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Agribusiness supply chains: Smallholder participation and implications

A thesis
submitted in partial fulfilment
of the requirements for the Degree of
Doctor of Philosophy

at
Lincoln University
by
Gursharan Singh

Lincoln University
2020

*“I dedicate this work to the 550th birth anniversary of the first Guru, the founder of Sikhism
Shri Guru Nanak Dev Ji”*

Abstract of a thesis submitted in partial fulfilment of the
requirements for the Degree of Doctor of Philosophy

Agribusiness Supply Chains: Smallholder Participation
and Implications

by

Gursharan Singh

Recent agribusiness literature has drawn attention to the rapid rise of institutional market channels for high-value crops in developing countries. Several driving factors are responsible for the transformation of traditional multilayer agribusiness systems into new coordinated value chains; these are; agribusiness industrialisation (Cook & Chaddad, 2000; Reardon & Barrett, 2000), changes in agribusiness technology (Reardon, Barrett, Berdegúe, & Swinnen, 2009; Saxowsky & Duncan, 1998), trade liberalisation (Pingali, 2007), rising urbanisation, the rising per capita income of the middle class, changes in consumer preferences (Reardon & Hopkins, 2006), and increased consumer awareness of nutrition (Gulati, Minot, Delgado, & Bora, 2007).

Traditionally, agribusiness transactions are conducted through spot markets. However, these markets are increasingly transitioning into vertically coordinated markets, thus transforming existing marketing relationships in the process (Peterson, Wysocki, & Harsh, 2001). While these new food systems offer fresh fruit and vegetable (FFV hereafter) growers opportunities to improve their incomes, their participation depends on a variety of factors, such as the structure and dynamics of these chains, and the institutional settings within which they are embedded (Barrett, 2008). Agribusiness literature indicates that institutional channels procure goods from large farmers/specialised traders to lower their transaction costs (Singh, 2009). While there is a very real risk of smallholder exclusion, there are numerous opportunities for value participation (Reardon & Hopkins, 2006). This research adopts a New Institutional Economics (NIE) framework to investigate smallholders' participation in institutional channels. The NIE framework provides insights into transaction problems among supply chain partners (Williamson, 2004).

Previous studies on this issue focus on the transformation of food systems in developing countries and the impact of institutional channels on farmers' incomes and poverty reduction (Barrett, 2008; Fenwick & Lyne, 1999; Jayne, Mather, & Mghenyi, 2005; Louw, Vermeulen, Kirsten, & Madevu, 2007; Weatherspoon, Cacho, & Christy, 2001; Weatherspoon & Reardon, 2003). However, many studies treat Fresh fruit and vegetable farmers as a homogeneous group when, in fact, they appear to be more heterogeneous in nature. This research firstly identifies the factors influencing market participation for smallholders in institutional channels. Secondly, it determines the mode of market engagement and finally, the role of collective action in ensuring smallholder farmers' participation.

The study collected data from 200 fresh produce growers (specifically potato and tomato croppers) in the Punjab region of India using an interview-survey method. The research identifies several factors which impact upon farmers' participation in institutional channels: these are, guaranteed price (contract farming), the operational land size, farmers' education levels, formal sources of credit and technical assistance. This research also suggests that re-engineering traditional cooperatives into new generation marketing cooperatives will enable smallholder farmers to achieve better returns. In particular, this research highlights the need for investment into more processing plants, enhance the capacity of existing ones and deploy new generation marketing techniques. The role of transaction costs and collective action for determining smallholders' participation in the institutional channels has assessed in new geographic location Punjab region of India. The empirical results of this research provide policy, methodological and theoretical contributions for various stakeholders.

Keywords: Fresh produce, market participation, institutional channels, smallholders, transaction costs, collective action, quantitative research.

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Chapter 1

Introduction

1.1 Background

While the relative importance of staple food is declining in developing countries, the prominence of fresh fruits and vegetables is increasing (Pingali, 2007). Hence, agribusiness supply chains are passing through a dualistic transitional phase. On the one hand, institutional distribution channels are rising in numbers and importance in big cities. On the other hand, the rural population is still very dependant on more traditional marketing channels (Gulati et al., 2007). In the current study, the term 'developing countries' refers to countries where agriculture constitutes a high proportion of the Gross Domestic Product (GDP), the population is mostly rural, and where there are few opportunities for income generation outside of agriculture (McCullough, Pingali, & Stamoulis, 2008). Fresh fruit and vegetables can be thought of as high-value crops. They are critical components of transitioning agribusiness commodities in developing countries (Hewett, 2012). The transformation of agribusiness has significant effects on existing agribusiness markets, FFV growers, government policy, and private investment. Further, the growth of high-value commodities requires coordinated linkages among supply chain actors throughout the entire value chain.

Traditionally, agricultural transactions are made through wholesale spot markets where the producer's share of the total value paid by the end consumers is typically low (Singh & Singh, 2012).

While the FFV producer's return is considered low, it is actually much higher than other agricultural products, for example, cereal crops. Yet, in some cases, producers end up with a net loss, such as that reported by potatoes growers in India (Sandip & Sarkar, 2003). Indeed, FFV producers face significant risks due to price and demand fluctuations.

Agribusiness literature has drawn attention to the rapid rise of institutional channels for FFV markets, such as supermarkets, hotels, restaurants and value-adding food processing in developing countries (Gulati et al., 2007; Michelson, Reardon, & Perez, 2012; Reardon & Berdegue, 2002; Reardon, Timmer, Barrett, & Berdegué, 2003). While these transformations are occurring, fresh produce markets are still dominated by traditional spot markets such as

found in India, Vietnam, Honduras, Chile and Madagascar (Berdegué, Balsevich, Flores, & Reardon, 2005; Blandon, 2006; Reardon & Timmer, 2007; Singh, 2008). Typically, traditional spot markets are characterised by poor performance, high price volatility, significant marketing costs, a large number of intermediaries, inefficient logistics, and asymmetric information flows (Cadilhon, Moustier, Poole, Tam, & Fearné, 2006; Murray-Prior et al., 2005). Moreover, traditional spot markets are often just price-driven. As such, chain participants often engage in risky behaviour to maximise their self-interests (Martin & Jagadish, 2006).

In contrast, institutional channels focus on achieving scale economies (Singh & Singla, 2011), meeting higher quality requirements, ensuring continuity of supply, food safety, and extending shelf-life (Dabas, Sternquist, & Mahi, 2012). These factors are believed to increase producers' overall production and marketing costs but provide better margins. Institutional channels offer an opportunity for international retail chains, as well as regional and smallholder agribusiness entities, to cash in on opportunities as both quality and reliability rise (Reardon & Berdegué, 2002). While Institutional channels have transformed agribusiness markets in developing countries, they have done so at different rates, and to varying extents, across regions and countries (Reardon & Gulati, 2008).

However, Reardon et al. (2003) argue that while agribusiness markets are transforming from traditional to modern institutional distribution in developing countries, institutional channels are still inefficient and imperfect. The reason for these imperfections are temporal and localised price variations at various geographic locations, where the price is the sole mechanism for marketing agribusiness products. Furthermore, in the context of FFV, due to short shelf-life and poor/limited/non-existent logistics infrastructure, marketing and distribution is very challenging for smallholder FFV producers.

Agribusiness literature explores a variety of issues, including the types of fresh produce procurement practices that agribusiness markets use (Minten, Randrianarison, & Swinnen, 2009; Miyata, Minot, & Hu, 2009; Neven, Odera, Reardon, & Wang, 2009) and whether smallholders actually participate in emerging institutional channels (Barrett, 2008; Blandon, Henson, & Cranfield, 2009; Omiti, Otieno, McCulloch, & Nyanamba, 2007; Sebatta, Mugisha, Katungi, Kashaaru, & Kyomugisha, 2014). Others ask salient questions such as: is participation in institutional channels economically beneficial for smallholders (Barrett et al., 2012; Wollni

& Zeller, 2007), and what are the entry barriers for institutional channels? (Alene et al., 2008; Hewett, 2012; Minot, 2011; Poulton, Kydd, & Dorward, 2006)

Agribusiness literature further highlights a variety of factors that constrain fresh produce growers in participating in institutional channels. One factor is the size of available and operational land under cultivation. While large farmers have an advantage due to scales of economy, it is challenging for smallholders to scale up due to the marketing and transaction costs involved (Alene et al., 2008; Blandon, 2006; Ruben, Boselie, & Lu, 2007). Several studies have revealed several barriers to entry for smallholders including; the lack of information on prices (Markelova, Meinzen-Dick, Hellin, & Dohrn, 2009), high unit transaction costs due to the small volume of marketable surplus (Dorward, 2001; Minot, 2011), significant costs associated with meeting quality and food safety standards (Dolan & Humphrey, 2000; Pingali, Khwaja, & Meijer, 2007; Vorley, Lundy, & MacGregor, 2009), a lack of access to agricultural extension services (Pingali et al., 2007; Shepherd, 2007), investment constraints related to efficient plants and machinery (Poulton et al., 2006), access to formal credit (Ayaz & Hussain, 2011; Minot, 2011), poor road infrastructure (Minten et al., 2009; Singh, 2009) and high chances of product damage and spoilage pre and post-harvest (Rienekens, 2011). Institutional channels focus on creating economies of scale, continuous orders, higher quality standards, and graded quantities; thus the chances of smallholder FFV growers' exclusion are high due to low physical, legal, capital or regulatory infrastructure (Kirsten & Sartorius, 2002; Reardon & Barrett, 2000; Reardon et al., 2003). Hence, the possibility of many smallholder farmers participating in value-added institutional channels remains low.

Conversely, a few researchers have reported that for some fresh produce, smallholders may have a competitive advantage over larger producers (Singh, 2009), especially in the case of exclusive FFV products that require specialised supervision and attention. Increasing demand for organic FFV products is one example that requires particular skills and the use of specialised labour and knowledge of local climate conditions. To leverage this, the significance of providing education, skill-based training, and technical assistance is thus of utmost priority for policymakers. Opportunities for smallholder FFV growers to raise their economic viability depends on access to, and participation in, institutional value chains for both domestic use and export (Meinzen-Dick, DiGregorio, & McCarthy, 2004; Poulton et al., 2006). Several studies have suggested that institutions play a vital role in smallholder farmers' participation in new market opportunities (Alene et al., 2008; Hellin, Lundy, & Meijer, 2009; Kaganzi et al.,

2008). The collectivisation of agricultural products by smallholders remains a widely discussed institutional governance arrangement that enables the collectivised smallholders to better compete in institutional channels. More recent studies report that if small and medium-sized farmers successfully pool their resources to mitigate the pressure of scale economies, they too can participate in institutional channels (Barham & Chitemi, 2009; Devaux et al., 2009; Hellin et al., 2009; Markelova et al., 2009). Agribusiness researchers note the importance of vertical coordination among buyers and FFV producers in the form of 'contract farming' as it enables smallholders to participate in institutional channels (Barrett et al., 2012; Key & Runsten, 1999; Minot, 2011). Yet the rate of involvement of smallholders in appropriately structured collectivised arrangements remains low in developing countries. Indeed, the issues identified above raise serious questions about whether smallholders will ever be able to participate in institutional channels and improve their lot.

1.2 Defining key terms

1.2.1 Market participation

The term 'market participation' is widely used in agribusiness literature. It is both a cause and a consequence of economic development. Markets offer primary producers the opportunity to specialise for comparative advantage and thereby enjoy welfare gains from trade (Al-Hassan, Sarpong, & Mensah-Bonsu, 2006). In agriculture literature, there is a lack of universal definitions of market participation or access. Moreover, different researchers use different indicators to measure market participation/access.

Generally, market participation refers to growers' access to points where they can sell their marketable surplus to buyers to make a profit (Barrett, 2008). In the context of fresh produce, physical access to the markets is even more significant as fresh produce has a short shelf-life. Remoteness and distance to market, including transportation costs and time spent travelling to the selling points, are essential factors in market participation (Feleke & Zegeye, 2006). The cost involved in moving fresh produce between the location of production to exchange point also affects market price. Chamberlin and Jayne (2009) refer to market access as the farmers' proximity to the market in the nearest town or district where farmers can sell their products without incurring extra transportation costs.

Other aspects derived from those who define market participation are; FFV growers access to farm inputs, agribusiness services, and their ability to make a profit (Salami, Kamara, &

Brixiova, 2010). In developing countries, markets provide farmers with opportunities to generate income, alleviate poverty, and decrease hunger rates in developing countries (Alwang, Siegel, & Jorgensen, 1996). Market signals should direct FFV growers on what to grow, both in terms of quality and quantity, according to consumers' needs. Access to market information is thus essential for ensuring that fresh produce growers receive a stable income. In developing countries, access to information is considered an essential element of market participation. The link between the market and production points is another aspect of market participation. In developing countries, intermediaries such as 'middlemen' or 'wholesalers' play a crucial role linking producers with the market as they have access to market information and are often in a position to determine what price producers should sell their supplies at (Abebe, Bijman, & Royer, 2016).

In this study, the term market participation refers to the context where FFV growers are in a position to sell their produce at the nearest selling point at a feasible price with minimal post-harvest losses.

1.2.2 Smallholder farming

This research focuses on smallholder farmers who grow FFV. The term 'smallholder' is also difficult to define because it is conceptualised differently according to specific geographical locations, socioeconomic conditions, levels of technology, types of agribusiness markets, and available resources (Arias, Hallam, Krivonos, & Morrison, 2013). As such, the term 'smallholder' is often defined and used inconsistently, referring, inter alia, to farmers who occasionally sell products for cash as a supplement to other sources of income; to those who regularly market a surplus after their consumption needs have been met; and to those who are small-scale commercial farmers, with a primary focus on production for the market (Kirsten & Van Zyl, 1998). Smallholders are also defined as those who own a small plot of land, use family labour, grow one or two subsistence crops and have minimal marketable surplus to sell. For example, Fenwick and Lyne (1999) view smallholders as households whose farming revenue comprises only a small portion of their gross income.

In order to ensure effective policy, it is crucial to define the term precisely. Predominantly, 'yes' or 'no' criteria have been found to generalise the term smallholder (often implicit, sometimes explicit) as the size of the operational landholding and the level of production (marketable surplus after home consumption) for the market. Other criteria also consider the

use of hired labour, the level of working capital invested in crops, and the level of farm machinery owned/used. The size of operational land is considered a common criterion for defining smallholders. However, there are a wide variation in measurements or what is considered a 'small' landholding (anywhere from 0.05 ha to 124.00 ha). Others consider farmers' socio-economic condition, their geographic location, and the country's existing market structure (Hassanullah, 1991). For example, Sidhu (2016) considers large farmers as those who farm more than 10 ha. The idea of using operational land as the only criterion to define smallholders is problematic (Chowdhury, 1987). Determining the size of operational land is challenging due to poor land records, family types, absentee landlordism, and other tenure issues. Indeed, it is virtually impossible to include all contingencies in a single definition. In developing countries, smallholders that rely mainly on family labour are the backbone of agricultural production (Fan, Brzeska, Keyzer, & Halsema, 2013). Table 1.1 shows various research studies that use operational land to define smallholder farmers. As the table indicates their definitions vary widely.

Table 1.1 Categorisation of different farm sizes for smallholder farmers

Authors & Year	Country/Region	Smallholder Farmer Group
Ferris et al. (2014)	Various African countries	1-2 Hc
Sitko and Jayne (2014)	Zambia	0.1-4.99 Hc
Lowder, Scoet, and Raney (2016)	World data	less than 2 Hc
Dhillon, Singh, and Dhillon (2006)	Punjab India	0-5 Hc
Jagwe (2011)	Burundi, democratic of Congo and Rwanda	Less than 10 Hc

Besides, the importance of smallholder farming in the livelihood of the rural population has been referenced empirically by various agribusiness researchers. In Kenya, smallholder farmers contribute 75% of the total agriculture production and 50% of the total market output (Omiti et al., 2007). Lowder et al. (2016) conducted a study using agricultural census data. They found that globally, 570 million farms are operated by smallholders. In short, they demonstrate that smallholder farms/cultivate 75% of the world's agricultural land. The study also discovered that in most low and lower-middle-income countries (for those that had data available from the 1960s to the early 2000s), operational landholding size is decreasing. In contrast, during this same period, average farm sizes increased in some upper-middle-income countries, and nearly all high-income countries. For example, in Guatemala, the farmers

supplying institutional channels had larger farms (9.3 ha) and cultivated areas (4.6 ha), compared to those supplying traditional markets (7.8 ha and 2.5 ha, respectively) (Hernández, Reardon, & Berdegúe, 2007). In Kenya and Zambia, the average land holdings in the small farm sector range from between 2.5 and 3.0 hectares, while in Rwanda and Ethiopia, they are only approximately one hectare. In short, farm size figures mask significant variations (Jayne et al., 2005).

In the current study region (Punjab, India), farmers are categorised based on land-owning status. For example, Dhillon et al. (2006) followed by Vatta and Sidhu (2010) categorise farmers in the following way: 1. Landless: no land in the farmer's name, 2. marginal: less than 1 ha, 3. small: 1-2 ha, 4. Semi-medium: 2-4 ha, 5. Medium: 4-6ha, 6. large: above 6 ha. Similarly Singh and Singla (2011), use acres as a parameter to categorise farmers as small (2.5 to 5 acres) semi-medium (5 to 10 acres) medium (10 to 25 acres) and large (above 25 acres). Sidhu (2016) study on marketing systems and agricultural development in the Punjab region, defines small as up to average 2.5, medium up average to 5.5 and large 5.5 and above in hectares. Most recently, Chandrasekhara Rao and Bathla (2016, p. 211) consider three operational land categories in their comparative study of institutional and traditional markets in India; small (0-5 acres), medium (5.1-10 acres) and large (above 10 acres). After considering the above reviews and the geographic conditions of the study area, this research defines smallholders as those who own 1-5 hectares of land or less.

1.3 Research problem

Growing high-value crops, especially FFV, is a feasible way to improve agricultural productivity, raise farmers' income and absorb agricultural surplus labour in rural areas (Barrett, 2008; Fenwick & Lyne, 1999; Jayne et al., 2005; Louw et al., 2007; Weatherspoon et al., 2001; Weatherspoon & Reardon, 2003). Despite the emergence of institutional channels for FFV markets in developing countries, the availability of data and analyses of their magnitude and impact on smallholder's fresh produce growers are still at an early stage. The heterogeneity of FFV growers and their participation in viable markets are continuing issues for developing countries.

Indeed, the question of smallholders' market participation has been discussed by various researchers in the context of different demographics and food commodities in developing countries and finds that smallholder farmers face significant challenges for entering

institutional channels. (Alene et al., 2008; De Janvry, Fafchamps, & Sadoulet, 1991; Fafchamps, 1992). Agribusiness literature contends that participating in institutional channels increases farmers' economic viability and their income (Miyata et al., 2009; Neven et al., 2009). In general, there are two significant determinants of market participation; 1. incentives associated with participating in institutional channels, and 2. smallholders' ability to meet institutional channel requirements related to quality, quantity, and food safety (Reardon et al. (2009).

From an incentive point of view, previous research suggests that participation in institutional channels results in smallholders receiving a higher net premium price (Boughton et al., 2007). Likewise, Reardon et al. (2009) report that farmers who supply institutional channels are paid higher prices compared to those who supply products to wholesalers in traditional spot markets. Similarly, Neven et al. (2009) report that institutional channels pay farmers 10-20% more than what they usually receive in traditional markets in Kenya. Further, Blandon et al. (2009) find that nearly 60% of smallholder farmers supplying institutional channels were paid higher prices vis-à-vis spot markets in Honduras. Schipmann and Qaim (2011) also find that institutional channels in Thailand paid smallholder farmers (those selling sweet peppers) a higher price.

