profitability), information-based (communication) and governance (human relationships) sub-systems. He suggests eight performance criteria spanning multiple perspectives from these sub-systems that could be used to map any chain from least value orientation to greatest value orientation.

This literature on chain performance, however, tends to focus on developing chain performance frameworks and identifying performance metrics related to logistics. This approach seldom considers the smallholder perspective in assessing chain robutness which is more about offering smallholders acceptable levels of risk and reward rather than about chain logistics.

2.3 Theory review

TCE provides useful insights into different modes of engagement between producers and their buyers. According to TCE, transaction costs incentivise buyers and suppliers to develop closer contractual relationships (away from spot market transactions) and the selection of a particular mode of engagement in based on its efficiency to minimise transaction costs (Williamson, 1979, 1991; Woods, 2004). Literature on relational exchange distinguishes between transactional and relational exchanges, and highlights the revenue enhancing benefits of relational exchanges (Ganesan, 1994; Morgan & Hunt, 1994; Spekman, Kamauff Jr & Myhr, 1998). Fischer (2009) argues that personal bonds and power symmetry directly enhance relation stability or indirectly strengthen it by enhancing effective communication. Although the constructs of TCE, relational exchange and power-dependence take different viewpoints, they can be complementary to analyse modes of engagement in the farmer-buyer dyad. These constructs are reviewed in subsequent sections of this chapter.

2.3.1 Transaction cost economics

The perfect competition model of neoclassical economics assumes that traders possess complete information, do not face any entry or exit barriers, trade homogenous products, cannot influence the market price as there are a large number of competing buyers and sellers, and that no economies of scale or production externalities exists (Kirsten, Karaan & Dorward, 2009). In such a perfectly competitive condition, transactions are assumed to occur in a frictionless

economic environment (Hobbs, 1996) and there is no coordinating role for any market actor as the market itself coordinates demand and supply through the price mechanism (Poulton & Lyne, 2009). The new institutional economics (NIE) assumes that transactions are not cost free (Furubotn & Richter, 2005, p. 47). According to Kirsten et al. (2009), NIE basically relies upon imperfect transaction information and considers institutional issues related to non-standard behaviour of actors, lack of complete markets, poorly defined property rights, and high transaction costs.

Barzel (1985) argues that transactors are able to gain at their partners' expense in the presence of positive transaction costs. Consequently, they agree to develop institutions that limit opportunism in order to minimise associated losses. TCE, which is a branch of NIE, primarily describes institutions that emerge or evolve to deal with different types and sources of transaction costs. TCE considers the transaction as a unit of analysis and explains different modes of engagement or governance structures in terms of their ability to reduce transaction costs (Slangen, Loucks & Slangen, 2008, p. 173; Williamson, 1985, pp. 16-18).

Coase (1937) posits that firms emerge to reduce transaction costs of market exchange, and that the boundary of a firm or extent of vertical coordination depends on the magnitude of these transaction costs. Though Coase's analysis visualised only the discrete conditions of either market transaction or hierarchy, several intermediate forms of governance were later recognised (Frank & Henderson, 1992; Gereffi, Humphrey & Sturgeon, 2005; Peterson, Wysocki & Harsh, 2001; Williamson, 1991). These modes of engagement or governance structures are often represented in a continuum of vertical coordination that comprises all means of harmonising vertically interdependent production and distribution activities ranging from spot markets through various types of contracts to complete integration (Frank & Henderson, 1992). The principal motive for this progression from 'loose' to 'tight' vertical coordination is the desire

to avoid high transaction costs (Frank & Henderson, 1992; Hobbs, 1996; Williamson, 1979; 1985, pp. 129-130; 1991). Jaffee (1995a) notes that no one mode of engagement is absolutely more efficient than any other and that their relative efficiency depends on the actual operating conditions surrounding the trading relationship.

Williamson (1985) considers transaction costs as the economic equivalent of friction in the physical system. Transaction cost has been defined as the cost of exchanging ownership titles (Demsetz, 1968) or the cost of running the economic system (Arrow, 1969). Hobbs (1996) defines transaction cost as the costs of carrying out any exchange, including costs associated with the transfer of resources within a vertically integrated firm. Allen (1991) summarises two approaches of defining transaction costs. In his view, transaction costs could be defined as the costs involved in establishing or maintaining property rights or the costs incurred in the transfer of property rights (i.e. market exchange).

Hobbs (1998) categorises transaction costs into information costs, negotiation costs, and monitoring (enforcement) costs. Williamson (1985, pp. 20-21) distinguishes between *ex ante* and *ex post* transaction costs. *Ex ante* transaction costs are mostly fixed costs associated with the search for trading partners and negotiation of agreements. *Ex post* transaction costs are those associated with monitoring and enforcing agreements, and with the risk of losses caused by a breach of contract. *Ex post* transaction costs are largely variable costs that increase with the volume transacted. Pingali et al. (2005) note that transaction costs could be specific to buyers, suppliers, location and the crop.

2.3.1.1 Drivers of transaction costs

Asset specific investment, uncertainty surrounding transactions, and frequency of transactions increase transaction costs (Williamson, 1979; 1985, pp. 52-61). Complexity is also viewed as

contributing to transaction costs (Hobbs & Young, 2001; Jaffee, 1995b; Poulton & Lyne, 2009).

2.3.1.1.1 Asset specificity

Asset specificity arises when a trading partner invests in assets that have little or no value in an alternative use (Hobbs, 1996). Williamson (1985, pp. 95-96) mentions four different types of asset specificity; site specificity, physical asset specificity; human asset specificity and dedicated assets. Site specificity refers to investments made in a particular location to reduce supply and transport costs. These assets involve high relocation costs if relocation is required. Physical asset specificity refers to investment in physical assets (such as equipment or buildings) that have narrow and specific uses. Human asset specificity refers to specialisation of human resources in specific areas such as staff training or skill development. Dedicated assets are assets that are specific to a particular transaction partner. Poulton and Lyne (2009) distinguish two dimensions of asset specificity; asset fixity and transaction specificity. Asset fixity is a measure of the costs of exiting a particular investment. Transaction specificity is the extent to which the use value of the asset is dependent on the continuation of a specific transaction or contract.

From a farmer perspective, asset specificity arises from the gestation period of perennial crops because farmers have to commit scarce land and capital for several years to realise a return (Jaffee, 1995a, 1995b). Demand for environmental and ethical credence attributes tends to raise levels of asset specific investment because of the specialised production technique or knowledge (Jaffee, 1995b) and direct investment in complying with standards (e.g. in certification or in the use of approved inputs) (Menard & Valceschini, 2005; Okello & Swinton, 2007). In addition, farmers have to sacrifice higher productivity to comply with credence attributes (such as organic produce) (Cobb et al., 1999; Lansink, Pietola & Backman, 2002) and

the difference in production, in true sense, can be regarded as an investment. This investment in the form of a lower productivity can only be compensated by a price premium.

Asset specific investment exposes the investor to risk of hold-up that can be exploited opportunistically unless appropriate contractual safeguards are designed (Klein, Crawford & Alchian, 1978). A hold-up problem arises when a contracting party is able to extract more favourable contractual terms from a trading partner that has made a significant asset specific investment. The likelihood of a hold-up problem could also result in under-investment in relation specific assets (Klein et al., 1978). Problems associated with asset specificity are more pronounced when uncertainty prevails in the trading relationships.

2.3.1.1.2 Uncertainty

Uncertainty refers to unanticipated changes in the circumstances surrounding a transaction. Such changes may arise due to environmental or behavioural risks (Jaffee, 1995b). Grover and Malhotra (2003) argue that environmental risk mainly affects the ability to formulate a contract *ex ante,* while behavioural risk affects the ability to enforce or verify the contract *ex post*.

Environmental risk arises when suppliers are otherwise trustworthy but cannot honour the terms of trade for reasons that are beyond their control. Their inability to honour contractual obligations arises due to unpredictability of the natural, technical and policy environments (Grover & Malhotra, 2003). Such outcomes are frequently observed in trading relationships with small scale farmers because they do not have the capital, technical skills and technologies to mitigate adverse changes in farming conditions (Vorley et al., 2009).

Behavioural risk arises when a trading partner does not comply with the terms of a contract. This is analogous to what Williamson (1985, p. 47) describes as opportunism that arises from the difficulties associated with monitoring the contractual performance of exchange partners.

Pervasive opportunism (such as strategic non-disclosure, disguise or distortion of information) manifests as a lack of trust. Side-selling and price manipulation are perhaps some of the more common symptoms of opportunism in relationships between smallholders and their buyers. The presence of opportunism gives rise to transaction costs in the form of monitoring behaviour, safeguarding assets, losses or potential losses caused by a breach of contract, and contract enforcement (Grover & Malhotra, 2003).

2.3.1.1.3 Complexity

Perishability, specificity of quality standards especially those relating to credence attributes, seasonality of supply and traceability requirements increase the complexity of transactions (Jaffee, 1995b; Poulton & Lyne, 2009). Credence attributes increase the complexity of transactions because quality cannot be ascertained even after consumption (Raynaud, Sauvee & Valceschini, 2005). Complexity increases transaction costs by increasing the uncertainty of supply, by increasing information and monitoring costs (Hobbs & Young, 2001; Jaffee, 1995b), by increasing the need for assets that have little value in alternative uses, and by increasing the cost of renegotiating (incomplete) contracts *ex post* (Poulton & Lyne, 2009). Product standards and grades for search attributes, however, reduce information costs, facilitate measurement of quality, simplify the search process and assist in matching buyers with sellers, thereby reducing the complexity of transactions (Hobbs & Young, 2001).

2.3.1.1.4 Frequency

Transaction costs are also expected to increase with the frequency of transactions owing to search and negotiation costs associated with each transaction. However, frequency should not be confused with recurrence. Recurrent transactions involve the same trading partner and could reflect a lack of alternative trading parties or an attempt to avoid high transaction costs

associated with frequent transactions. Williamson (1985, p. 60) argues that the cost of specialised governance structures will be easier to recover for large transactions of a recurring kind.

2.3.1.1.5 Size

Although transaction costs increase as the volume traded increases, they decline relative to the value of the transaction. For small farmers transacting small quantities, aggregate transaction, compliance and marketing costs can easily exceed the value of their transaction. The fixed nature of *ex ante* transaction costs irrespective of transaction size discourages buyers from engaging with smallholders as they incur lower transaction costs by dealing with a few large producers (Pingali et al., 2005; Young & Hobbs, 2002). Although small farmers may possess comparative advantage in labour intensive high value crops, the increasing importance of quality standards poses problems for small farms (Poulton, Dorward & Kydd, 2005) because low volumes result in high unit compliance costs (Vorley et al., 2009) Vorley et al. (2009) note that inadequate infrastructure and support services in developing countries tend to accentuate this problem, and there is mounting evidence that smallholders are being increasingly excluded from agri-business supply chains by rising transaction and compliance costs associated with demands for a continuous supply of safe, value added food products (Batt & Cadilhon, 2006; Pingali et al., 2005; Reardon et al., 2005). Poulton et al. (2005) suggest that agribusiness firms are less likely to engage with small farmers when they have alternative sources of supply. Thus, interventions aimed at sharing fixed transaction, compliance and marketing costs could improve market access and chain performance for smallholders (Delgado, 1999; Dorward, Kydd, Morrison & Urey, 2004; Ortmann, 2001; Pingali et al., 2005). Collective marketing can reduce these unit costs but introduces other costs that may prevent market participation (Lyne & Martin, 2008).

2.3.1.1.6 Information and power

Vulnerability to opportunism may increase due to information asymmetry regarding the intentions and capabilities of trading partners, and the attributes of the product traded (Dorward, 2001; Hobbs & Young, 2001; Jaffee, 1995b; North, 1991). Opportunism arising from asymmetric information can be *ex ante* (adverse selection) or *ex post* (moral hazard) (Akerlof, 1970; Hobbs, 1996). Adverse selection implies failure to discriminate between high and low risk trading partners. Moral hazard arises when a trading party alters its behaviour after a contract has been agreed. Credence products are particularly vulnerable to moral hazard because the product characteristics cannot be readily verified (Vetter & Karantininis, 2002). Neither of these problems would arise in a world of perfect information, but information is often scarce and seldom costless. North (1990, p. 27) contends that costliness of information is the key to the cost of transacting which involves the cost of measuring attributes of the products or services being exchanged and the cost of protecting rights and policing and enforcing agreements.

Opportunism may also arise due to power asymmetry between buyers and sellers in the supply chain (Ganesan, 1994; Heide & John, 1988; Vorley et al., 2009). Woods (2004) argues that power is related to dependency created by a lack of alternatives. Information and power asymmetry provide incentives for more informed and powerful agents to extract undue benefits from transactions, or to pass excessive risk to their transaction partners. Poulton et al. (2006) note that investments may not be made and potential supply chain relationships may not develop when behavioural risk is high compared to the returns expected from investment. The issue of power is further explored in Section 2.3.3.

2.3.2 Relational exchanges

Although TCE provides a powerful framework to analyse buyer-supplier relationships, it is often criticised for emphasising cost minimisation and ignoring the benefits of the relationship. The literature on relational exchanges complements TCE in explaining buyer-supplier relationships, especially from a revenue enhancing perspective.

The literature on relational exchanges emphasises the role of commitment and trust in sustaining relational exchanges (Dwyer, Schurr & Oh, 1987; Morgan & Hunt, 1994). Commitment and trust are purported to encourage transaction partners to preserve their relationship in favour of expected long-term returns over attractive short-term alternatives. However, commitment and trust are not inherent attributes of chain actors. They are likely to be influenced by uncertainty, relationship termination costs, relationship benefits, shared values, and communication (Morgan & Hunt, 1994). Kim (2000) argues that dyadic trust lessens the use of coercive power, but safeguarding mechanisms are required to ensure a balance of power in a relationship with a long-term focus.

Spekman et al. (1998) argue that a revenue enhancement approach puts more emphasis on joint learning and innovation in a long-term relationship. Jap (1999) contends that collaboration can increase the size of benefits to each party due to enhanced joint benefits. Such relationships are expected to incentivise recurrent transactions among trading partners. Dyer and Singh (1998) contend that relational exchanges can create additional value for exchange partners not only by investment in relation-specific assets but also by combining complementary knowledge, resources or capabilities, and employing effective governance mechanisms that lower transaction costs. Ganesan (1994) also suggests that transacting parties derive efficiencies through joint synergies from investment in and exploitation of idiosyncratic assets and risk sharing.

According to Spekman et al. (1998), shared values promote information sharing that increases the ability of exchange partners to meet end-users needs or to add value. Substantial knowledge and information exchange can also promote joint learning which could itself be a source of competitive advantage in a dyadic relationship (Dyer & Singh, 1998). According to Jap (1999), collaboration also comes with risks, but congruent goals (or alignment of interests and objectives) between exchange partners diminish the threat of opportunism. It follows that effective internal enforcement mechanisms or the alignment of incentives are vital in sustaining relational contracts.

2.3.3 Power-dependence model

TCE primarily emphasises gaining efficiency from the relationship through transaction cost minimisation and relational exchange emphasises both cost minimisation and revenue enhancement through long-term relationships. Although the issue of power is implicitly mentioned in TCE (through asymmetric information and opportunism) and relational exchanges (through the effect of misuse of power on commitment and trust), these constructs are not explicit about the role of power in shaping supply chain relationships. Sodano (2006) argues that power-based considerations should accompany efficiency-based considerations in comparing different institutional frameworks.

Hunt and Nevin (1974) define power as the ability of one individual or group to control or influence the behaviour of others. Chain members derive power from various sources. French and Raven (1959, pp. 150-167) consider five sources of power available to chain actors: coercive power (threat of punishment), reward power (monetary or non-monetary compensation), legitimate power (legitimate right to influence), expert power (derived from superior knowledge and information) and referent power (based on reputation, admiration and follower's loyalty).

Emerson (1962) views power as a function of dependence. Ganesan (1994) argues that dependence increases with investment in specific assets. Dependency is primarily related to the availability of profitable alternatives (Batt, 2004). When fewer alternative sources of exchange are available, or when replacing or substituting a current exchange partner is difficult, dependence will increase (Heide & John, 1988). This situation is more likely to arise when buyers are concentrated or when a key process is controlled by one party (Cox, 1999; Ganesan, 1994; Heide & John, 1988; Woods, 2004). In an agribusiness context, smallholders are more dependent on their trading partners for access to markets and capital than are large farmers (Batt, 2004). Capital constraints can lock smallholders into captive relationships through credit arrangements, thereby exposing them to buyer opportunism in product pricing (Wheatley & Peters, 2004).

Power asymmetry between buyers and sellers in a supply chain may provide incentives for powerful actors to behave opportunistically and manipulate the terms of trade to their own advantage (Ganesan, 1994; Heide & John, 1988; Vorley et al., 2009). The perishable nature of many agricultural products exposes producers to opportunistic behaviour as those products have to be sold shortly after harvest and, therefore, put producers in a weak bargaining position (Delgado, 1999).

Bucklin and Sengupta (1993) argue that imbalances in power are detrimental to long-term relationships as they discourage less powerful actors from remaining engaged with a chain. In such situations, it is quite natural for these actors to attempt to lobby for more market power or to seek ways of reducing their dependence on a particular relationship. Hingley (2005) argues that stronger parties frequently use their power and that weaker parties will tolerate this imbalance provided that they perceive benefits from the relationship. Consequently, relationships built on asymmetric power are not necessarily short-lasting.

From the perspective of NIE, Sodano (2006) argues that power issues arise in long-term contracts that are incomplete and not enforceable by a third party because the attributes being traded are measured either imperfectly or at considerable cost. In his view, incomplete contracts are enforced by either trust-based or power-based enforcement mechanisms (promise, threat, retaliation, reward, punishment), and that vertical integration occurs only when contract incompleteness cannot be corrected through enforcement mechanisms. Sodano (2006) further argues that power motivations can encourage chain actors to stick with an inferior mode of engagement even when another mode of engagement could yield a superior outcome.

As power is related to dependency, the availability of alternatives reduces the likelihood that smallholders will be unduly affected by the power of their exchange partners. Woods (2004) argues that there are strong incentives for smallholders to work collectively as the small and fragmented nature of their production provides them very little power to deal with their buyers as individuals.

2.4 Horizontal coordination

Horizontal coordination refers to coordination among actors at a given stage of a supply chain. Marketing associations and cooperatives are common forms of horizontal coordination between producers in agribusiness supply chains.

According to Markelova et al. (2009), smallholder success in accessing markets depends upon their ability to deal with economies of scale and coordination issues. Vorley et al. (2009) suggest that the organisation of marketing is central to overcoming costs associated with the dispersion of producers, small quantities, poor access to information, technology and finance, inconsistent volume and quality, traceability and management of risk. Private companies often prefer to work with farmer organisations rather than with individual farmers despite the

increased bargaining power that groups may enjoy because the costs of transacting and capacity building are lower.

Farmer organisations offer both farmers and their buyer benefits by pooling produce and reducing unit transaction costs (Jaffee, 1995b; Markelova et al., 2009). Farmer organisations also facilitate both the delivery and coordination of services to smallholders as they make service provision less costly for service providers (Poulton et al., 2006). Poulton and Lyne (2009) conclude that horizontal coordination between smallholders is often a prerequisite for their vertical coordination.

Buyers with power may act opportunistically to the disadvantage of producers. Perceptions of unfair treatment have motivated producers to market their produce collectively (Young & Hobbs, 2002). Horizontal coordination may also help to minimise producer opportunism through peer monitoring and pressure to combat strategic default (e.g. side-selling) and specification opportunism. Poulton et al. (2005) define specification opportunism as cheating by exploiting information asymmetry, e.g. supplying a sub-standard product when it is costly to measure quality.

Modern supply chains require investment in value-adding assets, including intangible assets like brand, as buyers are becoming more demanding in terms of quality and timing requirements. However, small outputs make it impossible for individual producers to finance lumpy assets (Jaffee, 1995b). Again, horizontal coordination by smallholders can help to overcome this problem by pooling their produce and their capital (Poulton & Lyne, 2009). Markelova et al. (2009) argue that acting collectively helps to correct market imperfections such as missing markets for credit, insurance and information.

Although it is generally accepted that producer marketing organisations can overcome some of the high transaction costs that farmers face acting individually, they are not universally successful (Shepherd, 2007). Major challenges arise from weak institutional arrangements, poor management and inadequate capital (Poulton et al., 2005). Cook (1995) contends that vaguely defined property rights (i.e. voting and benefit rights) in producer organisations that adopt institutional arrangements found in traditional marketing cooperatives suffer from free-rider, horizon, portfolio, control and influence problems that constrain their ability and incentive to finance value-adding assets.

A free-rider problem arises when members benefit disproportionately from their investments. Sykuta and Cook (2001) distinguish between internal and external free-rider problems. An internal free-rider problem arises when new members enjoy the same rights and benefits as existing members. An external free-rider problem arises when non-members enjoy the same benefits as members. The horizon problem refers to disincentives for members to invest in long-term and intangible assets. This problem arises when a member's residual claim on income generated by the asset is shorter than the economic life of that asset (Porter & Scully, 1987). In such conditions, new members become free-riders because shares purchased in a traditional cooperative are non-appreciable (Poulton & Lyne, 2009). A portfolio problem arises when members cannot adjust their investment in the organisation to match their own risk preferences. This is true of traditional cooperatives because their shares are redeemable at par value and therefore non-tradable.

The control problem is the cost associated with monitoring managers to ensure that their interests do not misalign with those of members. An influence problem arises when voting rights are equal rather than proportional to investment as this distances investors from control. Democratic voting is a feature of traditional marketing cooperatives. These property right

problems create disincentives for member investment and constrain the ability of farmer organisations to generate equity capital, and hence to borrow debt capital (Cook, 1995; Cook & Iliopoulos, 2000; Rosairo, Lyne, Martin & Moore, 2012). Several hybrid forms of marketing organisations such as New Generation Cooperatives (NGCs) and Investor-share Cooperatives (ISCs) have emerged to overcome these institutional problems associated with traditional marketing cooperatives (Cook & Iliopoulos, 2000). NGCs link members' investment to their patronage via tradable delivery rights. This not only alleviates the horizon, portfolio and control problems but also makes the quantity of product supplied to the cooperative more predictable (Harris, Stefanson & Fulton, 1996).

2.5 Enabling environment

The ability of smallholders to participate in a supply chain is also influenced by the broader environment surrounding transactions. Vorley et al. (2009) argue that infrastructure, finance and support services can stimulate and support smallholders' inclusion and that the public sector has an important role to facilitate successful linkages between smallholders and larger business. The provision of public infrastructure and services (such as roads, transport, water, electricity and telecommunication) is often considered a central element of the enabling environment. Market information, agricultural extension and research also have public good properties, as does the legal system that is required to enforce conventional contracts. According to Pingali et al. (2005), poor public good provision and the absence of adequate regulation can interact with the specific requirements of commercial markets to increase the costs of transacting. Conversely, affordable access to these goods and services reduces marketing and transactions costs, both directly (e.g. lower transport and search costs) and indirectly (e.g. by reducing environmental and behavioural risk, and the complexity of transactions).

Access to all-weather roads reduces transport costs. Shepherd (2007) argues that good roads are particularly crucial for perishable produce and for crops that require processing soon after harvest, such as tea and palm oil. Trienekens (2011) notes that the expansion of mobile telephone services in developing countries is rapidly improving the flow of information, and thus, helping to reduce the search costs for buyers and producers.

North (2000) contends that the role of government is often crucial in upholding property rights and enforcing contracts in order to reduce the costs of market exchange. The chances of opportunistic behaviour are high in developing countries because their legal institutions are weak (Kirsten & Sartorius, 2002). Easy access to an efficient legal system should therefore reduce transaction costs by reducing behavioural risk in trading relationships. However, the utility of a legal system could be low due to high unit enforcement costs when the size of transactions is small (Shepherd, 2007).

The institutional environment relating to rules, standards and market information can indirectly influence transaction costs. Shepherd (2007) contends that farmers often lack market information (in terms of current prices and future trends) and are, therefore, ill-equipped to negotiate with buyers. Enforcement of trading rules and provision of reliable market information to transacting parties can significantly reduce transaction costs (by reducing behavioural risk) and increase the producer's share of the consumer's dollar (Gabre-Madhin, 2012). Farina and Reardon (2000) contend that governments can introduce basic grades and standards that lower transaction costs by reducing information asymmetry and the complexity of transaction.

Hazell (2005) argues that small farmers rely on public research and extension service to meet their technology needs. However, the quality of agricultural extension services is often poor in developing countries (Shepherd, 2007). The promotion and adoption of new technology

through public investment in research and extension can help to reduce environmental risk in production. Similarly, public investment in irrigation infrastructure can also help to offset the risk of production failure due to adverse weather.

Financial services are critical to smallholders, particularly in the planting season (Poulton et al., 2006). However, lack of collateral, high unit transaction costs for small loans, covariant risks from adverse weather and prices, and the absence of insurance markets undermine their access to formal financial markets (Binswanger & Rosenzweig, 1986; Poulton et al., 2005), and encourages them to seek credit from buyers who exploit this dependency (Poulton, Dorward & Kydd, 1998; Wheatley & Peters, 2004). Credit constraints are also important for small market intermediaries who lack capital to finance value-adding assets. Poulton et al. (1998) argue that increased and more reliable flows of finance to traders encourage both input supply and output marketing. Pingali et al. (2005) argue that effective rural finance institutions also assist in risk management and in spreading the benefits of commercialisation more widely across the community and region.

2.6 Theoretical framework

The research objectives and questions presented in Chapter 1 and the literature reviewed in this chapter informed a theoretical framework. The objectives of the study are to identify and characterise modes of engagement, explain why they are used (or not used), to draw inferences about chain robustness and to recommend ways of promoting sustainable smallholder engagement. In order to achieve these objectives, the study intends to find out how product attributes, market structure and the enabling environment influence modes of engagement available to smallholders. Section 2.3.1 reviewed TCE literature that helps to explain the drivers of transaction costs that influence modes of engagement. Sections 2.3.2 and 2.3.3 reviewed relational exchanges and power-dependence constructs that influence the sharing of risk and

reward. The literature also explains how transaction costs and their drivers are influenced by attributes external to the dyad. It follows that modes of engagement can be linked to product attributes, market structures and attributes of the enabling environment within which the supply chain operates. A generalised theoretical framework to assess chain robustness from a smallholder perspective is outlined in Figure 2.1.

Dorward (2001) and Hobbs and Young (2001) attempted to model relationships among attributes external to the dyad, transaction characteristics (or the drivers of transaction costs) and modes of engagement in the vertical coordination continuum. While these authors focus on analysing the discrete choice of modes of engagement between producers and buyers, this study analyses the availability of modes of enagagement and hence chain robustness. Figure 2.1 provides an overall framework for the study, but a conceptual model to analyse modes of engagement in the farmer-buyer dyad is required.

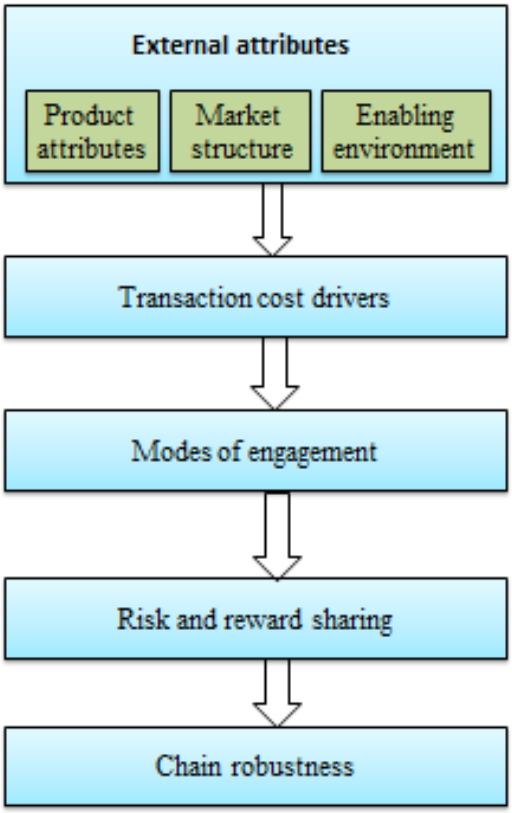


Figure 2.1: Generalised theoretical framework

The factors that influence transaction costs not only help to explain the presence or absence of farmer-buyer dyads but also help to explain the mode of engagement between farmers and buyers where dyads do exist. Observed dyads are often categorised according to their level of coordination, ranging from spot market through different forms of contracting to vertical integration (Frank & Henderson, 1992; Hobbs, 1996). Intermediate modes of engagement between spot market and vertical integration have been presented differently in the literature. For example; Gereffi et al. (2005) refer to modular value chains, relational value chains and captive value chains as intermediate modes of engagement. On the other hand, Jaffee (1995a) describes market reciprocity agreements, forward market contracts, and interlinked forward and market contracts as intermediate steps between the spot market and vertical integration. This study follows Williamson's (1979) view of intermediate modes of engagement, i.e. conventional and relational contracting. As discussed in Section 2.3.1, the move from 'loose' to 'tight' modes of engagement in the vertical coordination continuum is driven by a desire to avoid high transaction costs. Consequently, the mode of engagement between transacting parties will be influenced by the drivers of transaction costs (Williamson, 1985, pp. 52-61).

This traditional continuum of vertical coordination from spot market to vertical integration tends to ignore the distinction between spot markets and informal markets. Price is often viewed as the only coordinating mechanism in spot markets (Gereffi et al., 2005; Hobbs, 1996). However, North (1990) contends that spot markets are coordinated by strong institutions that allow traders to compete purely on price. Poulton and Lyne (2009) note that 'near perfect' spot markets, like commodity exchanges, can focus on price alone thanks to well-defined standards and rules enforced by private or public agencies. This is entirely different from informal markets that lack the benefit of such coordinating institutions. In addition, the traditional vertical coordination continuum does not explicitly account for the absence of transactions.