Nevertheless, previous studies show that farmers who supply institutional channels incur higher production costs associated with maintaining the quality, quantity, and post-harvest viability of their products (Fischer & Qaim, 2012). There is a much higher rate of rejection in institutional channels. Smallholder farmers must consider these risks before deciding to sell their produce through institution markets. Blandon et al. (2009) reveal that the perceived risk of low quality and high rejection rates significantly negatively influence smallholders' decisions to supply institutional chains in Honduras. Smallholders also consider the transaction cost of marketing, including logistics and communication, in their decision to participate in these channels (Rao & Qaim, 2011). The distance to the marketplace is also a significant factor in determining farmers' decisions to participate in these channels. Miyata et al. (2009) note that distance to the marketplace strongly influences farmers' decision to participate in institutional channels. Relatedly, access to the road network is also a significant variable determining farmers' participation in these channels (Rao & Qaim, 2011).

Similarly, smallholders' capacity (scale) to supply institutional channels play a vital role in participating in these channels. Smallholders first must consider their human capital assets before agreeing to participate in these channels. For example, the age of household head, the number of family members participating/engaged in farm activities, and their levels of education, their farming experience, and off-farm income are some of the human capital assets which determine smallholders' ability to fulfil the conditions laid out by institutional channels (Rao & Qaim, 2011). Along with human capital assets, smallholders' ability to fulfil the channel's requirements related to physical farm assets is also a consideration. For example, farm ownership, farm size, farm machinery, access to irrigation, are a few of the physical assets that reflect a farmer's capacity to supply institutional channels. A lack of access to these physical farm assets contributes significantly to the fresh produce farmers' failure and/or reluctance to participate and receive higher returns (Barrett, 2008; Burke, 2009).

Indeed, the literature suggests that farmers with more physical farm assets have greater access to institutional channels. In Kenya, institutional channel farms are, on average, five times larger in overall farm size than traditional channel farms (9–18 ha vs 1.6–2.4 ha per farm depending on the crop) (Neven et al., 2009). Further, in India, Singh (2008) asserts that 85% of farmers are small or marginal landholders and are widely excluded from institutional channels. Furthermore, institutional channels (supermarkets) source 60% to 70% of their procurement needs from wholesale markets rather than directly with smallholder farmers. Dhillon et al. (2006) study of contract farming in Punjab found that medium (up to 10 acres) and large farmers (more than 15 acres) participate more in institutional channels as opposed to smallholders (0-5 acres). The above discussion reflects the importance of the empirical study on smallholders who are generally 'locked out' of participating in institutional channels.

Other factors that enhance smallholders' capacity to supply these channels, including membership in various institutions and participation in collective capital schemes, such as having shared agricultural assets (Reardon et al., 2009). Interestingly previous studies on collective action and market participation have found that these factors help smallholders achieve lower per-unit transaction costs so that they can indeed supply institutional channels (Hellin et al., 2009; Markelova et al., 2009).

Although various studies have investigated transformations in food systems in developing countries and the emergence of institutional channels and their impact on farmers, a gap

remains, specifically, what factors drive smallholders to participate in these channels? The current study is significant because much of the extant research sees fresh produce farmers as a homogeneous group and does not fully consider their differences. This is necessary to understand their specific problems and design effective solutions. Furthermore, the lack of empirical survey-based studies on factors that hinder or facilitate market participation needs addressing to enhance our overall understanding of the phenomenon. In line with agribusiness literature, this research outlines, from the smallholders' perspective, what drives participation in institutional channels vis-à-vis traditional channels in developing countries. It aims to provide recommendations designed to ensure better economic viability for smallholder farmers. In particular, the current study considers farmers' incentives, risk factors, and capacities to participate in institutional channels.

1.4 Study objectives

Research objectives for the current study focus on what factors smallholders consider when deciding to participate in institutional channels, and as well as the economic rationale for doing so. The sections above have highlighted various factors related to changes in consumer preferences, transitioning food systems, different procurement practices, agribusiness markets, and barriers to entry for smallholder farmers. Keeping these in mind, this study has formulated the following primary research objectives:

1. Identify the factors that influence market participation of FFV growers in institutional channels. The context is the state of Punjab (India).
2. Identify which mode of market engagement is more economically viable for FFV growers.
3. To determine the role of collective action on the market participation of FFV growers in institutional channels.
4. Provide recommendations to enhance market participation and maximise the returns for FFV growers.

1.5 Research contributions

This research makes two major contributions. First, the current study empirically supports the assumptions of New Institutional Economics (NIE). This study finds that vertical coordination helps smallholders to increase their economic viability and access allied agricultural services.

Smallholders are better off financially contracting with institutional channels, especially food processing firms. Theoretically, asset specificity, uncertainty, and frequency attributes of Transaction Cost Economics (TCE) motivate smallholders to prefer to sell to institutional channels when they have an opportunity to obtain an assured price and gain access to technical assistance and input support.

Additionally, this study also finds that the collective action assumptions are only partially met. Interestingly, the farmer's membership of cooperatives is significant for market participation in institutional channels; the experience with cooperatives over the years was found not to be significant. Even though the collective action by farmers offers limited services, the current study shows that collective action by farmer groups positively supports smallholders' participation in institutional channels. The study also finds that production services (inputs and credit) have the highest impact and are the most popular in terms of services offered by cooperatives. Further, collective action, even informal farmer groups based on socio-religious influence, should also be considered. Indeed, the findings show that smallholders are socially and religiously connected and that this collective solidarity helps them to participate in institutional channels.

Additional empirical results suggest that various factors impact on a farmers' ability to participate in institutional channels. These factors include; the level of education, the area under FFV production, off-farm income, assured price through contract farming, proximity to market, membership in cooperatives, formal sources of credit, and technical agricultural support. Similar to other results, this research suggests that higher levels of education are essential for smallholder farmers to capitalise on changes to the food systems. Thus policymakers must focus on the provision of education and technical assistance to enable farmers to adopt new technology and emerging/new changing business models. Also, there is a need to enhance the capacity of the food processing sector. This needs to occur at the government level and will create off-farm job opportunities for smallholders, which is significant for their participation in institutional channels.

The various factors associated with the production and marketing of FFV, such as; uncertainty, asset-specific investment, and frequency, search costs, negotiating, and monitoring supply chain partners, all involve various costs. The current study suggests that smallholders are more likely to participate in institutional channels if they are offered contracts with guaranteed

prices. The current study suggests policymakers to conceptualise the impact of current and future trends in the organisation of food systems to identify the incentives, opportunities and constraints they pose, now and in the future, from the smallholders' perspectives. Finally, the need for new generation cooperatives that provide marketing services along with their credit and input supply will enable farmers to participate in institutional channels and ultimately improve their livelihoods.

1.6 Thesis structure

This thesis is organised into eight chapters. While the first chapter has briefly described the research problem, background and objectives, the second chapter outlines the study's theoretical perspective and provides a review of the relevant literature. More specifically, it explains the NIE framework using Transaction Cost (TCE) and Collective Action (CA) theories. The third chapter establishes the context and motivation for conducting this research. This chapter discusses the driving factors of changing food systems and the emergence of new markets in developing economies. It also elaborates on the procurement drivers in institutional channels and the different modes of market engagement. Chapter 4 provides an overview of the geographic scope of the study and explains the research framework and hypotheses development.

The fifth chapter describes the research philosophy, research design, the process of survey formulation, the data collection and analytical methods. It also explains the sample selection, techniques, the survey protocol and the statistical tests (ANOVA and mean difference) used to analyse the data. The sixth chapter provides an overview of the results, a description of agribusiness in the sampled region such as the FFV growers' socio-economic characteristics, their human capital and physical farm assets. The chapter also includes the testing of the research hypotheses and summarises the results. The seventh chapter discusses the research objectives in relation to the NIE framework and agribusiness literature. It also provides detailed recommendations for policymakers to enhance market participation and maximise FFV growers' returns. The eighth and final chapter summarises the research findings, provides suggestions for future research and outlines the study's contributions to theory and policy.

1.7. Chapter summary

This chapter has established the study's background and has outlined the research problem. It has explained how in developing countries, agribusiness systems are undergoing a process

of transition, from wholesale spot markets to coordinated institutional channels. This transitional phase has been impacting the economic viability and livelihood of primary producers, especially smallholders who grow fresh fruits and vegetables. The chapter has outlined the challenges and opportunities for smallholder farmers in relation to their participation in institutional channels using New Institutional Economics (NIE), which include Transaction Cost (TCE) and Collective Action (CA) theory.

This chapter has also provided definitions for key terms using the agribusiness literature such as smallholders and market participation. It has also critically examined the research problem and different determinants of smallholder farmers' participation in institutional channels in order to establish a context for the study's research objectives. Finally, the chapter has highlighted the theoretical and empirical contributions and explained the thesis' structure.

Chapter 2

Theoretical framework and literature review

2.1 Introduction

Chapter one introduced the background, definitions of terminology, research problem, and outlined the current study's objectives. It discussed how FFV markets in developing countries are transforming from subsistence farming to commercial and explained how the evolution of institutional channels had added costs at different stages of the supply chain. This chapter introduces the theoretical foundation of the thesis which is used to explain actor behaviour and the smallholders' role in business transactions

New Institutional Economics (NIE) provides a way to examine dyadic and actor relationships such as between smallholders and other actors in agribusiness markets. The NIE framework (section 2.2) provides insights into transaction problems among supply chain partners. These connections may range from arm's length transactions to vertically integrated ones. The NIE approach is considered an appropriate theoretical framework due to factors associated with FFV production and marketing such as; market uncertainty, asset-specific investments, opportunism, frequency of searching, negotiating, and monitoring supply chain partners, all involving transaction costs. Key theories within NIE is that of Transaction Costs Economics (TCE) and Collective Actions (CA).

While TCE focus on different supply chain relationships and appropriate governance arrangements gave different levels of asset specificity and uncertainty, CA theory discusses potential solutions for combating the challenges mentioned above by invoking collaborative forms of governance. CA theory suggests institutional arrangements in terms of collective groups, help smallholders reduce their high transaction costs, and meet institutional channel requirements.

2.2 Theoretical approaches and empirical evidence

Fresh produce agriculture in developing countries has been transforming from subsistence to commercial over time, and the evolution towards institutional channels has added costs and barriers into multiple stages of the supply chain (Reardon & Timmer, 2007). In agribusiness, when transaction costs increase as a result of the buyer/supplier relationship, smallholders

should avoid business transactions despite the potential of gain for both parties (Alene et al., 2008). The agribusiness literature suggests that collective action provides one way to lower transaction costs. The NIE framework provides a way to understand complicated business transactions, such as the relationships between small FFV farmers and institutional supply chains. As it is especially interested in the different governance relationships, from arm's length to vertical integration, the NIE framework also provides insight into the transaction and relational problems among supply chain partners. We thus examine Transaction Cost Economics and the Collective Action frameworks to gain insight into smallholders' participation, or not, in higher-order agribusiness markets.

2.2.1 Transaction Costs

Transaction costs are a key feature of agribusiness markets. TCE has been widely applied to agribusiness research (Bhattarai, Lyne, & Martin, 2015b; Blandon, 2006; Key & Runsten, 1999; Pingali, Khwaja, & Meijer, 2005; Sartorius & Kirsten, 2007; Staatz, 1987). The TCE approach offers insight into the relationship between smallholders and institutional FFV markets. The theory has been used to understand these transactions as it can help shape fresh produce procurement modes.

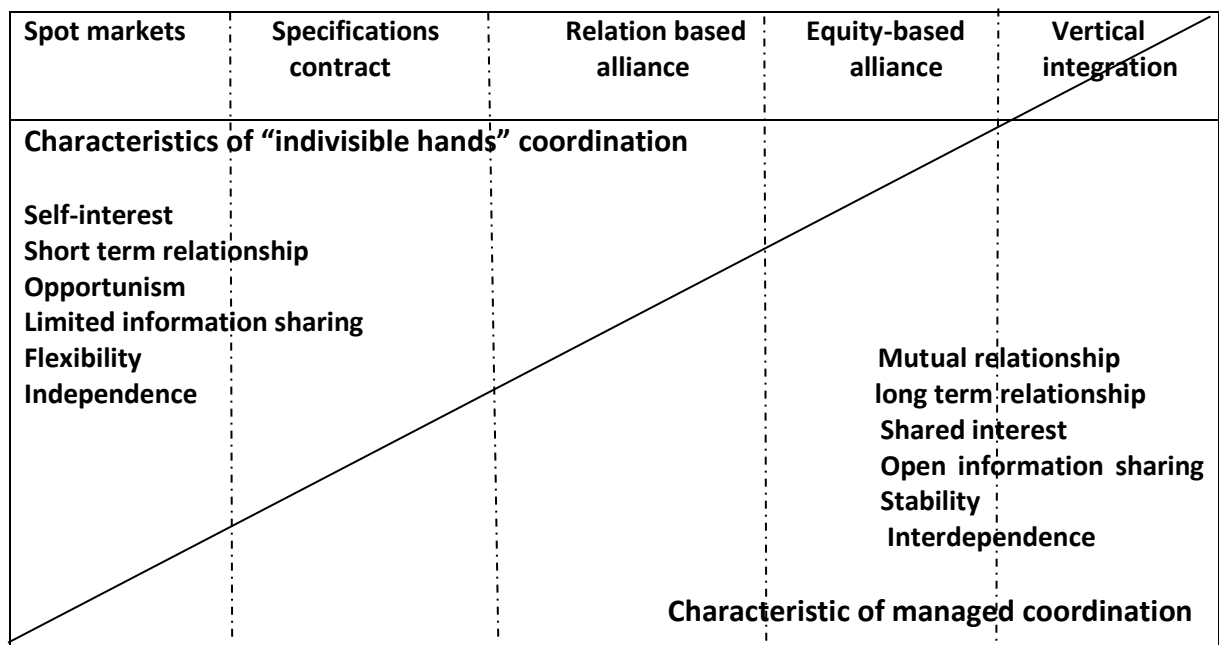


Figure 2.1 Exchange quantum of transactions in agribusiness
 Source: (Peterson et al., 2001)

Figure 2.1 shows the exchange quantum in agribusiness transactions. The diagonal line represents the mix of invisible-hand and managed coordination characteristics found in each

of the five alternative strategies for market exchange, The area above the diagonal indicates the relative level of invisible-hand characteristics and the area below the diagonal indicates the relative level of managed characteristics. The exchange quantum in the figure reflects that Low-cost frequent transactions are best suited for market exchanges, while less frequent, more expensive with higher levels of specificity are best transacted in-house through vertical integration. Thus, TCE proposes a range of governance arrangements that start with arms-length to vertical integration as the exchange relationship range. Williamson (1996) later discussed ‘hybrid’ type relationships that are equivalent to high trust partnership type relationships.

Coase (1937) introduced transaction costs into economic analysis. These costs include; the costs associated with information and the search for supply partners, the bureaucratic cost of maintaining a purchasing office, screening and monitoring costs by third-party arrangements, and the cost of negotiation, coordination and enforcement of contracts. Considering Coase’s work, Hobbs (1996) further divided transaction costs into information, cost into the negotiation, cost into control and monitoring, and cost of adaptation. Table 2.1 shows that the transaction costs can be divided following the phase of the transaction.

Table 2.1 Transaction costs in dependence of the phase of the transaction

Transaction cost	Where they occur
Costs of information	Search and acquisition of information about potential transaction partners and their conditions
Costs of negotiation	Intensity and time consumption of negotiations, contract formulation and reach an agreement
Costs of control and monitoring	Ensuring of compliance of agreed dates, quality, quantity, price and eventually confidentiality
Cost of adaptation	Enforcement of changes in dates, quality, quantity and price due to changing conditions during the agreement period

Source: (Hobbs, 1996)

Further, Williamson (1985, p. 52) considers three transaction-specific issues; asset specificity, uncertainty and frequency. From an agribusiness point of view, these three concepts can be understood as follows:

- **Asset specificity** defines the degree to which assets can be redeployed for alternative use. Firms or individuals may be exposed to the risk of being taken advantage of if an investment is only relevant for that specific transaction. This is particularly true in the

producer-buyer relationship; producers often make transaction-specific investments (relationship-specific investments), thereby becoming exposed to what is called the 'hold-up' problem. Here, one of the actors seeks to renegotiate the contract using the threat of losing the specific investment as leverage. Asset specificity refers to the producer's investment decisions, such as the selection of inputs, allocation of land to specific crops, physical assets, knowledge, channels of distribution used in the transactions.

- **Uncertainty** in the agribusiness context refers to incomplete information about prices and market signals that mean that farmers often do not gain optimal prices for their efforts and default to selling into traditional markets. This price and quality uncertainty means losses that forces producers to accept variable prices at harvest time. From a buyers' point of view, farmers may behave opportunistically by not supplying the specified quality or quantity. Hueth, Ligon, Wolf, and Wu (1999) suggest that in general, uncertainty regarding the condition of fresh produce leads to lower prices for producers. Specifically, environmental uncertainty and risk in agribusiness are closely associated with the form of production, yield, price variability and quality loss. The perishability of fresh produce and limited storage options mean that the supply chain is highly inelastic (Sexton & Zhang, 1996).
- **The frequency** with which transactions occur can also affect the way that transactions are organised, and hence their associated transaction costs. Often the greater the frequency of the transaction, the better the parties understand each other, share information and trust develops. However, the seasonal nature of fresh produce production reduces the possibility of frequent transactions. Indeed, institutional chains demand high-quality standards with specific product and transaction characteristics. Institutional channels also require consistent and frequent deliveries of FFV products, which make spot markets inappropriate for them, especially in the case of some particular commodities where constant monitoring is needed (Boehlje, 1999). The frequency of transactions forces buyers and suppliers to coordinate their activities to mitigate transaction costs.

Transaction costs are also associated with several forms of selling to institutional channels. These transaction costs associated with FFV marketing can be classified into observable and

unobservable transaction costs (Ratnadiwakara, de Silva, & Soysa, 2008; Staal, Delgado, & Nicholson, 1997). Observable transaction costs include marketing costs, and distribution costs such as transport, handling, packaging, storage, and spoilage. Unobservable transaction costs include the cost of searching for information, bargaining and the enforcement of contracts. Ostrom, Schroeder, and Wynne (1993) think of business transaction costs in terms of *ex-ante* and *ex-post* costs. *Ex-ante* costs include searching for a partner, negotiating, and information costs, while *ex-post* costs cover governing, monitoring, sanctioning and renegotiation costs associated with conflict resolution.

With the emergence of institutional channels, new transaction costs have arisen. For example, the food processing sector has been rapidly transforming agribusiness into a consumer-oriented channel. As Reardon and Barrett (2000, p. 196) note, industrialisation involves the:

“...(a) the rise in the food processing sector and the introduction of effective logistics and distribution (b) increased vertical coordination between agribusiness firms and growers (c) and significant changes in agribusiness technology and market structures”.

Another viewpoint states:

Agribusiness-industrialisation is the application of modern industrial manufacturing, production, procurement, distribution, and coordination concepts to the food and industrial production chain. (Boehlje, 1996, p. 30)

The above definitions of agribusiness industrialisation highlight the adoption of business arrangements among different supply chain partners. Cook and Chaddad (2000) see agribusiness industrialisation as a rapidly growing globalised and industrialised system. In this system, various supply chain participants, such as primary producers, wholesalers, retailers and processors, all have specific roles to play.

Institutional channels demand fresh produce that meets higher quality and other requirements. As such they tend to source their produce from reliable sources who can guarantee quantity, quality, frequency and timing (Blandon et al., 2009), incurring higher channel transaction costs of searching, negotiation and monitoring costs. The transaction costs associated with fulfilling these requirements imply a need to develop contractual relationships between fresh produce growers and institutional channels buyers to safeguard

the transaction (Barrett et al., 2012; Reardon & Berdegue, 2002). As a result of these requirements and new costs, it is primarily only larger farmers who are able to participate in institutional channels (Singh, 2008).