Figure 2.2 models vertical coordination as a continuum that progresses from 'no-transaction' to the informal market, spot market, conventional contracting, relational contracting and vertical integration. The model highlights relationships between the drivers of transaction costs and modes of engagement between sellers and buyers, recognising that the absence of transactions provides valuable information about what it might take to create sustainable dyads. Anticlockwise shifts from one segment to the next are driven by the frequency and complexity of transactions, asset-specific investment and hold-up problems associated with behavioural and environmental risk. Transaction costs are expected to increase with increases in the levels of these drivers, motivating tighter coordination between sellers and buyers.

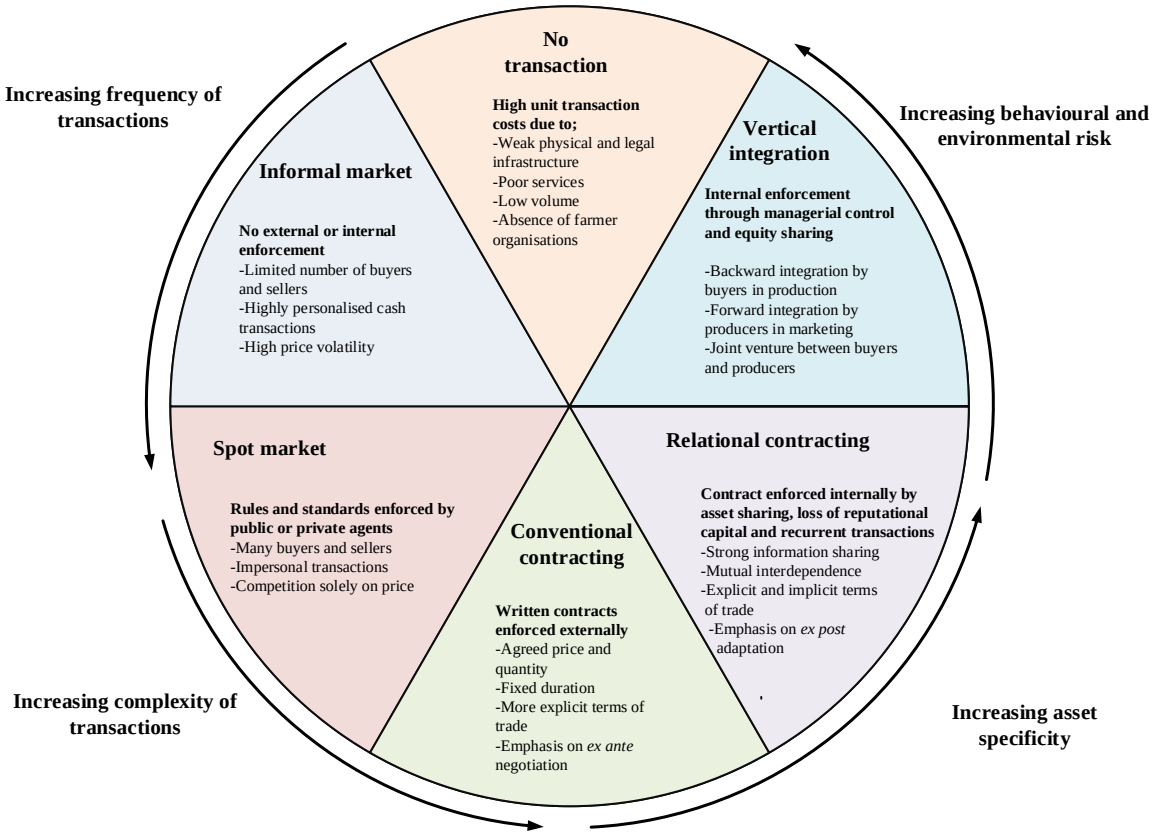


Figure 2.2: Modes of engagement between farmers and buyers

In Figure 2.2, the 'no transaction' segment refers to missing dyads where producers or buyers are either unwilling or unable to transact. Following the logic of TCE, this extreme outcome

could reflect prohibitively high unit transaction costs (Benham & Benham, 2000) and could well be characterised by weak physical and legal infrastructure, poor services, small and volatile marketable surpluses, high levels of distrust and the absence of farmer organisations to facilitate joint bargaining and marketing.

The 'informal market' segment is analogous to the thin market described by Dorward, Kydd, Poulton and Bezemer (2009), where prices are not discovered through competition owing to small numbers of buyers and sellers. In the informal market, individual buyers and sellers trade small quantities of surplus products that have inconsistent supply and quality. In the absence of standards, rules and reliable information, unit transaction costs tend to be high and participants often resort to personalised and cash-based transactions in order to reduce their exposure to opportunism.

In contrast, the 'spot market' segment is characterised by effective standards, rules and information flows that help to reduce participant transaction costs. Consequently, these markets can draw large numbers of buyers and sellers who compete on price for standardised products and services. Transactions tend to be impersonal without any commitment to engage in repeat transactions.

The 'conventional contracting' segment in Figure 2.2 refers to contracts that specify terms agreed *ex ante* relating to duration, quantity, quality and price, and that are formalised in writing to facilitate external legal enforcement. Williamson (1979), elaborating on Macneil's (1977) work, distinguishes between classical and neo-classical contracting. Classical contracting is an efficient form of governance when all contingencies are known *ex ante* and efficient legal remedies are available. On the other hand, neo-classical contracting accepts that contracts are incomplete and that third-party arbitration may be required to address unforeseen

contingencies. In either case, conventional contracting is characterised by ready access to external enforcement in a market burdened with environmental and behavioural risk.

The 'relational contracting' segment refers to written or verbal contracts relying on mutual promise between transactors. Relational contracts possess many implicit and some explicit terms, which are open to *ex post* adaptations to unforeseen circumstances. These contracts emerge when there is a threat of hold-up to asset-specific investment, and external enforcement is costly or impractical due primarily to incomplete and complex contracts. The 'promise' as a contracting process in the absence of opportunism (Williamson, 1985, p. 31) rarely exists in a real world situation. In reality, such contracts are backed with internal enforcement measures such as shared investment in specific assets, incentive payments and the threat of losing reputational capital and repeat business opportunities. Reputational capital gives a firm's trading partners confidence that it will not exploit their vulnerability (Sabel, 1993). Kale, Singh and Perlmutter (2000) argue that the threat of losing reputation discourages opportunistic behaviour.

Vertical integration is an extreme form of vertical coordination and refers to integration by buyers and suppliers into upstream or downstream functions, or joint equity investment by buyers and sellers in a single firm. Vertical integration arises when inter-firm transactions are constrained by prohibitively high transaction costs (Coase, 1937; Frank & Henderson, 1992; Hobbs, 1996; Williamson, 1979; 1985, pp. 85-102). Williamson (1979) argues that the advantage of vertical integration lies in quicker adaptation without the need to negotiate, revise or enforce inter-firm agreements. However, vertical integration is not immune to environmental uncertainty, and may well collapse if environmental risks are too high (Truong, 2012).

The conceptual model to analyse modes of engagement applies to individual agents in a chain, and a chain is therefore expected to host a variety of modes of farmer-buyer engagement as

transaction costs, risk aversion and levels of risk vary between individuals and locations. A chain in which smallholders continue to engage with buyers via multiple modes of engagement suggests that they are able to exercise utility-improving choices. Conversely, a chain that does not engage smallholders in multiple modes may well signal limited choice and hence scope for prudent interventions to promote smallholder participation.

2.7 Chapter summary

This chapter introduced the concepts of supply chain management and performance. Literature dealing with TCE, relational exchanges, power-dependence, horizontal coordination and the external enabling environment was reviewed as these issues help to explain the ways in which smallholders engage with markets. A theoretical model was then developed to analyse the performance of supply chains from a smallholder perspective. Chapter 3 discusses the methodology used to collect and analyse data in order to address the research questions and objectives presented in Chapter 1.

Chapter 3

Research methods and design

This chapter describes and rationalises the methods used to collect and analyse data for the study. The choice of methods was informed by the research questions posed in Chapter 1 and by the theoretical framework developed in Chapter 2.

3.1 Research design

Research designs are plans and the procedures for research, and range from the broad assumptions about the study to detailed methods of data collection and analysis (Creswell, 2009, p. 3). Research designs can be qualitative, quantitative or mixed methods. Qualitative and quantitative research may not necessarily be dichotomous but can represent opposite ends of a continuum with mix method research representing the middle of this continuum (Creswell, 2009, p. 3). Guba and Lincoln (1994) note that qualitative research may also involve limited numerical data involving mostly non-parametric statistics.

The major distinction between qualitative and quantitative research designs come from different philosophical assumptions underlying them (Davidson & Tolich, 2003, pp. 24-25; Sarantakos, 2005, pp. 29-37). Quantitative research perceives reality to be objective, simple and fixed, and that it can be discovered and readily measured. However, qualitative research is based on multiple realities with no absolute truths, and research focuses on the construction of meanings that are not fixed but emerge out of people's interaction with the world (Davidson & Tolich, 2003, pp. 24-25; Sarantakos, 2005, pp. 29-37). While the purist believes that the two methods are incompatible because they are based on different paradigms and worldviews, Firestone (1987) argues that these two methodologies can be complementary.

Research approaches can be categorised into deductive and inductive research, based on the relationship between theory and research (Babbie, 2007, pp. 22-23; Tolich & Davidson, 2003b, pp. 18-19). Inductive research develops general principles from specific observations, whereas in deductive research, specific expectations or hypotheses are developed based on general principles. Purely inductive or deductive research is rare (Tolich & Davidson, 2003b, pp. 18-19) although quantitative research tends to be deductive, and qualitative research tends to be inductive.

The selection of research design depends on the research questions being studied. Creswell (2009, p. 18) argues that quantitative research is best when the problems call for the identification of factors that influence an outcome or the utility of an intervention. On the other hand, qualitative research is suited when a concept or phenomenon needs to be understood in depth. A mixed methods design is useful when either the qualitative or quantitative approach by itself is inadequate to best understand a research problem or the strengths of both qualitative and quantitative research can complement each other to a better understanding.

The aim of this study is to find effective ways of improving chain robustness from a smallholder perspective. This requires an understanding of modes of engagement observed or missing between producers and buyers. It also involves understanding the behaviour of producers and buyers and its interaction with the wider environment surrounding transactions. To achieve this understanding, factors that might influence the availability and the choice of modes of engagement need to be studied in detail. Since qualitative research is best suited for exploring and understanding such issues, this method was deemed to be suitable for the proposed research.

3.2 Choice of research method

Research methods or strategies are the specific techniques adopted to collect and analyse the data required to answer research questions. Different research methods are available to researchers utilising a qualitative research design, such as ethnography, grounded theory, phenomenology, case study, narrative research and participatory action research (Babbie, 2007, pp. 293-301; Creswell, 2009, pp. 12-13). According to Tolich and Davidson (2003a), the choice of research method depends upon what researchers want to know, from whom they want to know, and the resources available for the study. Hence, the choice of research method is guided by the type of research question, the control an investigator has over actual behavioural events and whether the focus is on contemporary or historical phenomena. Case studies are most suitable when 'how' or 'why' questions are posed, when the investigator has little control over events, and when the focus in on contemporary phenomena within some real-life context (Yin, 2009, pp. 8-9). The case study places more emphasis on the full analysis of a limited number of events or conditions and their relationships.

Yin (2009, p. 18) defines case study as an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context. He further adds that the procedural characteristics of case study include; many variables of interests, multiple source of evidence, and theoretical propositions to guide the collection and analysis of data.

According to George and Bennett (2005, pp. 19-22), case study method has advantages over other methods because of its high conceptual validity (i.e. identification and measurement of indicators that represent the theoretical concept the researcher intends to measure), strong procedures for developing new hypotheses or propositions (i.e. emergence of new ideas researchers did not think of previously by the study of deviant or outlier cases), and its ability to explore complex causality.

Theoretical propositions posed by the conceptual model in Chapter 2 dwell on how and why producer-buyer relationships develop in the way they do. The study also explores why alternative relationships, that seems to be potentially superior, do not exist. A case study method was adopted for this study, as the intention was to generalise the findings of the study through the use of propositions, and these propositions address 'how' and 'why' questions about smallholder participation in supply chains, rather than questions relating to 'how many' (Yin, 2009, pp. 1-24).

3.3 Case study design

Ellram (1996) summarises some of the criticisms about case studies, such as the lack of rigorous design, use of an ad-hoc method and a lack of generalisability of findings, but notes that a carefully planned case study involves a rigorous design and analysis. Yin (2009, p. 15) notes that case studies are generalisable to theoretical propositions but not to populations.

Yin (2009, pp. 26-27) defines research design as a logical plan from a set of questions to a set of answers about these questions, and includes five components; a study's questions, its propositions (if any), its unit(s) of analysis, the logic linking the data to the propositions, and the criteria for interpreting the findings. The first two components were addressed in Chapters 1 and 2, and last two components will be discussed in subsequent sections of this Chapter. This section deals with the unit of analysis or the actual case in this study.

In a case study, the case can be virtually anything – a situation, individual, group, organisation or whatever researchers are interested in (Robson, 2011, p. 135). Miles and Huberman (1994, pp. 25-27) define a case as any phenomenon occurring in a bounded context. That means a case always occurs in a specified social and physical setting, and researchers cannot study individual cases devoid of their context. Yin (2009, p. 32) argues the need for concrete spatial and temporal

boundaries in defining the case. The research questions in Chapter 1 relate to modes of engagement between farmers and their immediate buyers as a measure of chain robustness. Therefore, the unit of analysis or the actual case in this study was considered to be the dyad between farmers and their buyers. Four agribusiness supply chains in different geographical locations in Nepal provide the context for this study.

Sarantakos (2005, p. 211) classifies case studies into intrinsic case studies (to learn about the case only with no expectation of generalising results), instrumental case studies (to inquire into a social issue or refine a theory) and collective case studies (a number of instrumental case study examined jointly for the purpose of an issue, phenomenon, group or condition). Yin (2009, pp. 46-65) suggests four types of case study design based on the number of cases to be studied (single or multiple) and the unit of analysis (single or multiple). Single case design is suitable for longitudinal study of the same case. Multiple case study enables replication to independently confirm emerging constructs and propositions, and also reveal complementary aspects of the phenomenon (Lewis-Beck, Bryman & Liao, 2004). Ellram (1996) suggests that multiple cases, like multiple experiments, represent replications that allow for development of a rich, theoretical framework. Results from multiple case studies are therefore considered to be more robust and generalisable. However, Yin (2009, p. 53) rationalises single case designs to test a well formulated theory or a unique or a revelatory case.

Yin (2009, pp. 50-53) describes the suitability of holistic and embedded case studies under different situations. Holistic case study (i.e. single unit of analysis) is suitable when the case relates to the global nature of the phenomenon. However, embedded case study is suitable if the phenomenon involves subunits. The subunits can often add significant opportunities for extensive analysis, enhancing insights into the case.

This study intends to assess chain robustness by analysing modes of engagement available to smallholders. The study also explores desirable relationships in addition to existing relationships, and attempts to answer why those desirable relationships do not yet exist. The intention was not to explain a unique or revelatory case, but to capture the diversity of relationships between farmers and their buyers. Therefore, a multiple case study method was selected with each case having a different context.

Each observed or potential farmer-buyer dyad comprises producers and their immediate buyers (or potential buyers), and may be influenced by service providers. The farmer-buyer dyad was the primary unit of analysis, and producers, buyers and service providers were treated as subunits in an embedded case study design (Yin, 2009, pp. 50-53).

Several techniques recommended by Yin (2009, pp. 39-45) were adopted to improve validity and reliability of the study. The multiple case study method helped to achieve external validity by establishing the domain to which findings could be generalised, and the inclusion of subunits helped to improve construct validity by allowing multiple sources of evidence and establishing a chain of evidence to support the study findings. The use of case study guides (Appendices 1-4) helped to improve the reliability of the data.

3.4 Selection of cases

Babbie (2007, p. 183) argues that social research is often conducted in situations that do not permit probability sampling. A comprehensive list of potential cases is not available, and even if available, probability sampling might not be appropriate for the research problems to be studied. This situation calls for non-probability sampling techniques, such as purposive sampling, snowball sampling and quota sampling. Purposive or judgemental sampling is a type of non-probability sampling in which the units to be observed are selected on the basis of

researcher's judgement about their usefulness (Babbie, 2007, p. 184). Ritchie, Lewis and Elam (2003) describe two aims of purposive sampling- to ensure that key issues relating to the subject matter are covered and to ensure that some diversity is included within each attribute to examine the impact of such attributes.

Eisenhardt (1989) argues that statistical sampling is irrelevant in case studies. Instead, theoretical sampling is used to replicate previous cases or to fill theoretical categories or represent polar types. Theoretical sampling is guided by theoretical purposes and relevance, and sampling continues until theoretical saturation is reached and no new insights emerge (Ritchie, Lewis & Elam, 2003). This type of theoretical sampling in multiple case studies uses replication logic and not sampling logic. Each case must be selected to provide both literal (predicts similar results) and theoretical (predicts contrasting results but for anticipatable reasons) replication (Yin, 2009, p. 54).

This logic of replication was applied to purposively select four agribusiness chains in Nepal. Figure 3.1 shows the case study sites in Nepal. Chains for organic vegetables, conventional vegetables, ginger and large cardamom were studied in Kathmandu, Chitwan, Palpa and Ilam Districts respectively. These case studies were identified through consultation with key informants from the Department of Agriculture and NGOs. Fresh vegetable chains served domestic markets and spice chains served primarily export markets. Products traded in these chains ranged from highly perishable fresh produce to products with long storability. The vegetable chains traded in the same products but differed in their compliance requirements. These similarities and differences between chains provided both literal and theoretical replication expected in multiple case studies.

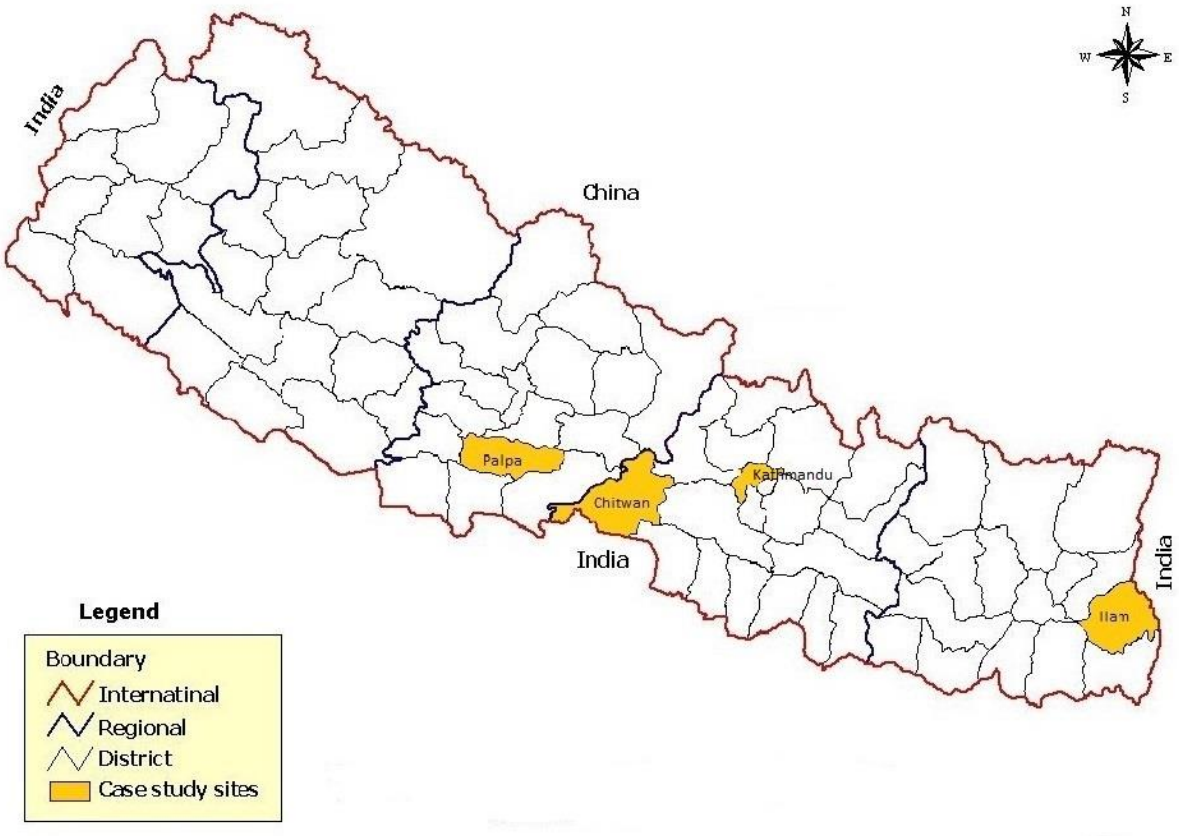


Figure 3.1: Map of Nepal showing case study sites

3.5 Selection of respondents

Different categories of respondents in each case are illustrated in Figure 3.2. As the unit of analysis was farmer-buyer dyads in four agribusiness supply chains, farmers, cooperative managers, buyers, potential buyers and service providers provided primary data for this study. A snowball sampling method described by Babbie (2007, p. 184) was used to identify respondents. Primary recruits were identified by key informants working for the Department of Agriculture and NGOs. These primary recruits then identified secondary recruits who, in turn, identified other respondents that could provide additional information. When producers were primary recruits, the buyers who were transacting with producer respondents were automatically selected for the interview. Likewise, when buyers were primary recruits, they

provided the names of the farmers supplying them. Potential buyers were identified based on the producers' perceptions of desirable relationships and in consultation with service providers.

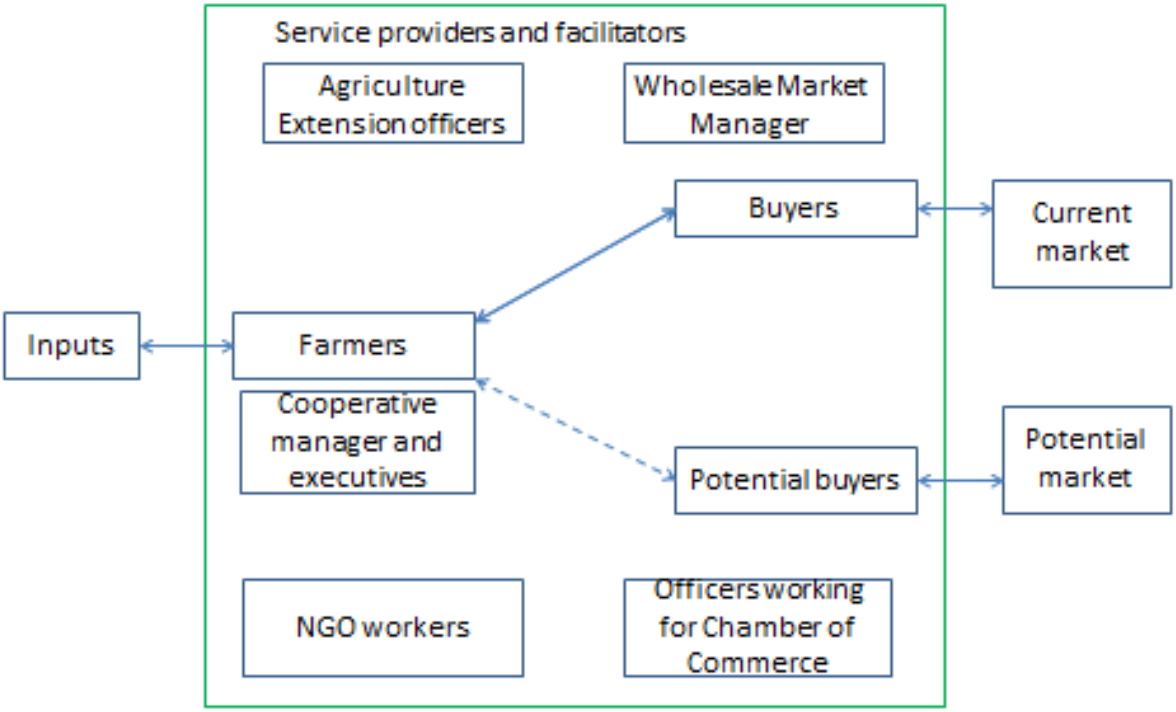


Figure 3.2: Respondent categories in the case study

3.6 Data collection

Yin (2009, p. 102) summarises the strengths and weaknesses of different data collection techniques, such as documentation, archival records, interviews, direct observation, participant-observation and physical artefacts. Among these techniques, interviews are an important source of evidence as they are targeted (focus directly on the case study topic) and insightful (provide perceived causal inferences), although they could be constrained by bias due to poorly constructed questions, response bias, inaccuracies due to poor recall and reflexivity. Using multiple sources of evidence is often a tactic used to triangulate data and also to address

construct validity (Yin, 2009, pp. 115-118). As this research involved examining observed and potential farmer-buyer dyads and attributes defining or constraining those relationships, choices of data collection method were limited. Personal interview was the primary source of evidence although direct observation of transactions between farmers and buyers and review of secondary information about contextual data were also employed wherever possible. Table 3.1 illustrates the number of respondents interviewed in the four supply chains studied.

Table 3.1: Number of respondents interviewed in the study

Respondent category	Supply chains			
	Organic vegetable*	**Conventional vegetable**	**Ginger**	**Large cardamom**
Farmers (includes cooperative executives)	6 (2)	7 (2)	8(3)	6
Buyers	2	4	2	3
Potential buyers				
a) Exporter	-	-	1	-
b) Supermarket	1	-	-	-
c) Hotel	2	-	-	-
Service providers				
a) Agriculture Extension Officer	1	-	1	1
b) Wholesale Market Manager	-	1	-	-
c) NGO Workers	1	-	1	-
d) Officers of Chamber of Commerce	-	-	1	2
Total respondents	**13**	**12**	**14**	**12**

*Information provided by the supermarket and hotels was also used in the conventional vegetable chain.

A qualitative interview does not use standardised questions but is guided by a set of topics to be discussed in depth (Babbie, 2007, p. 306). Yin (2009, pp. 107-108) describes three types of interview; in-depth interviews, focussed interviews and structured interviews. The semi-structured interviews used in this study resembled a focussed interview, which is open-ended but employs a set of questions informed by the case study protocol. Primary data were collected in Nepal during May to July 2011. Interview guides (Appendices 1-4) were prepared so that the

interview remained focussed and key issues were not overlooked. Types of primary data elicited from respondents are summarised in Table 3.2. Direct observation of farms, collection depots and transactions between farmers and buyers provided opportunities to corroborate the data obtained from interviews. Data triangulation was also achieved by interviewing different categories of respondents such as producers, buyers, potential buyers and service providers. Semi-structured interviews allowed flexibility to adjust questions in order to explore emerging issues while the interview progressed. All interviews were recorded with a digital recording device except for one interview. This particular interview was recorded in field notes as the respondent did not consent to digital recording.

Table 3.2: Types of primary data gathered from respondents

Respondents	Data collected
Producers	Farm and farmer characteristics, livelihoods, assets and resources, availability of extension advice, post-harvest functions, information about producer organisations and their role, information about buyers, contract characteristics, information exchange with buyers, investment in specific assets, costs and risk involved, perceived problems and missed opportunities, ways of improving existing market channels, availability of alternative marketing channels
Buyers	Nature of their business, size of their operation, information about their buyers/markets, their supply sources, contract characteristics (with their suppliers and buyers), information exchanges with producers, investment in specific assets, cost and risk involved, and perception of problems and missed opportunities, improvements needed in the existing marketing channels
Potential buyers	Nature of their business, their sources of supply, contract characteristics with their suppliers, product attributes and standards required, reasons for not sourcing from smallholders
Support agency staff	Activities of their agencies, their perception of an enabling environment, problems in existing market channels, alternative channels and problems accessing alternative channels

3.7 Data analysis

Data analysis involves making sense of the large volume of information collected from field research. Miles and Huberman (1994, pp. 10-12) suggest that qualitative data analysis mainly

consists of three activities: data reduction, data display and conclusion drawing/verification. Yin (2009, pp. 130-135) suggests four general strategies for the analysis of case study data: relying on theoretical propositions, developing a case description, using both qualitative and quantitative data, and examining rival explanations. Yin (2009, pp. 136-144) discusses specific techniques of data analysis, such as pattern matching, explanation building, time series analysis, logic model and cross-case synthesis.

The aim of data analysis is the discovery of patterns among the data (Babbie, 2007, p. 378). Pattern matching compares theoretically predicted patterns with empirical observations (Trochim, 1989). Hence, reducing voluminous text by coding and classifying the related concepts is important for systematic recording and retrieval for later use. In this study, digital interviews were transcribed and then coded and classified using NVivo software to facilitate data retrieval and analysis.

Individual case analysis followed the approach of searching for patterns in the data and comparing or contrasting observed patterns with those predicted by theory. In this way, theoretical propositions (such as those summarised by the model illustrated in Figure 2.2) can be confirmed or rejected. If rejected, data may suggest alternative propositions, shifting the focus of the analysis to 'theory building'.