Specifically, institutional channels have quality, food safety compliance, quantity, and frequency of supply requirements (Kirsten & Sartorius, 2002). The mode of procurement differs between the spot market and other forms, such as vertical coordination (Boehlje, 1999). Buyers and sellers must share information according to the evolving needs and preferences of consumers. Therefore, smallholders clearly face high infrastructure and transaction costs to sell into institutional channels (Barrett, 2008; Jayne et al., 2005).

Furthermore, the grading of products and contract terms used also causes uncertainty for smallholders in terms of estimating sales or how much product will be rejected. To participate in the institutional channels, smallholder needs specific investment that enables them to produce enough and meet the quality requirements. As a result of these high transaction costs, farmers often default to selling their produce into traditional markets because it has minimal requirements. Moreover, framers are generally familiar with the other actors (buyers/wholesalers) at their local markets (Dolan & Humphrey, 2000; Pingali et al., 2007; Vorley et al., 2009). In short, mounting transaction costs explain why some farmers forego the potential benefits of selling through institutional channels.

Makhura (2001a) argues that transaction costs reflect the character of the market but embedded in the characteristics of individual households and their economic environment. Bandon (2006, p. 47) elaborates transaction costs relevant to smallholders' participation of in institutional channels. Table 2.2 shows the transaction cost(s) associated with agribusiness transactions.

Table 2.2 Transaction cost (s) in agribusiness

	Uncertainty	Specific asset	Frequency
1	Production risk	Irrigation	Month of production
2	Quality risk	Greenhouse	Frequency of delivery
3	Information asymmetry	Collection and distribution centres	
4	Price volatility	Logistics	
5	Payment mechanism	Technical assistance	
6	Trust in relationship		
7	Grading		

Source: (Bandon, 2006).

2.2.2 Collective action theory

NIE contends that certain forms of collective institutions can help lower individual farmer's transaction costs. Williamson (2004, p. 597) proposes four levels of societal analysis related to institutions. They are composed of formal rules, informal constraints, and the enforcement characteristics of both." The levels include: 1) informal institutions, such as customs, traditions, norms, and religions; 2) institutional environment, which includes formal rules of the game, such as property rights (political environment, judiciary, bureaucracy; 3) governance, which includes 'the play of the game,' specifically contractual arrangements; and 4) resource allocation and employment (prices and quantities; incentive alignment). NIE, as the branch of economics that focuses on institutions, is particularly interested in levels two and three that include institutional environment and institutions of governance.

NIE is a branch of economics that considers the rules of governance through the contracting game (institutions and the playing of games) (North, 1995). These institutions can be formal or informal or both. Formal institutions make rules, such as policy, judicial and bureaucratic rules, inherently related to collective action as people also form these rules. Informal institutions are typically formed by people living in one geographic location who create informal institutions, share common customs, traditions and often religious practices.

The most common forms of collective action are through informal networks, cooperatives and strategic alliances (Blandon, 2006). The 'network', form of collective actions, is known as a simple association of individuals who communicate with one another for mutual benefits (Holmlund & Fulton, 1999). These individuals establish informal network relationships and help each other in various circumstances, like times of natural disasters or when there is a need to share resources. Examples of informal institutions include family, friends, neighbours and religious bodies. Information sharing is central to economic activities, and as such, these informal networks share information and produce a shared pool of knowledge and experience. In terms of smallholders, they can establish a network among themselves to deal with institutional channels by sharing knowledge and expertise (Holmlund & Fulton, 1999).

Farmers' cooperatives are an example of a standard form of collective action. Gertler (2004, p. 18) defines cooperatives as "...associations of people voluntarily united to meet their everyday economic, social and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise". Table 2.3 provides a summary of various studies on

collective action in different parts of the world and shows how cooperation among farmers has helped them to address market imperfections.

Table 2.3 Review of collective action in agribusiness

Author and Year	Country/region	Key Objective	Method	Key findings
(Barham & Chitemi, 2009)	Tanzania	Collective action initiatives to improve group marketing performance	A pretext–post-test research design	Groups with strong internal institutions, functioning group activities, good assets, gender composition of groups also affect group marketing performance
(Devaux et al., 2009)	The Papa Andina	Use of collective action to foster pro-poor innovation in market chains	Participatory method	Collective action can reduce the transport costs in the final product value
(Hellin et al., 2009)	Honduras, El-Salvador, Mexico	Collective action can benefit high-value vegetables and maize producers	Case studies	Draws attention to the hybrid approach for farmer organisation
(Kruijssen, Keizer, & Giuliani, 2009)	Thailand, India, Syria and Vietnam	How collective action can provide a more understanding of how market chains operate	Case study	Collectively, farmers can utilise agrobiodiversity
(Markelova et al., 2009)	Peru, Bolivia, Ecuador, Uganda, Thailand, India, Syria, Vietnam, Tanzania	How the collective impacts smallholders' market access	Review of case studies and literature	Collective action can bring advantages for smallholder marketing, in terms of natural resource management
(Narro et al., 2009)	Kenya & India	How collective smallholders can achieve food safety requirements	Case study method	Collective actions can play a crucial role in creating a farm to fork linkages
(Woldie & Nuppenau, 2008)	Southern Ethiopia	Memberships in cooperatives in Southern Ethiopia affect smallholders' bargaining power	A regression analysis	Access to central-market price information and trade relationship enables farmers to stick to their original asking price

At the organisational level, collective action can be defined as the activities of a group of people either directly on behalf of an organisation, or for the shared interest or benefit of group members (Meinzen-Dick et al., 2004). Collective action refers to actions taken by a group either directly or indirectly in pursuit of members' perceived shared interest (Sandler, 1992). Collective action theory argues that where groups are formed, members jointly benefit. Levins (2001) emphasises that one of the key benefits of collective action is the strengthening of farmers' collective arrangements to gain market power by pooling resources to negotiate with buyers of fresh produce, inputs and machinery suppliers.

Institutional channels prefer to work with large farmers or groups who produce the best quality products at the lowest possible cost (Kirsten & Sartorius, 2002). Collective actions lower the barriers for smallholder farmers to participate in these channels. For example, Markelova et al. (2009) contend that collective action increases smallholders' market access by reducing imperfections in the market. Collective actions lower the per-unit transaction cost by significantly reducing the number of smallholder farmer exchanges. Collective action empowers smallholders to access information, meet quality standards enforced by institutional channels and gain scale economies by pooling financial and labour resources (Moustier, Tam, Anh, Binh, & Loc, 2010). Collective action also empowers smallholders to access new domestic or international markets, which would otherwise be out of reach (Devaux et al., 2009). It also enables smallholder farmers to comply with food safety standards, access information and market signals to become competitive (Minten et al., 2009; Vorley et al., 2009).

Conversely, in many cases, the formation of collective farmer organisations also adds additional transaction costs in the form of subscription fees for smallholders that many find they can not afford. These additional fees may impede or discourage farmers from joining collective groups (Stockbridge, Dorward, Kydd, Morrison, & Poole, 2003). Some have reported that in the case of staple commodities the supply chains usually have low transaction costs anyway, and the reductions gained by collective action and farmer organisations do not compensate for their high subscription fees (Berdegué Sacristán, 2001).

The above discussion provides an insight into the use of collective action theory in the current study. The above review suggests that collective action can create economies of scale for smallholder farmers in the production and marketing of agribusiness produce. Also, the

farmers' group can achieve efficiencies through access to cheaper inputs, and collectively they can lower the marketing cost. The implementations of food safety standards, requirements of traceability, post-harvest cold storage, specific transportations are other issues hinder smallholders' participation in institutional channels. With the collective actions and coordinated behaviour of groups towards shared goals, these hindrances can be lowered.

2.3 NIE and the buyer-supplier relationships

Supply chain relationships are vital for building and maintaining strong professional connections between buyers and suppliers (Baihaqi & Sohal, 2013). These connections are critical for perishable FFV product supply chains. Transaction cost economics focuses on the cost involved in making transactions, and how these costs are shaped the buyer-supplier relationship. Williamson (2004) discusses three generic modes of market engagement; arm's-length (spot transactions), hybrids and vertical integration.

Referring back to Arm's length transactions, these are a widely used method of procuring raw material from spot markets (Prajogo, Chowdhury, Yeung, & Cheng, 2012), especially in agribusiness. The traditional procurement systems involve buying through the spot market from food wholesalers. Usually, in arm's-length transactions, farmers have low control over price, and transactions happen frequently and immediately (Chen, Sohal, & Prajogo, 2013). One key reason for these actions is that transaction cost barriers are a significant reason why resource-poor smallholders choose arm's-length transactions in developing countries (De Janvry et al., 1991). While price and freshness are considered the key requirements in spot market transactions, Farmers often have no other options but to sell at the auction price. In other words, they have the 'produce and then sell' approach in spot market transactions. Reardon et al. (2009) consider arm's-length transacting to be a poor way of co-ordinating activity and transmitting market information between buyers and sellers. Agribusiness literature also discusses the contract farming model of market engagement in the context of smallholder farmers' market participation in institutional channels (Barrett et al., 2012; BIRTHAL, Joshi, & Gulati, 2005; Key & Runsten, 1999; Miyata et al., 2009; Sartorius & Kirsten, 2007). While traditional markets usually operate using arm's-length transactions, institutional channels focus on several alternative modes of exchange relationships with suppliers to procure FFV (Peterson et al., 2001).

Alternatives to arm's length transactions, contract farming is another form of exchange relationship for the production and supply of agricultural produce. The essence of such contracts is that there is a commitment to provide a specific agricultural commodity (tomatoes for example), at a particular time, for a particular price and at a particular quantity, required by a known buyer. Further, contract farming involves a pre-agreed price, quality, quantity or acreage (minimum/ maximum) and time (Singh, 2009). As such, contract farming is a form of vertical coordination that falls in between spot markets and vertical integration through ownership. TCE suggests that because contracting involves costs, it is economically justifiable only when:

- the buyer is a large firm (a processor, exporter, or supermarket chain),
- significant quality variations characterise the product, perishability is technically tricky to produce, and has a high value-bulk ratio,
- the destination market is willing to pay a premium for a specific product or production attributes that can be ensured only by high coordination between farmers and buyers, and,
- the policy environment is conducive.

The specific terms and conditions of the contract determine the share of benefits, costs, and risks of coordination between the parties. The contract should also include the timing of payments, price setting, extension and input provisions, quality and quantity, and dispute resolution information. Johal (2018) argues that contract farming allows farmers to produce high risk, high-value perishable crops that they would otherwise avoid due to price and overproduction risks. Contract farming also provides retailers and processing firms with some level of security compared to buying from open markets, and it also facilitates the development of trust over the longer term.

Contract farming enables smallholder farmers to access critical inputs and extension services. Buyers will often provide quality seeds, inputs and pesticides at below-market prices, along with technical support and extension services as part of the contract (Singh, 2009). Often, smallholder farmers who participate in contract farming also have assured access to credit in advance from buyers (Swinnen, 2005). However, there are mixed views about contract farming as a mode of market engagement in developing countries. There is some evidence that smallholders are typically excluded from contract farming due to high unit transaction

costs (Pingali et al., 2005), and that institutional channels prefer large farmers due to their economies of scale. Agribusiness literature suggests that in general large companies procure fresh produce from larger farmers and not from smallholders due to significant variations in volume, quality and delivery (Berdegué et al., 2005; Pingali et al., 2005; Reardon et al., 2009).

Apart from arm's length and contracting out solutions, Macneil (1980) introduces another form of engagement based on trust and commitment in reciprocal transactions with the same buyer, otherwise known as Relational Exchange theory. In these types of arrangements, contracts may be present even in highly collaborative exchanges. If they are, they tend to be ignored, and the relationship develops more through trust and commitment until something goes wrong. If no contract is present, exchanges take place through verbal or 'handshake' agreements based on trust and reciprocity. These verbal contracts often prevail in developing countries where the legal framework is not mature or strong enough to enforce formal contracts by law. The dual marketing options of fresh produce (either sold in traditional markets as raw commodities or for processing at institutional channels), triggers parties to form verbal contracts rather than enter into a formal contract. It allows the seller to play-off both markets to get the better price, but this is highly detrimental to trust and commitment type long term relationships. In these more informal relationships, the trust and commitment of both parties are fundamental elements of this relationship and develop over the longer term, thus reducing transaction risks and costs. This collaboration between markets and suppliers (farmers) plays a vital role in traditional markets where farmers sell through commission agents who also provide farmers' credit and inputs needs.

In addition to the above discussion, agribusiness literature relevant to the impact of the NIE framework has been widely discussed by many authors examining different perspectives. One of these perspectives focuses on understanding the role of TCE and smallholder farmers' limited market access (Holloway, Nicholson, Delgado, Staal, & Ehui, 2000; Kirsten & Sartorius, 2002). The role of TCE on smallholder farmers market access has been established theoretically and empirically by Key and Runsten (1999) and Barrett (2008). Furthermore, agribusiness researchers have identified various endogenous and exogenous factors that affect the market selection of fresh produce growers in Asia, Africa and Latin America. Endogenous factors are related to farm and farmer characteristics; for example, resource endowments (social, physical, human, and financial capital), the dependency ratio, household size, and the household head's age and gender (Von Braun & Kennedy, 1994).

Conversely, researchers have identified endogenous factors affecting market participation. These are; low-yielding environments, the lack of essential farm assets and high transaction costs that present obstacles for the integration of smallholders into the market economy (Omiti et al., 2007). Pingali et al. (2007) include household-specific factors that influence transaction costs such as social networks and human assets: that is, age, gender and education. The authors argue that the existence of social networks might offer smallholders opportunities in the form of scarce agricultural tools and machinery. Age, gender and education can impact on transaction costs in different ways. While the period in terms of past years in farming activities are relevant to farm experience, gender is related to better access to land and credit, whereas the level of education matters in reducing the cost of searching for information. The current study considers the theoretical components of TCE and CA theories as well as various endogenous factors affecting market participation of smallholders' farmers into institutional channels.

2.4 Chapter summary

This chapter has examined the theoretical perspectives of the research approach. It has discussed Williamson's (1975, 1979, 1985a) new institutional economics framework and collective action theory (Olson, 1965). These theories have been used to identify issues for fresh produce growers, in particular, hindrances and enablers for participation in Institutional channels. Indeed, the above discussion has outlined the relevance of NIE for the current study. Hence, when considering transaction cost economics, the following conclusions are drawn;

- TCE, explains relations between buyers and sellers in terms of the cost of carrying out transactions, including finding a buyer, negotiating a price, delivering the commodity, and obtaining payment, as well as the risks associated with the transaction, including the risk of being cheated (Williamson, 2004).
- The cost off carrying out a transaction can be considerable because of imperfect information, and sellers must spend time finding potential buyers and negotiating over the price. Often the seller has more information about the quality of the product, but the buyer has better information about the market demand. This information asymmetry prevents markets from operating efficiently.

- Limited ability to process information: Even if the buyer and seller had all the relevant information, they would not have the time or capacity to analyze it thoroughly, a problem sometimes called bounded rationality.
- Dishonesty: The buyer and seller can never fully trust each other since each has some short-run incentive to misrepresent the truth and violate the terms of their agreement. It is referred to as the risk of opportunistic behaviour.
- Transaction-specific investments: The risk of opportunistic behaviour is even more significant when the buyer or seller must make investments that are only useful for carrying out a transaction with the other party because of asset specificity.
- Through collective action, smallholders can gain economies of scale, increase bargaining power and lower transaction costs associated with dealing with institutional channels. Logically, smallholder farmers are incentivised to choose the most appropriate market channel based on the lowest transaction cost for themselves. Collective action theory argues that when groups are formed, members jointly benefit. Levins (2001) emphasises that strengthening farmers, collective arrangements gain more significant market power by pooling their resources to negotiate with buyers of fresh produce, inputs and machinery suppliers.

Having discussed the theoretical perspectives, the following chapter explains how agribusiness markets act in different regions. The chapter also discusses the operation of effective food systems, different market structures, procurement models, and the various constraints which affect smallholders' participation in food supply chains.

Chapter 3

Agribusiness markets and smallholder participation: A review of the literature

3.1 Introduction

Chapter 2 provides the theoretical perspectives necessary to assist in the understanding of the various processes and transformations occurring in FFV supply chains. It also helps explain how smallholder farmers overcome significant challenges to participate in institutional channels and increase their economic viability. This chapter outlines how agribusiness markets differ across regions and provide the context for this study. It reviews the research on effective food systems, market structures, procurement modes, and the constraints that influence smallholders' participation in food supply chains.

The functions of production and consumption of food are often geospatially separated. While production activities generally occur in rural areas, consumption primarily happens in urban areas. Agricultural marketing is the process that overcomes this separation, allowing produce to be moved from an area of surplus to one of need (Rapsomanikis, 2015). While food is a basic physiological need for the survival of all living entities, the volume of food consumed varies along with food types, such as cereals, meats, dairy, and vegetables. Affordability and availability contribute to these variations, as developed, developing and underdevelopment countries are characterised by different food choices and systems (Pingali, 2007). The following section describes the different food systems from around the globe and provides a context for the current study.

3.2 Differences between food systems

Food systems include all the processes and infrastructure involved in feeding a population. In terms of farming, it begins with planting and ends with harvesting. Further steps in food systems include processing, packaging, labelling, logistics, marketing, and sales to end consumers (McCullough et al., 2008). There are many different food systems around the world; in particular, different procurement models for fresh produce can characterise these systems. Ericksen (2008) describes a food system as a chain of activities from 'farm to fork' with particular emphasis on processing and marketing, and the multiple transformations of food that these systems entail. Maxwell and Slater (2003) describe food systems, according to

their model of a food's lifespan from origin to plate, as either traditional or modern. McCullough et al. (2008) characterise food systems according to their country typology as either; traditional, structured/modernising or modern/integrated.

Traditional food systems comprise a significant portion of agriculture in a country's GDP where; the population is rural, the agricultural economy is traditional, and there are few opportunities for income outside agriculture. In traditional food systems, supply chains are typically short, and food does not travel far from their place of production (McCullough et al., 2008, p. 11). Agribusiness transactions are primarily arm's-length spot markets where farmers bear the costs associated with market imperfections, such as irregular charges by intermediaries (Maxwell & Slater, 2003). Agricultural growth reduces rural poverty by providing work for rural labour forces and via market linkages of traditional export commodities (McCullough et al., 2008). Traditional food systems are usually managed centrally by state-sponsored bodies and boards such as the Agricultural Produce Marketing Committee (APMC) in India (Singh, 2009) in an attempt to reduce the impact on farmers of market imperfections.

In contrast, structured/modernising food systems comprise a moderate share of agriculture in the country's total GDP (for example, between 10-30%). Here the population is moving to urban locations in varying degrees and the percentage of the workforce involved in agriculture varies considerably (anywhere from 15-50%) (McCullough et al., 2008). Structured/modernising food systems largely depend on the urbanisation of the rural population, and the rising income of the middle class. Structured food systems exist somewhere between traditional and industrialised economies (McCullough et al., 2008, p. 17). A feature of these systems is that the agricultural economy is quickly modernising, offering more diverse opportunities for the population in the processing industries and high-value crops in domestic markets. Agribusiness institutions have been transforming over time and are usually still in a transitional state. India, China, Honduras, and Mexico are examples of economies that have, or are at a stage of transition, in becoming structured/modernising food systems (Blandon et al., 2009; Schwentesius & Gómez, 2002).

In modern or integrated food systems, the agricultural contribution to the country's GDP is low (usually less than 10%). The population is largely urbanised, and approximately only 15% of the workforce is involved in agriculture. In a modern agribusiness system, target customers

include both domestic and international. Modern food systems create job opportunities for the rural population through value-added products (in food processing). These jobs create a middle-class urban population that is reliant on processed meals. These modern food systems also rely on machinery and benefit from economies of scale. Marketing and temperature-controlled logistics provide additional flexibility in the value chain. Finally, modern food systems are characterised by differentiated products with short shelf-lives, flowing through well-coordinated value chains that provide end consumer value. Governments and the industry bodies set basic food safety and traceability standards which they must meet (Kinsey & Senauer, 1996). It is also proposed that these more advanced food systems, while delivering value to consumers, also facilitates higher returns to farmers/producers. Table 3.1 shows the characteristics of these three different food systems.

Table 3.1 The characteristics of different agribusiness food systems

Indicators	Traditional	Structured/ modernising	Modern/integrated
Agricultural share in GDP	A high share of agriculture (more than 30%)	Medium (10-30%)	Low (10% of GDP)
Workforce involved in agriculture	Over 50%	Between 15-50%	Less than 15%
Urbanisation	Rural	Mixed	Urbanised
nature of the agricultural economy	Small marketable surplus	Transition to modern	Industrialised
Rural income sources	Few opportunities outside agriculture	More diversified opportunities	High % share of labour in manufacturing
Agriculture's role in poverty reduction	Agricultural growth stimulates poverty reduction by providing market linkages	High levels of opportunities for value-adding	Agribusiness provides employment
Institutions examples	Government regulations	Public/private partnership	Regulatory frames

Source: McCullough et al. (2008, p. 10)

In traditional markets, agribusiness transformations are slow, and high-value institutional channels are rare. Moreover, their presence is limited to the rural areas, and long-life staple foods are a more significant part of their offerings compared to fresh produce. Table 3.2 following explores the market indicators of different food systems.

Table 3.2 Trends in the food systems from primary producers to consumers

Trends	Traditional	Structured/modernising	Industrialised
Consumption	Growing awareness about dietary diversification	Shift to ready to eat, processed food	Higher value, processed food
Structure of retail	Spot market on a small scale	The rising presence of supermarkets, but a low proportion of FFV	Widespread supermarkets
Value-adding	Some degree of processing industry	Local and international food processors	Large processing industry for domestic market and export
Procurement	Spot transactions	Government-regulated structured markets	High coordination among channel partners
Wholesale	Traditional wholesalers	Traditional and specialised wholesalers	Specialised wholesalers
Production systems	Diversified, a low input system	Intensive input use, specialisation of cropping systems	More focus on conservation
Food safety	No traceability	Traceability to some extent, private standards	HACCP systems, private safety standards and public accountability
Vertical coordination	Relationships	Relationship rules	Contracts, ICT systems for efficient response

Source: McCullough et al. (2008)

Table 3.2 highlights the transitioning trends of different food systems from farm to fork. Awareness about dietary diversification remains at an initial stage in the traditional food systems, and the retail structures rely on spot markets and on a small scale. There is a lack of traceability for FFV products, and buyer/supplier relationships rely on the informal reciprocity of repeated transactions (Cadilhon et al., 2006).

In structured/modernising economies, farmers primarily produce for domestic markets. In these food systems, both subsistence and export-oriented agribusiness systems co-exist side-by-side. Agribusiness literature notes that more urbanised economies, those in central and eastern European and Latin America (Mexico and Honduras) for example, have more significant opportunities for FFV marketing (Blandon et al., 2009; Schwentesius & Gómez, 2002). Different models of procurement of fresh produce also coexist, either through government-regulated structured markets or institutional channels which rely on direct procurement through contracting. Indeed, due to rising urbanisation, international and

domestic food processors contribute to value-adding processed food in modernising economies.

3.3 Driving factors of transition in agribusiness food systems

At the macro level, several driving factors are responsible for changes in agribusiness systems. It is noted that; agribusiness industrialisation (Cook & Chaddad, 2000), changes in agribusiness technology (Saxowsky & Duncan, 1998), trade liberalisations (Pingali, 2007; Reardon et al., 2003), rising urbanisation, the rising per-capita income of the middle class, changes in consumer preferences (Reardon & Hopkins, 2006), increased awareness of nutrition are considered the significant factors in these changes. Finally, changes in macroeconomic policies are all significant factors of food system transitions. The next section discusses each of these factors in turn.

3.3.1 Changes in agribusiness technology

In modernising economies, farmers face challenges due to the distance and remoteness of the rural areas where they farm. Access to information and agribusiness technology is essential for facilitating inclusion in institutional channels. Rapid technological innovation and adaptation have transformed agribusiness food systems, but a lack of information technology often makes the transaction costs prohibitively high (Saxowsky & Duncan, 1998). The use of modern technology leads to higher yields, less post-harvest losses and products which are of a higher quality. Access to modern agribusiness technology means that fresh produce growers are able to grow high-value crops that meet processing standards (Reardon & Barrett, 2000).

New information and communication technologies (ICT) enable supply chain partners to coordinate their activities even when remote from the decision-making point (Salin, 1998). These include various communication devices such as smartphones, radios, televisions, computers, and the internet. Mobile phones significantly reduce communication and information costs for the rural poor in developing countries. This not only provides new opportunities for rural farmers to obtain access to information on agricultural technologies but also to use ICTs in agrarian extension system (Aker, 2011). Along with hardware technology, software technology in terms of ios or android applications helped farmers to provide information about support regulatory compliance, equipment optimization, farming simulator games, information management, agronomy references, product tracking, pest identification, emissions accounting, or benchmarks for marketing compliance claims (Eichler

Inwood & Dale, 2019). In addition to it, new production and harvesting technologies, advanced irrigation systems and temperature-controlled logistics also provide new ways for FFV growers to enter institutional channels (Collins, 2006).

3.3.2 Trade liberalisation and globalisation

The globalisation of agribusiness products has a significant impact on changing agribusiness systems. The globalisation of markets has increased the vertical coordination and mutual dependence among food supply chain partners for the production and distribution of food products globally. It has been enhanced with the adoption of structural adjustment programmes by various developing countries, characterised by an inflow of foreign direct investment, exchange of technology and information, technical assistance and the integration of agribusiness systems (Abbott, Boehlje, & Doering III, 2001). For example, in the early 1990s, India liberalised the market for foreign direct investment, resulting in an easing of regional trade barriers. This change created opportunities for international food supply chain retailers, as well as local agribusiness chains, to create and fill new gaps in the market (Reardon & Berdegue, 2002).

While traditional food systems still dominate the procurement of FFV from traditional wholesale spot markets, trade liberalisation and globalisation have increased the opportunities for primary producers, particularly in terms of retail, value-adding and processing to engage in institutional channels (Reardon & Berdegue, 2002; Singh, 2009).

3.3.3 Changes in consumer preferences

A significant issue in modern agribusiness is that of changing consumer preferences. Increases in per-capita income positively affect the disposable income of households in developing countries (Pingali, 2007). This extra income allows consumers to shift from staple foods to those with higher levels of nutrition, such as fresh produce and dairy products (Reardon & Barrett, 2000). Another factor responsible for changes in consumer preferences is the increased number of women in the workforce (Gulati et al., 2007). A reduction in the time available for cooking at home has resulted in increased demand for differentiated processed food products and ready-to-eat meals which have become increasingly popular in developing countries.

Besides, consumers are more concerned about what they are consuming as their awareness widens to include the origin of the food they are eating and concerns about food safety. The result of these changing consumption patterns, alongside increased food safety concerns, is an ideal setting for supermarkets to prosper using the more robust institutional channels (Reardon & Berdegue, 2002). Indeed, Pingali (2007) states that more structured economies, such as India, are moving away from staple foods as the growing demand for safer and differentiated food products cannot be satisfied using purely traditional markets. These products require a modern, integrated food system, that relies upon the development of institutional channels.

3.3.4 Government investment in extension services

Government investment in the development of infrastructure plays a vital role in providing smallholders with a pathway to market access. Furthermore, a farmer's attitude to risk determines the extent of their participation in modern food systems (Von Braun & Kennedy, 1994). Government investment in research and innovation and the establishment of agricultural institutions/universities and extension centres in distant rural areas all enhance FFV's investment and farmer's risk-taking capacity (Minot & Ngigi, 2004). The government's securing of access to irrigation through improved canal systems, improvements in temperature-controlled logistics and communication infrastructure; road access to rural markets, improved credit services, and other public goods such as better education, health, and sanitation services are significant contributors to the emergence of institutional agribusiness food systems (Pingali et al., 2007)

3.3.5 The urbanisation of the rural population

The increasing urbanisation of the rural population negatively impacts the traditional food system. Wilkinson (2012) states that the size of the urban middle class determines the nature of retail markets. With increasing opportunities for employment in urban cities, landless and marginal rural farmers have been converting to urban labour in many developing countries (Singh, 2004).

Conversely, the increasing number of women in the workforce has had a positive effect on changing food systems. The rising disposable income of the middle class, the emergence of convenience shopping and the availability of processed meals are factors that mean that food systems are moving away from traditional systems to new ready-to-eat meal options (Birthal

et al., 2005; Gehlhar & Regmi, 2005; Louw et al., 2007). Also, the household head's opportunity cost is higher if they perform paid work other than cooking at home because he/she can invest that time in productive means (Gulati et al., 2007). The next section of this chapter discusses agribusiness markets that dominate developing countries and their transition into modern food systems.

3.4 Transitioning agribusiness markets and food systems

Changes in food systems are related to market coordination, where agricultural inputs and food distribution systems are aligned with information, technology, logistic arrangements, and food safety standards (McCullough et al., 2008). Agribusiness products move through the supply chain, utilising different marketing channels. These channels can be categorised based on frequency, the type of products traded, the scale of transactions, the kind of marketing functions performed, and the types of consumers targeted. Channels can be distinguished from each other based on market intermediaries involved in moving the FFV products from farm to fork. The total length of the marketing channel depends on the size and location of the market, the nature of the FFV products and the consumer demand patterns (McCullough et al., 2008). The next section discusses different agribusiness marketing channels in developing countries

3.4.1 Traditional market channels

As previously discussed, traditional markets are part of traditional food systems, characterised by the dominance of price-driven exchanges, unorganised supply chains involving several intermediaries and limited market infrastructure. There are various forms of traditional agribusiness markets for FFV products in developing countries. The agribusiness scholars have attempted to define the features of traditional markets, and one of the key features noted is that of government regulations. The effects of such regulation have been studied in Chile by Dirven and Faiguenbaum (2012), Agriculture produces marketing committee (APMC) in India by Singh (2012b), and agricultural marketing services (AMS) in Bhutan by Tobgay and McCullough (2008). Further, traditional markets can be categorised based on various marketing functions, such as the frequency with which they are held, the types of products traded, and the marketing functions performed (Singh, 2009). Considering factors, such as the nature of FFV products, production patterns and demographics, the current research divides

traditional agribusiness markets into two broad categories: wholesale markets and traders at the farm gate. These are described next.

3.4.1.1 Wholesale markets

In developing countries, food products reach the consumer through a complex network, involving production, assembly, sorting, reassembly, distribution and retail stages. The wholesale markets provide the linkage between the producer (farmer) and the retailer that enables farmers to sell their goods and traders to purchase them. Wholesalers assemble, grade and sort produce. They provide a connection between primary producers and supermarkets (Reardon & Berdegue, 2002). Specialised wholesalers conduct food safety checks and perform hazard analysis. They also meet supermarkets' critical control point requirements. These are challenging in the case of traditional wholesalers, as they rely on size, colour and other outwardly observable FFV attributes (Berdegué et al., 2005). The wholesale markets are significant contributors to FFV procurement in developing countries. For example, in Chile, 65% of all FFV products are traded in traditional wholesale markets (Dirven & Faiguenbaum, 2012).

Without wholesale markets and wholesaler agent, the retailer would need to purchase directly from farmers, that would involve completing many minor transactions with numerous smallholder farmers. Due to the existence of wholesale markets, the number of transactions are reduced, and the marketing process is simplified (Bathla, 2015). In India, wholesale markets can only be established with the permission of state governments. Each state has a State Agriculture Marketing Board (SAMB). These, in turn, form market (mandi) boards at the district level. In India, there are 6,983 wholesale agricultural produce markets and about 22,000 primary rural markets. Out of these, 6,738 operate under the APMC act (McCullough et al., 2008).

At wholesale markets, FFV prices are determined via open auctions run by registered commission agents. In this marketing model, the farmer has no choice but to sell his/her produce at the current or spot price. In the wholesale market, the price of goods can vary widely. Due to the perishable nature of FFV, farmers only have a short period between harvesting and selling (Singh, 2009). Consequently, farmers who use this process to sell their goods do not pay much attention to what happens to the product once it leaves the farm gate. This process is different from new agricultural practices where farmers can see further down

the value chain and consumers who want to know where their products come from (Boehlje, 1999).

FFV production involves both production and marketing risks. The perishability of fresh fruits and vegetables means that there is a very limited opportunity (time and space) for producers to store and transport their products, compared with other staple food products. Without temperature-controlled logistics, producers are vulnerable and must accept whatever price is offered in the traditional markets (McCullough et al., 2008). Also, unlike the intensely graded food systems, the traditional markets are comprised of fragmented and temporary links. In short, they are characterised by a general lack of integration between the partners. Traditional markets also lack adequate infrastructure and/or facilities such as water and sanitation (Fonseca & Njie, 2014). Post-harvest losses are much higher in traditional wholesale markets (Aulakh & Regmi, 2014; Kader, 2004). Furthermore, food safety and traceability are compromised or non-existent in traditional markets (Berdegué et al., 2005; Bertolini, Bevilacqua, & Massini, 2006; Henson, Masakure, & Boselie, 2005).

On a positive note, traditional spot markets have advantages for the consumers in terms of price, freshness and localisation. However, to obtain better economic returns, fresh produce growers need to have greater levels of production and better marketing skills in order to participate in institutional channels

3.4.1.2 Traders at the farm gate

In developing countries, the second primary type of traditional market is that of selling products at the farm gate. In this supply chain, traders, either licenced wholesalers or commission agents, procure FFV products from producers at the farm gate. This market channel is common in less developed and developing economies due to the predominance of price-driven, wholesale push markets, where farmers sell in open auctions that have inherent price volatility. It may be one reason why smallholders in Bhutan prefer to sell FFV directly to traders at the farm gate where selling to traders at the farm gate proportionately contributed between 28% to 89% in the four regions of the country (Tobgay & McCullough, 2008).

Another reason for the popularity of this channel is that many smallholders are in isolated rural areas where there are poor roading and general infrastructure. As Tobgay and McCullough (2008) found in Bhutan, many farmers lack access to cold storage. Likewise, Fafchamps and Hill (2005) note that in Uganda, most farmers do not have access to

temperature-controlled logistics. Other reasons for selling at the farm gate include, failing to meet quality standards, high rates of rejection and delayed payments by procurement firms (Key & Runsten, 1999). Other scholars have found that eligibility conditions related to minimum land holdings imposed by buyers to mitigate uncertainty and frequency of raw material also contribute to this phenomenon (Kirsten & Sartorius, 2002). High transaction costs (transport, packing and loading/unloading costs) borne by farmers who sell at traditional wholesale markets, means that selling at the farm gate may be a more attractive option (Fafchamps & Hill, 2005).

In India, APMC regulated wholesale markets and traders at the farm gate were significant marketing channels for the procurement of potato crops (Singh, 2008). Farmers sell to traders at farm gate because the transaction costs of transport, packing and loading are borne by traders who recover their damages by offering a lower price than the prevailing rate at the wholesale market. Despite a lack of formal agreements between traders and FFV growers, these supply chains work due to trust built up over years of trading. Selling at the farm gate often pays less; however, for farmers, it may be the only option for those who cannot afford to transport their crop to the market. The next section discusses agribusiness marketing channels that fall under the category of newly emerging institutional channels.

3.4.2 Institutional channels

Institutional channels rely primarily on vertical coordination to procure differentiated products for food processing. As there are high transaction costs associated with the procurement of differentiated products from traditional spot markets, institutional channels impose food quality and safety standards, that cost smallholder. In response, fresh produce growers use vertical coordination to deal with institutional channels. Indeed, Reardon and Barrett (2000) highlight the need for vertical coordination among supply chain partners as there are substantial spillover of the benefits for global agribusiness markets in developing countries. In the current research, supermarkets, including domestic retail chains and value-adding food processors, are identified as the primary institutional channels.

3.4.2.1 Supermarkets and domestic retail chains

While there are various institutional channels, supermarkets are the most visible and important. Supermarkets have a smaller number of intermediaries and procure goods through several logistically efficient networks (Gulati et al., 2007). The growth of supermarkets in

different regions across many developing countries has been documented by various researchers (Hernández et al., 2007; Reardon & Berdegue, 2002; Reardon et al., 2003).

Supermarkets offer consumers competitive prices and the convenience of being able to purchase different food products under one roof. In developing countries, there are numerous variations of retail food stores that are considered to fall within the supermarket category. Stores range from multi-product retailers with two to three cash registers to large hypermarkets with areas covering approximately 150m² or more (Singh, 2012c). Along with internationally owned chains, in developing countries, there are also domestically owned retail chains. In India, many farmers participate in these new domestic retail chains without even knowing it. These domestic retail chains procure some of their fresh produce from the traditional wholesale markets (Singh, 2008), while others have verbal contracts with farmers. In addition to purchasing directly from farmers, supermarkets procure FFV from other suppliers, including dedicated wholesalers, specialised traders, and large contracted farmers (Neven et al., 2009; Rao, Brümmer, & Qaim, 2012; Rao & Qaim, 2011). These methods provide supermarkets with a way to gain scale economies.

Conversely, in some developing countries, supermarkets have micro-contracts with smallholders that, combined with extensive farm assistance and supervision programmes, help them to integrate into institutional channels (Minten et al., 2009). More recently, supermarkets are turning towards direct procurement from primary producers where consumers are willing to pay more for fresh, local, seasonal FFV. Some studies reveal that traditional wholesale markets in developing countries still sell FFV and bulk commodities from smallholders with a marketable surplus (Chen & Stamoulis, 2008).

Agribusiness markets in developing countries are passing through a dualistic transitional phase. On the one hand, supermarkets are increasing in numbers in big cities; at the same time, the rural population still relies on the traditional retail sector of 'mum and pop' shops and street vendors. It is necessary then to discuss the fresh produce growers' mode of engagement and how they engage with markets in this changing agribusiness environment.

3.4.2.2. Food processing

The second form of institutional channels is the food processing sector. Food processors are known for transforming farm outputs into products that meet consumer demands, for example, ready-to-eat meals. Examples of food processing include the preservation of fresh

fruits and vegetables, either by freezing, puréeing or juicing, the milling of grains and the making of confectionery, potato chips, French fries and bakery products (Chen & Stamoulis, 2008). Processed food products are achieving a more significant value share in global agribusiness compared to raw FFV products (Wilkinson, 2012). Yet, the expansion of the food processing sector is at a much slower pace in developing countries when compared to higher-income developed countries (Alexandratos & Bruinsma, 2012). However, food processing is an essential process in a structured/modernising food system. On the one hand, it creates jobs for landless and marginal farmers; on the other hand, it fulfils the demands and requirements of urban consumers. Food processing also helps reduce post-harvest losses and increase food availability by increasing the shelf life of fresh food products that cannot be consumed immediately (Dani, 2015).

Food processors can be classified as either domestic or international entities according to their size and processing capacity. Small processors face challenges due to the high stocking fees charged by the more prominent retailers (Chen & Stamoulis, 2008). Further, a significant challenge for food processing is obtaining a ready supply of raw materials and maintaining links with downstream supply chain entities. As such food processors invest in technology and infrastructure and adopt new procurement practices to ensure they have adequate raw materials (Singh, 2009).

Some scholars argue that quality standards for raw FFV materials used by processing firms are not as strict as those for supermarket chains (Fafchamps, Hill, & Minten, 2008). With lower compliance costs and less seasonal price variability, scale economies are less prohibitive. Thus food processing channels may be more accessible to smallholders. For example, Narrod, Roy, Avendano, and Okello (2008) report that quality standards are much lower in the case of canned green beans compared to fresh green beans in Kenya. Figure 3.1 (following) shows an example of the predominant models of agribusiness supply chains prevailing in India.