Figure 3.2 outlines the process used to analyse the data. First, existing and missing dyads were identified. Missing dyads included past dyads that were no longer evident and potential dyads between producers and buyers that were not operating. Next, these existing and potential dyads were matched with modes of engagement represented by the segments of the model shown in Figure 2.2, and propositions that their transaction characteristics would match particular drivers of transaction costs were then checked against the data. Insights revealed by this process were used to inform recommendations aimed at making existing dyads more sustainable and creating

new dyads to broaden the range of market channels available to smallholders. In multiple case studies, cross-case analysis can enhance the generalisability and robustness of results obtained in pattern matching and explanation building (Miles & Huberman, 1994, p. 173; Yin, 2009, pp. 156-160). In this study, individual case analyses were followed by cross-case comparisons aimed at identifying external determinants of transaction costs influencing the observed modes of engagement. The four supply chains studied were grouped into pairs displaying similarities in key product and market attributes in order to facilitate cross-case analysis. High-level insights were generated by these cross-case analyses.

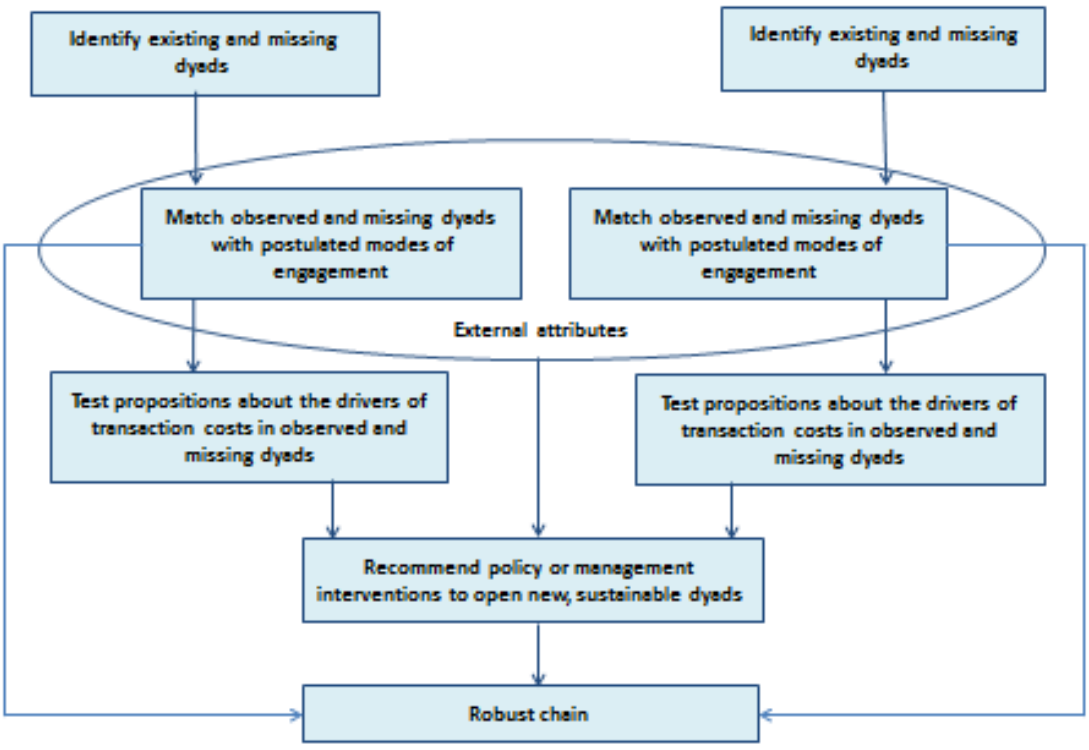


Figure 3.3: Process used to analyse the supply chains

3.8 Human ethics

The data required for this study were gathered by personal interview with farmers, executives of the producer cooperatives, buyers, potential buyers and officers working for government and non-government service providers. These primary data relate to business relationships between farmers and buyers, and to services provided by agents in support of these relationships. The Lincoln University Human Ethics Committee (HEC) guideline states that interviews with professional persons in the areas of their duties and competence and non-interactive observation of these people in the course of everyday life do not come under the scope of HEC review. HEC approval was therefore not required for this study. Nevertheless, all respondents were briefed about the voluntary nature of the interview and informed that they were free not to answer any question, or to withdraw from the interview at any stage. Respondent names are not mentioned anywhere in this thesis to protect their anonymity.

3.9 Chapter summary

This chapter rationalised the multiple case study design adopted for this study. The logic behind the selection of cases and the process used to select case study respondents was then discussed. This chapter also discussed the method of data collection and the process used to analyse data. The chapter concluded with remarks on human ethics considerations. The following chapter (Chapter 4) presents individual case studies of the four chains that were studied.

Chapter 4

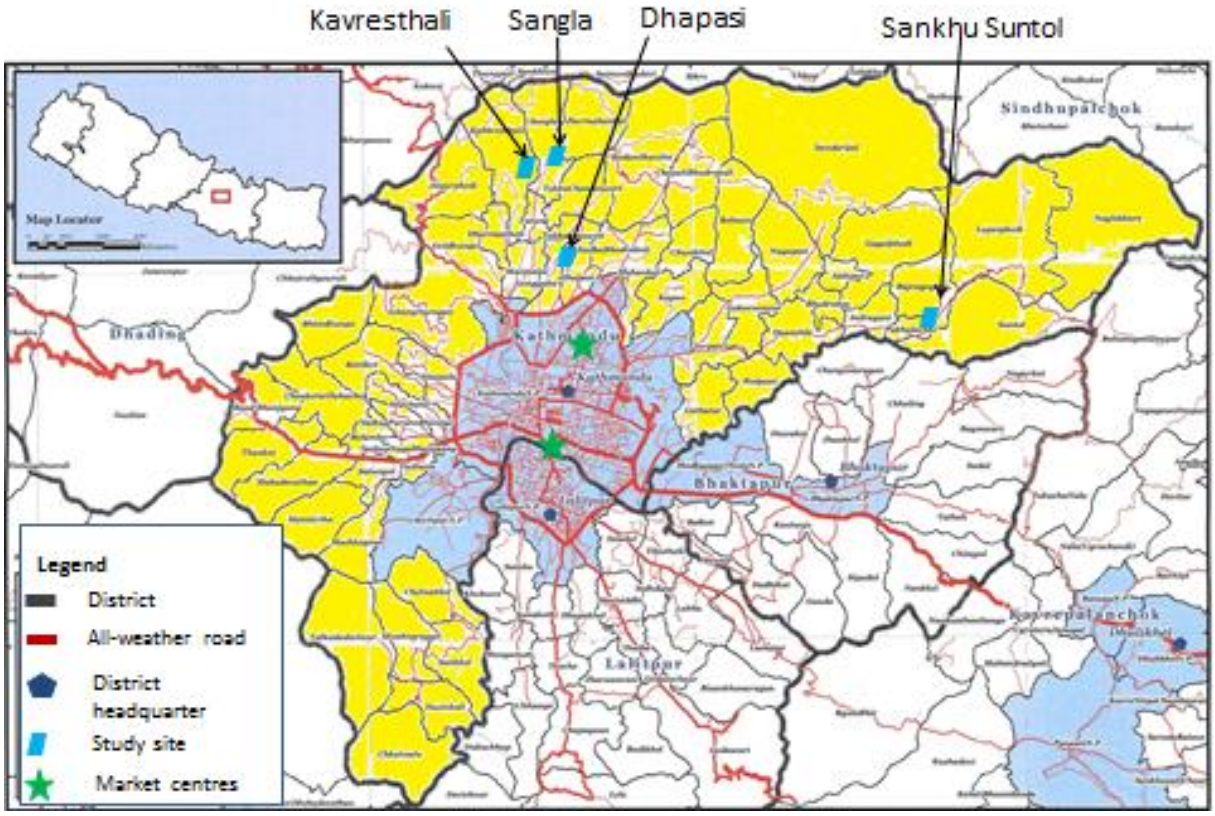
Case study results and discussion

This chapter describes each of the four case studies. In each case, it tests the propositions of the transaction cost driver model and concludes with recommendations to improve chain robustness from the perspective of smallholders (Sections 4.1 to 4.4). The aim of this chapter is not to provide a full account of these chains, but to provide insights into the nature of the relationships between producers and buyers in the selected case studies. In this chapter, the terms 'farmers' and 'buyers' refer only to the case study respondents and not to all farmers and buyers engaged in these chains. The chapter concludes with a revised theoretical framework drawing from the analysis of individual case studies.

4.1 Supply chain for organic fresh vegetables in Kathmandu

4.1.1 Case description

The organic vegetable chain is a relatively new chain and includes a range of fresh vegetables. Precise data are not available on the market share of organic vegetables and the number of actors engaged in Kathmandu's organic fresh vegetable chain. Discussions with buyers suggested that only a small share of the fresh vegetables traded in Kathmandu are marketed as organic produce. The case comprises interviews with six farmers, two immediate buyers (an 'organic wholesaler' and an 'organic retailer'), a supermarket, a premium class tourist hotel, an extension officer and an NGO employee. The farmers operate in the Kathmandu valley, between 10 and 25 km from the city centre (Figure 4.1). They had been farming organically for the past three to eight years, and most of them produced conventional vegetables before converting to organic farming methods.



Adapted from United Nations Nepal (undated)

Figure 4.1: Map of Kathmandu showing case study sites

Five of the six farmers are owner-operators but one is a tenant who rents land. Organic farmers produce a range of vegetables such as cauliflower, cabbage, beans, tomato, cucurbits, capsicum and okra. Other farm enterprises included dairy, poultry, goats and apiculture. Characteristics of the farmer-respondents are summarised in Table 4.1. The farms are accessible by public transport and are mostly less than an hour's walk from all-weather roads. Modern telecommunications like mobile phones and the internet are also accessible in the area. The farmers and their immediate buyers are located close to each other, as are buyers and end consumers further down the chain.

Table 4.1: Farmer characteristics in the organic vegetable chain

Characteristic	Farmers					
	1	2	3	4	5	6
Farm size (ha)	1.00	0.80	1.00	0.30	0.35	0.00
Area under vegetables (ha)	1.00	0.55	0.20	0.30	0.15	1.50
Annual vegetable revenue (NPR)	700,000	140,000	50,000	350,000	50,000	1,000,000
Other income sources	None	Dairy	Dairy, goats	None	None	Poultry, apiculture, dairy

Figure 4.2 illustrates observed linkages between farmers and markets (solid arrows) as well as potential marketing channels (dotted arrows). Four distinct market dyads (Table 4.2) were observed in the case study. These dyads showed marked differences in contract type, methods used to determine product prices, information exchange, levels of asset-specific investment by buyers, and the presence or absence of horizontal coordination amongst farmers.

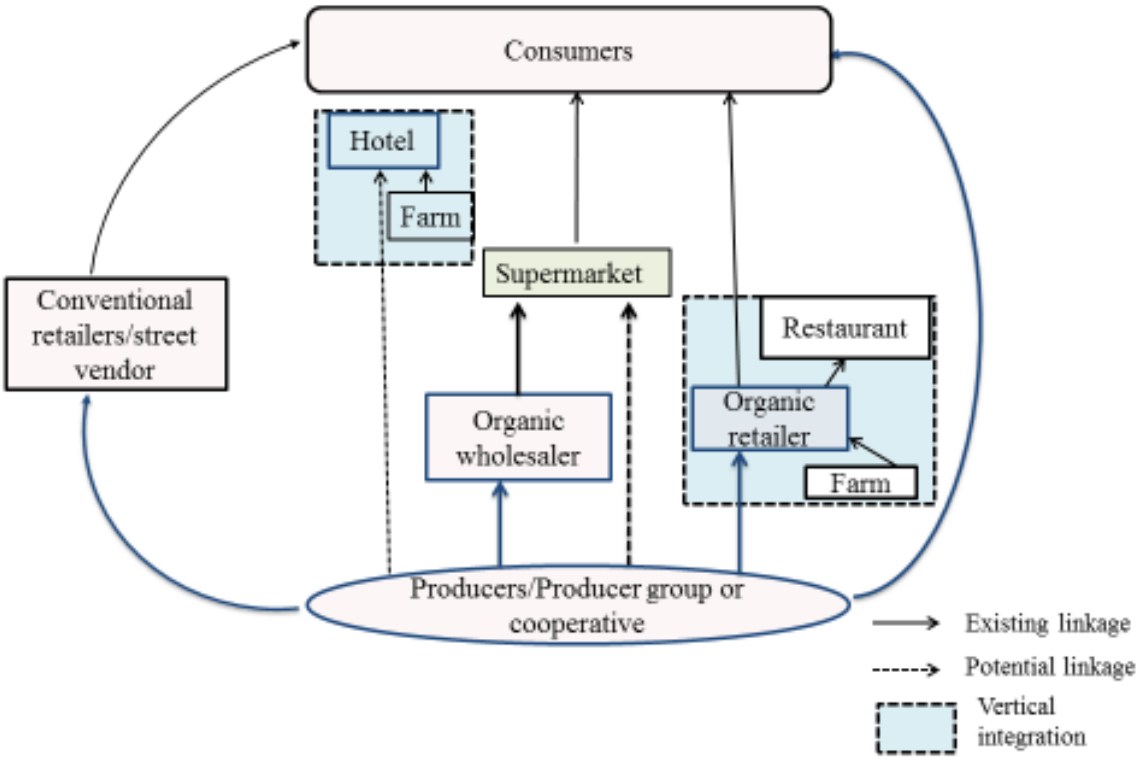


Figure 4.2: Organic vegetable supply chain

The largest farmer (farmer 6) sells most of his produce to conventional retailers. Farmer 4 sells to a vendor operating at a popular street market. These dyads do not involve *ex ante* negotiation of price and volume, and information exchange occurs only at the time of trade. However, the transactors have implicitly agreed to set prices at a level slightly below retail market prices.

Table 4.2: Characteristics of farmer-buyer organic vegetable dyads

Characteristics	**Producer-consumer dyad**	**Conventional retailer and street vendor dyads**	**Organic retailer dyad**	**Organic wholesaler dyad**
Contract	None	Verbal	Written and verbal	Written annual
Contract with	Individual	Individual	Individual and group	Individual
Price	Premium on retail price of conventional produce	Discount on retail price of conventional produce	Premium on wet market wholesale price	Fixed
Payment	At the time of transaction	Next day	Weekly (often delayed)	Weekly (often delayed)
Extension advice from buyer	No	No	No	Yes
Finance by buyer	No	No	No	No
Asset specific investment by the buyer	No	No	Yes	Yes
Information exchange	None	Information exchange limited to price and quantity, Mostly famers initiate the exchange	Exchange of price, quantity and quality information	Farmer seek extension advice, regular interaction to adapt volume, occasional formal meeting to address problems
Next buyer	-	Consumers	Consumers and Restaurant co-owned by the buyer	Supermarket

Although these dyads involve recurrent transactions, mutual interdependence is weak because organic produce constitutes a small share of the fresh produce sold by conventional retailers and the vendor does not differentiate between organic and conventional produce. None of these buyers had made any asset specific investment in organic trade. Farmers tended to take the lead in these dyads, delivering to the buyers and bearing the risk of unsold produce. Payment is made the day after the retailers sell the produce. Late or incomplete payment is sanctioned by withholding supplies to the buyer.

The transaction between the organic wholesaler and his supplier (farmer 1) is based on a written annual contact. Prices are fixed at a level negotiated at the beginning of each season. Quality and volumes are mentioned in the contract but volumes are not fixed owing to potential variation in yield and changes in market conditions. This dyad is also characterised by recurrent transactions and mutual interdependence due to the buyer's specialisation in organic produce. However, the wholesaler is more dependent on producers than are producers on the wholesaler as there are alternative buyers and limited sources of supply. Information sharing is fairly strong in this dyad because the wholesaler provides extension advice and occasionally organises formal meetings with producers. The farmer occasionally sources product from another farmer (farmer 4) to meet anticipated volumes. The wholesaler also sources organic vegetables from other organic farmers and producer groups. A supermarket retails the wholesaler's supplies, charging a commission of 15 per cent. Producers sanction the wholesaler for late or incomplete payment by withholding supplies, and the wholesaler sanctions farmers who side-sell or who deliver sub-standard produce by removing them from his preferred suppliers list.

The organic retailer sources fresh vegetables from four suppliers (farmers 1, 2, 3, and 5). The retailer sources individually from farmer 1 but collectively from the other farmers via their cooperative. He has a written contract with farmer 1 and verbal contract with the cooperative.

In either case, prices are linked to wholesale prices at the (conventional) wet market and the retailer pays agreed premiums on those prices. Volumes and prices are agreed when orders are placed. The retailer and producers engage in recurrent transactions and are mutually interdependent as the retailer trades exclusively in organic produce. Again, the retailer is more dependent on producers than are producers on the retailer as there are alternative buyers and limited sources of supply. The retailer has also opened a restaurant offering organic cuisine. Information sharing is not particularly strong because the retailer and producers interact only at the time of ordering and delivering produce. In this dyad too, payments are supposed to be made weekly, but were often delayed. The contract enforcement mechanism is similar to that in the organic wholesaler dyad.

Farmers 4 and 6 also sell part of produce directly to consumers at the farm-gate. Farmer 6 operates in a heavily populated residential area and sells almost 50 per cent of his surplus directly to consumers. Many of the consumers buy daily or every few days. In these dyads, producers anticipate a premium on the prevailing retail price of conventional produce, and transactions are personalised and cash-based to avoid behavioural risk. Even so, there is no interdependence between buyer and seller.

In addition to these market dyads, there was evidence of buyers (the organic retailer and tourist hotel) integrating vertically into organic vegetable production. There was also evidence of broken relationships between a cooperative and a supermarket, and between a farmer and a specialised organic asparagus buyer and the organic retailer. The collapse of these relationships is described in Section 4.1.2.2.

4.1.2 Chain analysis and discussion

4.1.2.1 Observed and potential dyads

Farmers close to densely populated residential areas sell part of their produce directly to consumers. In these dyads, producers anticipate a premium on the prevailing retail price of conventional produce, and transactions are personalised and cash-based to avoid behavioural risk. Even so, there is no interdependence between buyer and seller.

The conventional retailer and street vendor dyads do not involve *ex ante* negotiation of price and volume. It is implicitly agreed that price will be based on the retail price of conventional produce and that farmers will bear the risk of unsold produce. Although these dyads involve recurrent transactions, mutual interdependence is weak because organic produce constitutes a small share of the fresh produce sold by conventional retailers and the vendor does not differentiate between organic and conventional produce. Information exchange between producers and these buyers occurs only at the time of trade. Late or incomplete payment is sanctioned by withholding supplies to the buyer.

The organic retailer dyad also does not involve *ex ante* negotiation of price and volume. However, it is explicitly agreed that a certain premium will be applied to the wet market wholesale price. Volumes and prices are agreed when orders are placed. The retailer and producers engage in recurrent transactions and are mutually interdependent as the retailer trades exclusively in organic produce. However, the retailer is more dependent on producers than are producers on the retailer as there are alternative buyers and limited sources of supply. Information sharing is not particularly strong because the retailer and producers interact only at the time of ordering and delivering produce. Producers sanction the retailer for late or incomplete payment by withholding supplies, and the retailer sanctions farmers who side-sell or who deliver sub-standard produce by removing them from his preferred suppliers list.

The organic wholesaler dyad involves considerable *ex ante* negotiation regarding price and volume, but allows for *ex post* adaptation of volume due to yield risk. This dyad is also characterised by recurrent transactions and mutual interdependence due to the buyer's specialisation in organic produce. Again, the wholesaler is more dependent on producers than are producers on the wholesaler as there are alternative buyers and limited sources of supply. Information sharing is fairly strong in this dyad because the wholesaler provides extension advice (when consulted) and occasionally organises formal meetings with producers. The contract enforcement mechanism is similar to that in the organic retailer dyad.

All of the dyads involving intermediaries (conventional or organic buyers) rely on internal contract enforcement. They all represent forms of relational contracting yet differ in their degree of *ex ante* negotiation, explicit contractual terms, frequency and type of information exchanged, and mutual interdependence. In Figure 4.3, the organic wholesaler dyad is located towards the upper end of the relational contracting segment as it is characterised by mutual interdependence and a relatively high level of information sharing. The conventional retailer and street vendor dyads are characterised by low levels of mutual interdependence and information sharing and therefore occupy the lower end of this segment. The organic retailer dyad positions itself between these two dyad types.

The hotel and organic retailer both developed organic farms of their own, which fits into the vertical integration segment of Figure 4.3. The organic retailer still sources most of his supply from producers, but the backward integration into production by the hotel effectively excluded other growers from participating in this dyad. The potential farmer-hotel dyad is therefore located in the 'no-transaction' segment, along with discontinued dyads between a cooperative and a supermarket, and between a farmer and a specialised asparagus buyer. Figure 4.3

emphasises the dominant role that relational contracting appears to play in Kathmandu's chain for fresh organic vegetables. Spot markets and conventional contracting are both missing.

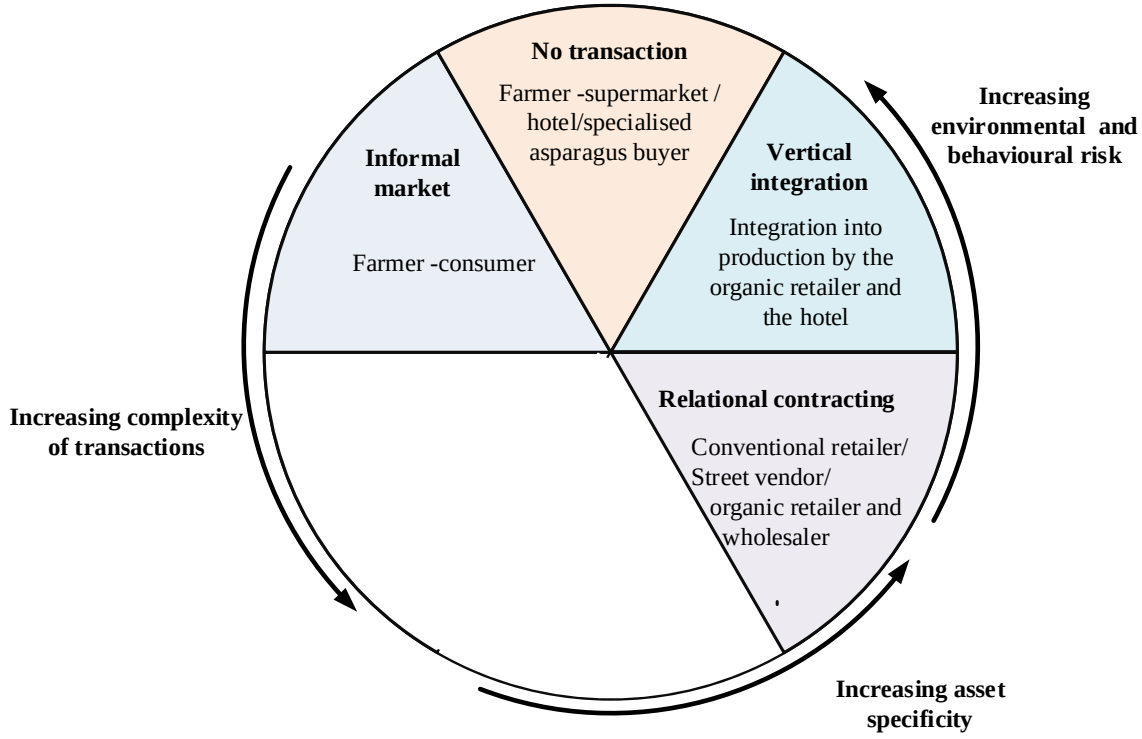


Figure 4.3: Observed modes of engagement and their drivers in the organic vegetable chain

4.1.2.2 Transaction cost drivers

Producers included in the case study were located within Kathmandu valley, enjoyed similar levels of physical and legal infrastructure, similar access to extension and credit services, and farmed the same products. The frequency of transactions was high in all dyads because vegetables are perishable and produced year-round. All producers made substantial asset-specific investments in production infrastructure and in acquiring specialised knowledge. Power asymmetry was not an issue for smallholders in this chain due to the presence of alternative buyers. There is some variation in these transaction-cost drivers (due primarily to

distance from Kathmandu) and their impacts on chain performance will be discussed in cross-case studies in Chapter 5 that compares chains for different products in different parts of Nepal.

Participating in the informal market segment involved little complexity for farmers and consumers who visited the farms. Consumers purchase what farmers offer, pay in cash and do not seek proof of organic compliance. Search, negotiation and monitoring costs are particularly low for farmers. This meant that farmers could transact small quantities in the informal market without any need for collective action to reduce their unit transaction costs. Transaction costs are higher for consumers, and increase with distance from the growers. Of the two farmers participating in the informal market, one located very close to the city sells a sizeable volume of produce through this channel. This dyad appears to exist due primarily to low transaction costs associated with easy physical access and low complexity of transactions.

Given the prevailing infrastructure and transport services, physical access tends to diminish sharply with increasing distance between consumers and farmers. Commercial growers therefore required alternatives to the informal market in order to sell produce in excess of the small volumes purchased at the farm gate by neighbouring consumers. However, spot markets and conventional contracting did not feature amongst the alternatives used by smallholders producing organic vegetables. The wholesale market operated by the Department of Agriculture provided the physical infrastructure for trading, but did not enforce the rules and standards required to differentiate organic produce. As a result, the wholesale market does not compensate farmers for asset specific investments in organic production methods, nor does it meet the specific requirements of 'organic consumers'. The absence of a spot market for organic fresh vegetables can therefore be attributed partly to high transaction costs associated with asset specificity and complexity.

Conventional contracts usually come with specific terms of trade regarding volume, quality, delivery and price. Although farmers had invested in plastic houses and irrigation to alleviate environmental risk, this technology did not give them sufficient protection from unfavourable weather, pests and disease to consistently meet the terms of conventional contracts. Under these conditions, improved access to the legal system would do little to encourage conventional contracting, a view reinforced by the following statement:

> *"Initially a fix-priced contract was tried. However, it failed due to fluctuation in market price and the organic retailer switched to a price linked to wholesale market price"* (Farmer 2).

However, there was also an element of behavioural risk because farmers were averse to losing potential income when market price exceeded the contracted price:

> *"I have encountered several cases of farmers not willing to supply at the contracted price. I do not think the legal option of contract enforcement will work in ensuring supplies"* (Organic retailer).

This statement suggests that buyers lacked access to an affordable and efficient legal system, and helps to explain why most organic fresh vegetables are sold via relational contracts. All dyads clustered in the relational contracting segment of Figure 4 involved recurrent transactions. The conventional retailer and street vendor dyads were positioned in the lower band of relational contracting and so were closer to the informal market, due to low switching costs for buyers, as these buyers did not make any asset specific investment in organic trade. These dyads were perceived to offer quicker payment and prices higher than (or at least comparable to) those offered by specialised organic buyers:

"I sell to conventional retailers at a price slightly lower than the retail price. This price is higher than the price offered by organic buyers" (Farmer 6).

Transactions were also less complex because the buyers did not specify a delivery schedule or quality and compliance requirements. The conventional retailers and the street vendor did not reject supplies from producers as they did not bear the risk of unsold produce.

The organic retailer had made asset specific investments in branding and in an organic restaurant. Quality and delivery standards were more specific in this dyad than in conventional retailer dyads. The organic retailer did not insist on formal organic certification, but asked farmers for a letter of commitment stating that they would not use inorganic chemicals and fertilisers. He offered a premium on the wholesale market price to discourage farmers from side-selling when market prices were bullish. However, weak information sharing often resulted in scarcity of one product and abundance of another:

"Production of some vegetables is beyond the capacity of organic buyers to absorb. As a result, we have to sell surplus organic produce in the wet market. On the other hand, we cannot supply the required volume of some other products. Joint planning of production is not practiced yet. I think the buyer is not too interested in supporting farmers to plan production in accordance with consumer demand" (Farmer 2).

"If everyone produces cabbage, how can the market absorb so much cabbage? My customers are looking for a variety of fresh organic products for their kitchens" (Organic retailer).

The organic wholesaler had made asset specific investments in branding, in acquiring knowledge and in providing extension advice to farmers. Transactions in this dyad were relatively complex as the wholesaler required consistent delivery and specified terms for

product quality and organic compliance, possibly because he supplied a supermarket. The wholesaler rewarded compliance with a bonus payment, provided extension advice (when consulted) and organised meetings with producers. These interactions helped to strengthen the organic wholesaler's relationships with farmers:

> *"I have more contact with the organic wholesaler. He gives due recognition to farmers and their efforts"* (Farmer 1).

The small size of the informal market and the absence of spot markets and conventional contracting meant that relational contracting was the only option for most farmers. Premiums, bonus payments and recurrent transactions facilitated internal enforcement of these relational contracts, reducing transaction costs associated with asset specificity and behavioural risk. When buyers made asset specific investments (the organic wholesaler and the organic retailer dyads) they also took the lead role in coordinating the dyad. In the absence of asset specific investment by buyers (conventional retailers and the street vendor dyads), farmers played the main role by bearing the risk of unsold produce. Dyads involving specialised organic buyers were in the upper band of relational contracting due to increasing complexity of transactions and asset specific investment by buyers.

Despite their efforts to incentivise compliance, the organic wholesaler and retailer were still vulnerable to environmental and behavioural risk. They both stated that they were unable to expand business due to uncertain supplies. Internal enforcement measures were not sufficient to address behavioural risks in the absence of shared assets and in the presence of alternative buyers. Consequently, buyers were reluctant to invest in storage, processing and certification due to possible hold-up problems:

"I am confident of raising capital from financial institutions. But I cannot take a risk as the volume of supply is small and uncertain. A hotel approached me for organic fresh vegetable but the contract did not materialise because I could not ensure consistent supply" (Organic retailer).

"Due to uncertainty of supply, I had to stop supplying a supermarket. I am also unable to enter into a supply contract with the supermarket and have to sell on a commission basis" (Organic wholesaler).

The organic wholesaler and retailer sourced produce from cooperatives and individual growers. Contracting with cooperatives helped to reduce unit transaction costs for buyers and producers. Collective marketing also helped in meeting compliance requirements through peer monitoring in the absence of formal certification. However, it did not solve the problem of uncertain supply as producer groups and cooperatives had not succeeded in coordinating members' production plans to meet buyer requirements. As a consequence, uncertainty persisted despite group contracting, and buyers with high asset specific investment (such as the organic retailer and the hotel) integrated backwards into production:

"I had to start my own farm due to uncertainty of supply as I need consistent supply for my restaurant" (Organic retailer).

The hotel cited inability to demonstrate organic compliance as another reason for its decision to integrate backwards into production:

"Lack of assured supply of organic produce and organic certification forced us to start our own farm" (Purchase manager of the hotel).

Vertical integration helped the organic retailer to stabilise supply and to continue buying from other suppliers. However, backward integration into production by the hotel displaced transactions with small farmers. Uncertainty of supply also forced a supermarket to reduce its purchases from a cooperative and the relationship collapsed due to high unit transaction costs. Other dyads were discontinued by farmers who were dissatisfied with the terms offered by buyers or their reluctance to accept more produce at the times of peak production:

> *"I am not happy with the premium offered by organic buyers because their base price is the wholesale market price. I do not normally supply to them except when they approach me with better offer during short-supply from their regular sources" (Farmer 6).*

> *"I supplied to a specialised asparagus buyer for two years. I came to know the huge difference between his buying and selling price and stopped supplying to him" (Farmer 4).*

> "*The organic retailer could not absorb all of my produce, so I stopped supplying him*" (Farmer 4).

4.1.3 Conclusions and recommendations

Organic vegetable farmers were able to trade small volumes in informal markets because unit transaction costs were low due to inexpensive physical access and non-complex transactions. Improving road access may extend informal market opportunities to more smallholders but this market will remain small and easily saturated.

Farmers were denied opportunities to engage in spot market trading because the municipal wholesale market did not differentiate organic produce. Standards and rules for organic produce

could facilitate spot market trading. However, third party certification is costly and may not be economically feasible for smallholders selling to domestic markets where few buyers are willing to pay the required premiums. Less expensive methods of certification such as Participatory Guarantee Systems (PGSs) have been successfully trialled in several developing countries (Fonseca, Wilkinson, Egelyng & Mascarenhas, 2008; Nelson, Gomez Tovar, Schwentesius Rindermann & Gomez Cruz, 2010) and warrant consideration by the Department of Agriculture and organic farmer groups in collaboration with specialised organic buyers.

Farmers and buyers were also unable to engage in conventional contracts owing to uncertain yields and weak external enforcement. Extension staff could help farmer groups to develop well-coordinated production plans. Similarly, an effective certification scheme should encourage investment in on-farm technologies that reduce yield variability. Buyers are also more likely to brand and promote organic produce that is certified, and more so if the legal system gives them affordable and effective protection against side-selling by farmers.

Despite these missing dyads, the supply chain for organic fresh vegetables in Kathmandu is reasonably robust because smallholders with different risk-reward profiles can, and do, engage in a variety of relational contracts with buyers. These contracts addressed increasing transaction costs associated with asset specific and complex transactions that required higher levels of coordination and internal enforcement. Enforcement mechanisms included extension advice, recurrent transactions and the payment of premiums and bonuses.

Even so, relational contracts were vulnerable to uncertainties arising from environmental and behavioural risk. Behavioural risk stemmed mostly from side-selling by farmers who could get better prices from alternative buyers. Improved production planning and on-farm technology, better information sharing and agreement on *ex post* adaptation to price changes would help to

strengthen relational contracting and perhaps encourage buyers to make the asset specific investments needed to differentiate fresh organic vegetables.

As matters stand, buyers selling into premium organic markets tend to integrate into production activities in order to improve consistency of supply and compliance with organic standards. Shared investment in labelling and promotion by farmers and their buyers could provide another avenue for the internal enforcement of relational contracts, but will most likely require prior investment in a PGS or third-party certification scheme.

Given their small size, it is unlikely that individual farmers will lead innovation in this chain. Leadership is more likely to come from farmer groups and specialised organic buyers that handle relatively large volumes of organic produce. Government agencies could play a key role in building a more robust chain by helping these parties to deepen and extend their relational contracts, by establishing standards and rules for organic produce traded in municipal spot markets, and by facilitating farmer marketing groups and advising them on production plans, technology and participatory guarantee systems. The government could also improve physical infrastructure, mandate extension staff to facilitate and witness contracts, and provide contractual parties with easy access to legal recourse for small claims.

4.2 Supply chain for conventional fresh vegetables in Chitwan

4.2.1 Case description

Fresh vegetable production activity has become a major livelihood option for small farmers in Nepal who operate near urban centres and in areas connected by road networks. There was a 1.67-fold increase in area and a 2.66-fold increase in the production of fresh vegetables during the period 1990-2010 (Table 4.3).

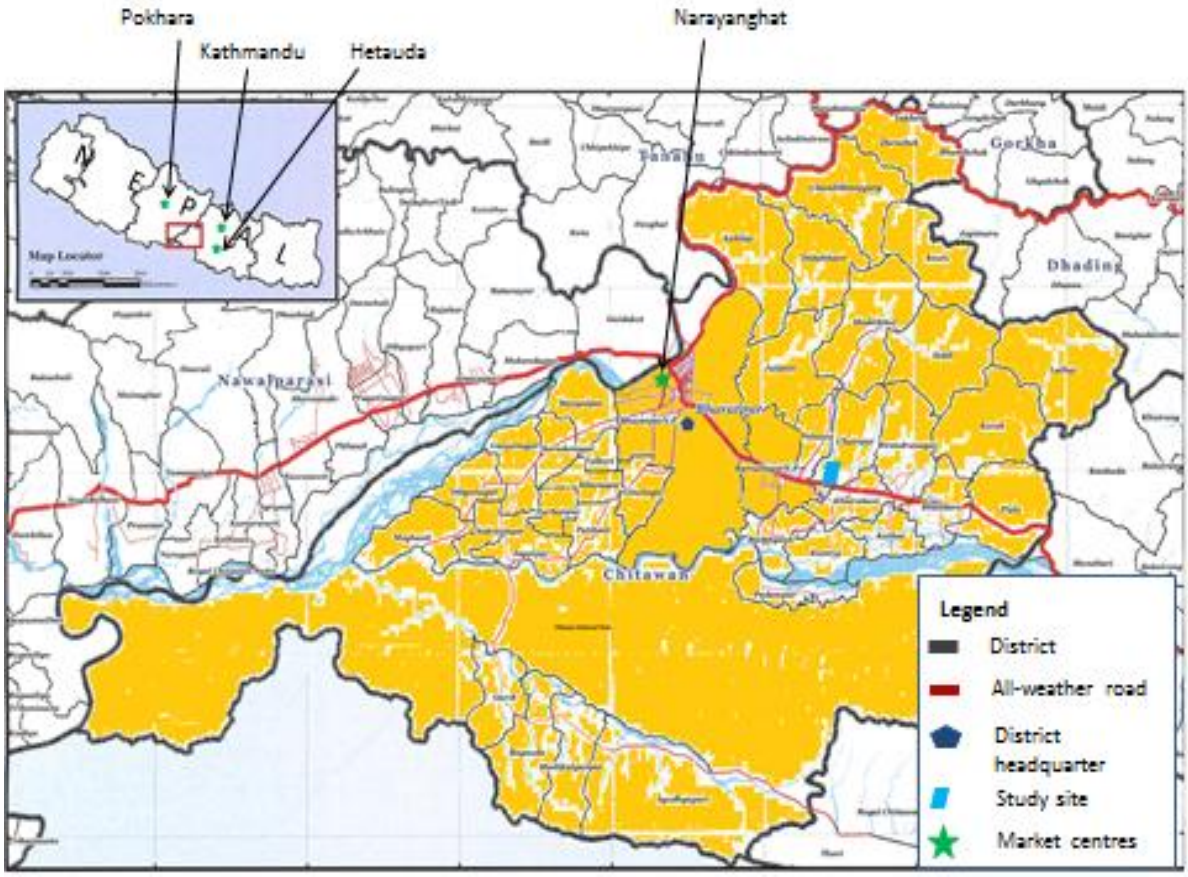
Table 4.3: Area and production data for fresh vegetables in Nepal

Year	Area (ha)	Production (MT)
1989/90	140,500	1,127,884
1999/00	149,030	1,489,665
2009/10	235,098	3,003,821

Source: MOAC, 2010

This case study was conducted in Jyamire village in Chitwan, a major vegetable producing district. Chitwan lies in the southern plain of central Nepal (Figure 4.4) and is well connected by road network to the rest of the county. A national highway passes directly through Jyamire village. In-depth interviews were conducted with five farmers, two executives of the farmers' cooperative, three immediate buyers, a wholesale trader and an official of a wholesale wet market operated by the Department of Agriculture.

Commercial vegetable production in the case study area started during the mid-1990s. The farmer-respondents had been growing vegetables for at least 12 years. The farms are located close to the highway and are readily accessible by a network of village roads. The nearest urban market, Narayanghat, is approximately 17 km away, and the cities of Kathmandu and Pokhara are approximately 150 km from the case study site.



Adapted from United Nations Nepal (undated)

Figure 4.4: Map of Chitwan district showing case study site

A mobile telephone service is also available in the area. Two of the five farmers, who owned comparatively less land, hired additional land to increase their scale of production. Conventional vegetable farmers produce the same crops produced organic vegetable farmers; cauliflower, cabbage, bean, tomato, cucurbits, capsicum and okra. The relative proportions of these crops vary with changes in expected market prices. Other farm enterprises included food crops, dairy, poultry and goats. Socioeconomic characteristics of the farmer-respondents are presented in Table 4.4.

Table 4.4: Farmer characteristics in the conventional vegetable chain

Characteristic	Farmers				
	1	2	3	4	5
Farm size (ha)	0.10	0.50	0.66	1.00	0.23
Area under vegetables (ha)	0.37	0.37	0.23	0.33	1.00
Annual vegetable revenue (NPR)	120,000	120,000	60,000	120,000	300,000
Other income sources	Dairy	None	Food crops	Food crops, dairy, poultry	Dairy, goats

The respondent farmers are all members of the Gramin Fresh Vegetable and Fruit Producer Cooperative. The cooperative was established in 2002 and has 200 members. It provides product marketing services to farmers and operates its own collection depot. However, it does not supply inputs, not does it offer advisory services- although occasionally coordinates training and extension services provided by government agencies. The cooperative financed investments in a building to accommodate its collection depot and office using a government subsidy, reinvesting profit generated from the trade and seeking labour contributions from its members. Some producers also invested in a community irrigation scheme that attracted a government subsidy. Producers operating outside the command area of this irrigation scheme made private investments in water wells and pumping equipment or rented their neighbour's facility to irrigate their crop. Bulking of supplies attracted large buyers and reduced unit transaction costs for both buyers and sellers. The annual value of fresh vegetables sold by cooperative members exceeded NPR 15 million in 2011.

Figure 4.5 illustrates observed linkages between farmers and markets (solid arrows) as well as potential marketing channels (dotted arrows). Table 4.5 presents characteristics of farmer-buyer dyads observed in the case study. Historically, farmers sold individually to wholesalers in Narayanghat market, and some of the larger farmers transported vegetables to Kathmandu or

Pokhara (channel 1). Mobile communication services were not available during that time and no information exchange took place before travelling to the market. Upon reaching the market, farmers checked prices with different traders and dealt with those traders offering the highest prices.

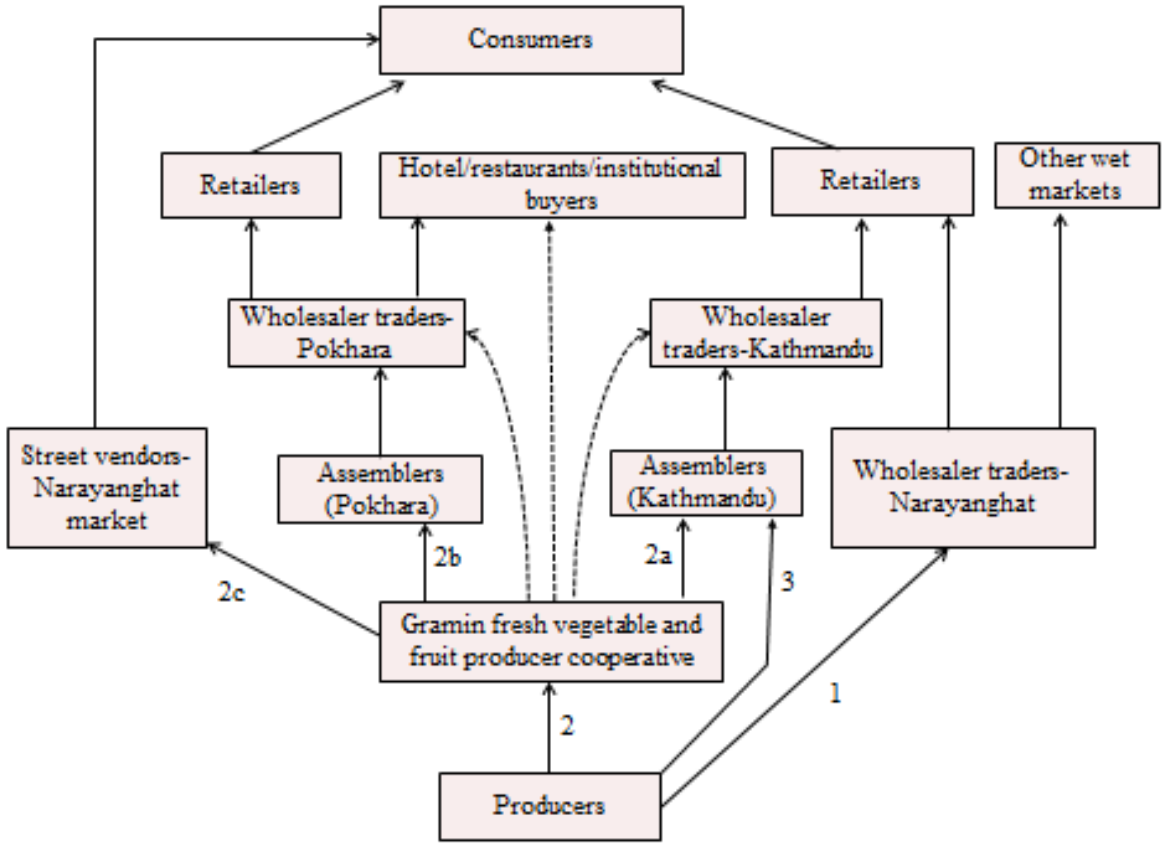


Figure 4.5: Conventional fresh vegetable supply chain

Farmers would usually have to find more than one buyer to clear their produce. They faced high levels of price risk and sometimes could not find a buyer when the wet wholesale markets were well supplied. Payment was received immediately in cash. This particular marketing channel still operates but is no longer the primary marketing channel for farmers in the case study site. Farmers resort to wholesale wet market in Narayanghat if they need immediate cash payment,

and when buyers fail to visit the cooperative's collection depot or offer prices that members perceive to be unfair.

As noted previously, the cooperative currently operates a collection depot, where a numbers of buyers make procurement visits. They are mainly assemblers working as commission agents for wholesale traders operating in Kathmandu (channel 2a, 3) and Pokhara (channel 2b), and street vendors operating in Narayanghat (channel 2c). Few buyers visit the collection depot from June to August when there is little production.

Table 4.5: Characteristics of farmer-buyer conventional vegetable dyads

Characteristics	**Wholesalers (channel 1)**	**Assemblers (channel 2a, 2b, 3)**	**Street vendors (channel 2c)**
Contract	Verbal	Verbal	Verbal
Contract with	Individual producer	Individual producer	Individual producer
Price	Prevailing market price	Spot market price	Spot market price
Payment	At the time of transaction	Four to seven days	Next day
Extension advice from buyer	No	No	No
Finance by buyer	No	No	No
Asset specific investment by the buyer	No	No	No
Buyer type	Wholesaler	Commission agent	Retailer
Information exchange	Price information	Price, availability of produce	None
Next buyer	Retailers	Wholesalers	Consumers

The buyers make telephonic enquiries with the cooperative about the availability of produce before they visit the depot. Prices are also discussed prior to the visit, but are negotiated by the buyers directly with individual farmer. Once a transaction is concluded, the cooperative weigh the farmer's produce and issues a receipt detailing the terms of the transaction. These receipts are sorted and records are maintained for each buyer. Traders usually pay the cooperative within

four to seven days. The cooperative then forwards the payment to the farmer after deducting its service fee. The service fee is charged at the rate of two per cent for members and three per cent for non-members. This discriminatory pricing helps to address the external free-rider problem that can discourage members from investing in their cooperative. Buyers bulk up supplies from different farmers by the evening and repackage produce before transporting it to Kathmandu or Pokhara overnight. Larger farmers sell directly from their farms to minimise the burden of unloading and reloading the produce at the collection depot (channel 3). These on-farm transactions are recorded by the cooperative and attract a service fee of NPR 50 per truckload.

There is no grading by size, colour or other quality attributes other than removing insect infested and deformed produce. Assemblers supplying to Pokhara market tend to deal with farmers that offer better quality produce and reward them with prices higher than those offered by Kathmandu's assemblers. This price premium is usually up to NPR 2 per kg. Pokhara is, however, a smaller market than Kathmandu for the cooperative farmers.

Street vendors are small operators and the size of transactions in this dyad is usually small. However, these buyers visit the collection depot frequently even during the off-peak seasons. They also tend to make quicker payments. Prices are established following a process similar to that observed in the assembler dyad.

None of the buyers had made any asset specific investment in the vegetable trade. The buyers do not provide extension advice nor do they pre-finance producers. The cooperative's executives are aware that institutional buyers (such as hotels, restaurants and supermarkets) are potential buyers, but these relationships had not materialised for reasons discussed in Section 4.2.2.

4.2.2 Chain analysis and discussion

4.2.2.1 Observed and potential dyads

Section 1 identified three dyads operating between farmers and their buyers. These dyads differ in the degree of *ex ante* information exchange, price setting mechanism, payment intervals, presence or absence of collective marketing and the place of physical exchanges.

The wholesaler dyad does not involve *ex ante* negotiation. Wholesale markets in Nepal merely provide trading space to buyers and sellers. Rules and standards required to support impersonal transaction are absent. There is no mechanism in place to disseminate timely price information. Farmers check prices with buyers they know, and transact with those offering the best price. Such personalised transactions suggest that farmers are exposed to opportunistic behaviour in a dyad characterised by asymmetric information. These attributes classify the wholesaler dyad as an informal market transaction rather than a spot market.

The assembler dyad involves some information exchange between traders and cooperative (and/or farmers) but the negotiation does not normally take place *ex ante*. Farmers bring produce to the collection depot where buyers inspect it and offer a price. There could be intense price competition between buyers if several buyers visit the collection depot at the same time. When parties reach agreement on the terms of sale, the cooperative issues a receipt to each party and payment is channelled via the cooperative to the famer. These payments, less service fees, are passed on to farmers the following day if the buyer is a street vendor, and within one week of the buyer is an assembler. The transaction is fairly impersonal. Although this dyad exhibits some properties of relational contracting (as failure to comply with the agreed terms could be sanctioned by eschewing future transactions), this dyad had much in common with a spot market.

There was no evidence of dyads involving third party or external enforcement of contracts to deal with opportunism. Likewise, there was no evidence of dyads involving recurrent transactions due to mutual interdependence. In other words, there was little evidence of conventional contracting or relational contracting in the case study.

4.2.2.2 Transaction cost drivers

The previous section categorised observed dyads into modes of transaction predicted by the model. This section seeks to explain the presence or absence of different modes of engagement in the chain for conventional fresh vegetables in Jyamire village.

Informal market transaction was the only available mode of transaction before the initiation of collective marketing. At that time, farmers operated individually and volumes were not large enough to attract assemblers who would have faced prohibitively high unit transaction costs. Consequently, travelling to market was the only option available to producers. As explained earlier, this dyad was constrained by asymmetric information that exposed farmers to behavioural risk:

> *"We harvested and packed produce in the evening, got up at 2 am in the dark and travelled to Narayanghat market. We would not know the price before reaching the market. We checked price with some buyers and sold produce to a buyer offering the highest price" (Farmer 2).*

Although behavioural risk in payment was mitigated by selling in cash, farmers were often subjected to opportunistic pricing due to perishability of the produce. In addition, prices were very sensitive to large deliveries owing to the small size of Narayanghat market. Transport costs and opportunity costs of time were invariably high as every farmer would travel to market.

Costs and risks in the wholesaler dyad increased when volumes of produce increased, encouraging producers to establish a cooperative and collectively bulk up supply in order to attract larger buyers. The benefits of collective marketing are well summarised by respondents:

> *"Operating a collection depot attracted traders from Kathmandu and Pokhara. We have been getting similar or even higher prices than Narayanghat market. Even small farmers with little marketable surplus can sell locally" (Farmer 4).*

> *"Farmers are happy even though they have to pay a service fee because trips to Narayanghat market were expensive, used their time and involved too much price risk" (Cooperative manager)*

Visits by multiple buyers promoted price competition and diminished opportunism in pricing:

> *"Price may vary with traders. However, traders offering lower prices have to increase their offer to ensure supply when another trader offers higher price" (Farmer 1).*

> *"Normally I do not make first offer but offer NPR 2 more than the price offered by Kathmandu traders. If Kathmandu traders offered my maximum threshold price, I would buy the remaining volume at the price offered by Kathmandu traders" (Buyer 3).*

The advent of mobile telephone services enabled buyers to check the availability of stocks before embarking on a visit, and made it possible for farmers to check on prices in other markets. This flow of information minimised information asymmetry regarding the availability of produce and market prices. In addition, the role of the cooperative in channelling payments to growers tends to make transactions fairly impersonal in these dyads. These attributes characterise the assembler and the street vendor dyads as a spot market rather than an informal market.

Transactions at the collection depot are simple as quality is measured purely on visual attributes such as appearance, maturity and freshness. These quality requirements are not stringent and very little produce is rejected. Nevertheless, the standards are enforced by the buyers. Low complexity of transaction and the enforcement of basic quality standards facilitated the development of this spot market:

> *"We sort insect infested, diseased and deformed produce. However, there is no practice of grading by size or other quality attributes" (Farmer 3).*

Although trading via the cooperative approximates a spot market, it does have elements of relational contracting as transactions are not altogether impersonal. Buyers avoid farmers that deliver too much sub-standard produce, and farmers avoid buyers that are tardy with payments:

> *"I do not sell to buyers who consistently delay payment even if they offer a slightly higher price" (Farmer 5).*

This element of relational contracting suggests that members of the cooperative are not immune to a hold-up problem, although they may not perceive it as a major source of risk. This hold-up problem arises from members' own investments in collective marketing and the perishability of their produce. If buyers do not visit the collection depot, the farmers have to sell individually on the wholesale market where marketing and transaction costs (including risks) are higher. There is thus some need for them to build relationships with reliable buyers in order to protect their investments in collective marketing. Buyers, on the other hand, can source conventional vegetables that meet the same modest quality standards from a host of other producers and are not exposed to a hold-up problem on either the demand or supply sides of their trading operations. Consequently, they have little incentive to co-finance assets or to help maintain the cooperative.

"I supply my own brother and also other wholesalers on commission. Commission rate is usually 10 per cent and I have to bear the risks and losses during transport" (Buyer 2)

"I do not take any risk while supplying the wholesaler and get a commission of NPR 1 per kg" (Buyer 1).

Buyers' low asset specificity and low complexity of transactions (in terms of quality and schedule requirements) may explain why transactions at the collection depot are not strongly relational. The ease with which buyers can access produce of similar quality from other growers discourages them from engaging in conventional contracts with the cooperative or its members. When alternative trading partners are readily available even a small change in price offers exposes conventional contracts to behavioural risk when the cost of enforcing small contracts is high.

Supplying institutional buyers such as hotels, restaurants and supermarkets would require producers to make substantial investments in private assets and collective efforts to ensure consistent supply. Collective investment by members is unlikely given traditional nature of their cooperative. In this instance, altering the cooperative's institutional arrangements to encourage member investment in value-adding assets would expose producers to a serious hold-up problem as institutional buyers can source the undifferentiated produce elsewhere when effective internal and external enforcement measures are unavailable. This could explain why transacting directly with institutional buyers has not materialised.

In spite of the high costs and risks in the wholesaler dyad, some farmers still use it when they need cash or they perceive the prices paid at the collection depot to be unfair. Unlike in the past, the availability of mobile communication services has made it possible for them to check prices

with wholesalers before travelling to the market. But, the characteristics of this dyad remain largely unchanged. The observed modes of engagement and their drivers in the supply chain for conventional fresh vegetables are summarised in Figure 4.6.

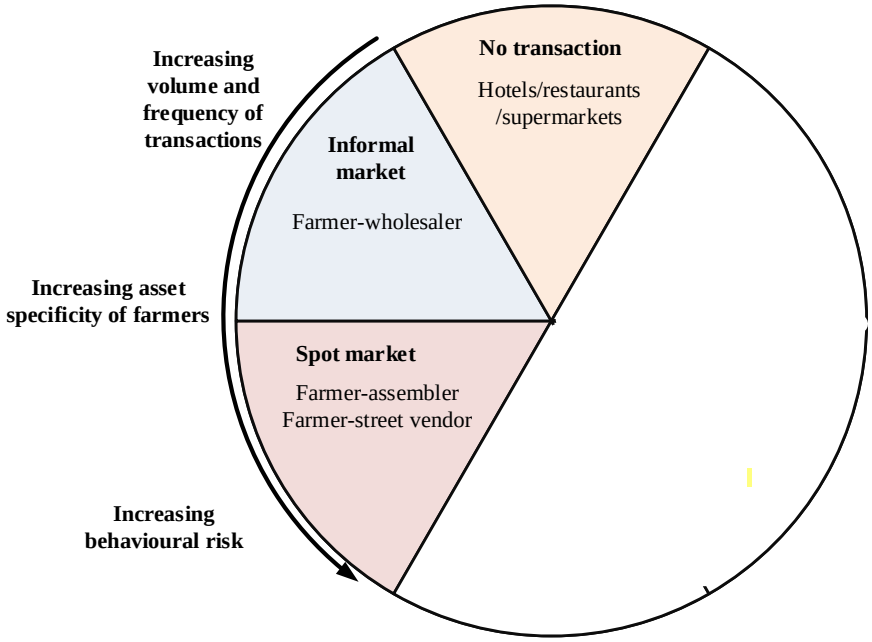


Figure 4.6: Observed modes of engagement and their drivers in the conventional vegetable chain

4.2.3 Conclusions and recommendations

Increasing volumes and frequency of transactions increased the costs and risk in the informal market owing to buyer opportunism arising from asymmetric information and produce perishability. This encouraged producers to coordinate horizontally in order to better coordinate vertically in the supply chain. Bulking of supplies through the collection depot attracted larger buyers and substantially reduced unit marketing and transaction costs (including risks) for both buyers and producers. Easy physical access and the availability of a reliable transport system further encouraged buyers to procure from the collection depot.

The cooperative played a key role in channelling payments to producers that promoted fairly impersonal transactions. At the same time, the advent of mobile telephone services facilitated information flows regarding the availability of produce and prevailing market prices in other trading centres. These conditions, together with simple, internally enforced quality standards promoted spot market trading at the cooperative's collection depot. However, transactions were not altogether impersonal and the cooperative had to build relationships with some reliable buyers. There was no progression to fully fledged relational or conventional contracting because buyers do not face a hold-up problem due to their low asset specificity and have easy access to alternative sources of similar produce.

The supply chain for conventional fresh vegetables appears to be fairly robust as the operation of the collection depot and associated enabling environment promoted spot market trading giving farmers an alternative to the high costs and risks of selling in wholesale markets. Creating new dyads would require major investment on farm and in collective effort to differentiate members' produce and improve consistency in supply. A more feasible approach to improve the robustness of the chain would be for government to introduce well-defined rules and standards and a system to collect and disseminate information to facilitate spot market trading in wholesale wet markets, where most conventional fresh vegetables are traded. Improving trading practices in wholesale markets would have a trickle-down effect on trading practices in upstream parts of the supply chain.