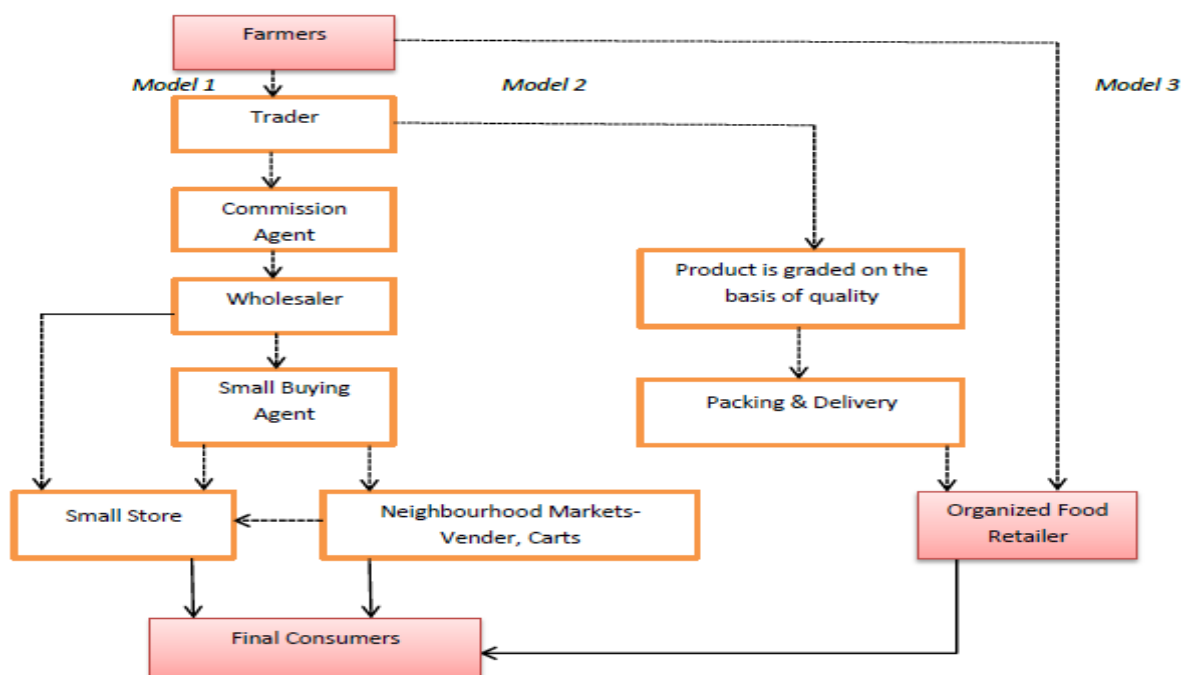


Figure 3.1 A model of agribusiness supply chains in the context of developing countries

Source: Mishra, Mahesh, and Kolluru (2016)

In the above figure, Model 1 represents the generic traditional agribusiness supply chains, where FFV products move through five stages before they reach end consumers. These five stages do not add much if any, the value in the supply chain. Instead, each stage adds to the cost of goods in the form of profit margins, inventory costs and movement of goods. This model highlights the numerous non-value-added stages in the supply chain that results in, lower returns for the farmer, inefficiencies in the supply chain, a higher percentage of food waste, and an end price that is passed on to the consumer.

Model 2 represents the semi-institutional agribusiness supply chain model, which is a more contemporary model. In this model, many of the non-value-adding stages are eliminated before the product reaches the end consumer. The significant benefits of this model are reductions in food losses, the FFV products reach quicker to the consumers and they receive better quality products.

Model 3 is an example of an institutional agribusiness supply chain model, where institutional, retail chains and food processors directly procure FFV products from farmers and deliver to end-users. While there is a minimal scope for intermediaries in the transactions between farmers and institutional buyers, quality, grading and traceability issues pose some barriers for primary producers wanting to participate in these channels (Henson et al., 2005). Model 3

is common in industrialised economies and influences the agribusiness markets in developing countries. This model is an institutional arrangement, which offers farmers high returns and lower costs (Schipmann & Qaim, 2011).

3.5 Impact of the transitioning of food systems on market channels

The immediate effect of the transition of food systems in developing countries was the occurrence of shared information for buyers and suppliers in agribusiness markets (Blandon, 2006; Boehlje, 1999; Young & Hobbs, 2002). Yet, the most significant impact of these transformations in developing countries are the changes to preexisting procurement patterns. Table 3.3 shows the characteristics of traditional and institutional channels.

Table 3.3 Impact of the food systems transitioning on market channels

Characteristics	Traditional channels	Institutional channels
Products types	Bulk production; Similar products/minimal value-adding in raw commodities	Market-driven differentiated products/food processing
Commodities structure	Fragmented supply chain; Spot markets	Vertical coordination; collaboration; integrated supply chain
Farmers' interface	Farms carry out many activities	Specialisation; separation of production stages
Marketing	Many middlemen	Direct procurement by the lead firm or processor or marketing firm
Type of risk	Price and production risk	Relationship risk; food health and safety; private standards: quality-based rejections
Producers concern	Concern about monopoly pricing	Concerns about access to information
Source of control	Money and ownership of assets are a prime source of control	Information as a prime source of control
Financing	Moneylenders, traders, relatives and friends mostly for production	Financing within and outside the chain through the contract

Source: (Blandon, 2006; Fulton, 2001; Maxwell & Slater, 2003)

With the emergence of supermarkets and new food processing practices in developing countries, there is a notable shift in the procurement of FFV from primary producers (Blandon et al., 2009). These changes have impacted the existing procurement system in three significant ways (Reardon & Berdegue, 2002);

- The introduction of private standards for quality and food safety. The private standards are enforced to assure quality and safety in a competitive market. Consumers expect

a great deal from the food system: safety quality, variety, convenience, and service. Ultimately consumer demand is now considered the main driver in the food systems. The private standards ensure that the suppliers are meeting the specific criteria to deliver the best quality and safe products to customers (Fulponi, 2007). The private standards sometimes replace public standards, especially for food safety. They are also used to differentiate products and build a trading and brand reputation, both in terms of quality and safety (Berdegué et al., 2005; Fulponi, 2007; Henson et al., 2005).

- A shift from spot market relationships in traditional wholesale markets to the use of vertical coordination mechanisms. The latter includes explicit contracts or implicit contracts such as preferred supplier lists, and market inter-linkages such as linking output procurement to the provision of credit or inputs.
- A shift from local procurement by each store, to centralised procurement, using distribution centres, coupled with a shift to procurement catchment areas broadening from local to sourcing via national, regional, and global networks.

The next section discusses FFV supply chains post-transition and the institutional channels' modes for procuring FFV in various developing countries.

3.6 FFV procurement and smallholders: International experience

As discussed in agribusiness literature, there are several *modus operandi* for institutional channel procurement. Unlike traditional models, institutional chains adopt contractual arrangements with buyers to minimise the number of intermediaries in the chain (Christopher & Peck, 2004). Here, the transaction cost is one reason why farmers consider contract farming (Blackburn & Scudder, 2009). Indeed, the coordination of supply chain partners to improve the control of production is a crucial factor in the establishment of large-scale retail networks (Minten, Randrianarison, & Swinnen, 2005; Reardon et al., 2003). In countries like India, most significant retailers source their produce almost exclusively from medium and large-sized farmers (Reddy, Murthy, & Meena, 2010; Singh & Singla, 2011). Conversely, smallholder farmers are typically excluded due to the enforcement of contracts, high transaction costs, quality standards, business attitudes, delayed payments, high rates of product rejection and weak bargaining power (Reardon et al. (2009).

A question of great importance, especially in academic circles, is how to make farming economically, socially and environmentally sustainable, especially for smallholders who

constitute 83% of the farming population of India (Singh, 2012b). To help address this concern, Reardon, Timmer, and Minten (2012) examined 3,500 stakeholders. They concluded that transformational modernisation in the food value chains across Bangladesh, China and India is underway, though at varying paces. Singh and Singla (2011) criticise the role and organisation of various food value chains currently at work in India in terms of their net socio-economic impact on smallholders. They suggest different policy and institutional steps to fine-tune the current policies and practices to ensure the inclusion of smallholders in what they call 'Modern Food Value Chains in India'. Table 3.4 shows the international procurement practices of institutional channels.

Table 3.4 Procurement practices of international institutional FFV channels

Author & Year	Country	Modes of Procurement
Minten et al. (2009)	Madagascar	Micro-contracts with smallholders combined with extensive farm assistance and supervision programmes
Miyata et al. (2009)	China	Procure with contract and non-contract growers of apples and green onions in Shandong Province
Neven et al. (2009)	Kenya	Centralised procurement into distribution centres, creating preferred supplier systems
Rao and Qaim (2011)	Kenya	Direct supply and specialised traders supply to supermarkets
Rao et al. (2012)	Kenya	From local wholesale markets and directly from farmers as well
Schwentesius and Gómez (2002)	Mexico	Directly from primary producers through their centralised distribution. Collection networks
Michelson et al. (2012)	Nicaragua	rely on a network of traditional wholesalers and preferred smallholders groups and two producer cooperatives. Walmart uses contractual relationships
Singh and Singla (2011)	India	70% direct procurement through their collection centres
Réviron and Chappuis (2005)	Switzerland	Partnerships with intermediate companies and collective organisations for procurement
Boselie, Henson, and Weatherspoon (2003)	Various	Traditional multilevel and fragmented marketing systems
Dolan and Humphrey (2000)	UK	UK importers source produce from a range of exporters
Pritchard, Gracy, and Godwin (2010)	India	Farmers sell through traders rather than to supermarkets
Berdegúe et al. (2005)	Latin America	Supermarkets use centralised purchases and use of implicit contracts and specialised/dedicated wholesalers
Moustier et al. (2010)	Vietnam	Farmer organisations have written contracts with supermarkets
Singh (2009)	India	The supermarket collection centres source disproportionately from medium and large farmers

Table 3.4 summarises the procurement modes of major institutional channels, the main characteristics are noted as;

- direct, uncontracted purchases from farmers;
- procurement from wholesalers, who either work directly with farmers or through wholesale markets;
- procurement through independent procurement companies (dedicated suppliers) who often work with farmers approved by the supermarket chains (preferred suppliers);
- purchasing through government-sponsored distribution centres;
- purchasing through informal farmer groups, farmer associations or cooperatives;
- buying through large farmers, who procure and assemble FFV from local smallholders.

3.7 Smallholders' participation in institutional channels: Opportunities and challenges

Institutional channels generally focus on creating economies of scale, hence, there is a high chance of smallholder exclusion. Yet, some academics suggest that smallholders that have gained access have actually benefited from institutional channels through income gains, higher and stable prices, an increase in farm employment and technology adoption (Michelson et al., 2012; Michelson, 2013; Minten et al., 2009; Miyata et al., 2009; Neven et al., 2009; Rao et al., 2012; Rao & Qaim, 2011). Indeed, Miyata et al. (2009) find that in China, participation in institutional channels raises smallholders' incomes compared to contract and non-contract smallholders. They also found that farmers contracted to supermarkets have higher incomes compared to those who sell at the traditional wholesale market. In Madagascar, Minten et al. (2009) find that supermarkets have micro-contracts with smallholders, combined with extensive farm assistance and supervision programmes. The study finds higher welfare, income stability and intensive farm assistance gains by smallholders, in addition to the supervision programmes that enable farmers to meet supermarkets' complex quality requirements. Neven et al. (2009) find positive impacts of smallholder farmers in Kenyan smallholders where they receive higher wages and employment. Rao and Qaim (2011) also find that farmer participation in supermarket channels leads to higher incomes due to the demands of hired labour. In another study, Rao et al. (2012) find that by participating in supermarket supply chains, farm productivity is increased by 45% due to the adoption of

production technology required by the supermarkets. Further, Michelson et al. (2012) find prices to be more stable for farmers participating in supermarket procurement programmes in Nicaragua. Singh and Singla (2011) report that farmers who supply goods to institutional channels realise higher profits, higher yields and higher prices compared to farmers who supply traditional wet markets, due to the technical assistance that results in higher quality produce. Similarly, Bellemare (2012) also identifies an increase in household income and finds positive impacts on farmers' livelihoods due to participation in supermarket channels in Madagascar. Bandon et al. (2009) report that in Honduras, 57% of the farmers supplying the supermarket channel received higher prices than wholesale spot markets, compared to only 26% of farmers supplying spot markets.

Conversely, other studies on smallholder participation in institutional channels find mixed results. Singh (2012b) finds smallholder exclusion by supermarket procurement in Punjab (India) where supermarkets tend to rely on large landholders. Likewise, Shepherd (2005) notes that supermarkets prefer large farmers. Schwentesius and Gómez (2002) note that although supermarkets in Mexico pay the suppliers higher prices than traditional market suppliers, the suppliers' net benefit was offset by strict quality standards and practices. In Thailand, Boselie et al. (2003) find considerable risks to smallholder producers through strict quality requirements and specific production practices that sometimes resulted in higher rejection rates. Louw, Vermeulen, and Madevu (2006) reveal that the practice of supermarket supply scheduling sometimes results in deliveries from different suppliers arriving at the same time creating an oversupply on specific days. Consequently, smallholders are forced to sell at lower prices to ensure the clearance of stock due to its perishable nature. Ruben et al. (2007) also report that smallholders in Thailand often deliver fresh produce to supermarkets in non-standardised crates, in small lots, often in non-refrigerated trucks, with high variations in quality and quantity which all lead to higher ordering and invoicing costs.

Indeed, Hernández et al. (2007) examination of supermarket procurement practices in Guatemala finds that smallholders benefit from their participation in institutional chains. However, they incur some additional transaction costs that traditional farmers do not. Chowdhury, Gulati, and Gumbira-Sa'id (2005) investigation of the Indonesian institutional procurement systems finds that high fixed transaction costs and the need to implement quality grades and standards are significant barriers to participation. Pritchard et al. (2010) report on three districts in Karnataka in India reveals that quality parameters used by

institutional channels exclude the smallholders. A similar study in India by Mangala and Chengappa (2008) notes that smallholders are excluded by Spencer's supermarket.

Réviron and Chappuis (2005) report that despite significant improvements in the chain's organisation, costly investments in quality control and storage facilities, smallholder exclusion remains high in Switzerland. Similar results have been found in other countries such as Guatemala (Berdegué et al., 2005), Mexico (Reardon et al., 2009), and Kenya (Rao & Qaim, 2011). Further, in Kenya, Dolan and Humphrey (2000) find supermarkets procure only 18% of their fresh produce needs from smallholders, compared with 40% from contracted farms and 42% from large commercial farmers. However, they identify some exceptions; in these cases, smallholders have a competitive advantage over larger producers, due to their low costs (related to their use of family labour and intensive local knowledge). An example of this includes tomato farmers in Guatemala and guava farmers in Mexico (Reardon et al., 2009), and also Nicaragua (Michelson et al., 2012). The next section discusses the constraints faced by smallholders selling via institutional channels.

3.7.1 Challenges related to participation in institutional channels

The literature reviewed above reveals mixed findings relating to smallholder participation in institutional channels. While some studies find smallholders obtain higher returns for participation, others show how challenging it is for them to participate in this channel. Buyers use a variety of modes of engagement: Vertical coordination, collaboration and integrated supply chains. The next section identifies the different modes of engagement that smallholders can adopt when attempting to participate in institutional channels.

The literature discusses the challenges smallholders face in transitioning from traditional farming to high-value crops to ensure better economic viability. The review identifies numerous factors that affect farmers' prospects in the value chain and establishing market linkages, such as; a lack of information on prices and access to new technologies (Markelova et al., 2009), small land holdings (Jayne et al., 2005; Louw et al., 2006), high transaction costs due to small volumes of marketable surplus (Minot, 2011; Poulton et al., 2006), high quality and food safety standards costs (Dolan & Humphrey, 2000; Pingali et al., 2007; Vorley et al., 2009), private standards (Fulponi, 2007; Minten et al., 2009), poor access to agricultural extension services (Pingali et al., 2007; Shepherd, 2007), investment constraints related to the installation of costly machinery (Poulton et al., 2006), credit constraints (Ayaz & Hussain, 2011;

Minot, 2011), poor road infrastructure (Minten et al., 2009; Singh, 2009), and high chances of product spoilage (Rienekens, 2011). In summary, Table 3.5 highlights those factors affecting smallholder farmers' market participation as identified in the literature.

Table 3.5 Key barriers affecting the market performance of FFV growers

Key factors	Specific details
Farm size	<p>Institutional channels avoid working with farmers who have less than 2 ha of land (Barrett, 2008; Jayne et al., 2005).</p> <p>Farmers who sell to institutional channels are five times larger than traditional farmers, 9-18 ha compared with 1.2 - 2.4 ha (Neven et al., 2009)</p> <p>In traditional markets, most smallholder farmers are constrained by their ability to supply markets due to their farm size and access to resources (Minot, 2011; Poulton et al., 2006; Poulton & Lyne, 2009)</p>
Link to credit and extension services	<p>To invest in change, farmers need farm credit</p> <p>Large farmers have better access to formal sources of credit (Ayaz & Hussain, 2011; Minot, 2011).</p>
Ability to own resources	<p>Owning warehouse and agricultural machinery increases economic viability</p> <p>The issue of assured irrigation</p> <p>Farmers who sell to institutional channels typically have access to irrigation, whereas most smallholders, especially those growing field crops, operate in rain-fed environments (Agrawal, 2001; Barham & Chitemi, 2009).</p>
Variable production cost	<p>High prices, availability, and financing for inputs are significant barriers to their use (Ferris et al., 2014)</p> <p>The cost to establish production for many types of crops can require a farmer's entire savings and loan potential</p> <p>Farmers with access and the ability to buy technologies (such as improved seed or fertiliser), and who can manage water resources have sizeable advantages over farmers who are unable to use such technologies</p> <p>Family labour provides smallholders with a comparative advantage because it minimises production costs in the case of crops which need a lot of attention</p>
Transaction costs	<p>Increasing consumer demand for high quality, safe, value-added food, requires a fixed compliance cost (Poulton, Dorward, & Kydd, 2010; Poulton et al., 2006).</p>
Price volatility	<p>Fresh produce is perishable by nature and is considered high risk due to a loss of aesthetics and quality</p> <p>Price driven market participants prefer opportunistic self-interest rather than the whole chain (Ragasa et al., 2013).</p> <p>Lack of storage and processing facilities means that producers cannot find alternative markets and are forced to sell at low prices in wet markets</p>

Access to roads and ownership of transport	Proximity to markets reduces variable transaction costs in horticultural markets and is associated with fixed transaction costs Access to roads and transport is typically a function of location: more remote and poorer farmers have less market access than those farmers living in areas with more investment (Minten et al., 2009; Singh, Singh, & Kingra, 2009)
Age and education level	Education levels are highly correlated with market access (Bathla, 2015).
Collective actions	Collective efforts are advantageous for obtaining extension services. Groups are more likely to achieve common goals and lower individual farmers' per-unit transaction costs. Group member support helps farmers to learn together, stick to plans, and sell collectively (Devaux et al., 2009; Kaganzi et al., 2009; Markelova et al., 2009).
Use of information and communication technologies	Smallholder farmers often lack access to, and rational use of, adequate market information, struggle to meet buyers' food safety and quality control requirements and are seldom able to provide standardised products continuously (Gulati et al., 2007; Markelova et al., 2009).
Specification of grades and standards	Leading supermarket chains impose private standards Preference for large farmers (Kirsten & Sartorius, 2002).
Supply chain visibility	Better proximity to buyers leads to lower marketing risks for smallholder farmers who have less of a marketable surplus.

3.8 Chapter summary

In summary, smallholder FFV growers' modes of engagement with markets depend on their production capacity, location, and individual characteristics. It is also affected by the scale of operations of the purchasing firms. If FFV growers have a limited marketable surplus, they usually rely on arm's length transactions with traditional wholesale markets. Likewise, if institutional channels have strict quality standards and food safety mechanisms, FFV growers are required to use modern technology and must have access to information to increase their existing capacity (Reardon & Barrett, 2000).