4.3 Supply chain for ginger in Palpa

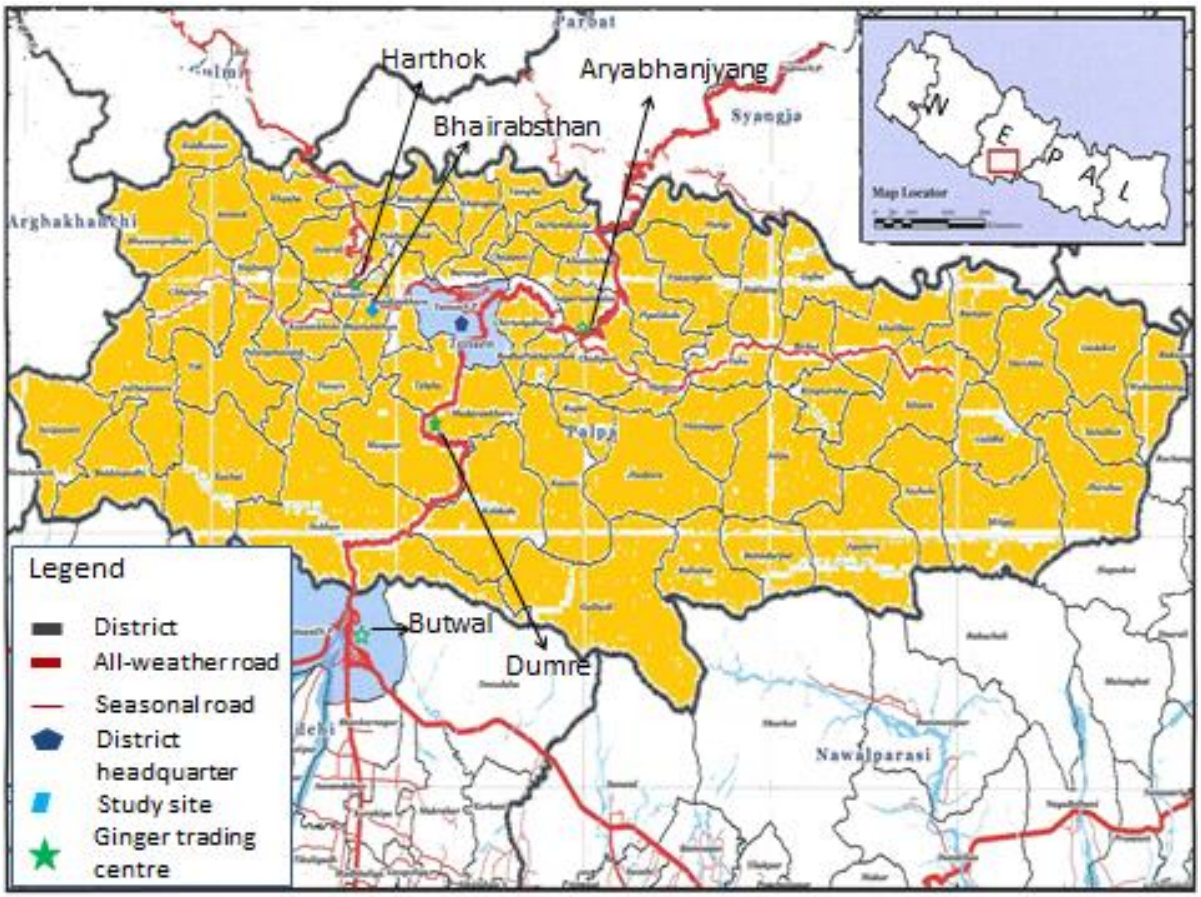
4.3.1 Case description

Nepal produced 210,790 tons of ginger and was the third largest producer after China and India during 2010 (FAO, undated). Approximately 40 per cent of the crop, including seeds, is believed to be consumed domestically. Ginger was the fourth most important agricultural export after lentil, cardamom and tea in FY 2010/2011 when it contributed 0.44 per cent to the total value of Nepal's exports and nearly two per cent to the value of the agricultural exports (Trade and Enterprise Promotion Centre, undated-a). Virtually all (98%) of the exported ginger goes to India (Trade and Enterprise Promotion Centre, undated-a, undated-b).

The case study was conducted in the Palpa district, a major ginger producing district along with Ilam, Salyan and Nawalparasi districts. Palpa lies in the mid-hills of western Nepal (Figure 4.7) and is connected by all-weather roads to Butwal in the southern plain and the resort town of Pokhara in the North. Another all-weather road links Palpa with the interior district of Gulmi in the west. This road passes through Bhairabsthan village, the case study site. The case study comprises interviews with five farmers, the manager of the Bhairab Ginger Producers' Cooperative, two executives of the district federal cooperative, three traders (including a potential buyer) and three officials of government and non-government agencies.

Historically, ginger was produced as part of a mixed cropping system with maize in the Palpa district under rain-fed conditions. However, ginger production intensified in the early 2000s when a NGO (Rural Economic Development Association) implemented a donor funded project and promoted ginger as a strategy to enhance the livelihoods of smallholders. This project imparted technical knowledge about production and processing to thousands of smallholders and created organisations such as producer groups, producer cooperatives at the village level

and a federal cooperative at the district level. Bhairab Ginger Producers' Cooperative (a producer cooperative) was established in 2004.



Adapted from United Nations Nepal (undated)

Figure 4.7: Map of Palpa district showing case study site

At the time of the case study, the cooperative had 109 members organised in seven producer groups. Non-members also supply the cooperative. The volume sold increased from 15 to 77 tons between 2004 and 2011. Characteristics of the farmer-respondents are summarised in Table 4.6.

Table 4.6: Farmer characteristics in the ginger chain

Characteristic	Farmers				
	1	2	3	4	5
Farm size (ha)	0.75	0.90	0.75	0.25	0.50
Area under ginger (ha)	0.15	0.15	0.45	0.10	0.20
Annual ginger revenue (NPR)	60,000	100,000	300,000	40,000	75,000
Other income sources	Grocery store, vegetables	Food crops	Pigs, employment in India	Cosmetics shop	Vegetable

The cooperative has used several different marketing channels to sell ginger. Figure 4.8 shows the existing (solid arrows) and discontinued (dashed arrows with dots) or potential (dashed arrows) market linkages.

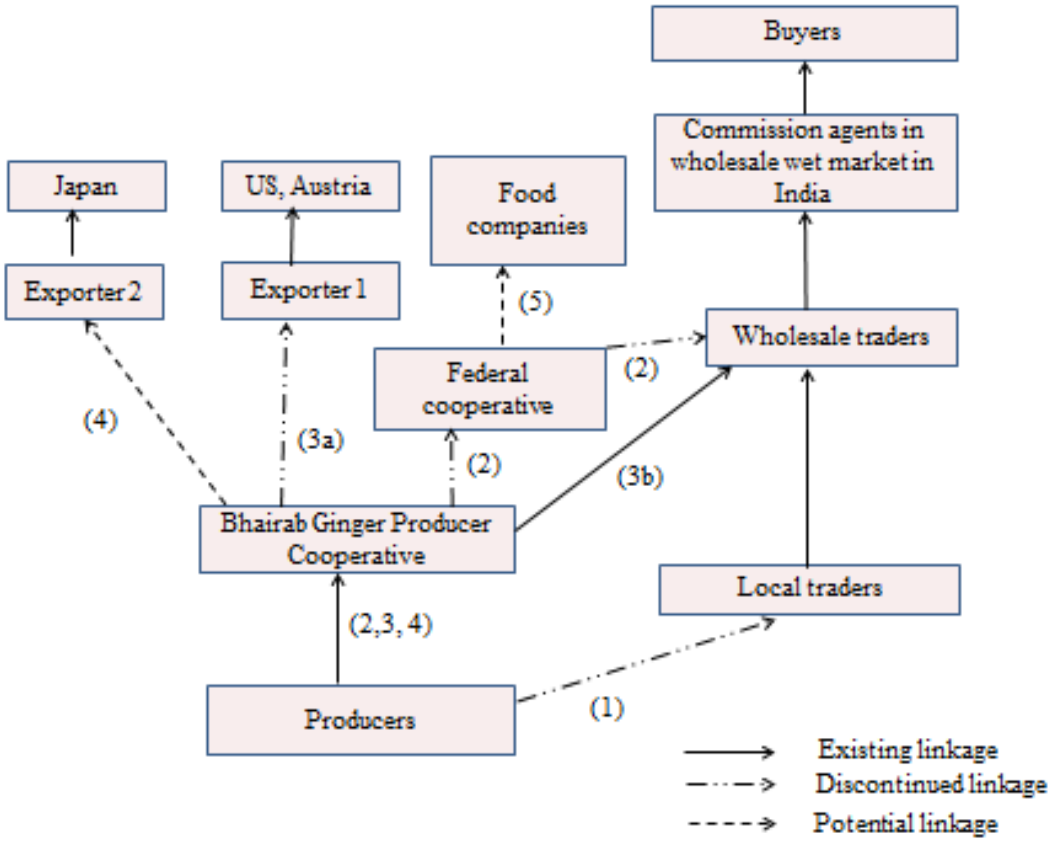


Figure 4.8: Ginger supply chain

The cooperative operates a collection depot in Bhairabsthan village. Producers are located on hill slopes, usually less than five kilometres from the highway. There is no public transport system and access to the highway is mostly via foot trails. Ginger traders are based in towns along the highways, such as Harthok, Aryabhanjyang and Dumre within the Palpa district and Butwal, a major trading hub outside the district. Table 4.7 summarises characteristics of farmer-buyer dyads that are currently operating or which operated in the recent past.

Table 4.7: Characteristics of farmer-buyer ginger dyads

Dyad characteristics	**Local trader dyad(1)**	**Federal Cooperative dyad(2)**	**Exporter 1 dyad (3a)**	**Wholesale trader dyad (3b)**
Contract	Verbal	Written	Written	Verbal
Contract with	Individual producer	Federal Cooperative	Primary Cooperative	Primary Cooperative
Product	Fresh	Fresh	Processed (sliced and dried)	Fresh
Price	Prevailing market price	Negotiated price valid for a week	Fixed price negotiated for a year	Negotiated for each transaction
Payment	At the time of transaction	Part advance and final payments settled monthly	Part advance and full payment on delivery	Part advance and full payment before dispatch
Extension advice from buyer	No	No	No	No
Finance by buyer	No	No	No	No
Asset specific investment by the seller	None	In building and equipment through grant funding	In building and equipment through grant funding	In building and equipment through grant funding
Asset specific investment by the buyer	None	None	Investment in organic certification, drying equipment	None
Information exchange	None	Price, volume	Quality requirement, delivery schedule	Price and quantity at the time of negotiation
Next buyer	Wholesalers	Indian traders	Importers in US and Austria	Indian traders

Producers traditionally sold individually to local traders based in market centres before collective marketing was initiated (channel 1). They traded at prevailing market prices and did not exchange information *ex ante*. During the initial days of collective marketing, the federal cooperative bulked up supplies and sold to an Indian wholesale trader (channel 2). There was a written contract and recurrent transactions with a particular wholesaler. Producer prices were set for a week with provision to renegotiate the contractual price if the wholesale market price increased by more than NPR 2 per kg. If market prices fell, the trader would purchase only the already collected produce at the contractual price. The trader made an advance payment to the federal cooperative with final settlements paid on a monthly basis. During this era, primary cooperatives served merely as collection centres. A fee of NPR 2.50 per kg was deducted from payments received to cover handling and marketing costs, and this fee was shared between the federal and primary cooperative. However, this arrangement collapsed after three years for reasons discussed later in Section 4.3.2.

Prior to this study, the primary cooperative had also processed ginger into dried ginger slices for sale to Exporter 1 (channel 3a). Processing into dried slices substantially reduced bulkiness (five to six kg fresh produce made a kg of dried product) and improved storability of ginger. Dried slices were sold at price ranging from NPR 180 to 230 per kg. This marketing channel operated for three consecutive years with volumes increasing from 1.5 tons in the first year to 5.5 tons of dried ginger in the third year. Contracts in the processed product chain were written with explicit terms for volume, price, quality, packaging specification and delivery schedule. Quality specification included thickness of slices, ginger oil content, moisture content and the absence of foreign materials. The exporter made a part payment in advance to the cooperative once the contract was negotiated and paid the balance on delivery. The exporter also invested in obtaining organic certification as the intention was to engage in a long-term, recurrent transaction. However, this relationship failed after three years for reasons discussed later.

At the time of the case study, the producer cooperative was selling directly to wholesale traders supplying Indian markets (channel 3b). The cooperative approaches several traders and reaches a verbal agreement with the buyer that offers the best price. Contract terms include price, volume and delivery deadline. Farmers are then advised to bring produce to the collection depot. The negotiated price is valid only for that transaction but may be adjusted upwards if the market price rises while the order is being assembled. Each transaction is independent of previous or subsequent transactions. The trader makes a part payment in advance once the transaction has been negotiated, and usually pays the balance before the produce is dispatched. Although this dyad involves *ex ante* negotiation of price and volume, and also some *ex post* adaptation according to market situations, there are seldom any recurrent transactions between the cooperative and the wholesalers.

Negotiation was initiated with a second exporter (Exporter 2) to trade dry ginger (channel 4). This exporter specialised in exporting coffee and had never traded ginger before. He wanted to venture into ginger trade and had identified a Japanese importer. The producer cooperative sold three quintals of sliced dry ginger to Exporter 2, who then exported the product to Japan. The Japanese importer also visited the production area and the product sent to Japan was reported to have met the importer's standards. However, this transaction failed to develop into a trading relationship. Talks between the federal cooperative and a local noodle factory also failed to produce a trading relationship (channel 5).

4.3.2 Chain analysis and discussion

4.3.2.1 Observed and potential dyads

Section 4.3.1 identified existing and recent dyads. It highlighted marketing channels for two distinctive ginger products; fresh ginger and locally processed (dried and sliced) ginger.

However, only the wholesaler dyad for fresh ginger was still functional at the time of the case study.

The wholesale trader dyad is primarily an informal market transaction owing to the lack of well-defined standards and trading rules, and the absence of recurrent transactions. Nevertheless, this dyad also exhibited some features of a spot market (checking price with many buyers and selling to the buyer that offers the best price) and relational contracting (advance payments and *ex post* adaptation of prices). The local trader dyad, which was operating before the advent of the cooperative, also resembled an informal market transaction as producers and local traders engaged in personalised cash transactions at prevailing market prices.

While it functioned, the federal cooperative dyad involved a relational contract owing primarily to the recurrent nature of transactions and renegotiation of price *ex post.* This dyad also involved frequent exchanges of information regarding prices and volume. The Exporter 1 dyad was also a form of relational contracting as it involved recurrent transactions and relation specific investment by the exporter in getting organic certification. Although the written contract made no explicit provision for *ex post* renegotiation of prices, this provision was implicit in the contract as the exporter often renegotiated the price to ensure supplies when market prices of fresh ginger were bullish.

Transactions with Exporter 2 did not materialise even though the product met the importer's requirements. Similarly, transactions with a noodle factory did not materialise despite efforts by the federal cooperative to engage this buyer. In summary, the farmer-buyer dyads in this supply chain for ginger switched from informal market transactions to relational contracts and back to informal market transactions. This last switch occurred in the continued presence of the producer cooperative. There was no evidence of spot market trading or conventional contracting in the chain for ginger in Palpa.

4.3.2.2 Transaction cost drivers

The previous section categorised existing and recent dyads into modes of engagement defined by the model. This section seeks to explain why dyadic relationships switched over from informal markets to relational contracting, and why they moved back to informal markets. It also explains the absence of spot markets transaction and conventional contracting in the chain for ginger in Palpa.

During the pre-project era, the volume and frequency of transactions was generally low. The low volume generated by individual farmers did not attract wholesalers due to high unit transaction costs. Therefore, the only option available to farmers was selling individually in the informal market arrangement to local traders based at Dumre or if volumes were sufficiently large, in the more distant Butwal market. Information asymmetry in this dyad appears to have encouraged widespread opportunism:

> *"Price volatility was too high and traders often cheated in weighing by using non-standard weighing methods. Incidents of farmers flocking to the market upon hearing about good prices, only to be disappointed with lower prices after reaching market, were not uncommon" (Manager of the primary cooperative).*

Ginger production increased substantially following donor-funded interventions. Producers trading larger volumes and engaging in more frequent transactions were increasingly exposed to this opportunism in informal market. Producer cooperatives and federal cooperative promoted by the project intended to avoid local traders by offering substantial volumes to large scale traders who had direct access to Indian markets. The project facilitated a market study tour to India, which initiated relational contracts with an Indian wholesaler. Palpa's federal cooperative negotiated terms with the buyer and its primary cooperatives functioned as

collection depots. The federal cooperative negotiated a fixed price for each of three broad grades of ginger (based on rhizome size) for a fixed term. Provision was made to renegotiate prices if prices increased by more than NPR 2 per kg:

> *"The federal cooperative negotiated a fixed price for a period of four to seven days in advance. If market price increased, there was provision to renegotiate the price. The trader would buy already assembled produce at the contracted price and advised no further collection, if prices fell down" (NGO Officer).*

This form of relational contracting in the federal cooperative dyad was facilitated by larger volumes, more frequent transactions, and high levels of behavioural risk in the local trader dyad. *Ex post* price renegotiation when prices were bullish and repeat transactions provided some internal enforcement measures to encourage contract compliance. These contracts also required the buyer to make payments in advance of delivery, and therefore shifted risk from growers to the buyer. This suggests that collective marketing via cooperatives afforded the growers more bargaining power.

The federal cooperative dyad collapsed after three years. Respondents offered several reasons for this collapse. First, the internal enforcement measures were not sufficient to deter opportunism and conflict in the relationship between the federal cooperative and the Indian wholesaler:

> *"Final settlement of payments used to be made on a monthly basis. Once, three truckloads of ginger dispatched to the trader were unaccounted for. It was resolved through mutually sharing the loss. But this episode soured the relationship with the trader"(NGO officer).*

Second, total reliance on the Indian buyer introduced a high level of environmental risk as cross-border trade was affected by policy changes within India:

> *"While we were trading with this wholesaler, India controlled the ginger imported via Sunauli and Nepalgunj customs bordering the state of Uttar Pradesh. As our buyer was trading via Nepalgunj custom, he had difficulty in procuring ginger. We had to find a new buyer from eastern Nepal who used to operate via Kakarvitta customs bordering the state of West Bengal" (Secretary of the federal cooperative).*

Third, the costs of collective action were too high in the federal cooperative dyad and the federal cooperative was not financially viable when project support was withdrawn:

> *"Logistic problems arose after withdrawal of project support. The federal cooperative could not hire staff and there was also a problem of working capital" (Chairperson of the federal cooperative).*

After the collapse of the federal cooperative dyad, the producer cooperative resorted to trading its (smaller) volumes directly with wholesalers. In addition, the producer cooperative secured grant funding to construct a building and to purchase solar dryers and a grinding machine in order to process ginger into slices and powder. The ability to add-value allowed the cooperative to participate in processed product marketing channel. Most of the crop was sold as dried ginger slices, with a small volume of wastage from this process sold as powder. Processing required ginger to be more mature, and usually the produce harvested after January was used in processing.

As previously noted, the Exporter 1 dyad involved a relational contract and was driven by the complexity of transactions as the importers specified stringent quality, volume and schedule requirements. Asset specific investment in organic certification by the buyer also encouraged

relational contracting in this dyad. This dyad certainly offered growers a more stable pricing regime than did the volatile fresh ginger market.

Despite its advantages, the dry ginger dyad also collapsed after three years. The first reason for its failure was inconsistent quality:

> *"Escherichia Coli was detected in dried ginger due to poor sanitation in processing. I also have to sort black spotted slices due to inappropriate drying. Another problem was insect infestation during storage as I did not have a vacuum packing facility for large packages" (Exporter 1).*

The second reason was the inconsistent volume and delivery:

> *"I had to make several calls to the cooperative during delivery time. Had I not kept a sufficient time gap between the cooperative's delivery schedule and delivery schedule to my buyer, I would not have met my buyer's requirement" (Exporter 1).*

> *"We could not supply the required quantity in the second year due to a loss of dry ginger owing to excessive rainfall" (Manager of the primary cooperative).*

Bullish prices tend to shift bargaining power from buyers to sellers and increase the buyer's exposure to opportunism. Exporter 1 had made an asset specific investment in organic certification and was therefore susceptible to a hold-up problem if the cooperative behaved opportunistically and the external enforcement of the contract was not viable. According to the Exporter, this was indeed the case:

> *"I had to increase the price as the cooperative told me that they would not be able to supply at the contracted price due to increase in fresh produce prices" (Exporter 1).*

This suggests that the producer cooperative sacrificed the long-term benefits of relational contracting in the dried ginger market for short-term gains in the informal fresh ginger market. This behaviour may also explain why the producer cooperative was not enthusiastic about supplying Exporter 2:

> *"Farmers wanted an immediate decision when I sent their sample to a Japanese buyer. However, they told me that they were getting a better price from another buyer when I started negotiating. I lost a potential buyer due to their lack of commitment" (Exporter 2).*

> *"Exporter 2 wanted to buy ten tons of dried ginger. However, we were not very interested as the price of fresh ginger was high in the market" (Manager of the primary cooperative).*

The quality and consistency problems created environmental risk in the dry product marketing channel. They appear to have originated from under-investment in value adding assets, which not only constrained the Exporter 1 dyad, but also constrained the potential relationship with a food company as the federal cooperative was unable to offer assured volume, quality and consistency of supply:

> *"The capacity of the solar dryer is very small. On the other hand, sun drying takes a very long time and product spoilage is possible if there is continuous rain for few days. Product quality is also not uniform. We do not have access to efficient drying technology" (Manager of the primary cooperative).*

> *"Ginger powder is used by spice and noodle factories. A noodle factory was ready to pay NPR 250 per kg for ginger powder. But their demand was too big and it was not*

possible to supply them as it would need a substantial investment in processing. They also wanted quality assurance" (NGO Officer).

Under-investment in value-adding assets may also have constrained the export of fresh ginger to more countries, thereby limiting the number of marketing channels available to producers and creating excessive dependence on Indian markets. Current practices of exporting fresh ginger without adequate screening of pest and diseases make it virtually impossible to exploit new export opportunities:

"Fresh ginger is exported to India without removing soil from the rhizome. It is hard to export to another country as importing countries can apply sanitary and phyto-sanitary measures to block ginger import. India has also intermittently prohibited ginger import from Nepal. They are probably allowing imports from Nepal due to low levels of production in India" (Official of the national chamber of commerce).

"Ginger trade is totally dependent on India. India is also seeking pest risk analysis intermittently. Nepal is not taking necessary actions to ensure that India does not block future ginger export from Nepal citing pest risks. We are not even able to wash mud from the ginger rhizome" (Chief of District Agriculture Development Office).

Producer opportunism during periods of rising prices and under-investment in value-adding assets are predictable problems in traditional marketing cooperatives as their institutional arrangements encourage members to maximise profits in the short-term and to avoid investments that yield superior returns in the long-term (Cook, 1995; Harris, Stefanson & Fulton, 1996). Nepal's ginger cooperatives were established along traditional lines and are therefore prone to the 'horizon' problem described by Cook (1995). The flawed institutional arrangements of these cooperatives appear to have contributed to the demise of relational

contracts and loss of robustness in the ginger chain as the only investment made by the Bhairab Ginger Producers' Cooperative was financed from external grants and the evidence points strongly to opportunism by the cooperative during periods of rising prices.

As described earlier, the cooperative was trading fresh ginger informally with wholesalers at the same time that it sold processed products. Ginger harvested before December was usually sold in the fresh market. When opportunism and under-investment damaged relational contracting dyads, the producer cooperative was left with no choice but to trade informally with wholesalers. Spot markets do not exist as there are no grades and standards to differentiate produce - fresh ginger is traded in Nepal without even removing soil from the rhizome. The behavioural and environmental risk that undermined relational contracts also constrained conventional contracting in the absence of cost-effective external enforcement. Collective marketing and the low complexity of transactions in the informal market help to keep transaction costs low even though the frequency of transaction is high. The observed and failed modes of engagement and their drivers are presented in Figure 4.9.

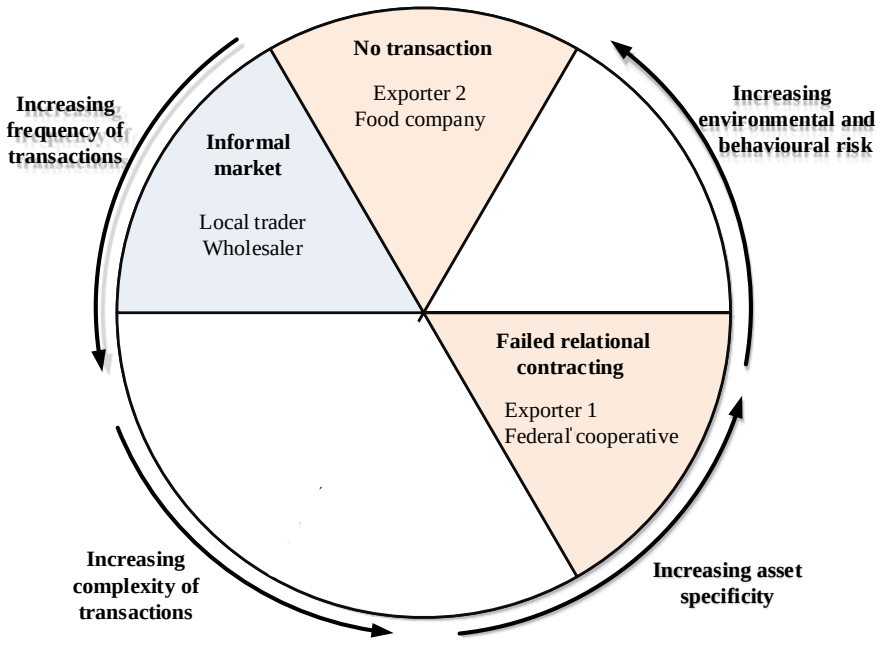


Figure 4.9: Observed and failed modes of engagement and their drivers in the ginger chain

4.3.3 Conclusions and recommendations

Informal market transactions with local traders failed owing to buyer opportunism arising from asymmetric information. Collective marketing through cooperatives offered larger volumes and created opportunities to engage wholesalers directly, thus reducing the problem of asymmetric information. Collective marketing also increased the bargaining power of producers who demanded *ex post* price adaptation when market prices were bullish.

Opportunism and a high frequency of transactions in the local trader dyad encouraged a shift to relational contracting via the federal cooperative when the volume of fresh ginger increased. However, dependence on the Indian market and the absence of effective internal enforcement exposed producers to high levels of environmental and behavioural risk. In the absence of asset specific investment and in the presence of alternative sources of ginger, the buyer had little incentive to nurture this relationship. In addition, the federal cooperative added to the costs of collective action and rendered this dyad dependent on external funding.

Relational contracting in the dry product marketing channel (the Exporter 1 dyad) was promoted by the complexity of these transactions (quality, schedule and compliance requirement) and by asset specific investment on the part of the buyer. This dyad was also vulnerable to environmental and behavioural risk. In this case, these risks stemmed from underinvestment in value-adding assets by the primary cooperative and producer opportunism during periods of rising prices. The tendency for cooperatives organised along traditional lines to underinvest not only undermined the existing relational contracts but also constrained potential relational contracts in the dry product supply chain.

Spot market trading was not among the options available to producers due to absence of grades and standards to facilitate impersonal transactions. Likewise, conventional contracting was not

an option owing to high levels of environmental risk and the absence of effective external enforcement to mitigate behavioural risk. As a result, the surviving marketing channel was limited to informal transactions with wholesalers supplying Indian markets. Producers operating under rain-fed conditions in interior areas have fewer options to deal with the vagaries of this informal market and continue to farm ginger despite high price volatility.

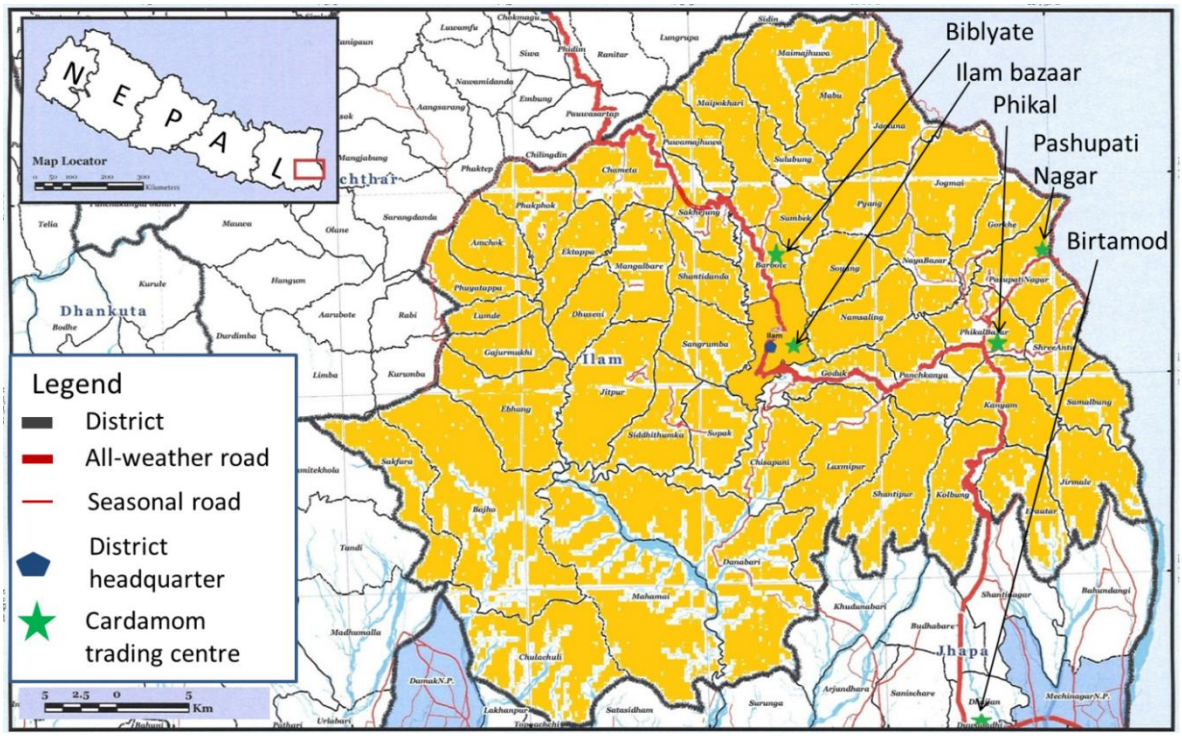
Improving on-farm production practices could improve product quality. However, this would require complementary investment in processing equipment to reduce environmental risks in both the dry and fresh product marketing channels. In reality, Palpa's ginger cooperatives are unlikely to make these investments without grant funding as they are organised as traditional cooperatives and consequently do not generate strong incentives for investment. Chaddad and Cook (2004) describe alternative cooperative models that substantially address this problem. The recent proliferation of successful 'New Generation' cooperatives in the USA has been well documented (Harris et al., 1996). These cooperatives introduce a parallel set of tradable delivery rights that return benefits, including capital gains, in proportion to individual patronage and investment. Adapting the institutional arrangements of ginger cooperatives along these lines is recommended to facilitate investment in processing equipment. Such investment by the cooperatives could also open additional marketing channels as it would create opportunities for more effective internal enforcement of contracts.

4.4 Supply chain for large cardamom in Ilam

4.4.1 Case description

Large cardamom (*Ammomum Subulatum* Roxb) is indigenous to the eastern Himalayan region and Nepal is a major producer along with India and Bhutan (Sharma, Sharma & Sharma, 2009). Varadarasan and Biswas (2002) reported several culinary, medicinal and industrial uses of large cardamom. Its fruit is used either directly or as an ingredient in spice blends for flavouring foods, as a flavouring agent in confectionaries, for masticatory purposes, and also as an ingredient in *ayurvedic* medicines. Industrial uses of large cardamom are for flavouring toothpastes, sweets, soft drinks, toffees, flavoured milk and alcoholic beverages. Essential oil can also be produced (Seildemann, 2005, p. 37). Commercial cultivation of large cardamom in Nepal started during the 1950s (Vander Stoep, Pokharel, Rajbhandari, Shrestha & Kanel, 2010). It was Nepal's second most important agricultural export (after lentil) in terms of value in 2010/2011 (Trade and Enterprise Promotion Centre, undated-a).

A large number of farming households produce large cardamom. Most of these producers are located in the eastern hills districts where climatic conditions suit the crop. Cardamom can be grown in moist and shaded areas on hill slopes where other crops do not thrive. However, many growers converted cropland to cardamom orchards in response to increasing cardamom prices in international markets. Cardamom fruits once a year, and capsules are harvested from September to November based on altitude and variety. After harvest, the capsules are separated from their panicles and dried over a fire. Dried cardamom capsules can be stored for a long period of time. Household consumption is negligible and virtually the entire production goes to market as a cash crop. This case study was conducted in Ilam district in eastern Nepal, a major cardamom producing district bordering India (Figure 4.10).



Adapted from United Nations Nepal (undated)

Figure 4.10: Map of Ilam district showing cardamom trading centres

An all-weather road from the southern plains passes through Ilam, and another main road connects Phikal - a major cardamom trading hub in southern Ilam - to India. Several district roads, which are not all-weather roads, feed these highways. The case study included interviews with six farmers, three immediate buyers and four key informants working for government and non-government agencies involved in large cardamom promotion. Farmer respondents in this study live from half an hour to nearly a day's walk from an all-weather road. Recent expansion of the mobile telephone network allows producers, irrespective of remoteness, to communicate with traders and service providers. Farmers interviewed had farmed cardamom for at least the past 15 years, and some of them were already second generation growers in their family. All of the farmer respondents were owner-operators. Other farm enterprises included fresh vegetables, ginger, tea, potatoes and dairy. Characteristics of the farmer-respondents are summarised in Table 4.8.

Table 4.8: Farmer characteristics in the large cardamom chain

Characteristic	Farmers					
	1	**2**	**3**	**4**	**5**	**6**
Farm size (ha)	1.25	1.50	0.80	3.00	3.00	3.00
Area under cardamom (ha)	1.10	0.35	0.10	0.75	0.25	1.00
Annual cardamom revenue (NPR)	450,000	300,000	50,000	-	200,000	300,000
Other income sources	Dairy, overseas employment	Dairy, ginger, chayote	Vegetable, ginger	Tea, dairy	Vegetable, ginger, dairy, overseas employment	Potato, food crops

Major cardamom traders are located in market centres (such as Phikal, Ilam Bazaar, Pashupati Nagar and Biblyate) along the highways. These traders are referred to as district traders throughout this section. Some district traders export directly to India but most of them sell to exporters based at Birtamod (a major cardamom trading hub in Jhapa district in the southern plains). Small grocery shop operators in villages also buy cardamom during the production season. These buyers are referred to as village traders. Village traders sell mostly to district traders but also to exporters based at Birtamod market. Birtamod-based exporters sell to traders in the Indian cities of Siliguri, Kolkata, Kanpur, Delhi, Mumbai, Amritsar and Jammu. The solid arrows in Figure 4.11 show how farmers in the study chain are linked to the market. Dotted arrows indicate potential export links directly to countries other than India.

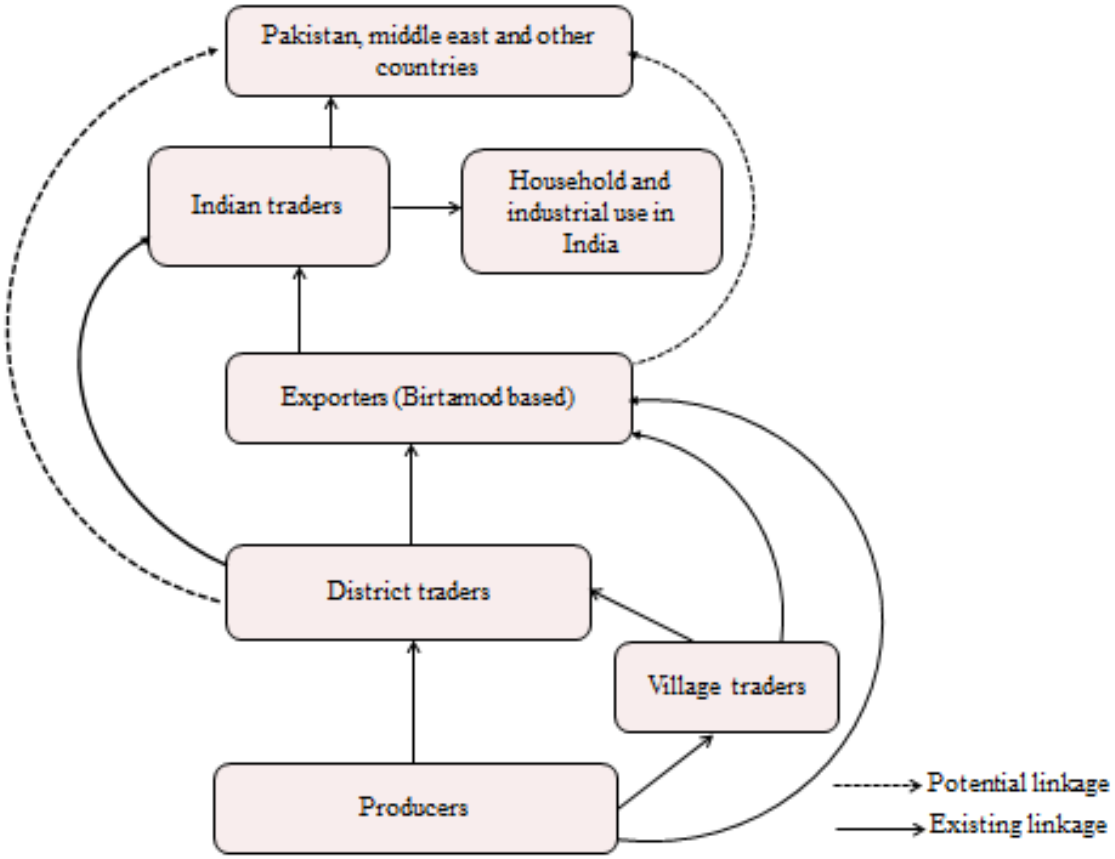


Figure 4.11: Large cardamom supply chain

Table 4.4 presents data on large cardamom exports from Nepal and India. More than 98 per cent of Nepalese cardamom was exported to India during the three year period ending 2010/11. The traders interviewed in this study believed that Indian traders exported large cardamom to Pakistan and Middle Eastern countries. However, Indian export and import data (Table 4.9) show that Indian exports to Pakistan amount to less than 15% of Nepalese exports to India. Pakistan is, however, the single biggest importer of large cardamom from India. Table 4.4 does not show the export of value added products from India. Likewise, the proportion of large cardamom going to different uses is not known. The volume of domestic consumption in Nepal is believed to be very small.

Table 4.9: Export data for large cardamom from Nepal and India

Year	Nepalese export (MT)		Indian export (MT)	
	Total	India	Total	Pakistan
2008/09	9820	9614	1875	1482
2009/10	5783	5700	1000	758
2010/11	4821	4809	775	581

Source: Trade and Enterprise Promotion Centre (undated-a, undated-b), Spice Board India (undated)

Cardamom is still a major income source for many farmers. However, cardamom production is threatened by *chhirke* and *furkey* diseases. Decreasing production due to diseases is also reflected in declining exports to India over the past few years. Some producers have lost their entire crop. These diseases are transmitted from diseased planting materials and also by insects. Uprooting and burning diseased plants and planting disease-free materials in new land are recommended measures to contain the problem. However, crop loss is gradual and farmers are reluctant to destroy orchards that are still productive.

Farmers interviewed for this study sourced planting materials from a government farm and also from visually healthy orchards owned by other farmers. Farmers stated that disease-free planting materials were not readily available. Advanced methods of propagation (such as tissue culture), which ensures no transmission of diseases to saplings, has not been initiated by the government farm or by private sector entrepreneurs.

There were three different dyads operating between farmers and their buyers in the chain studied. However, all three dyads exhibited very similar relationship characteristics (Table 4.10). Farmers negotiate price, tentative volume and delivery time *ex ante* with buyers when their crop is ready. Negotiation may take place over the phone or by meeting in person. Farmers enquire about product prices from many buyers before reaching a verbal agreement to sell to a particular buyer. Product attributes such as size, colour and aroma are considered when deciding

on the price. If product quality deviates from the sample produced at the time of negotiation or from the described attributes, the price is renegotiated. Otherwise, *ex post* adaptation of the verbal contract is not common.

Farmers sell individually to buyers. Payment is normally made at the time of transaction unless farmers accept delayed payment for a slightly higher price. Farmers have to deliver produce to district traders and exporters, but village traders often collect produce from farmers. None of the buyers provided extension advice. Although the respondents were members of producer groups, the main purpose of this collective action was to access extension advice and subsidies from government agencies and development projects.

Table 4.10: Characteristics of farmer-buyer cardamom dyads

Characteristics	**Exporter dyad** **District trader dyad** **Village trader dyad**
Contract	Verbal
Contract with	Individual
Price	Negotiated for each transaction
Payment	At the time of transaction
Extension advice from buyer	No
Finance by buyer	No
Asset specific investment by producers	Low for most farmers but high for those who grow cardamom in their arable lands
Asset specific investment by the buyer	Some processing by exporters, none by other buyers
Information exchange	Price and quantity at the time of negotiation
Next buyer	Indian traders for exporters Exporters for district traders District traders and exporters for village traders

Cardamom is a perennial crop and it takes at least three years to produce a crop worth harvesting. In spite of the long gestation period, farmers who grow cardamom in marginal lands do not have to sacrifice other crops. Farmers also have to invest in dryers. However, the

improved drying technique is not widely practiced and traditional dryers can be constructed at low cost. Asset specificity is therefore low for farmers, apart from those who grow cardamom on arable land. Only one farmer respondent in this case study planted cardamom on his arable land.

Buyers have been operating in the cardamom business for as long as 70 years. Of the buyers interviewed, one specialised in cardamom while the remaining two had other business interests. Village traders and district traders act only as intermediaries and do not engage in any processing activities. Exporters (including district traders who sell directly to Indian buyers) add value by tail clipping, removing foreign materials, grading and packaging for the market.

Buyers did not provide any embedded services. Information exchange between producers and buyers was limited to price, quantity, delivery time and comments on the size, colour and aroma of the consignment. However, there is no well-defined grading system for large cardamom. Farmers' choice of buyer is guided solely by price as there are many buyers, the dried crop is not highly perishable and price information is easy to gather. Consequently, there is no mutual interdependence between producers and their buyers. Among the buyers interviewed, one buyer supplied directly to Indian traders based in different Indian cities, and the remaining two supplied exporters in Birtamod. Like the farmers, none of these buyers engaged in recurrent transactions with their own buyers.

Farmers and traders used to engage in a practice known as Dahadani. In terms of this practice, forward purchase was negotiated at an agreed price or a promise to buy at a prevailing market price, and buyers would advance cash or supply foodstuffs to farmers on credit. However, this practice no longer exists and buyers no longer finance producers. Farmers believed that Dahadani exposed them to opportunistic pricing, both in selling cardamom and in purchasing foodstuffs from the buyers.

4.4.2 Chain analysis and discussion

4.4.2.1 Observed and potential dyads

Section 4.4.1 identified three dyads operating between farmers and their buyers. The characteristics of these dyads were essentially the same, although there was some variation in price offered by the buyers due to their relative position in the supply chain. Transactions are strictly cash based in all of these dyads, but are not personalised as farmers call a number of buyers when they have product to sell and trade with the buyer that offers them the best price. Cash transactions do not expose the parties to behavioural risk. There was no evidence of dyads that relied on third-party, external or internal enforcement of contracts to deal with opportunism. In other words, there was little evidence of a spot market, conventional contracting or relational contracting. Consequently, all the dyads observed in the cardamom chain were characterised predominantly by the attributes of an informal market where product standards and trading rules are poorly specified, goods are traded for cash, and transactions are independent of previous or subsequent transactions. Nevertheless, these dyads did exhibit some spot market and relational contracting properties as transactions were not strictly personalised and prices are renegotiated *ex post* when basic quality standards are not satisfied.

The discontinued Dahadani practice could be classified as a form of relational contracting; buyers paid farmers in advance, and recurrent transactions provided a means of internal enforcement. However, the evidence (see next section) suggested that the relationship was built on asymmetric information and was not fair to farmers. The advent of cellular telephone technology led to the demise of Dahadani as farmers were able to seek out better deals at low cost.

4.4.2.2 Transaction cost drivers

Producers included in the case study were located in different parts of Ilam district. Their access to physical and legal infrastructure, extension and credit services varied - primarily with distance from all-weather roads. Despite these differences, only one mode of engagement, the informal market, linked farmers and buyers. Dahadani, a form of relational contracting that had operated in the past, is no longer practiced. This section seeks to explain the absence of all but informal market transactions.

As noted previously, Dahadani involved a pre-harvest agreement to trade cardamom at a price negotiated before harvest or at the market price that prevailed when the product was exchanged. Buyers advanced cash or supplied foodstuff on credit. Dahadani appears to be a beneficial relational contract for farmers as it gave them access to finance and an assured market. However, farmers perceived the interest charges and prices offered by buyers to be unfair, and were obliged to commit a part of their next crop to redeem loans if their current crop fell short of expectations. Buyers, it seems, had an information advantage:

> *"Traders advancing money used to offer a lower price. When price was kept open, they had a tendency to complete the transaction when cardamom prices were weak. They never informed us when the price was bullish. Currently, I can check price with many buyers by mobile phone and borrow money from Nirdhan (a microfinance institution). I no longer take advance money or make a forward commitment to sell"* (Producer 1).

The attributes of the Dahadani system suggest that this type of relationship can be best described as a captive relational contract. However, such a captive relationship was not driven by mutual interdependence or by efforts to jointly create value, but by a combination of asymmetric information and the absence of alternative sources of credit. Expansion of mobile phone

technology reduced the cost of information as farmers could easily ask alternative buyers for prices. In addition, alternative sources of credit emerged and farmers were no longer dependent on finance from traders. As a result, the captive Dahadani system collapsed.

When this happened, producers switched to informal market trading that offered them better terms. A true relational contract did not develop for several reasons. First, cardamom buyers do not require tight relational contracts as they do not make asset specific investments in the cardamom trade:

> *"I hire labour to grade and clip the tails of cardamom capsules. I also pack cardamom in 10, 20 and 40kg packages, but I do not have any specific investment in the cardamom trade. Big exporters based at Birtamod also have no specific investment in this trade"* (Buyer 1).

> *"There is big investment in tea processing by entrepreneurs; hence they have to develop long-term relationships with producers. They also operate their own farms. Cardamom traders do not need to invest in such relationships due to lack of such investment in the business"* (Producer 4).

Second, environmental risk in production is high due to fungal and viral diseases. Some producers have lost their entire crop to diseases. Farmers, traders and extension staff all concurred that the government's efforts in research and extension to mitigate the disease problem were very weak:

> *"My income from cardamom has gone up in recent years, but it came from an increase in the price. Production volume has actually come down"* (Farmer 2).

"I used to sell 800kg a few years before. Last year, I could not even sell one kg of cardamom" (Farmer 4).

Likewise, price volatility is high owing to shifts in production and demand in India (and possibly in other countries). Production and price uncertainty also make it harder to anticipate contingencies and raise the cost of both relational and conventional contracting.

While mobile phone technology alleviated the problem of asymmetric price information in the farmer-buyer dyad, farmers and supporting agencies claimed that prices were not competitive as their buyers supply a small number of exporters who control the links to Indian markets. In their view, these exporters are large, well-informed and collude to keep new entrants out of the market:

"Large cardamom trade in Nepal is controlled by a few exporters. Once, a new buyer tried to export cardamom to third countries, but could not get enough supply due to manipulation of price by exporters" (Former manager of a donor-funded project).

On the other hand, the buyers claimed that prices were dictated by supply and demand in Indian markets and that there was little scope for price manipulation as mobile phone technology had made price information available to all parties:

"The price of cardamom is determined by daily prices in Delhi market. If I get a better price, I offer more to my suppliers. Farmers decide to supply me after enquiring about prices with many buyers. Artificial pricing, if any, cannot sustain for a long time" (Buyer 1)

Nevertheless, perceptions of asymmetric information and opportunistic behaviour by exporters would tend to discourage farmers from making value-adding investments:

> *"I used a solar dryer as well as gasifier technology to dry cardamom. I sent samples to buyers and they offered to pay only an additional NPR 500 per 40kg. The premium was not sufficient to recover my investment of money and effort"* (Farmer 1).

If farmers under-invest because they perceive a problem of asymmetric information, then potential solutions are to disseminate credible information and to strengthen farmers' bargaining power through collective marketing. On the other hand, if farmers under-invest because the premiums for value-adding are genuinely too low, then a potential solution is to reduce the unit costs of value-adding and of engaging in more complex transactions by pooling their produce and marketing collectively (the ginger chain highlighted the role that producer cooperatives could play in value-adding and attracting preferred buyers). In either case, collective marketing could play an important role in developing contractual relationships between producers and buyers further down the chain. Higher levels of investment would, however, also require that producer marketing cooperatives be structured in ways that encourage investment by farmers and, perhaps, by strategic partners.

Lack of confidence in the prices offered by exporters may also have contributed to the absence of well-defined grades and standards (as they would be of little value) and, consequently, to the absence of spot markets. Following the welcome demise of captive relational contracts, cardamom farmers in Ilam were left with informal trading as their only marketing channel (Figure 4.12).

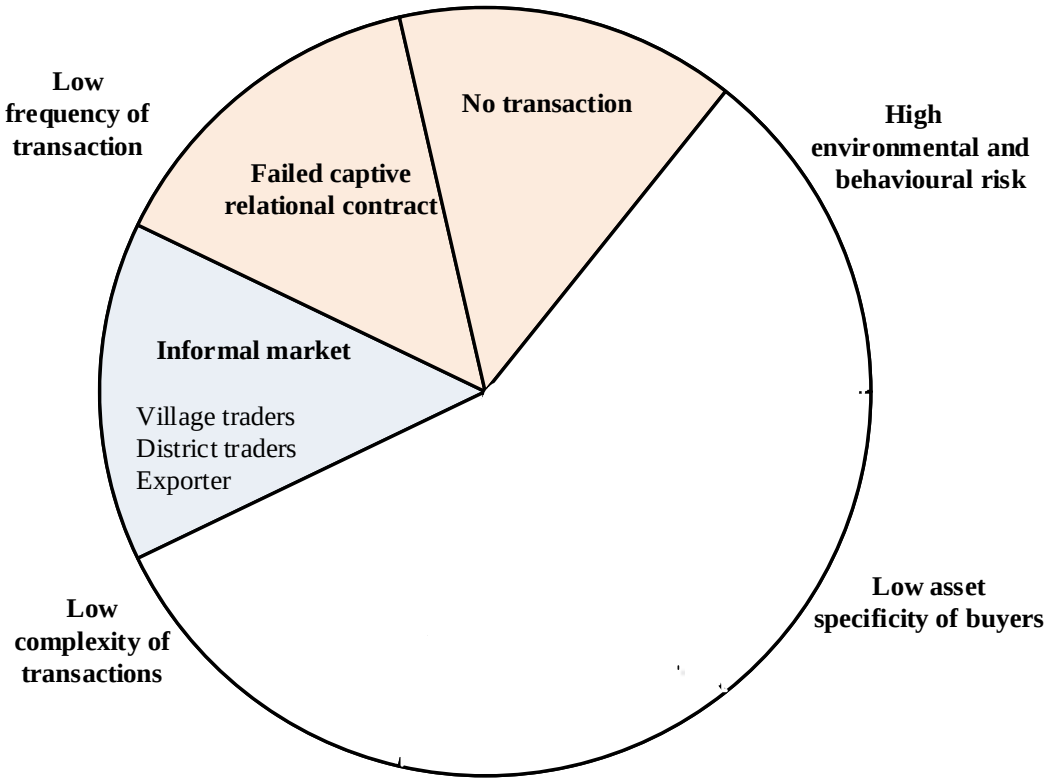


Figure 4.12: Observed modes of engagement and their drivers in the large cardamom chain

4.4.3 Conclusions and recommendations

The chain for large cardamom in Ilam is dominated by informal market trading between farmers and their buyers. The chain is not robust as it does not support dyads that offer different risk-reward profiles to small producers. The case study suggests that farmer perceptions of asymmetric price information have contributed to this situation as a lack of confidence in the credibility of prices mitigates against investment in value-adding (and hence contractual arrangements) and against well-defined grades and standards (and hence the development of spot markets). Clearly, government should consider ways of improving farmer access to reliable and timely information from Indian and domestic wholesale markets. Government should also give more attention to the vehicles it supports to promote collective marketing. Traditional cooperatives can and do help to resolve problems of asymmetric information and high unit

transaction costs, but more innovative cooperative models are required to encourage the investment needed to finance value-adding assets and activities without which new marketing channels are unlikely to develop. In addition, the case study highlighted an urgent need to address for research and development to address the cardamom disease problem.

4.5 Theoretical framework revisited

Sections 4.1 to 4.4 applied transaction cost driver model to analyse four agribusiness chains in Nepal. Table 4.11 illustrates a range of modes of enagement observed in these chains.

Table 4.11: Modes of engagement (current or historical) observed in four agribusiness chains in Nepal

Modes of engagement	Organic fresh vegetables	Conventional fresh vegetables	Ginger	Large Cardamom
'Captive' relational contract	No	No	No	Yes (past)
Informal market	Yes	Yes	Yes	Yes
Spot market	No	Yes	No	No
Conventional contracting	No	No	No	No
Relational contracting	Yes	No	Yes (past)	No
Vertical integration	Yes	No	No	No

These chains displayed all potential modes of engagement originally presented in the transaction cost driver model in Chapter 2 except for conventional contracting. The absence of conventional contracting is consistent with the model as cost-effective extenal enforcement was not available to address high levels of behavioural risk. However, the cardamom case study revealed a mode of engagement omitted from the conceptual model illustrated in Figure 2.2, Dahadani – a 'captive' form of relational contracting. This mode of engagement was associated with buyer opportunism to take advantage of asymmetric information and the absence of anternative sources of credit. The captive relational contract observed in the cardamom chain differs from the captive supply contract described by Gereffi et al. (2005) which was aimed at

adding value by strenghtening the capacity of small farmers to meet rigourous product specifications. In the case of Dahadani, the captive relationship fits the lower end of the vertical coordination continuum as the risk-reward profile of informal market transactions was preferred to that of Dahadani. Figure 4.13 offers a revised version of the conceptual model.

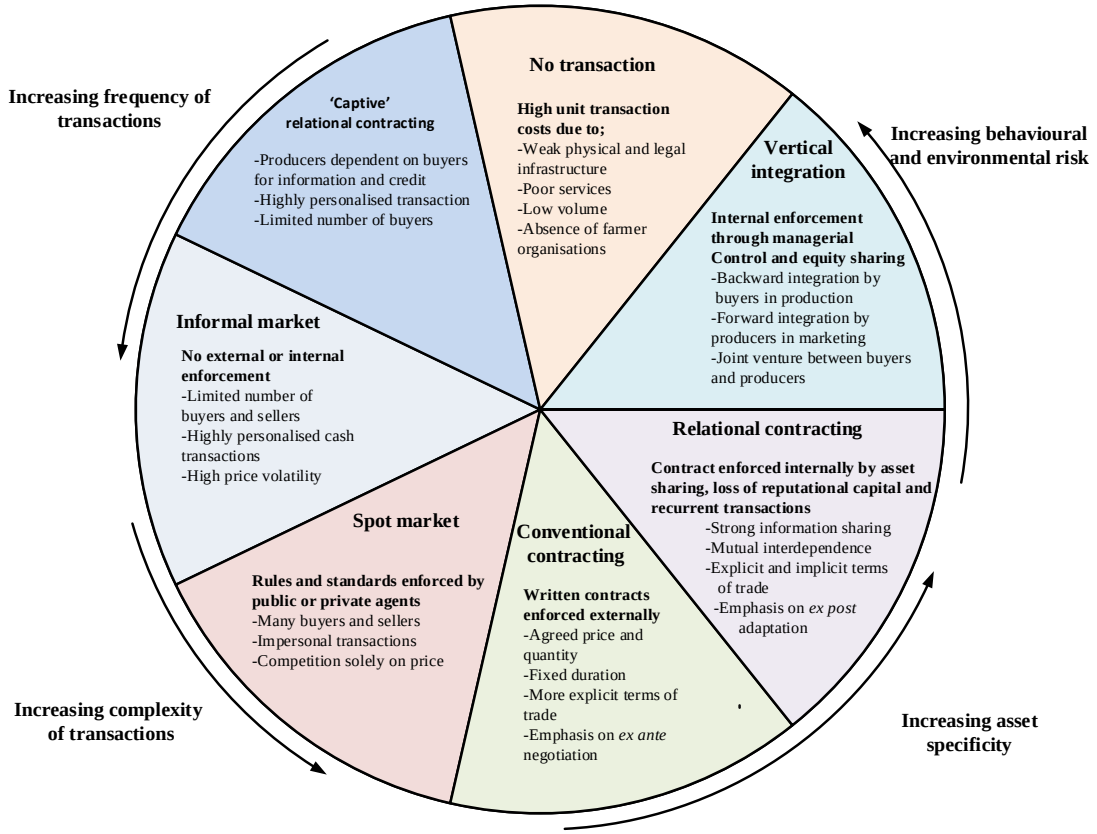


Figure 4.13: Revised conceptual model

4.6 Chapter summary

This chapter presented individual case descriptions, their analysis and conclusions. These case studies highlighted the relationship between transaction cost drivers and modes of engagement available (or unavailable) to producers in a within-case context. The findings of these case studies informed a revision of the conceptual model.

Chapter 5

Cross-case comparisons

Chapter 5 examines the effect of external attributes (product attributes, market structure and the enabling environment) on modes of engagement available (or unavailable) to smallholders across case studies. To control for obvious differences in product attributes (perishable vs. storable) and market structure (domestic vs. export), the analysis compares chains within the spice group (cardamom vs. ginger) and then within the fresh vegetable group (organic vs. conventional).

5.1 Large cardamom and ginger supply chains

Observed and failed modes of engagement in the supply chains for large cardamom and ginger are reproduced in Figure 5.1, along with the revised conceptual model developed in Section 4.5. *De facto,* the chains looked similar because informal market trading was the only mode of engagement available to producers at the time of the study. However, trajectories to this informal market were different in these chains. In the large cardamom chain, producers switched to the informal market from a 'captive' form of relational contracting. In the ginger chain, producers switched from the informal market to relational contracting and back to the informal market when relational contracts collapsed.

Transaction cost drivers that were instrumental in equalising the modes of engagement observed in each of these chains at the time of the study were discussed in Sections 4.3 and 4.4. This section focuses on external attributes associated with this outcome.