Coordination of supply chain partners to improve the control of production is a crucial factor for supplying large retailers (Minten et al., 2005; Reardon et al., 2003). Institutional channels favour pre-arranged contractual agreements with farmers to minimise the number of intermediaries in the chain (Christopher & Peck, 2004). Here, reducing transaction costs is a key motivating factor in these new supply chains (Blackburn & Scudder, 2009).

Although modern retail supermarket chains have contractual relationships with large farmers, they still procure a large amount of fresh produce from traditional wholesale markets (Singh & Singla, 2011). McCullough et al. (2008) discuss the interaction between traditional and institutional channels in modernising food systems. In modern chains, primary producers supply fresh produce to specialised supermarket buying centres. After the produce is sorted and packaged, it is dispatched to a hub and later transported to respective stores, finally reaching the customers. In some situations, the hub directly procures produce from traditional markets via commission agents who make a connection with primary producers. In terms of the focus of this research, several studies have found that Indian fresh produce markets have yet to be affected by the supermarket revolution (Fafchamps et al., 2008; Gulati et al., 2007).

The main point highlighted in this chapter is the rapidly changing food systems and the evolution of more formal institutional channels. In developing countries, food systems are transforming quickly for a variety of reasons. As food systems change, so too have the requirements for suppliers. Farmers in developing countries are incorporating these changes into their production and marketing methods. Yet, the impact of these changes and the participation of FFV growers in institutional channels depends on the structure and dynamics of the chains, the institutional settings within which they are embedded, and the terms of

farmers' integration. The next chapter formulates the research framework and hypothesis development to investigate what drives smallholder participation in institutional channels.

Chapter 4

Hypothesis development

4.1 Introduction

The theoretical framework discussed in Chapter 2, and agribusiness literature discussed in Chapter 3, provide insight into the various factors that drive smallholder participation in institutional channels. As previously discussed, smallholders' participation in institutional channels depends on multiple factors. Hence, the hypotheses formulated for this research are derived from transactions cost (Coase, 1937; Hobbs, 1996; Williamson, 1979) and collective action (Olson, 1965) theories, as well as the agribusiness supply chain literature. The previous chapter discussed various exogenous factors that drive the transition of food systems in developing countries. These factors include:

- The urbanisation of the rural population and rising middle-class incomes (Reardon & Barrett, 2000; Reardon & Hopkins, 2006).
- Changes in macroeconomic policies, trade liberalisation and government investments in extension services, the improvement of transportation and communication infrastructure, the upgrading of credit services and rural markets (Minot & Ngigi, 2004; Von Braun & Kennedy, 1994).
- Changing lifestyles and increased female participation in the workplace. While women usually assist with agricultural production and food preparation, their movement into the paid workforce means that many have less time to devote to these activities (Pingali, 2007; Reardon & Barrett, 2000; Reardon et al., 2003).
- Access to agribusiness technology that allows for the use of different foods and food preparation methods (Cook & Chaddad, 2000; Reardon & Barrett, 2000).
- Industry-level access to better food packaging and logistics technology (Reardon et al., 2009; Saxowsky & Duncan, 1998)
- Changing consumer preferences and awareness of food safety (Von Braun & Kennedy, 1994).

In developing countries, these changes have led to transformations in consumers' food demands:

- The quantity of food per person and overall demand from urban food markets is increasing faster than in rural areas (Delgado, 1999).
- The composition of the food basket is different, as better-off consumers often shift away from grains and consume more high-value products such as fruits and vegetables, dairy products, meat, fish and pre-prepared meals. The changing requirements of urban consumers lead to a restructuring of food supply chains (Gulati et al., 2007). The final food supply chain arrangements are not only shaped by these demand factors, but also by conditioning factors such as geography, and more processed foods for convenience.
- There is a demand for more choices per product and a greater variety of food products in general (Holloway et al., 2000).
- In developing countries, urban customers are increasingly concerned about food quality and safety issues, especially as these tend to be a more significant problem with non-staple foods (Kirsten & Sartorius, 2002). Urban consumer demand is transmitted through the marketing sector or supply chain to the rural producer. This chain ensures that primary agricultural products are delivered to the customer in the right form, at the right time, and the right location (Henson et al., 2005).

According to the consumers' changing requirements and growers' profit margins, these transformations affect the overall cost structure associated with food production. There are several costs involved in this process; food handling costs, transaction costs, and potentially rent (profit margins). These differ per product, as the cost of transportation, handling, processing, storage, and traceability depends on the product characteristics. The degree of perishability often affects material costs, as higher losses, as well as higher risks, are reflected in the final price of perishable goods (Singh, 2008). On top of the substantial delivery costs (transport and handling), marketing margins (rent) also reflect charges and the risks incurred in the process of conducting transactions between different agents who have imperfect information (Alene et al., 2008).

Supply chain partners incur higher exchange costs due to transaction cost factors; these include uncertainty, asset-specific investment and frequency, the act of searching, negotiating and monitoring the supply chain partners (Hobbs, 1996). Furthermore, fulfilling specifications such as grading, consistent supply and seasonality make the situation even more challenging for small producers. However, Collective Action theory provides a way to mitigate the

challenges mentioned above (Barham & Chitemi, 2009; Devaux et al., 2009; Hellin et al., 2009; Kaganzi et al., 2009; Markelova et al., 2009; Narrod et al., 2009; Staatz, 1987). This theory suggests that institutional arrangements, such as farmer cooperatives, enable smallholders to reduce high transaction costs and meet product specifications enforced by institutional channels. Cooperatives organisations help smallholders move up the relational continuum that ranges from spot market exchanges to full vertical integration where all stages of marketing, transactions, and production are linked through ownership rather than through market exchanges (Swinnen, Colen, & Maertens, 2013). Coppoeratives organisations then act as a surrogate to vertical integration.

The above factors influence the rising share of institutional channels in existing food supply chains. Vertical coordination mechanisms may result in significant cost savings for purchasing firms. Likewise, economies of scale may also potentially lead to lower prices for consumers (Chowdhury et al., 2005). However, the growth of institutional channels depends on feasible policy factors as well as the specific structure of FFV supply and demand (Swinnen et al., 2013)

The current study investigates various factors that drive smallholder farmers market participation in institutional channels. These factors include individual characteristics of smallholder farmers such as the gender, age, education, and experience of the farmer, as well as farm characteristics, such as land, machinery and production costs. Secondly, various other marketing, institutional and infrastructure variables, such as the role of collective action and institutions in farmers' market preferences, are also postulated to affect smallholder participation. Hence, the following five research questions are formulated to address the research's objectives:

- **RQ1:** *What is the impact of human capital assets on smallholder FFV growers' participation in institutional channels?*
- **RQ2:** *What is the impact of physical farm assets on smallholder FFV growers' participation in institutional channels?*
- **RQ3:** *What is the impact of transaction costs on smallholder FFV growers' participation in institutional channels?*
- **RQ4:** *What is the impact of collective action on the market participation of smallholder fresh produce growers in institutional channels?*

- **RQ5:** *What is the impact of institutional characteristics on FFV growers' participation in institutional channels?*

Having formulated the research questions, the next section of this chapter provides an overview of the geographic scope of the study.

4.2 The geographic scope of the study

The study was conducted in the Punjab state of India known as the land of five rivers, due to the rivers that flow in the region. The State's land is known for its agricultural fertility and assured irrigation that makes agricultural production almost climatically risk free. The state is also known as the food basket of India; it was an experimental state for the green revolution during 1970-80 when India was facing severe food shortages. Until recently, agriculture has been the primary occupation of most Punjabi residents. However, today Punjab agriculture has become highly capitalised and resource-intensive. Punjab has the highest yield for two crops, rice and wheat when compared to other Indian states (GOP, 2016). After the green revolution, the yield for wheat and rice increased and brought Punjab farmers out of poverty. They had higher in per capita income compared to other Indian states (Singh & Singh, 2016). After the reorganisation of the state in 1966, political instability and the short tenure of the state government led to civil, political and religious unrest in the region. However, the state ensured the food security of the nation by producing wheat and rice at a guaranteed minimum support price offered by the national government.

In the mid-1970s, the economic benefits of the green revolution had neutralised, and other states were turning to industrial development. The political turmoil leads to an armed struggle in the early 80s and the demand for a Sikh homeland (Singh & Singh, 2016). This conflict affected the economy badly, and when other states were transitioning into industrial economies, Punjab was still relying on agriculture as a primary occupation. Over this period, Punjab's ranking dropped on various parameters of development compared to other Indian states. Due to this political unrest, Punjab did not benefit from the economic transformation introduced in India in 1991. Public and private investments in food processing went to neighbouring states (Singh, Bhangoo, & Sharma, 2019).

Due to the plain geographical landscape, the agriculture land is mostly under irrigation. Farmers have access to irrigation mainly through government-managed canal and groundwater. In 2016, the net area irrigated by government canals was 1,201,000 hectares

and 2,936,000 hectares irrigated by well/tube wells (GOP, 2016). Rainwater from the monsoons (from mid-July to mid-August), also helps farmers in paddy plantations.

In 2011, the total population of Punjab was 27 million, of which approximately 17 million (62.52%) live rurally, and ten million (37.48%) live in urban areas. According to the 2011 census, 1.935 million cultivators were involved in agriculture (GOP, 2016). Punjabi is the primary language spoken in the state.

Agriculture plays an essential role in the state's economy. It constitutes 30% of the state's GDP. Most of the population live in villages where the main occupation is agriculture. As per the 2011 census, 37% of the total workforce depends on agriculture (GOP, 2016). The state has a 75.8% literacy rate. Figure 4.1 shows that the 2014 – 2015 share of agriculture in gross state value-added was 17%.

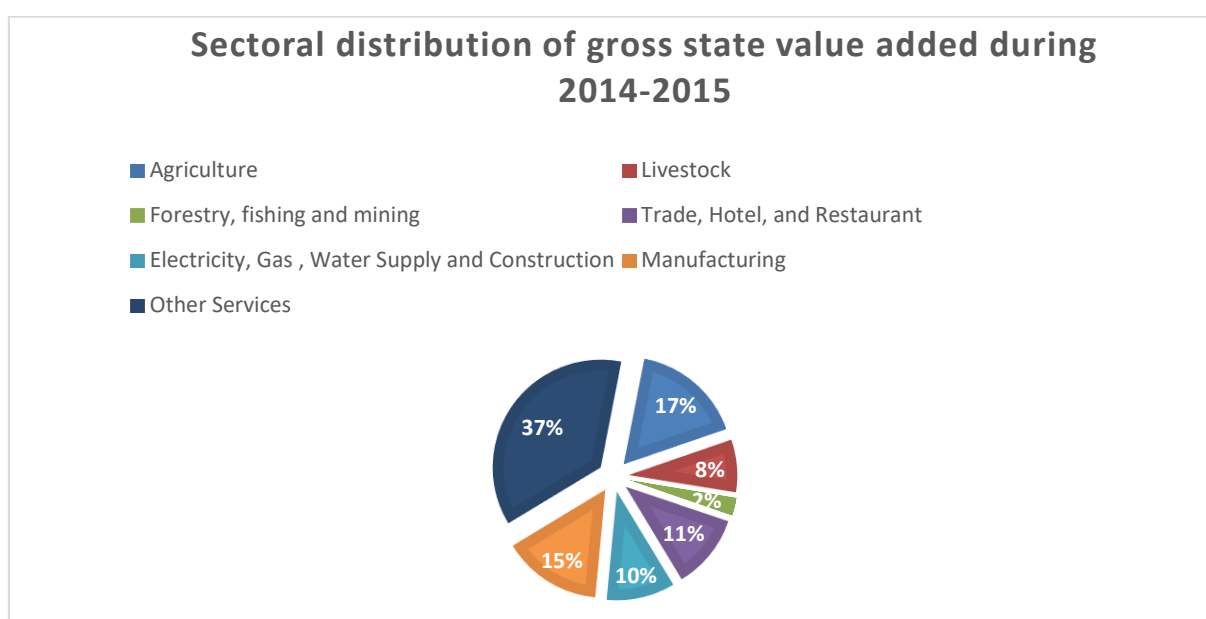


Figure 4.1 Sectoral distribution of Gross State Value Added during 2014-2015 in Punjab
Source: GOP (2016)

Punjab is a landlocked border state and shares a border with Pakistan. In terms of the Indian side, it borders Jammu and Kashmir, Himachal Pradesh, Rajasthan and Haryana. The state has a long history of divisions. In 1947, when India gained independence from British rule, the state was divided between two countries, East and West Punjab based on religion. The Muslim population migrated to Pakistan, while the Hindu/Sikh community moved to Punjab. This division resulted in an unprecedented geographical transfer of 10 million people. Half a million lost their lives due to communal riots (Singh & Singh, 2016).

In 1966 the state of Punjab (India) was divided again based on language: two new states, Haryana and Himachal Pradesh were formed. At present, the state has a geographical area of 5,0362 sqkm, of which 48,265 sqkm is rural, and 2,097 sqkm is urban.

The state has 22 districts, 87 tehsils and 149 blocks. A tehsil (also known as tahsil, taluka or taluq) is an administrative division in the Indian subcontinent that is usually translated to "township". In the year 2015-2016, the net sown area under agriculture was 4,137,000 thousand hectares (Singh & Singh, 2016). Agricultural land in Punjab is favourable to more than one planting per season, often two harvests per year are achievable. Wheat and paddy are the major cereal crops grown in rotation during the year. Punjab is the second-largest producer of wheat and the third-largest producer of rice in India.

Despite being the most significant contributor of cereal crops, when it comes to FFV, Punjab is a relatively minor producer in India. The net cultivated FFV area is less than 2%. The state produces less than 2.5% of the total vegetables grown in India (Ghosh, 2013). FFV is not a preferred agricultural option due to the production and marketing risks associated with it. In contrast, cereal production has become economically non-viable for smallholders. Another reason why farmers prefer cereal crops is the assured minimum support price offered by state and national procurement agencies. Together, fruits and vegetables constitute only 3.64% of the gross cropped area in Punjab, compared to 8.3% at the nation-wide level (Gulati, Roy, & Hussain, 2017). Figure 4.2 shows the net FFV cultivated area in Punjab. The subtropical location leads to variations in temperature during the year. Punjab experiences three main seasons: a hot season (from mid-April to the end of June), the rainy season (from early July to the end of September) and the cold season (from early December to the end of February). The monsoon season provides most of the rainfall in Punjab.

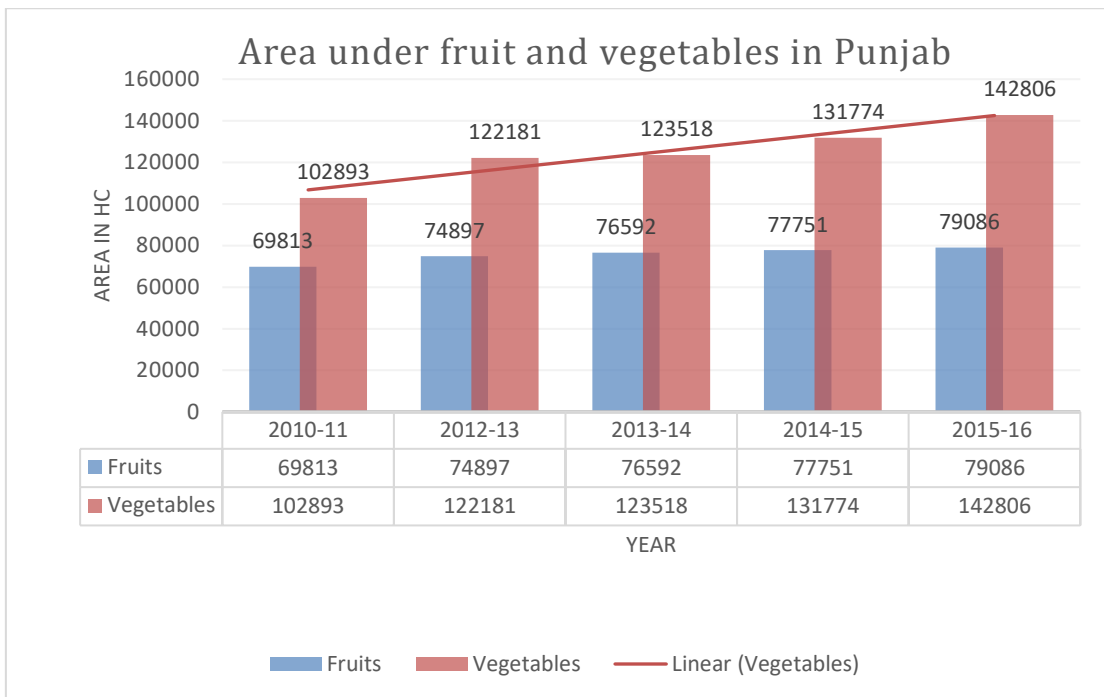


Figure 4.2 Area under fresh fruits and vegetables in the Punjab state of India

Source: GOP (2016)

Agribusiness researchers have recommended diversification to enhance the share of other crops, but despite this, the area under FFV cultivation in Punjab has increased only marginally (Johl, 1986; Singh, Singh, et al., 2009; Singh, 2004). The procurement of wheat and paddy by state agencies for a minimum assured price is considered a significant factor in farmers are continuing to grow these crops. There is no similar mechanism for FFV production and marketing; thus, most do not want to take this risk.

Due to the climate, potatoes are the primary vegetable crop in Punjab, accounting for 60% of total FFV production (Singh & Singh, 2016). Table 4.1 shows crop-wise percentages for the cultivated area to total cropped area in Punjab for the years 2010-11 and 2013-14. Table 4.1 shows that the percentage area covered by wheat and paddy remains similar over these two time periods (2010-11 and 2013-14). While potato is a significant crop in the state of Punjab, in India, the state is only a minor producer after Uttar Pradesh, West Bengal and Gujarat. Several districts in Punjab, including Jalandhar, Hoshiarpur, Kapoor Thala, Ludhiana and Bhatinda grow potatoes. These districts account for over 66% of the area under potatoes in Punjab. Jalandhar, an irrigated river plain with an impressive level of urbanisation, leads the Punjab districts, accounting for 23% of the potatoes grown.

Table 4.1 Crop wise percentage of cultivated area in Punjab in 2010-11 and 2013-2014

Rank	Crop	Percentage of total cropped area 2010-11	Percentage of total cropped area 2013-14
1	Wheat	44.53	44.72
2	Paddy	35.92	36.30
3	Cotton	6.13	6.13
4	Maize	1.69	1.67
5	Total Oil Seeds	1.40	0.60
6	Potato	1.06	1.01
7	Sugarcane	0.89	1.13
8	Pulses	0.27	0.24

Source: GOP (2016)

While potato is a major FFV commercial crop, peas and tomatoes are also essential commercial FFV crops in Punjab. Four Punjabi districts, Amritsar, Ropar, Jalandhar and Hoshiarpur, are major tomato growers. Due to the importance of the potato and tomato crops, and also their different product characteristics and credence attributes for consumers, this study has selected these two vegetable supply chains as the basis of the study. In the literature review, it was found that these two crops are commonly grown across the Jalandhar and Amritsar districts (See Figure 4.3), and as such, these two regions were selected as the sampling districts.