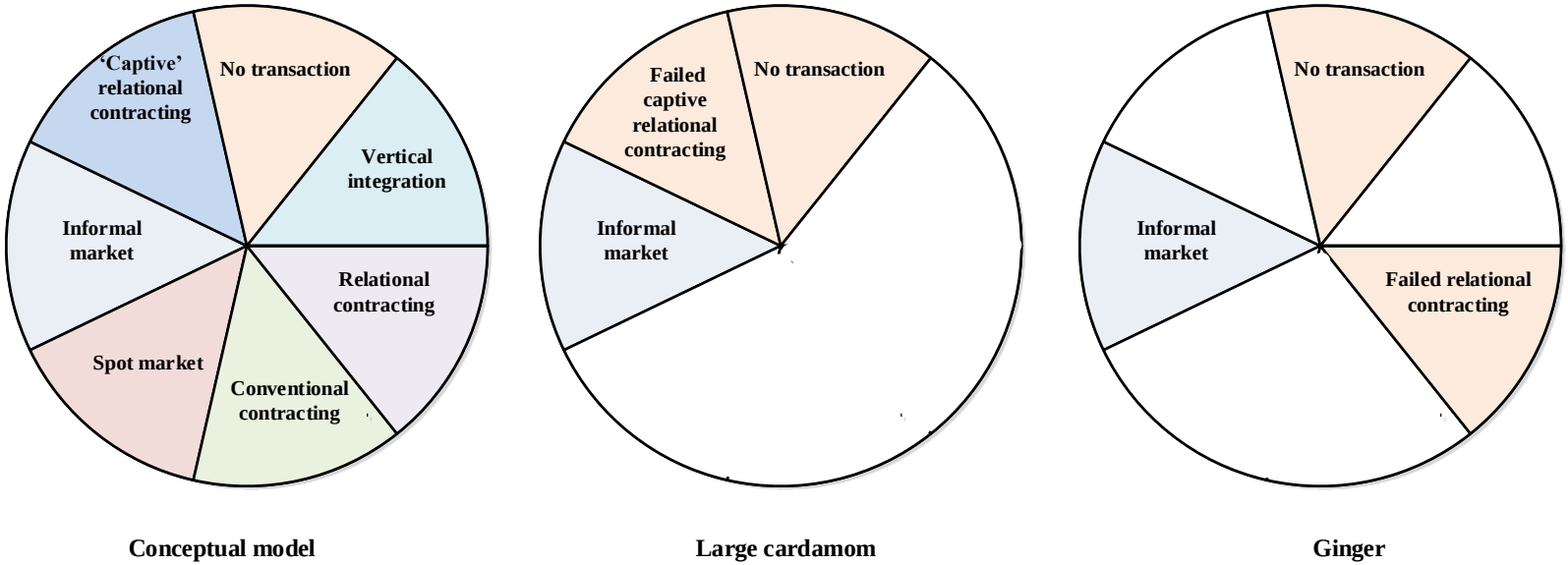


Figure 5.1: Revised conceptual model vs. observed and failed modes of engagement in the spice chains

Table 5.1: External attributes of observed farmer-buyer dyads in the spice chains

Attributes	Large cardamom	Ginger
Biological product attributes		
Product traded	Dried capsules	Fresh rhizome
Crop biology	Perennial with a long gestation period	Annual
Bulkiness	Low	High
Storability	Long	Short
Harvest season	Once per year	Once per year
Market product attributes		
Product uses	Consumption and industrial	Consumption and industrial
Product differentiation	None	None
Compliance requirement	None	None
Market structure		
Export vs. domestic	Export	Primarily export
Alternative local buyers	Many	Many
Alternative suppliers	Many	Many
Intermediaries in the supply chain	Many	Many
Grades and standards	Basic quality standards enforced by buyers	Basic quality standards enforced by buyers
Enabling environment		
Collective marketing	No	Yes
Access to finance	Self-help groups/Micro-finance institutions	Via cooperatives
Mobile telephone	Now available	Now available
Road access	All-weather road connected nearby market centre but not farms	All-weather road connected nearby market centre but not farms
Research and extension advice	Available from government extension agency (perceived as weak)	Available through cooperative and government agency
Formal legal system	Unavailable or costly	Unavailable or costly

Table 5.1 compares the external attributes characterising the cardamom and ginger chains. These attributes can influence transaction costs and may have been instrumental in shaping the dyads observed in the chains. The impacts of these external attributes on modes of engagement are discussed in this section.

5.1.1 Biological product attributes

Large cardamom is a perennial crop that takes at least four years to produce its first economic harvest. Farmers dry the fruit capsules to reduce their volume and to improve their storability. Ginger, on the other hand, is an annual crop. Its rhizomes are bulky and cannot be stored for a long once harvested. However, farmers can postpone harvesting if they expect prices to rise. Although drying techniques are available, it is not common. Both cardamom and ginger are harvested once a year and trading is seasonal.

Cardamom's long gestation period increases the level of asset specific investment made by farmers who grow the crop on land suited to annual crops. However, cardamom is easy to store, allowing farmers to wait for favourable prices and so reduce their risk of hold-up. Likewise, the ability to delay harvesting helps ginger farmers to avoid hold-up problems even though the crop is perishable. This alleviates the need to develop complex contractual arrangements in the spice chains. Ultimately, differences in crop biology, bulkiness and storability between cardamom and ginger did not alter the way producers and buyers engage in these supply chains.

5.1.2 Market product attributes

Large cardamom and ginger are either consumed directly or as a minor input in a manufactured end product (such as spice blends). Even in direct consumption, they constitute a small fraction of the consumer's food basket. The markets served by the surviving dyads observed in this study do not require a differentiated product and therefore do not impose high levels of

compliance on farmers. India's recent introduction of pest risk analysis (PRA) had not affected production or postharvest practices observed in the case studies. Interestingly, ginger is still exported without basic cleaning. This suggests that either the ginger exports are pest free or that exporters may have found ways of avoiding PRA at border control points.

In the absence of product differentiation and rigorous compliance requirements, it is easy for buyers and suppliers to find alternative trading partners and to transact without negotiating complex contractual terms. However, evidence from the ginger supply chain indicates that some markets do value a differentiated product (dried ginger slices). Attempts to exploit this market failed, apparently due to flaws in the model adopted for collective marketing (Section 5.1.4.1).

5.1.3 Market structure

The observed spice chains are long, primarily serving Indian markets and involving many intermediaries. Both chains comprise many growers and buyers. Cardamom prices are perceived to vary with quality (size, colour and aroma), but buyer enforced quality standards are highly subjective and premiums are trivial. In the ginger chain, quality standards are limited to sorting of insect infested and rotten rhizomes.

Collective marketing and mobile telephone services alleviated the problem of asymmetric information in the farmer-buyer dyads of the ginger and cardamom chains. However, the flow of information from export markets is constrained by long chains with many intermediaries that span international borders, and farmers were not convinced that prices offered by exporters were market related.

Cardamom exporters add value by tail-clipping and grading capsules by size and colour and ginger rhizomes are cleaned in India before they are sent to markets. This suggests that grades and standards exist further down the chain. It is not clear why grades and standards do not

characterise upstream transactions. It may be that downstream buyers are able to capture more value by appropriating this function or that it is costly to enforce quality standards in small transactions with many suppliers. In either case, the absence of well-defined grades and standards at the farm gate serves to heighten concerns about the credibility of prices offered by exporters.

The absence of well-defined grades and standards could also explain the absence of spot markets despite the presence of many suppliers and local buyers in the chain. In addition, perceptions of asymmetric information discourage farmers from investing in value-adding activities, which may have constrained the emergence of more complex contractual arrangements.

5.1.4 Enabling environment

5.1.4.1 Collective marketing

Collective marketing was observed in the ginger chain, but not in the cardamom chain. At first glance, the apparent unimportance of collective marketing in distinguishing modes of engagement is surprising, as cooperation is expected to reduce unit transaction costs and to facilitate joint investment in value-adding assets and so lead to more complex modes of engagement. However, collective marketing failed to create new modes of engagement in the ginger chain despite increasing the volumes and frequency of transactions, and attracting large buyers. A possible explanation is that the producer cooperative was established along traditional lines with institutional arrangements that created a horizon problem (Cook, 1995). This institutional problem discourages investment in value-adding assets and encourages decision-making that favours short-term gains over long-run growth. Under-investment in dryer capacity and a temporary increase in the price of fresh ginger discouraged the cooperative from maintaining its relational contract with an exporter to supply dried ginger slices. Nonetheless,

collective marketing in the ginger chain attracted preferred buyers and strengthened the bargaining power of producers, enabling them to secure better trading terms. In the cardamom chain, the absence of collective marketing not only precluded farmer investment in value-adding assets, but also denied farmers the opportunity to bulk up supplies, reduce unit transaction costs and attract a preferred buyer.

5.1.4.2 Access to credit and information

Cardamom producers were locked into credit relationships with buyers until micro-finance institutions and local saving groups emerged and provided alternative sources of credit. Likewise, reliable and affordable price information was unavailable before the expansion of mobile phone services. Access to alternative sources of credit and information help to reduce producers' dependency on buyers and was instrumental in releasing them from a 'captive' relationship in the cardamom chain. However, it did not lead to spot market trading – possibly for the reasons discussed in Section 5.1.3. Improved access to credit and information appears to have played a significant role in alternating the mode of farmer-buyer engagement.

5.1.4.3 Roads

All-weather roads link market centres, but not farms in these spice chains. Road access has improved following recent public works connecting interior villages. Better access to roads should reduce transport costs for both producers and buyers, but is unlikely to alter the mode of engagement while there is under-investment in value-adding assets or a perception that prices offered by exporter lack credibility.

5.1.4.4 Research and extension

Farmers received extension advice from government extension agencies in both chains, and – in the case of the ginger chain – from local advisors trained by the cooperative with support from a donor funded project. Extension advice was perceived to be weak in the cardamom chain and was considered to be a major reason for production uncertainty. This poor perception of extension advice may reflect the severity of production problems encountered by cardamom farmers. Research that resolves production problems combined with an improved extension service should improve yields and quality. However, such improvements are unlikely to create new marketing channels for smallholders.

5.1.4.5 Formal legal system

There was no evidence of parties relying on the legal system to enforce contracts in either chain. This could reflect the absence of an efficient and affordable legal system. However, improvements to the legal system may do little to encourage conventional contracting while crop yields and export markets are so uncertain. In this situation, quality, research, extension and market information are first required to reduce environmental risk.

5.2 Conventional and organic fresh vegetable supply chains

Modes of engagement observed in the vegetable chains are reproduced in Figure 5.2, along with the revised conceptual model developed in Section 4.5. These chains displayed some similarities and differences in modes of engagement in the farmer-buyer dyad. The striking difference between these chains was the importance of spot market trading in the conventional vegetable chain compared to relational contracting in the organic vegetable chain.

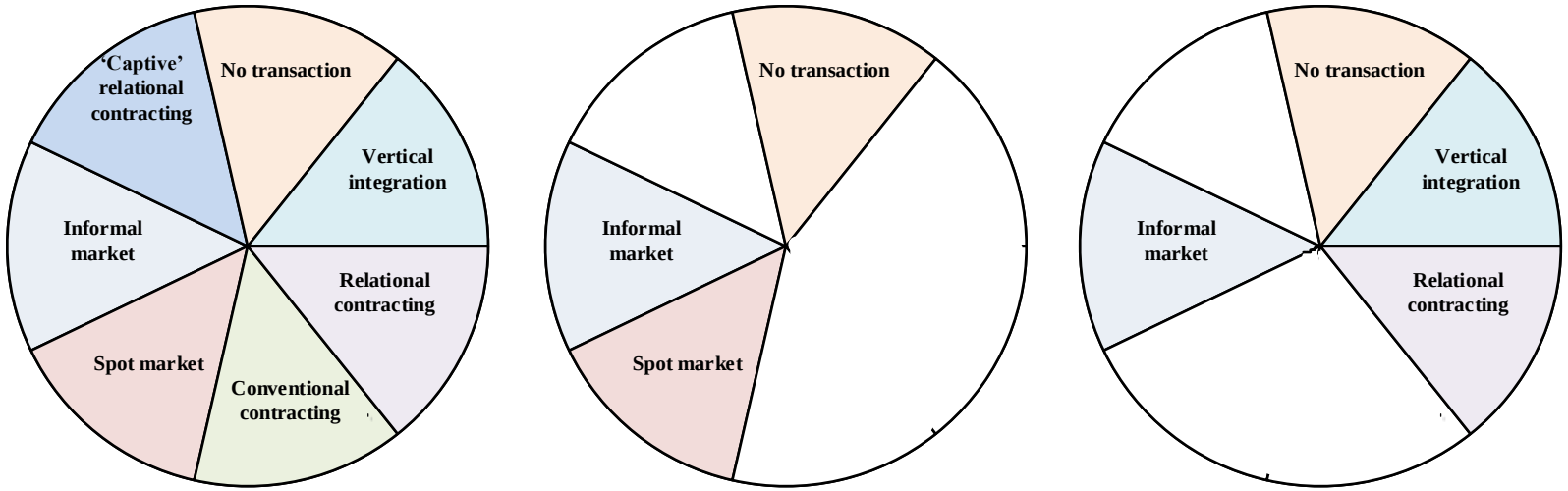


Figure 5.2: Revised conceptual model vs. observed and failed modes of engagement in the vegetable chains

Table 5.2: External attributes of observed farmer-buyer dyads in the vegetable chains

Attributes	Conventional vegetables	Organic vegetables
Biological product attributes		
Crop biology	Seasonal	Seasonal
Bulkiness	High volume	High volume
Storability	Short	Short
Harvest season	Different vegetables throughout the year	Different vegetables throughout the year
Market product attributes		
Product uses	Consumption	Consumption
Product differentiation	No	Yes
Compliance requirement	None	Organic production practices
Market structure		
Export vs. domestic	Domestic market	Domestic market
Alternative buyers	Many	Limited
Alternative suppliers	Many	Limited
Intermediaries in supply chain	Many	Few
Grades and standards	Basic standards enforced by buyers. No third party enforcement	Basic standards enforced by buyers. No third party enforcement
Distance to market	17-150 km	2-25 km
Enabling environment		
Collective marketing	Present	Present
Access to finance	Via cooperative	Via cooperative
Mobile telephone	Available	Available
Road access	All-weather roads	All-weather roads
Extension advice	Available from government extension agency	Available from government extension agency, buyers and NGOs
Formal legal system	Unavailable or costly	Unavailable or costly

The organic vegetable chain also exhibited vertical integration by a buyer. Informal market transactions were observed in both chains, but conventional contracting was not observed in either chain. Transaction cost drivers that fashioned modes of engagement in the vegetable chains were described in Sections 4.1 and 4.2. This section focusses on external attributes that affect these drivers and which help to explain important differences in modes of engagement observed in the vegetable chains. Table 5.2 lists external attributes of the vegetable chains.

5.2.1 Biological product attributes

Both chains deliver a very similar mix of seasonal vegetables that are bulky and highly perishable. Vegetables are traded throughout the year, but with distinct peak and off-peak trading seasons. These product attributes increase the frequency and complexity of transactions as well as environmental risk, and could be expected to encourage closer vertical coordination between farmers and their buyers. Consequently, differences in the modes of engagement observed in these chains most likely reflect factors other than biological product attributes.

5.2.2 Market product attributes

The vegetable chains serve consumers in the fresh produce market. The chain for organic fresh vegetables involved a differentiated product that required compliance with organic production practices. The absence of third party certification meant that buyers and producers had to collaborate in order to meet their objectives - organic compliance for buyers and a price premium for growers. Under these conditions, impersonal transactions are unlikely to meet traders' objectives even if more buyers and suppliers enter the chain. Consequently, relational contracting emerged as the dominant mode of engagement between buyers and suppliers in the organic vegetable chain. Farmers and buyers adopted a variety of risk-reward sharing mechanism in relational contracts to promote contract enforcement. However, there was evidence of a buyer vertically integrating into production as he was not satisfied with the level

of organic compliance achieved by farmers. In the conventional vegetable chain, the absence of product differentiation and compliance requirements helps to explain the absence of relational contracts.

5.2.3 Market structure

The conventional vegetable chain comprised of many buyers and sellers. The organic vegetable chain, however, hosted a relatively small number of buyers and sellers. The conventional chain made use of modest quality standards based on tangible search attributes such as freshness, maturity stage and signs of disease and pest infestation. In the organic chain, quality standards were based on these same search attributes and a credence attribute that required farmers to use organic production methods. Buyers enforced these quality standards in both chains.

The large number of buyers and suppliers operating in the conventional vegetable chain made it easy to find alternative trading partners. Transactions in this chain were not complex as the quality standards were modest and readily observable. Consequently, there was little need for contractual modes of engagement. The organic vegetable chain was quite different. With few buyers and sellers to choose from, contractual arrangements were more likely to develop as both parties faced uncertainty in finding a suitable trading partner. Moreover, the organic credence attribute implies asset specific investment and higher levels of behavioural risk - particularly when there are few trading partners to mitigate the threat of hold-up. Under these conditions, impersonal spot market transactions were unlikely in the organic vegetable chain.

The vegetable chains serve consumers in domestic markets. The chain for organic vegetables is generally shorter in terms of both distance and the number of intermediaries. This is consistent with the finding in Section 5.1 that long chains are prone to problems of asymmetric information – a problem that is expected to become more pronounced when product quality is defined in terms of both search and credence attributes. All else being equal, relational

contracting is less likely to occur when markets are located a long way from growers and involve many intermediaries.

5.2.4 Enabling environment

5.2.4.1 Collective marketing

Marketing cooperatives played a major role in linking smallholders to markets in both vegetable chains, but they played quite different roles in the organic and conventional chains. In the conventional vegetable chain, the cooperative facilitated spot market transactions between farmers and buyers. In the organic vegetable chain, the cooperatives bulked up supplies and negotiated relational contracts with buyers. In both instances, collective marketing helped to reduce transaction costs for buyers and sellers and attracted preferred buyers.

All of the cooperatives observed in the case studies were structured as traditional marketing cooperatives. Differences observed in their modes of engagement are therefore not explained by differences in their institutional arrangements, but more likely by differences in market product attributes and market structure. Cooperatives were able to enforce trading rules that promoted impersonal transactions at their collection depots when competing buyers were available and were not looking for quality standards beyond those based on tangible search attributes. However, a closer relationship had to be forged with buyers when selling vegetable products characterised by both search and credence attributes. Although larger farmers were able to contract individually with organic buyers, collective marketing provided a vehicle for small farmers to engage buyers in relational contracts. Collective marketing may also facilitate peer monitoring of organic compliance in the absence of third-party certification. Traditional cooperatives, however, find it difficult to deliver the consistent supplies required by buyers as they reward members for patronage (rather than investment) and do not restrict membership (unlike NGCs and proportional investment cooperatives). This may explain why some organic buyers integrated backwards into farming.

Conventional vegetable farmers continue to sell their produce at wholesale wet markets, but the frequency of these transactions diminished with the introduction of marketing cooperatives. Transactions conducted in wholesale wet markets are viewed as informal transactions owing to the absence of trading rules (like the payment rules imposed by cooperatives) that facilitate impersonal spot market transactions.

5.2.4.2 Access to information and credit

Price information at Kathmandu's wholesale wet market is reported in a daily radio broadcast. However, the reports are a day late and price information from other markets is not broadcast. Farmers usually check price information by contacting traders operating in wholesale wet markets and other collection depots in their vicinity. The introduction of mobile telephone services significantly eased this process and minimised levels of information asymmetry. Reduced levels of information asymmetry, together with modest quality standards and trading rules, were sufficient to facilitate fairly impersonal spot market transactions in the chain for conventional vegetables. The case studies did not reveal any clear link between access to credit and different modes of engagement observed in the organic and conventional vegetable chains as farmers in both chains were able to borrow small amounts from local cooperatives.

5.2.4.3 Roads

The case study sites were well-connected by all-weather roads. Easy physical access and the availability of transport services encouraged many buyers to make regular procurement visits in the chain for conventional vegetables. Similarly, farmers can supply wholesale wet markets in different towns in response to better prices. All weather roads also allowed organic vegetable farmers to reach more buyers. Improved roads are expected to offer significant savings to both famers and buyers, particularly with regard to transport costs, but are unlikely to alter the modes of engagement used by smallholders.

5.2.4.4 Research and extension

Both organic and conventional vegetable farmers have access to government extension services. Farmers in the organic chain often benefit from private extension services provided by NGO's and buyers. Advisory services provided buyers tend to be attributes of relational contracts rather than antecedents of closer relationships. Likewise, extension advice provided by government or non-government agencies is unlikely to alter modes of smallholder engagement unless it is specifically aimed at linking smallholders to markets.

5.2.4.5 Formal legal system

Transactors in the vegetable chains did not rely on the formal legal system to enforce supply contracts. This is often the case when small volumes are being traded as the cost of legal enforcement is likely to exceed its expected benefits. Kirsten and Sartorius (2002) argue that high costs of contract enforcement make contract farming unattractive in developing countries with weak legal institutions. While improvements to the legal system are unlikely to promote conventional contracting in undifferentiated products with many buyers and sellers, easier and more affordable contract enforcement could make conventional contracting a viable mode of engagement for cooperatives in the organic vegetable chain. However, this will most probably require investments in organic certification to verify the credence attributes.

5.3 Chapter summary

This chapter made cross-case comparisons within the vegetable and spice chains and identified the effects of external attributes on the observed modes of engagement. The findings of the chapter are discussed in Chapter 6 to draw conclusions and make policy recommendations.

Chapter 6

Discussion and conclusions

6.1 Introduction

The aim of this research was to identify effective ways of improving chain robustness from a smallholder perspective. The rationale behind this study was that the literature on chain performance focused on whole chain issues and did not consider smallholder issues. The study proposed that a chain is robust if it provides smallholders with one or more sustrainable modes of engagment. A mode of engagement is regarded as sustainable if it shares risk and reward in a way that is considered acceptable by both buyers and sellers. A chain that gives smallholders more choice in selecting a sustainable mode of engagement, or a portfolio of such modes, that maximises their utility is considered more robust than one that offers less choice.

The literature reviewed in Chapter 2 led to the development of a model based on NIE to explain modes of engagment in the farmer-buyer dyads. This model was used to analyse agribusiness chains in Nepal adopting a qualitative, multiple case study research design (Chapter 3). The supply chains and repondents were selected purposively to ensure both theoritical and literal replication. Data were collected from semi-structured interviews with farmers, buyers and service providers.

Four agribusiness supply chains were examined for modes of engagment available (and unavailable) to smallholders, and their transaction cost drivers (Chapter 4). This process revealed some interesting insights into modes of engagement and was the basis for recommentations to increase chain robustness within a single case context. The analyses also led to the revision of the theoretical model to incorporate an unanticipated mode of engagement (Section 4.5). The four supply chains were divided into two groups based on product attributes and market structures for cross-case analysis (Chapter 5). These cross-case comparisons were

aimed at comparing and contrasting the effects of external attributes on modes of engagment within the vegetable and spice chains that were studied. This chapter starts with a synthesis of the research and discussion of its key findings in relation to the research objectives, which are restated below:

- To identify and characterise modes of engagement that are used or not used by smallholders
- To explain why these modes of engagement are used or not used
- To assess chain robustness from a smallholder perspective using this understanding of engagement or non-engagement
- To recommend ways of promoting sustainable smallholder engagement in supply chains

Consideration is then given to policy implications and limitations of the research. The chapter concludes with a comment on the contribution of the study.

6.2 Research synthesis and conclusions

6.2.1 Identification and characterisation of modes of engagement

The theoretical model proposed in Section 2.6, individual case studies reported in Sections 4.1-4.4 and the revised model presented in Section 4.5 help to identify and characterise modes of engagement used (or not used) by smallholders. Much of the existing literature presents spot markets and vertical integration as polar opposites in the vertical coordination continuum, although there is divergence in defining intermediate modes of engagement between these two extremes (Gereffi et al., 2005; Hobbs & Young, 2001; Jaffee, 1995a; Peterson et al., 2001; Williamson, 1979). This study modified the usual approach by including the informal market as a mode of engagement and connecting the ends of the continuum via a ‘no transaction’

segment to close the circle. This segment was deliberately positioned adjacent to the 'vertical integration' segment as vertical integration can exclude smallholders from the market.

Although the literature recognises the problem that smallholders are often excluded from markets by high unit transaction and marketing costs (Dolan & Humphrey, 2000; Pingali et al., 2005; Poulton et al., 2006; Vorley et al., 2009), traditional descriptions of the vertical coordination continuum do not account for missing dyads. The inclusion of missing dyads in the model is consistent with Benham and Benham's (2000) argument that not all potential transactions actually occur, and finding why a particular transaction is undertaken requires knowledge of why some potential transactions are missing.

The distinction between spot markets and informal markets is especially important when analysing chains from a smallholder perspective. Following North (1990), the model asserts that spot market transactions occur when there is perfect information and rules and standards are enforced by public or private agents to facilitate impersonal transactions based purely on price. In the absence of perfect information and rules and standards, producers and buyers have to engage in highly personalised cash transactions to avoid behavioural risk. A shift from informal to spot market trading is theorised to occur when more buyers and sellers enter the chain, exchange parties have relevant information, trading rules are enforced, and product standards are easy to measure, attain and monitor. While Gereffi et al. (2005) note that spot market transactions do not have to be entirely impersonal and can persist over time with repeat transactions, they did not go on to distinguish between spot markets and informal markets.

The conceptual model developed to explain modes of engagement in the farmer-buyer dyad was empirically applied to four agribusiness chains in Nepal (Sections 4.1-4.4). Application of the model supported the distinction made between spot markets and informal markets. Many transactions previously interpreted as spot market transactions (such as those in wholesale wet markets) were better characterised as informal market transactions. This finding has an

important policy implication as spot market transactions appear to be constrained by an inadequate enabling environment.

Empirical application of the model also revealed the existence of captive relational contracts, which have the superficial appearance of a relational contract due primarily to their recurrent nature. However, the captive relationships observed in this study were devoid of other attributes that characterise relational contracting, such as mutual interdependence, information sharing and the ability of both parties to apply internal enforcement measures that curtail opportunism. Instead, the captive relational contracts observed in this study were vulnerable to opportunism as smallholders had to rely on buyers for information and credit. These relationships collapsed when improvements in the enabling environment allowed smallholders to participate in informal markets that offered them better utility outcomes.

Captive relationships have previously been described in the literature as highly coordinated contractual arrangements (Gereffi et al., 2005). However, this study - which focuses on the robustness of chains – found that captive relationships did not share the attributes of relational contracts and provided less utility than informal market transactions. This finding also supported the proposition that relational contracts are sustained by internal enforcement measures available to both parties and not just by mutual promise or trust. Carson, Madhok and Wu (2006) and Wu (2006) also note that relational contracts are not immune to opportunism. However, such opportunistic relational contracts are not classified as a distinct mode of engagement in the literature.

The revised theoretical framework raises some pertinent question: (i) How can smallholders step up from captive relational and informal transactions? (ii) How can engagement be encouraged where none exists? (iii) How can chain robustness be maintained? These questions are addressed in the following section.

6.2.2 Why modes of engagement are used or not used

This section synthesises the key findings reported in Chapter 5 and relates them to existing literature.

6.2.2.1 Biological product attributes have little impact on modes of engagement

Biological product attributes were found to influence several transaction cost drivers in the chains studied. However, similar biological product attributes were associated with different modes of engagement in the vegetable chains, and different biological product attributes were associated with similar modes of engagement in the spice chains. This suggests that factors other than biological product attributes determined the modes of engagement observed in the study.

The impacts of biological product attributes on transaction cost drivers have been described in the literature (Hobbs & Young, 2001; Jaffee, 1995a, 1995b) with different views expressed on their relationship with modes of engagement. Martinez (2002) found that product perishability favoured contracts and vertical integration in US poultry, egg and pork industries. However, Jaffee (1995a) did not find any consistent effect of biological product attributes on modes of smallholder engagement in his study of horticultural export chains in Kenya. It is plausible that the relative importance of biological product attributes (when compared to other attributes) may have differed between these studies.

6.2.2.2 Market product attributes can impact on modes of engagement

Market product attributes were found to alter modes of engagement in the chains studied. The study showed that products possessing only search attributes were traded in either spot or informal markets as the attributes being traded could be visually assessed. In contrast, products with both search and credence attributes exposed both growers and buyers to a hold-up problem

due to asset specificity and information asymmetry in the absence of third party certification. Such products were traded via relational contracts involving internal enforcement mechanisms such as close monitoring, reputational capital and repeat transactions. The compliance standards required by buyers to confirm credence attributes varied in the chains studied, and that buyers who were not satisfied with internal mechanisms integrated back into production.

Past studies have shown that vertical integration is often the preferred mode of engagement when products have credence attributes and there is no scope for third party certification (Raynaud et al., 2005; Vetter & Karantininis, 2002). Dolan and Humphrey (2004) found that stringent product and process standards specified by UK supermarkets promoted vertical integration by Kenyan fresh vegetable exporters. However, Pascucci (2010) argued that relational contracting could be the preferred mode of engagement between locally based buyers and sellers to trade products with credence attributes.

6.2.2.3 Market structures can influence modes of engagement

The study showed that a long chain with many intermediaries is vulnerable to asymmetric information as farmers perceive that prices are not market related. Farmers' perceptions of asymmetric information in the long export chains for cardamom and ginger discouraged investment in value-adding assets and deterred efforts to establish and comply with grades and standards. As a result, farmers traded undifferentiated products in informal markets.

Jaffee (1995a) found a similar kind of information asymmetry in Kenya where markets in Nairobi were distanced from production sites by weak infrastructure. Trienekens (2011) attributed this problem to inadequate end market information in long chains with many intermediaries. Grades and standards can minimise information costs and their importance is more pronounced when transactions take place between distant parties (Jaffee, 1995b). While the role of grades and standards in reducing information costs and increasing market efficiency

is undisputed, this study showed that unreliable price information can also decrease the credibility of grades and standards, suggesting that their introduction should be complemented with improvements in the flow of information.

6.2.2.4 Collective marketing helps, but the traditional cooperative structure constrains the development of new modes of engagement

Collective marketing was found to reduce unit transaction costs for buyers and growers, afford more bargaining power to producers and attract preferred buyers. Marketing cooperatives also enabled farmers to trade products with credence attributes via relational contracting. In addition, marketing cooperatives facilitated impersonal transactions in commodity chains serving domestic markets by enforcing trading rules relating to payment and by providing a physical sales depot. This showed that marketing cooperatives can play an important role in creating or shifting modes of engagement for smallholders. However, marketing cooperatives did little to attract member and lender investment in the value-adding assets needed to sustain relational contracts in the spice chains, and this resulted in a shift back to informal market transactions.

Similar findings about the role of producer marketing organisations in reducing unit transaction costs and increasing the bargaining power of producers have been reported by Chowdhury, Negassa and Torero (2005) in Kenya and India, and Okello and Swinton (2007) in Kenya. Narrod et al. (2009) found that well organised producer groups can monitor food safety standards and can even satisfy traceability requirements of buyers.

While the role of producer organisations in pooling resources and spreading the costs of lumpy investment has been highlighted in the literature (Jaffee, 1995; Okello & Swinton, 2007; Poulton & Lyne, 2009), it is unfortunate that Nepal adopted a traditional cooperative model to promote collective marketing as traditional cooperatives do not generate strong incentives for investment (Chaddad & Cook, 2004; Cook, 1995). Instead, they created incentives for

producers to take advantage of high prices in spot and informal markets at the expense of relational contracts with long-term benefits. Beverland (2007) reported similar findings in his comparison of traditional and New Generation Cooperatives in New Zealand. Such an outcome is entirely inconsistent with the notion of value adding, especially when contracts are complex and external enforcement via the legal system is not a viable alternative to internal enforcement.

6.2.2.5 Changes in the enabling environment can create new modes of engagement

The study showed that the expansion of mobile telephone services reduced the cost of information and alleviated the problem of information asymmetry in the farmer-buyer dyad. In addition, the emergence of rural financial institutions provided alternative sources of credit. Access to alternative sources of information and credit was instrumental in releasing producers from captive relational contracts, allowing them to transact in informal markets that offered better utility outcomes. This clearly demonstrated the important role that changes in the enabling environment can play in expanding the marketing choices available to smallholders.

Ali and Kumar (2011) found that Indian farmers benefited from the use of information and communication technologies (ICT) when making production and marketing decisions. The contribution of mobile telephones in reducing information asymmetry between producers and markets in developing countries has been well documented (Mittal & Tripathi, 2008; Trienekens, 2011). Mittal and Tripathi (2008) point out, however, that the beneficial effects of mobile telephones depend on the quality and timeliness of information. This was clearly evident in the study chains as the availability of mobile telephones improved the flow of information in the farmer-buyer dyad, but did not fully address the problem of asymmetric information owing to the absence of credible market information further down the chain. The finding relating to credit is consistent with other studies that attribute opportunistic pricing on the part of buyers to a lack of formal financial services (Poulton et al., 1998; Wheatley & Peters, 2004).

6.2.2.6 Extension services and the formal legal system did not impact on modes of engagement

Extension services did not appear to have any influence on modes of engagement in the study chains. The apparent insignificance of extension services in creating new modes of engagement may, however, only reflect the limitations of a service that focuses on providing technical knowledge for improved productivity (Anderson, 2007). Evidence from sub-Saharan Africa suggests that outsourced extension can bring a market orientation to advisory services, emphasising linkages between farmers and markets (Heemskerk, Nederlof & Wennink, 2008).

The study also suggested that the formal legal system does not affect modes of engagement. This does not necessarily imply that the formal system is missing or unreliable. Enforcing a conventional contract in a court of law is often prohibitively expensive if the volume transacted is small. Internationals studies have shown that buyers are reluctant to engage in conventional contracts with small farmers (Coulter, Goodland, Tallontire & Stringfellow, 2009; Dolan & Humphrey, 2000; Kirsten & Sartorius, 2002). Apart from the high cost of enforcing small contracts, the buyer has little prospect of being compensated when contract default stems from environmental risk. Nevertheless, interventions that reduce the private cost of enforcing conventional contracts could open an additional mode of engagement for smallholders. As matters stand, buyers have resorted to private mechanisms to improve contract compliance, such as cooperation among buyers, embedded services, recurrent transactions, close communication, effective monitoring and working through producer groups (Coulter et al., 2009; Kirsten & Sartorius, 2002). Zylberberg (2013) reported a model of arbitration by the Horticultural Crop Development Authority in their study of a Kenyan smallholder flower chain.

6.2.3 Chain robustness from a smallholder perspective

The spice chains afforded smallholders only one sustainable mode of engagement (the informal market) whereas the vegetable chains provided small growers with opportunities to engage in relational contracts, spot markets and informal markets. The obvious conclusion is that the vegetable chains are more robust than the spice chains as they offer smallholders a choice in selecting a portfolio of engagement modes that best satisfy their risk-reward preferences.

It is tempting to conclude that the spice chains are also robust given the apparent durability of their informal markets. However, an earlier study of the cardamom chain might have drawn a similar conclusion about captive relational contracts. When the enabling environment improved, these contracts gave way to informal market transactions that offered small farmers a better risk-reward outcome. This implies that a chain is not necessarily robust simply because it has a durable mode of engagement. Durability may signal imperfections in the enabling environment that preclude superior modes of engagement. Indeed, farmers interviewed in this study associated the informal spice market with high levels of information asymmetry.

While it is true that a single mode of engagement does not necessarily imply a lack of robustness, it is unlikely that any one mode of engagement will be optimal for all farmers as they face different transaction costs and risks, and have different levels of risk aversion. The key issues are the risk-reward outcomes offered by the available modes, and whether or not the chain allows smallholders to choose an alternative mode of engagement, or a mix of modes, that best maximises their utility. Interventions aimed at improving the robustness of supply chains should therefore seek not only to expand the modes of engagement available to smallholders but, as a first step, to make existing modes more sustainable by improving their risk-reward outcomes for small farmers.

6.2.4 Ways of promoting sustainable smallholder engagement in supply chains

Section 6.2.2 discussed the impacts of external factors on modes of engagement available to smallholders, and Section 6.2.3 discussed chain robustness with respect to the availability of modes of smallholder engagement. Sections 4.1-4.4 presented conclusions and recommendations specific to the individual case studies. This section draws general conclusions about ways of making supply chains more robust for smallholders, and considers their policy implications.

The study demonstrated that changes in the enabling environment - particularly access to information and credit - can open more beneficial modes of engagement to smallholders. Although the widespread availability of mobile telephone services has made it easy for farmers to compare prices offered by alternative buyers, information asymmetries persist owing to the absence of credible market information further down the chain. Further improvements in the flow of information relating to prices, demand and trends in export markets could help to dispel farmers' perceptions of asymmetric information and expand modes of engagement beyond informal markets. Even in domestic chains, improving the quality and timeliness of information could improve outcomes for small farmers in existing spot markets and by converting informal markets to spot markets. The government could play an important role in reducing information asymmetry by setting up a mechanism to collect and disseminate reliable, timely and relevant information about domestic and international prices and market trends.

Together with an improved flow of information, the introduction of grades and standards for search attributes could promote spot markets by reducing information costs and the complexity of transactions. Public interventions in the introduction of grades and standards would be crucial in Nepalese markets where grades and standards do not exist or are poorly defined. Trading rules at wholesale wet markets ensuring timely payment could also promote impersonal transactions. The study showed that products with credence attributes can be traded via

relational contracts in the absence of third party certification. Third party certification may well help to open other modes of engagement for value-added products that possess credence attributes. Compliance with grades and standards would require credible information about quality premiums (i.e. reliable information on prices) and third party certification would require substantial investment (i.e. investor-friendly marketing cooperatives). Moreover, the cost of third party certification could be a limiting factor as the premium offered by markets may not cover compliance costs. Low-cost alternatives such as PGS may satisfy the requirements of consumers, at least in domestic markets. Again, the government could introduce a regulatory framework for PGS in collaboration with farmer marketing organisations and buyers that trade products with credence attributes.

Improved information flows and rigorously defined grades and standards could help even traditional marketing cooperatives to play a more effective role in facilitating spot market transactions. The study showed that collective marketing does help to attract large buyers and to strengthen producers' bargaining power. However, the study also showed that the traditional cooperative model is unlikely to sustain modes of engagement for value-added products because it discourages member investment and undermines compliance with relational contracts. A switch to more innovative cooperative models could attract investment by members and strategic partners in value-adding assets and encourage long-term relational contracts. Government could consider changing cooperative policy to promote New Generation Cooperatives or it could relax its conservative cooperative legislation to allow investor-share cooperatives. This could help not only to exploit opportunities in premium export markets, but also to engage key buyers further down the chain in existing marketing channels and capture additional value by integrating some downstream functions. In both cases, restructured cooperatives would have to collaborate with buyers to determine their quality requirements and work with their members to meet these requirements. Asset specificity inherent in such investments would encourage cooperatives to seek contractual relations with buyers. If

investments made by cooperatives (in value-adding assets) and the members (in on-farm production technology) serve to reduce the level of environmental risk, and if quality standards are easy to define and monitor, then conventional contracting may provide an alternative to relational contracting.

While extension services did not appear to influence modes of engagement in the chains studied, the public research and extension system has an important role to play in reducing environmental risk in production as smallholders rely on government extension agencies to meet their technology needs. Besides, market oriented advisory services could help farmer marketing organisations to participate in more beneficial modes of engagement by enhancing their ability to coordinate members' production plans and compliance with grades and standards. It is therefore recommended that the Department of Agriculture reorient its extension services to emphasise market-linked extension rather than the traditional production-focussed approach.

Improvements in the predictability of supply through better planning, reduced levels of environmental risk through investment in value-adding assets and improved production technologies, and grades and standards that are easy to define and monitor could improve the viability of engaging buyers via conventional contracts if small transactors had more affordable access to external contract enforcement. Mandating extension staff to facilitate contracts, and to arbitrate disputes could be a more effective approach than trying to improve the formal legal system.

In summary, it is plausible that (a) improvements in the flow of information, (b) a switch to more innovative cooperative models, (c) introduction of grades and standards, (d) a market oriented extension system, and (e) improved access to the legal system or third party arbitration would help smallholders to achieve better utility outcomes in existing modes of engagement, and could also provide them with new modes of engagement. While all interventions are

important, the evidence pointed strongly to the role of investor-friendly marketing cooperatives capable of sustaining value adding activities, and the provision of credible information to promote the development and uptake of quality standards.

6.3 Limitations and future research

This study comes with the usual limitations of a qualitative study. Results and findings are based on four agribusiness chains and interviews with a small number of respondents. The results can be generalised to theory but cannot be generalised to other supply chains.

The farmer-buyer dyad was the primary unit of analysis in this study. Information on downstream activities was collected from interviews with farmers, their buyers and service providers. Although multiple sources of evidence helped to triangulate the data, respondents may have limited knowledge or biased interpretations about downstream parts of the chains.

The findings of the study open new avenues for future research. Credible market information is a prerequisite for effective grades and standards that support spot markets. Applied research is required to establish farmers' information needs and how best to service them. For example, there may be opportunities to link farmers to a current on-line data service via low-cost smart phones. This study did not give attention to the institutional arrangements and management of municipal wholesale wet markets. Future research could address the feasibility of introducing product standards based on search attributes, and trading rules to ensure timely payment. Spot market trading at these venues would also help to generate credible market information.

The study showed that an investor-friendly cooperative model would be required to sustain value-adding activities. Further research is required to identify reasons underpinning the apparent absence of non-traditional marketing cooperatives. If the answer lies in conservative cooperative legislation, the reasons may have more to do with political preferences than with a pervasive lack of awareness of international trends towards investor-share cooperatives.

Another avenue for future research could be a quantitative study involving the drivers of transaction cost and the attributes of external environment as independent variables, and modes of engagement as a dependent variable in a multinomial logit model.

6.4 Study contribution

This study contributed to the body of knowledge in many respects. Bringing smallholder perspective to chain robustness is itself novel as past studies often focused on logistic issues. The study made a holistic analysis of smallholder engagement in supply chains, linking the drivers of transaction costs and attributes external to the dyad with modes of engagement available (or unavailable) to smallholders. Such a holistic analysis has not been incorporated into the prior literature.

This study confirmed the importance of collective marketing in linking smallholders to markets, but noted that the institutional arrangements associated with traditional marketing cooperatives limit the benefits of collective marketing. The study also confirmed the importance of product standards that are easy to define and monitor in linking smallholders to markets.

The model developed in this study envisages vertical coordination as a circular continuum rather than the usual approach of presenting spot markets and vertical integration as polar opposites in a linear continuum. This model provides a framework to analyse not only the degree of vertical coordination in operating dyads but also the causes of missing exchange relationships and the exclusion of smallholders.

The distinction made between informal markets and spot markets, which are often considered as synonymous modes of engagement in the literature, was supported by this study. The study also revealed an unanticipated mode of engagement, the ‘captive’ relational contract, which offered producers an inferior risk-reward outcome relative to the informal market. Informal markets and the ‘captive’ relational contracts are both extensions of the traditional vertical

coordination continuum, and a unique contribution of this research. Another theoretical insight generated from this study is that relational contracts are sustained by internal enforcement mechanisms rather than by trust, and are prone to failure if these mechanisms are not effective.

From a practical standpoint, this research developed a method to assess the robustness of supply chains from a smallholder perspective. This method could be used by development practitioners and extension workers to identify ways of improving the utility outcomes of supply chains for smallholders. Findings and policy implications generated from this study are also applicable to other developing countries sharing a similar context.

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Appendices

Appendix 1: Checklist for interview with growers

1. Demographic data (Respondent's education, age, gender, household off and on-farm family labour, main livelihood option-wage employment, farming, off-farm enterprise, others.....)

2. Overall operation

   Crops grown and proportion
   Crops sold
   Volume of sale and income (annual)
   Other enterprises (livestock, off-farm enterprises.....)
   Proportion of income from various sources
   Different supply chain you are participating and proportion of sale

Product	Chain 1	Chain 2	Chain 3

   (Select the pre-identified chain for details)

3. Assets and resources (owned or rented)

   Land (own/rental, categories)
   Physical assets (transport, packing shed.....)
   Capital
   People (No of family labour, wage workers)

4. .....chain
   How long have you been growing this crop
   How long have you been participating in this chain
   Proportion of sale of this product through this chain
   Profitability (compared with alternative chains of same product and another product)
   Seasonality

5. Availability of technical/extension advices
   Who provides?
   No of contacts in past season
   Do you demand?
   Price
   Relevance and usefulness
   Gaps- How do you fill those gaps?

6. Material inputs
   What are the major inputs?
   Inputs that may have created problems in the past, affordability, finance, availability, quality

7. Organization of marketing
   a) Individual marketing or collective marketing
   Why or why not individual or collective marketing? (quality, quantity, compliance, lumpy assets, bargaining power)
   Type of organization –formal/informal, name of the organization
   b) Services provided (input, finance, processing, transport, output market)
   c) Decision making in collective marketing
   Decision making-joint or centralized
   If centralized, voting rights

8. Marketing functions after harvesting
   Operations after harvest (sorting, grading, cleaning, processing, packaging, storage, transportation,.....)
   Where does your responsibility end and buyer takes over?
   Frequency of sale
   Average volume per transaction

9. Information about buyer (if this chain involves intermediary)
   Where to sell? Distance to selling point
   Who is buyer?
   How did you find this buyer?
   Are there alternative buyers in this chain? If yes, how do you choose this particular buyer?

      Price
      Personal relationship
      Past outcomes
      Timely payment
      Trust

   Are there other buyers in this chain that you would like to deal with? If so, what prevent you from transacting with them?
   Are you trading with multiple buyers in this chain?
   If dealing with multiple buyers, how do you decide to sell more to one buyer and less to another?
   Is there variation of prices offered by different buyers in this chain? Why is so?
   Mode of payment, payment frequency

10. Market
   Perception about end market of your produce and the buyers
   Customer of your buyer
   General market or specific/niche market
   Any idea about their requirements

11. Alignment of interests/objectives with buyer
   Do you and your buyer discuss opportunities/problems, how frequently?
   What are the requirements of your buyer? (Quantity, quality, timing and frequency of supply), do you meet his/her requirement?
   How often supplying more than or less than demand occur? Causes and consequences)
   Your goal in this business
   Perception of your buyer's goal

What do you do together to achieve the common goal or meet the market specification?

- Joint planning
- Decision making
- Problem solving
- Specific functions like grading, quality control
- Information sharing- more detail in Q 13.
- Investment in specific assets- more detail in Q 15.

Any kind of assistance to you by buyer (training, finance.....)

Alignment and long-term orientation

12. Information exchanges

Type of information shared

-Between buyer and group

-Between group and smallholder

Frequency of information exchange

Method, means of information exchange

Reliability

Alternative sources of information- Market price data in radio, by cell phone

Do you think buyers share all necessary information?

Why certain information is not shared (misalignment of interests/objectives, opportunism)

What happens when there is no effective sharing of information? (misalignment, adverse selection, information asymmetry, power asymmetry

Relationship between information exchange and long-term orientation

Relationship between information exchange and ability to create additional value

13. Type of contract

What sort of contract? (personal/impersonal, formal/informal, individual/group)

Terms of the contract –quality, quantity, price, delivery time and frequency, reward and sanction, dispute settlement procedure

Different contractual relationship with different buyers in this chain

Was it same in the past? How did it evolve?

What is your preferred contractual arrangement?

Why is it not happening?

Contract breaching/trust

How do you solve contract disputes?

Possible role of court

Effect of market (general/niche market, tighter/loose requirements) on type of contract

How are prices set?

How delivery time and quantity decided?

How often are prices and terms negotiated?

What do you think about the fairness of price and trading terms? What may impact this? How?

Availability of alternative trading partner in this chain

Buyers access to alternative source of supply

Dependence (finance, technology...)

Switch over cost (long gestation period, specialised investment)

Hold-up problem (Perishability, asset specificity)

Information asymmetry

Size of operation

14. Investment in relation-specific assets

Have you made any investments specific to this transaction? *physical assets-packing sheds, processing facilities, training, information, labelling, organic production methods, transport, storage*

Has your buyer made any investments specific to this transaction? *physical assets-processing facilities, farmers training, finance, transport, storage,*

Are there investments that should be made to improve the market access?

If yes, what constraints those investments?

Producers and buyers attributes (finance, volumes too small to benefit from size economies in value adding)

Uncertainty of transaction

Misalignment of interests/objectives

Relation-specific assets and long-term/short-term orientation (trust, dependence)

Type of contract and investment in relation-specific assets

Relation-specific assets and ability to create additional value

15. Perception of problems in current chain

List and rank the problems (including physical and legal infrastructure, services and government policy related issues)

16. Costs incurred in the participation in current market relationship

What are the major costs that you incur in the current chain? (Individual cost)

(Production inputs-seeds, fertilisers, pesticides

Physical assets: plastic house, processing facilities, packing sheds

Labour costs

Technology-irrigation, others.....

Compliance cost- certification.....

Marketing cost- grading, packaging

Transportation

Information- training, market information

.....*)*

Can you please rank these costs?

Are there costs shared? (in addition to the individual costs)

Among producers in a group

With buyers

With government (eg training, extension, transport, market information, compliance costs)

Source of finance

Constraints in access to finance

17. Risks involved to participate in the current chain and sharing of risks

What are the risks you are exposed to in the current chain? (*As a reminder and not to prompt)*

Production risks: extreme weather, pest and diseases, inferior quality inputs

Marketing risks:

-No sell due to over-supply, transport strikes, loss due to delayed sell
-Price fluctuation: price collapse after contract and before sell, price collapse after sell and before payment
-Delayed payment
-Fraud/No payment
-Penalty due to not meeting specification
-Risk of rejection?

Are any risks shared? What are those and how are those risks shared?

-Insurance
-With buyers
-with input supplier (in case of inferior inputs)
-in group (traceability-does each member get rewarded/penalized for their good/inferior products)
-Terms of risk sharing in contract

18. Benefits sharing
    Do you get additional price for good quality products?
    How are benefits shared in the group? Equally; according to patronage; according to investments and patronage (in case of group marketing)

19. Perception of missed opportunities
    Enhancing efficiency and effectiveness in current relationship
    Alternate chain-this crop or other crops
    Requirements of other chains
    Problems to participate in alternative chain
    -Marketing constraints: linkage, tight specifications, quantity, consistency of supply?
    -Production constraints: finance/inputs, labour, weather/irrigation, road/transport)
    -Perceived costs and risks in entering into alternative chain

20. What improvements you would like to see in the current chain?
21. If better alternative chains are possible, what could be done to link to alternative chains?
22. Considering the current relationship with your buyer, why don't you establish long-term relationship or on the other hand impersonal transaction?

Appendix 2: Checklist for interview with buyers

1. Demographic data (name, address, telephone number)

2. Overall operation
   Type of business (registered in any agency)
   Sole proprietor or partnership
   How long have you been operating this business?
   What are the other businesses you operate?
   Share of different business in total operation (time, investment, revenue)
   Different supply chain your business services for (If possible, identify proportion of supply and sale)

Product	*Sources of supply*	*Chain 1*	*Chain 2*	*Chain 3*

3. Assets and resources
   Physical assets (transport, packing shed.....)
   Capital
   People (hired employees)
   Supply contract

4. Scale of operation
   Years of involvement in this chain
   Volume of trade (monthly/yearly)
   Comparison with other chain (volume, profitability)

5. Market
   Your buyers in this chain
   Type of your buyer (intermediate buyer, wholesaler, retailers, exporter, consumers)
   General market or specific/niche market
   Their requirements, variation with buyers
      Quality (size, shape, colour, variety, ...)
      Quantity
      Timing of supply/seasonality
   Quality assessment by buyers
   What if requirements are not met?
   Proportion of your sales to different buyers in this chain
   Why do you sell more to one and less to another buyer?
   Do prices vary for each buyer?
   Alternative sources of supply of your buyers and your share in their purchase

6. Information about your supply and suppliers
   Who are your suppliers? How did you find these suppliers?
   History of trading with these suppliers
   Choice of supplier
      Quality (shape, size, colour, variety, shelf-life, others.....), Quantity
      Reliability of supply, Price, Personal relationship, Past outcome
      Others.....
   Alternative sources of supply, Proportion of supply from different sources

Reasons for sourcing more from one and less from another supplier
Conveying requirements
Assessing quality
Price setting for different suppliers
Frequency of buying
Average volume per buying

7. Alignment of interests/objectives with suppliers and buyers in this chain
   Do you and your suppliers discuss opportunities/problems? How frequently?
   Do you and your buyers discuss opportunities/problems? How frequently?
   What are the requirements of your buyer (Quantity, quality, timing and frequency of supply)? Do you meet his/her requirement?
   How often supplying more than or less than demand occur? Causes and consequences)
   Your goal in this business
   Perception of your buyer's goal
   Perception of your suppliers goal
   What do you do together with your suppliers to achieve the common goal or meet the market specification?
      - Joint planning
      - Decision making
      - Problem solving
      - Specific functions like grading, quality control
      - Information sharing- more detail in Q 9.
      - Investment in specific assets- more detail in Q 11.

   Any kind of assistance you provide to your suppliers (training, finance.....)
   Any kind of assistance you receive from your buyers (finance, ...)
   Do you undertake any activity after you receive products from suppliers to meet your buyer's requirements?
      Cleaning
      Grading
      Packaging
      Other forms of value addition
   Alignment and long-term orientation

8. Information exchanges
   Type of information shared with your supplier
   Frequency of information exchange with supplier
   Method, Means of information exchange
   Do you share all necessary information to suppliers?
   Why certain information is not shared (misalignment of interests/objectives, short-termism)?
   What kind of information does your buyer share with you?
   Is there any information your buyer does not share with you?
   What happens when there is no effective sharing of information (misalignment, adverse selection, information asymmetry, power asymmetry)?
   Relationship between information exchange and long-term orientation
   Relationship between information exchange and ability to create additional value

9. Type of contract with supplier
   What sort of contract (personal/impersonal, formal/informal, individual/group)

Terms of the contract –quality, quantity, price, delivery time and frequency, reward and sanction, dispute settlement procedure
Different contractual relationship with different suppliers in this chain, Why?
Was it same in the past? How did it evolve?
What is your preferred contractual arrangement?
Why is it not happening?
Contract breaching/trust?
How do you solve contract disputes?
Possible role of court
Effect of market (general/niche market, tighter/loose requirements) on type of contract
How are prices set?
How do you order the product?
How do you receive the product?
How often are prices and terms negotiated?
What is your view about the power relationship in the chain? Does it have any role in the fairness of price and terms of trade? (*with both your suppliers and buyers*)

- Availability of alternative trading partner in this chain
- Buyers access to alternative source of supply
- Dependence (finance, technology...)
- Switch over cost (long gestation period, specialised investment)
- Hold-up problem (Perishability, asset specificity)
- Information asymmetry
- Size of operation

10. Investment in relation-specific assets

Have you made any investments specific to this transaction? *physical assets-packing sheds, processing facilities, training, information, labelling, organic production methods, transport, storage*
Has your buyer made any investments specific to this transaction? *physical assets-processing facilities, farmers training, finance, transport, storage,*
Are there investments that should be made to improve the market access?
If yes, what constraints those investments?

- Producers and buyers attributes? (finance, volumes too small to benefit from size economies in value adding)
- Uncertainty of transaction
- Misalignment of interests/objectives

Relation-specific assets and long-term/short-term orientation (trust, dependence)
Type of contract and investment in relation-specific assets
Relation-specific assets and ability to create additional value

11. Perception of problems in current chain

List and rank the problems (including physical and legal infrastructure, government support, policy related issues)

12. Costs incurred in the participation in current market relationship

What are the major costs involved to participate in the current chain? (individual cost)

- Physical assets: processing facilities, packing sheds
- Transport costs
- Compliance cost- quality assessment, certification.....
- Marketing cost- grading, packaging
- Information- market information

Financing suppliers
Formal and informal taxes

Can you please rank these costs?

Are any costs shared?

With producers
With buyers
With government (eg financing, subsidies in transportation)

Source of finance

Constraints to access finance

13. Risks involved to participate in the current chain and sharing of risks

What are the risks you are exposed to in the current chain? (*As a reminder and not to prompt, ask to rank after listing)*

-Undersupply
-Loss due to transport strikes, loss due to delayed sell
-Price fluctuation: price collapse after contract and before sell, price collapse after sell and before payment
-Low quality products
-Risk of rejection by buyer

Are any risks shared? Which are those and how?

-With buyers
-With suppliers
- Do you penalize suppliers for low quality product? If trading with farmers group, how does that work i.e traceability
-Terms of risk sharing in contract?

14. Benefits sharing

Do you pay additional price for good quality products?

If you or your supplier has been able to generate extra revenue in a joint effort (by adding value or accessing premium market), how is that additional revenue shared with suppliers?

15. Perception of missed opportunities

Enhancing efficiency and effectiveness in current relationship

Alternative chain-this crop or other crops

Requirements of other chains

Problems to participate in alternative chains *(do not prompt)*

-Marketing constraints: linkage, tight specifications, quantity, consistency of supply
-Production constraints: finance/inputs, labour, weather/irrigation, road/transport
-Perceived costs and risks in entering into alternative chain

16. What improvements you would like to see in the current chain?
17. If better alternative chains are available, what could be done to link to alternative chains?
18. Considering the current relationship with your supplier, why don't you establish long-term relationship or on the other hand, impersonal transaction?

Appendix 3: Checklist for interview with potential buyers

1. Demographic data (name, address, telephone number)

2. Overall operation

Is your business registered in any agency?
Sole operator or partnership
What is your core business activity?- retailing, exporting, processing, market intermediation
How long have you been operating this business?
What are the other businesses you operate?
Share of different business in total operation (time, investment, revenue)
Different supply chain your business services for (If possible, identify proportion of supply and sale)

Product	*Sources of supply*	*Chain 1*	*Chain 2*	*Chain 3*

3. Assets and resources

Physical assets (transport, packing shed.....)
Capital
People (hired employees)
Supply contract

4. Scale of operation

Years of involvement in this chain
Volume of trade (monthly/yearly)
Comparison with other chain (volume, profitability)

5. Investment in this chain

Investment (Fixed and variable investment, training producers, developing supply base)
Source of finance (own, financial institution, others)
Terms of finance
Problems in accessing finance

6. Market

Who are your buyers?
Type of your buyer (intermediate buyer, wholesaler, retailers, exporter, importer in another country, consumers)
General market or specific/niche market
Their requirements, variation with buyers
    Quality (size, shape, colour, variety, ...)
    Quantity
    Timing of supply/seasonality
Quality assessment by buyers
What if requirements are not met?
Proportion of your sales to different buyers in this chain

Why do you sell more to one and less to another buyer?
Do prices vary for each buyer?
Alternative sources of supply of your buyers and your share in their purchase

7. Information about your supply and suppliers

Who are suppliers? How did you find these suppliers?
History of trading with these suppliers
Choice of supplier
- Quality (shape, size, colour, variety, shelf-life, others.....)
- Quantity
- Reliability of supply
- Price
- Personal relationship
- Past outcome
- Others.....

Alternative sources of supply, Proportion of supply from different sources
Reasons for sourcing more from one and less from another supplier
Conveying requirements
Assessing quality
Price setting for different suppliers
Frequency of buying
Average volume per buying

8. Product attributes and standards

- Quality (size, shape, colour, free from blemishes, variety, organic .....)
- Quantity
- Consistency of supply
- How do you assess quality?
- Rigidity of these requirements and what if these are not met?

9. Activities You do to meet customer requirements

Any sort of value addition activities done after sourcing product (cleaning, grading, packaging, labelling.....)
Any sort of assistance you provide to supplier (training, finance.....)
Any sort of joint effort you and your supplier perform to meet customer requirement

10. Problems seen in the current chain(don't prompt, let respondent list and rank)
- *Uncertainty- quality, quantity, reliability*
- *Compliance*
- *Physical and legal infrastructure*
- *Government support*
- *Policy issues*

11. Problems in linking smallholder suppliers to you (*don't prompt, list, rank and describe)*

Misalignment in market demand and producers capability

- *Quality*
- *Quantity*

Compliance
Consistency of supply

Misalignment of interests/objectives
Market segment
Long-term orientation

Uncertainty of relationship

Monitoring and enforcement cost

Ability to invest in relation-specific assets

12. What could be done to link smallholders with you?

Appendix 4: Checklist for interview with staff of supporting agencies

1. Name and agency:
2. Activities and services provided by your agency in facilitating .....chain
3. What problems do you see in linking smallholders to .....chain? (list, briefly describe and rank)
4. Do you see any alterative chain which could be more preferable to smallholders?
5. What are the constraints in linking to that chain? (list, describe and rank)
6. How do you rate the enabling environment to link smallholders to the preferred chain?
   Government services (extension/research)
   Irrigation
   Private goods (agricultural inputs, finance,.....)
   Physical infrastructures
      Transport
      Marketing infrastructures
   Legal infrastructure
   Policy issues (quarantine, standards, export taxes .....)
7. In your view, what should be done to link the smallholders to sustainable supply chain?