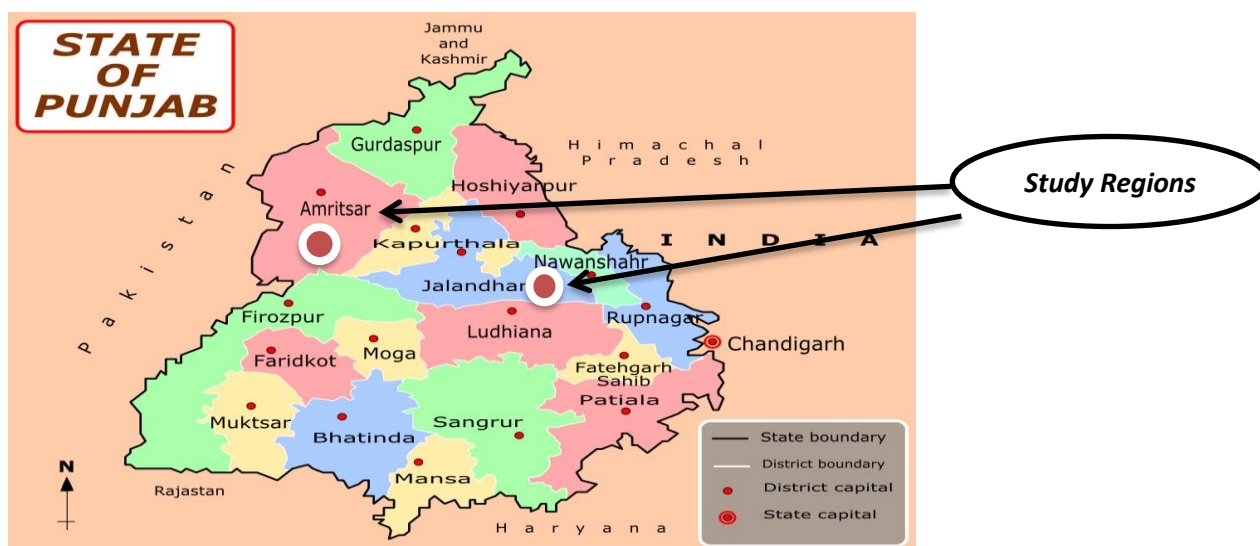


Figure 4.3 Map of the study regions

Source: The Map of Punjab (2018)

Besides potatoes and tomatoes, there are many other varieties of vegetables grown in the study area. The average landholding size of farmers in Punjab is 3.7 ha, while in the Jalandhar

district, the average holding size is 4.6 ha. Similarly, the average landholding size is 3.07 ha in Amritsar (GOP, 2016). The chosen districts were stratified further into blocks. Two blocks of Jalandhar Bhogpur and Jalandhar west (Kartarpur) were chosen for the current study; similarly, two blocks of Amritsar, Jandiala and Majitha were chosen. The block is often the next level of administrative division (for development purpose, whereas tehsil is next to the district for revenue purpose). The blocks consist of revenue villages, and the Punjab state overall has a total of 146 blocks.

In countries like India, the agribusiness markets and food processing are still in the early stages of development (McCullough et al., 2008). While the agribusiness markets are transitioning from traditional spot markets to coordinated institutional chains, these changes provide new opportunities for smallholder farmers to participate in and compete for better livelihoods and economic viability. The current study aims to identify the drivers of smallholder to participate in institutional channels. The next section outlines the development of the hypotheses and related factors that hinder or facilitate smallholder participation in institutional channels.

4.3 Hypothesis development

A hypothesis is a specified, testable expectation about the empirical reality that follows from a more general proposition. Hypotheses testing belongs to the hypothetico-deductive scientific research method, where assertions about possible outcomes are deduced from the extant knowledge/literature. Then data is gathered, and statistical tools applied to test hypotheses. However, it must be remembered that no method, including obtaining statistical results from hypothesis testing, is the absolute final answer to a research problem (Martin & Bridgmon, 2012). Research is designed to test the hypothesis. In other words, research will support (or fail to support) a theory only indirectly by testing specific hypotheses derived from theories and propositions (Babbie, 2013). Similarly, Snedecor and Cochran (1967, p. 3) state that "...the basic idea in statistics assist us in thinking clearly about the problem, provide some guidance about the conclusions that must be satisfied if sound inferences are to be made, and enable us to detect many inferences that have not good logical foundations".

The next section includes the development of the research hypothesis in relation to the research's theoretical underpinnings and agribusiness literature.

4.3.1 Human capital assets

The first group of hypotheses posit that higher levels of human capital assets will positively influence smallholders' participation in institutional channels. Each hypothesis examines a particular aspect of human capital assets, beginning with the age of fresh produce growers, followed by the percentage of family members involved in farming activities, their education levels and technical education related to farming.

4.3.1.1 Farmer's age

The age of the farmer variable represents the FFV farmer's age in years. Younger farmers are expected to be more adventurous and take more risks than older farmers (Simmons, Winters, & Patrick, 2005). As the farmer ages and has more experience, s/he will have a greater ability to adapt to new and more demanding market conditions (Alene et al., 2008). Hence, human capital assets, the age of the FFV grower, can influence marketing channel decisions.

Jagwe (2011) also reports that age is a critical variable in market participation, but in this case, in terms of younger family members as a form of labour. Kumar, Roy, Trapathi, Joshi, and Adhikari (2016) report that age has a positive and significant impact on ginger farmers' participation in institutional channels through contract farming in Nepal. Like them, Osebeyo and Aye (2014) observe that the age of the head of the tomato growers' household had a positive impact on market participation in Nigeria. Similarly, Slamet, Nakayasu, and Ichikawa (2017) find that younger farmers are more likely to participate in institutional channels in Indonesia. Lawal, Saka, Oyegbami, and Akintayo (2004) find that a farmer's age has a significant influence on their decision to adopt improved maize seeds in Southwest Nigeria. Likewise, Lawal et al. (2004) find that human capital assets, such as a grower's age, the household head's levels of education and the number of family members involved in farming have a positive influence on a farmer's decisions to adopt improved varieties of cassava seed in Ghana. Taking into consideration prior research, the first hypothesis states that:

H1: Smallholder FFV growers who are older will be less likely to participate in an institutional channel than those who are younger.

4.3.1.2 Education level of FFV growers

The relationship between education and a farmer's ability to access institutional channels has been discussed in the agribusiness literature (Ali, Abdulai, & Rahut, 2017; Asante-Addo,

Mockshell, Zeller, Siddig, & Egyir, 2017; Ghimire & Huang, 2016; Hewett, 2012; Lawal et al., 2004; Slamet et al., 2017). It is believed that educated farmers will be better able to use the information they receive to lower their transaction costs. Education provides farmers with skills need to make more informed decisions and a greater ability to analyse complex market situations.

It is argued that a higher level of education provides FFV growers with critical thinking skills, and thus, they are more likely to join collective action groups (Fischer & Qaim, 2012). Fresh produce growers with higher levels of education are hence better prepared for participation in institutional channels.

Generally, educated farmers have more positive attitudes towards the adoption of new agribusiness technology and allied agricultural services, such as farm insurance and farm credit. Various studies have found that fresh produce growers who sell to supermarkets have higher levels of education compared to those selling in traditional channels. For example, Makhura (2001b) report that in South Africa, educated households have better access and utilisation of market information (and at a lower cost), compared to non-educated households. Neven et al. (2009) find that farmers who supply institutional channels in Kenya have secondary school education compared to those using traditional channels who only have primary school education. Bishu, Lahiff, O'Reilly, and Gebregziabher (2018) find that a farmer's education level positively affects their decision to participate in cattle insurance as a risk management strategy in northern Ethiopia. Asante-Addo et al. (2017) reveal a positive association with the household head's level of education and the adoption of microcredit programmes in Ghana. Similarly, Osebeyo and Aye (2014), find that when tomato grower household heads' have higher levels of education, they are more likely to participate in institutional channels in Nigeria. Ghimire and Huang (2016) find that age and the household head's level of education both have a positive impact on a farmer's decisions to adopt new varieties of rice in Nepal. Giné and Yang (2009) find that a farmer's education level is positively correlated with insured loans and fewer default costs in Malawi. Kumar et al. (2016) report that a ginger grower's education level has a positive association with participation in institutional channels through the adoption of contract farming in Nepal. Zhu and Wang (2007) present similar findings for tomato growers in China, as do (Arumugam, Mohamed, Chiew, & Mohamed, 2011) in the case of fresh produce in Malaysia.

Similarly, Slamet et al. (2017) report that farmers who have higher levels of education are more likely to participate in institutional channels in Indonesia. Lawal et al. (2004) find that the household head's level of education has a positive influence on their decision to adopt new, improved seed varieties of cassava in Ghana. Minten et al. (2009) reveal that educated households have a better awareness of business opportunities associated with global retail chains in Madagascar.

The effect of education levels on farmers' decisions has been examined in relation to other crops. For example, Ali et al. (2017) find that educated cotton grower farmers in Pakistan are more likely to sell at markets compared to less-educated individuals who tend to sell at the farm gate.

Conversely, a few studies find a negative and insignificant relationship between education levels and the adoption of contract farming in institutional channels. Miyata et al. (2009) report no effect of education on apple and green onion growers' participation in contract farming with supermarkets in China. Another reason might be that young people with higher levels of education are not interested in working in the agricultural sector due to the physical nature of the work. Rather, they try to find jobs in the better-paying service sector.

Similarly, Guo, Jolly, and Zhu (2005) note that farmers' education levels have no relationship with their choice of contract farming. Ramaswami, Birthal, and Joshi (2006) also report no link between education levels and smallholders' market participation, in the case of Indian poultry growers. Blandon et al. (2009) also did not find a relationship between education levels and smallholders' decisions to sell produce to supermarkets in Honduras. Simmons et al. (2005) observe that the household head's level of education was not statistically significant in selecting seed corn contracts in Indonesia. Taking this literature into consideration, hypothesis 2 states that,

H2: Smallholder FFV growers with higher levels of education will be more likely to participate in institutional channels than those with lower levels of education.

4.3.1.3 Farming experience

Farming experience can be divided into two forms. First, experience in agricultural technology adoption (ETA). This refers to the time a farmer spends using improved technology. Second, general farming experience (GFE), which refers to the time a farmer has spent farming, or the

number of years s/he has been making independent production decisions (Ainembabazi & Mugisha, 2014). Fresh produce farming consists of a variety of production and marketing risks (Singh, 2009). Generally, the farming experience is measured using the household head's age. It is expected that the older the household head, the more experience s/he will have with farming technology and practices. The current study believes the longer a farmer has been farming, the greater his/her level of participation in institutional channels. This is an expected outcome because older farmers tend to have more farming experience and greater levels of awareness about changing weather patterns, the use of fertilisers and pesticides and production issues. Also, younger generations are less interested in farming. As noted above, they tend to find employment in urban areas, especially in the service sector. In short, the more experience a farmer has, the greater the possibility that s/he will participate in institutional channels.

Different risks such as adverse weather conditions, pest control, land preparation, nursery raising, adequate use of fertilisers, harvesting techniques and marketing affect FFV production. Farmers gain experience in agriculture practices over the years, which enables them to lower various production and marketing risks. The knowledge and skills farmers gain over the years help them increase their bargaining power (Jagwe, 2011; Omiti et al., 2007; Poole, 2017). Keeping the prior literature in mind, it hypothesised that:

H3: Smallholder FFV growers with more years of farming experience are more likely to participate in institutional channels than those with less farming experience

4.3.1.4 Family members involved in farming activities

Agriculture is a labour-intensive activity that requires both hired farm labour and family labour. Family members play a vital role in the supervision and monitoring of hired labour. In this research, a family unit involves grandparents, parents and children aged 18 and above. It is expected that household family labour increases the probability of participating in more labour-intensive market channels; for example, labour-intensive activities such as sorting, grading and packing. This variable is captured using the total number of members in a household (Boughton et al., 2007; Rao & Qaim, 2011).

Makhura (2001b) finds that households are more likely to participate in the markets when most of the family members are involved in production activities rather than being dependants. Lawal et al. (2004) find that family members involved in farming have a positive

influence on a farmer's decision to adopt new, improved seed varieties of cassava in Ghana. Further, family members' involvement in farming activities provides a financial edge in terms of saving money on hired labour. In short, family labour lowers hired labour costs; that means they can maximise returns on fresh produce (Gani & Hossain, 2015). When high-value crops require special attention to maintain the quality, smallholders may hold a competitive advantage over larger producers. This advantage is due mainly to their low labour costs that are made possible by the use of family labour and their essential local knowledge.

This research assumes that greater availability of household labour will increase the probability of participating in more labour-intensive market channels, such as sorting, grading and packing required for institutional channels. Therefore, it hypothesised that,

H4: Smallholder fresh produce growers with a higher percentage of family members involved in farming activities will be more likely to participate in institutional channels than those with a lower percentage.

4.3.2 Physical farm assets

Farm-related assets have a significant impact on resource utilisation and marketable surplus (Abu, Osei-Asare, & Wayo, 2014). For this group of hypotheses, it is assumed that low levels of available physical resources, such as input materials for production and other input supplies, will constrain a smallholder's participation in institutional channels. For example, Fischer and Qaim (2012) note that the high cost of accessing physical farm assets hinders farmers' chances of growing high-value crops in Africa. Secondly, most farmers do not own or have access to, farm machinery that would enable them to transport FFV products from their farms to the marketplace. This means that they often lose more food and have higher rejections due to poor quality. A farmer's proximity to the primary market impacts upon prices and participation in various channels (Von Braun & Kennedy, 1994). The next section explores the hypotheses developed to capture physical farm assets' impact upon FFV smallholders' market participation.

4.3.2.1 Percentage of operational land for growing FFV

Operational land is a significant factor in farmers' market decisions. This is particularly true of institutional channels, or those who require regular and periodical shipments of FFV. Similarly,

food processors require a regular supply of FFV to maintain the continuity of raw material for production.

The primary reason that FFV growers are excluded from institutional channels is the uncertainty of supply due to smallholder farmers' low marketable surplus. Transaction costs incurred by institutional channels, involved in dealing with many suppliers, means that they are more likely to favour sourcing from larger farms. Agricultural censuses and household surveys in developing countries often show that cash crop orientation depends on operational land (Fafchamps, 1992). There is an essential fixed transaction-cost component in the cost of exchanges between farms and companies, such as administrative costs, costs for time spent communicating, negotiating and monitoring contracts, and costs related to the storage and transportation of goods. In high-value supply chains, these transaction costs can be extremely high because buyers must monitor FFV growers' production practices to ensure food safety and quality. All this makes it more costly for buyers to deal with smallholders than a few larger suppliers (Swinnen et al., 2013). We expect that as operational land increases for FFV production: (1) farm households will have higher levels of wealth; (2) with higher wealth there is a reduction in farmers' uncertainty and risk aversion, (3) with less risk aversion; farmers are more willing to adopt new market channel opportunities. Keeping the prior literature in mind, hypothesis 5 states that,

H5: Smallholder FFV growers using a higher percentage of operational land for fresh produce are more likely to participate in institutional channels than those with smaller areas of operational land for fresh produce

4.3.2.2 Ownership of farm machinery and transportation

Agricultural production is highly specialised due to variations in weather conditions and soil types (Hodges, Buzby, & Bennett, 2011). Farming technology plays an essential role in production specialisation because it has a significant effect on efficiency. Resource endowment is commonly understood as the area of land, labour, capital, and entrepreneurship that farmers use for agriculture practices. Agricultural machinery, credit, access to irrigation and farm labour are some of the essential resources farmers require (Key & Runsten, 1999). Agricultural machinery, including tractors, trolleys and tillers, are necessary for cultivating and preparing the land for plantation.

In this research, farm machinery denotes access to tractors and trolleys. A tractor is a primary vehicle for tillage, land preparation and transporting fresh produce to the market. While trolley is a farm vehicle with wheels that farmer used to transport agriculture produce such as wheat, rice and vegetables to the market place (Sidhu & Vatta, 2012). Farm productivity not only depends on access to quality seeds, fertiliser and irrigation, but also farm machinery (Key & Runsten, 1999). Access refers to ownership, via rental, or sharing use through cooperatives or neighbours. Fresh produce agriculture requires a certain level of land preparation, weeding and harvesting. Post-harvesting marketing requires fresh produce to be promptly dispatched to the market to ensure the quality and aesthetics of the produce. Having access to machinery provides farmers with an advantage. It allows them to minimise losses and lower rejection rates. Hence hypothesis 6 states that,

H6: Smallholder FFV growers who have access to farm machinery will be more likely to participate in institutional channels than those with no access.

4.3.2.3 Variable production costs

Variable production costs are those costs associated with the volume and different types of crops produced. Smallholder farmers are more likely to have high per-unit transaction costs due to small volumes of marketable surplus. Traditionally, smallholders grow fresh produce with the help of family labour and rely on traditional agricultural techniques. Farmers incur different costs such as seeds, fertilisers, pesticides, fungicides, weeding, spraying, land preparation, pruning, and top dressing to produce marketable commodities. Post-farm gate costs such as packaging costs, new technology, transportation through the supply chain, cool-chain, adopting food safety standards and arrangements for a regular supply of FFV raw material. All of these costs increase the total production cost (Minot, 2011; Poulton et al., 2006).

When supermarkets reject a significant part of the delivered product, farmers tend to sell the rejected product in spot markets, thus surrendering the opportunity for a larger share of the final value. If a delivery is rejected/part rejected, it increases farmers' transportation and labour costs (Singh, 2008). Cadilhon et al. (2006) show that despite being offered higher prices by institutional channel, the risks, standards and extra costs incurred by farmers are barely offset by the profit.

Farmers coordinating with new chains incur higher transaction costs than farmers who sell into traditional spot markets. As such, Conversely, supply chains face increased transaction costs when dealing with a large number of smallholders due to higher levels of variability. As a result, institutional channels favour large farmers, collective groups and institutional arrangements to minimise their overall transaction costs (Pingali et al., 2005; Singh, Kaur, & Kingra, 2009). Also, the product specifications, grading and private standards established by institutional channels impose higher *ex-ante* costs on smallholder FFV growers. The imposition of grades and standards may put smallholders at risk of not being able to meet buyers' specified requirements (Berdegué et al., 2005). In these circumstances, individual smallholder farmers incur high 'variable' production cost to participate in institutional channels. Hence, hypothesis 7 states,

H7: Smallholder FFV growers with highly variable production costs are more likely to participate in institutional channels than those with lower variable production costs.

4.3.2.4 Off-farm income

Off-farm (non-farm) income refers to the portion of farm household income from off-farm employment, including non-farm wages and salaries, pensions, and interest income earned by farm families. In the agribusiness context, Lanjouw (1999) defines off-farm income as all the activities associated with waged work or self-employment in income-generating activities that are not agricultural but are located in rural areas. Thus, off-farm income activities might include manufacturing (that is, agro-processing) and may be accumulative (that is, setting up a small business), adaptive, switching from cash crop cultivation to commodity trading, and nonagricultural wage labour. Figure 4.4 shows farm household income patterns for developing countries.

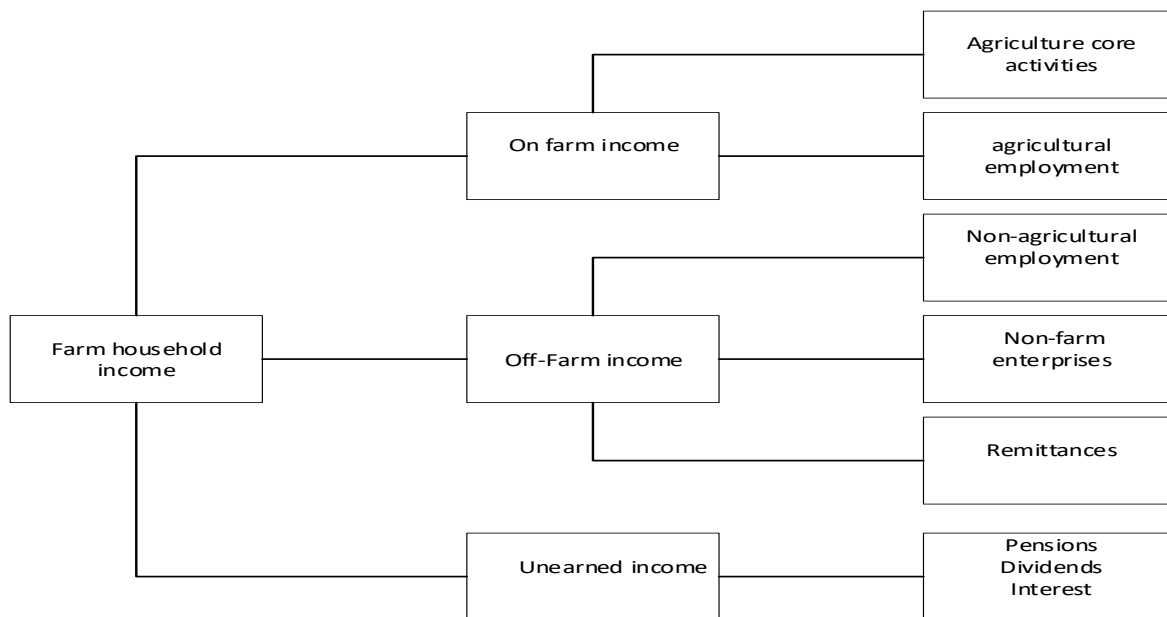


Figure 4.4 Farm household income sources in developing countries

Source (Developed by author)

Off-farm activities involve participation in paid work outside the participant's own farm. These activities play an increasingly essential role in sustainable development and poverty reduction, particularly in rural areas (Rao & Qaim, 2011). Income from off-farm work supplements on-farm income and helps to expand economic activity and employment opportunities in rural areas. For the agricultural sector, income from off-farm activities is an alternative source of income which may be used to finance agricultural production. In short, income diversification has the potential to increase farm investment leading to higher productivity. Off-farm activities also reduce smallholder farmers' income uncertainty (Anang & Yeboah, 2019).

Agribusiness literature states that, as a livelihood strategy, income diversification is a global phenomenon. According to Reardon, Berdegue, and Farrington (2002), off-farm income contributes 40% of total income in Latin America, while in sub-Saharan Africa, non-farm income constitutes between 30% and 42% of total household income. According to Davis (2003), the estimated share of off-farm income to total household income for Asian countries ranges between 29% and 32%. Thus, off-farm income provides farmers with a ready source of cash (they do not have to wait for credit), which they can use to buy inputs and pay expenses such as repairs to farm machinery. Alene et al. (2008) find that off-farm income is positively and significantly related to both the adoption and the use of fertilisers. These factors maximise overall farm productivity, and higher productivity is positively related to participation in institutional channels. Hence, hypothesis 8 states that,

H8: Smallholder FFV growers with off-farm income are more likely to participate in institutional channels than those with no off-farm income.

4.3.3 Marketing characteristics

The NIE framework highlights the transaction costs associated with the process of exchange. The extent of business transactions determines the form of the relationship between producers and buyers. Coase (1937) argues that economic transactions are not governed only by price. Rather, there are other costs associated with business transactions, including; the time spent searching for partners or information costs, negotiating costs, supervision costs, and enforcement costs (Ruben et al., 2007). By considering three principal aspects of TCE: asset specificity, uncertainty and frequency, business transactions might occur at spot markets, vertical coordination (contracts) and control over supply chain by the buyers. The use of spot market transactions can increase transaction costs for marketing because of supply chain partners' opportunistic behaviours. Vertical coordination is one way of lowering the risks associated with high transaction costs.

Similarly, the lack of information prevents supply chain partners from making rational decisions (Williamson, 1979). Thus, analysing transaction costs allows us to observe different modes of engagement, from choice based spot transactions to various forms of vertical coordination (Peterson et al., 2001). The 'contract form' of business transactions occur under the presence of contributory favourable transaction costs (Williamson, 2004). Indeed, information asymmetry in business transactions cause uncertainty and leads to opportunism and bounded rationality between producers and buyers. Formalised (contractual) relationships can minimise uncertainty and opportunistic behavioural risks associated with these transactions (Miyata et al., 2009). However, Williamson (2004) indicates that moral hazard and adverse selection can lead to incomplete contracts.

To participate in institutional channels, FFV growers need information about the market and buyers. In addition, they need *a priori* information about product and buyers' specifications. Solving this information asymmetry gap adds *ex-ante* costs. If these costs are high, smallholders may be excluded from participating in these new markets. Similarly, the *ex-post* costs are associated with governing, monitoring, authorising, and conflict resolution costs during the operation of the relationship that are often re-negotiated with supply chain partners (Ostrom et al., 1993). Specifications, grading and private standards established by

institutional channels impose higher *ex-ante* costs on smallholder FFV growers. The imposition of grades and standards may put smallholders at risk of not being able to meet buyers' specified requirements (Berdegué et al., 2005).

The marketing of fresh produce depends on multiple factors. Access to market price information, the visibility of the buyer, proximity to the primary market, grading and food standard specifications, and mode of market engagement are significant. Transaction costs associated with the marketing of FFV occur at different stages of this process. Costs including, contacting and negotiating with the buyers, post-harvest handling, maintaining the products' aesthetics and quality, obtaining price information and packaging and transport to market are essential for selling FFV. It is also necessary to discuss the farmers' mode of market engagement; for instance, how farmers engage with the market, either through spot transactions, word-of-mouth, or establishing contacts with buyers. The following variables are relevant to transaction costs that influence FFV growers' access to institutional channels.

4.3.3.1 Market information and knowledge

Selling produce to institutional channels incurs several transaction costs. Smallholder FFV growers may be uncertain if they will be able to meet quality and quantity demands. *Ex-ante* transaction costs associated with searching for, and negotiating with buyers, significantly affect a farmer's ability to access new markets. Indeed, the search for markets entails a significant information cost. Transaction costs also involve obtaining access to existing markets, along with the ability to find the best prices. Farmers require information on market signals, prices, trends, changing preferences, consumer or quality requirements (Lee & Whang, 2000; Murray-Prior et al., 2005). Kizito, Donovan, and Staatz (2012) state that holding other factors constant, access to market information by staple crop farmers in Mozambique is associated with a higher probability of market participation (up to 34%).

Conversely, asymmetric and incomplete information can discourage smallholders from finding the best marketing option for fresh produce. This leads to increases in transaction costs due to having to search for new buyers or dealing with previous bad decisions. Transaction cost theory describes the 'bounded rationality' factor, the idea that in decision-making, an individual's choices are limited by the information s/he have, the cognitive limitations of their minds, and the finite amount of time they have to make a decision (Simon, 1957). For example, an agribusiness firm may have excellent knowledge of markets and make less 'bounded' (risky)

decisions, while smallholders possessing only limited knowledge, make more 'bounded' decisions and are exposed to exploitation due to the application of asymmetric knowledge (Winters, Simmons, & Patrick, 2005).

Along with market information, the mode of information dissemination is also essential for smallholders' participation in institutional channels (Chalemba, 2017). Singh and Singla (2011) find that institutional channels pay farmers in cash based on the daily morning market price. Using survey research in northern Ghana, Zanello and Srinivasan (2014) suggest that the principal role of radio broadcasts and mobile telephones is to provide a broader knowledge of market price signals. Information facilitates timely and accurate decision making, thus reducing risks and costs.

In addition to the significance of the mode of information, the use of the information such as price, demand and selection of market depends on the farmers' level of education and knowledge. Dhillon et al. (2006) conclude that the adoption of contract farming with food processing companies in Punjab is more prevalent among more educated farmers. The effect of technology, such as the internet and mobile phones, depends upon a producer's ability to use these devices. The use of collective means of information sharing is also affected by farmers' education level (Neven et al., 2009).

There is a strong need for chain coordination utilising the flow of shared information among chain partners, coordination of processes from 'farm-to-fork' with efficient marketing arrangements. This is because the primary producer's economic viability relies upon effective supply chain linkages with the end market (Boehlje, 1999). All forms of buyer-seller relationships rely on information exchange as a critical relationship connector and coordinator (Cannon & Perreault Jr, 1999). Smallholder farmers are challenged by various constraints in developing countries, such as a lack of information on prices and technologies (Markelova et al., 2009). Therefore, it hypothesised that,

H9: Smallholder FFV growers with (a) access to and (b) usage of market information will be more likely to participate in institutional channels than those without these.

H10: Smallholder FFV growers who monitor prices with (a) higher frequency and (b) using multiple sources will be more likely to participate in institutional channels than those who do not.

4.3.3.2 Buyer visibility

Visibility is the ability to determine the on-going location of products, to trace products back to their origin and the production methods used (Aung & Chang, 2014). Visibility describes the interaction of primary producers with buyers and interaction with end customers. If primary producers know buyer requirements, for instance, the quality, quantity, frequency, changing trends and food safety requirements, they can then plan production more accurately. Moreover, closer proximity with buyers leads to lower marketing risk for smallholder farmers who have less marketable surpluses (Makhura, 2001a).

Product traceability and point of origin are also required under various safety standards (Bertolini et al., 2006). Food supply chains in developing countries are significantly affected by environmental, demand and supply risks. The environmental risk may affect a particular value stream (for example, product contamination), or any node or link through which the supply chain passes, for example, as the result of an accident, direct action, extreme weather or natural disasters (Christopher & Peck, 2004). Higher visibility in food supply chains, especially for smallholder farmers, will materially assist in their participation, hence:

H11: Smallholder FFV growers who have greater visibility of their supply chain will be more likely to participate in institutional channels than those who cannot.

4.3.3.3 Proximity to the market

Proximity (geospatially) to the market is a transaction cost variable that involves negotiation costs. The transport costs involved in transporting the goods from the farm to the market or delivery point is a major constraint for smallholder FFV growers. In rural regions, smallholders are generally dispersed over broad areas, and the infrastructure connecting farms with markets is often poor (Markelova et al., 2009). The potential effects of transport costs on the cropping choices of smallholder farmers have been investigated by a surprisingly small number of agricultural economists (Barrett, 2008; Goetz, 1992; Jayne, 1994). The marketing of FFV also includes transportation costs, waste costs, and waiting time. The physical distance (in kilometres) to the nearest market is a significant factor that affects farmers' selection of a market. The perishability of FFV means that most farmers prefer to sell their goods at the nearest market because temperature-controlled logistics are not always available, meaning that farmers cannot guarantee their products will arrive at institutional channels in a good

state. The element of waste associated with transportation may contribute to a farmer's decision to sell his/her produce at local markets and not participate in institutional channels.

However, institutional channels often have their own transport assets to collect fresh produce from the farm gate, thus facilitating deliveries, but this is not often the case for smallholder producers (Singh & Singla, 2011). Longer distances to the market increase farmers' dependence on intermediaries to sell fresh produce in traditional markets. Masuku, Makhura, and Rwelarmira (2001) consider long-distance markets as a constraint for smallholder farmers because it increases the total cost of selling their FFV. Given these considerations, hypothesis 9 states that,

H12: Smallholder FFV growers who are closer to their primary market will be more likely to participate in institutional channels than those who are not.

4.3.3.4 Specification of grades and standards

Specification of grades and standards are relevant to ex-post transaction costs for marketing (Ostrom et al., 1993). In particular, standards are rules of classification and measurements established by recognised and consistent use or by regulation. Quality (for example, the appearance, cleanliness, or taste), safety (for example, pesticide or artificial hormone residue, or the presence of microbes), authenticity (for example, a guarantee of the product's geographical origin or use of traditional processes) are the main components of these grades and standards (Giovannucci & Reardon, 2000). Institutional channels adopt stricter grading and higher standards as a strategic move to gain differentiation (Moustier et al., 2010). For example, Central American supermarkets impose quality standards on fresh produce suppliers to differentiate their products from traditional products and markets (Berdegué et al., 2005). These stricter grading and quality standards constrain smallholders from participating in institutional channels. Further, consumer expectations are changing in fresh produce supply chains in developing countries (Boehlje, 1999). In addition to demanding lower prices, consumers are more aware of safety, quality, variety, convenience and service concerns (Fulponi, 2007). Increasingly, they are also demanding that production and processing methods be environmentally sustainable, animal-friendly and that companies obey recognised labour and social standards (McCluskey, 2007).

Indeed, Collins (2006) argues that institutional channels use quality as a tool for gaining a competitive advantage. However, the implementation of quality systems to meet the required standards is very expensive for smallholders. Ménard and Valceschini (2005) also mention the quality and quality standards as tools which enable institutional channels to compete with the informal sector by claiming superior product attributes. Due to the use of centralised procurement systems by institutional channels, other requirements in terms of daily deliveries and formalised transactions can also result in the exclusion of most small-scale farmers (Moustier et al., 2010). Implementing and standardising processes according to the requirements of institutional channels represent high upfront costs for those wanting to participate (Kirsten & Sartorius, 2002; Pingali et al., 2007). The strict quality and grading standards of institutional channels create significant barriers to entry for smallholders. Keeping this in mind, hypothesis 13 states that,

H13: Smallholder FFV growers who can meet quality standards will be more likely to participate in institutional channels than those who do not.

4.3.3.5 Mode of market engagement

Transaction cost economics depicts a firm's mode of engagement with suppliers from spot transactions to vertical coordination through ownership. Contrary to traditional spot markets that focus on a single commodity, institutional channels focus on differentiated commodities and graded products that is not possible to achieve through spot transactions (Young & Hobbs, 2002). Traditional agribusiness assumes that there are no transaction costs in spot market transactions because individual farmers select potential buyers. In contrast, Williamson (2004) argues that NIE based vertically coordinated transactions relies on favourable transaction costs through contractual certainty. Due to price and demand certainty (favourable transaction costs) and smallholders' bounded rationality, the contract mode of market engagement is considered the best choice for access to institutional channels from the farmers as well as buyers perspective. Hobbs (1996) suggests that supply chain cooperation and information symmetry enhance the chances of producers and buyers lowering their transaction costs. The success of smallholder participation in institutional channels through vertical coordination has been discussed by various researchers (Bellemare, 2012; Miyata et al., 2009).

literature shows that in general, farmers relationships with buyers can be characterised into three major buyer/seller relationship archetypes. Contract farming refers to the production and supply of agricultural produce under advanced contracts. The essence of such contracts being a commitment to provide an agricultural commodity of a specific type (and quantity), at a pre-determined time, at a pre-determined price to a known buyer. It involves four things; a pre-agreed price, quality standard, quantity or acreage (minimum/maximum) and the time of deliveries (Singh, 2009). Contracted farmers obtain inputs and production services from the buyers (Abebe, Bijman, Kemp, Omta, & Tsegaye, 2013). Farmers often receive advanced credit from buyers whose final payments are settled after the sale (Barrett et al., 2012). Furthermore, contract farming often requires farmers to use new technology and learn new skills in order to meet industry standards and quality requirements (Kirsten & Sartorius, 2002). Contract farming mitigates price risks as buyers specify prices in advance (Singh, 2009). In essence, contract farming represents a new mechanism for small farmers to sell FFV into institutional channels. Bathla (2015) reports that farmers contracting with retail companies in the Haryana state of India gain higher prices/profits, through lower transportation cost and marketing cost, timely payments and transparency. Other researchers have confirmed that the existence of a guaranteed market reduces the transaction costs associated with searching for potential buyers, thereby encouraging participation (Minot, 2011; Pingali et al., 2005; Ruben et al., 2007). Hence, hypothesis 14 states that,

H14: Smallholder FFV growers with a formal contract, will be more likely to participate in institutional channels than those without.

4.3.3.6 Membership and experience with cooperatives

The mode of market participation is a significant factor for fresh produce growers in terms of economic viability and guaranteed markets. Smallholder performance can be heavily influenced by their participation in institutional channels and membership with cooperatives (Barrett, 2008). Collective action through farmer groups is a valuable social asset for smallholders who continue to face challenges in accessing both input and output markets. Collective action refers to actions taken by a group either directly or indirectly in pursuit of members' perceived shared interests. These arise when people work together to accomplish a goal that involves their common interest (Sandler, 1992). For example, cooperatives provide their members with education and technical assistance to ensure that they meet changing market requirements. The International Cooperative Alliance, the body representing co-

operatives worldwide, considers technical training and education as significant principles for the success of the cooperative movement (Lyne & Collins, 2008).

Without joint action, FFV growers are often worse off because of volatile prices, per unit marketing costs, less effective logistics and asymmetric information flow (Cadilhon et al., 2006). Individually, smallholders are unable to meet the entry cost for the institutional channels (Reardon & Barrett, 2000). Neven et al. (2009) have similar findings in the case of smallholders who supply FFV to supermarkets in Kenya. Agribusiness researchers have categorised the services provided by farmer organisations, and these are; organisational services, production services and marketing services (Hellin et al., 2009; Markelova et al., 2009; Narrod et al., 2009). Farmer groups organise themselves in such a way that they can establish profitable relationships with buyers. This assumes that institutional arrangements can lower the transaction costs associated with negotiating with multiple buyers. Prior literature provides evidence that collective action among farmers provides support and enables fresh produce growers to participate in institutional channels (Berdegué Sacristán, 2001; Boselie et al., 2003; Henson et al., 2005; Minten et al., 2005). Mahagrapes is an example of collective action in India, where organised small grape growers participate in the export market by fulfilling stringent quality requirements under several cooperatives (Roy & Thorat, 2008). Further, farmers also benefit from production services offered by farmers' organisations. Cooperatives are able to access cheaper inputs through collective bargaining, which they can then offer to farmers at an unexaggerated price. Jagwe (2011) report that cooperatives in Burundi help provide inputs and that there is a relationship between farmers' group membership and participation in the banana market.

Scarcity of capital and financial management are also challenges for developing countries' FFV growers. Asante-Addo et al. (2017) report that cooperative membership enables small FFV growers to participate in credit rationing programmes. Bellemare (2012) points out that household heads who are members of peasant organisations are 55% more likely to participate in contract farming than households whose heads are not members of such organisations. Lawal et al. (2004) find a positive influence of cooperative membership on the adoption of an improved variety of cassava by Ghanaian farmers.

Institutional channels pose strict quality, grades and standards on sellers to gain a competitive advantage over rival firms. Moustier et al. (2010) report that in Vietnam, smallholder FFV

growers are side-lined because of supermarkets' strict quality requirements. Hence, power relationships between institutional channels and smallholders tend to be highly asymmetric and primarily favour the resource-endowed large farmers or institutional suppliers, and large retailers or wholesalers (Kirsten & Sartorius, 2002; Vorley et al., 2009).

However, collective action can help small producers to be more competitive (Markelova et al., 2009). Shared interest through collective action can counter the power and policies of intermediaries (Narrod et al., 2009). Roy and Thorat (2008) show that grape collectives in India have successfully lowered their transaction costs and given them more bargaining power. Devaux et al. (2009) report a similar finding, where the collective actions of smallholders created new markets for potatoes growers in remote highland areas of 'Papa Andina'. Similarly, Wollni and Zeller (2007) reveal that coffee cooperatives in Costa Rica facilitate small-scale growers' participation in speciality markets delivering higher prices.

Further, as Narrod et al. (2007) report, collective actions enable farmers to pool resources so that they can meet food safety standards. Also, the shared resources by pooling resources for a common goal facilitate smallholders' economic viability, livelihood and responding to adverse events such as disasters. Holloway et al. (2000) note that producer cooperatives are useful in overcoming access barriers to assets, information, services and markets for FFV production. Okello, Narrod, and Roy (2007) also find that in Kenya, Ethiopia, and Zambia, green bean growers organised in farmer groups were able to enter European markets. Hence, cooperative arrangements lower farmers' transaction and information costs, asymmetric power structures, and facilitate smallholder participation in institutional channels (Barham & Chitemi, 2009; Kaganzi et al., 2009). Therefore, it is hypothesised that:

H15a: Smallholder FFV growers who participate in collective action will be more likely to participate in institutional channels than those without membership.

H15b: Smallholder FFV growers with more collective action experience will be more likely to participate in institutional channels than those not engaged in collective action.

4.3.4 Institutional and infrastructure characteristics

The fourth component recognises the influence of institutional and infrastructure on the market participation of FFV growers. Having access to credit and quality inputs is essential for

FFV growers. Institutions such as agricultural universities and research institutions add knowledge and innovation to existing agribusiness practices, and governments provide regulative policies that entities can use for compliance. The flow of information also depends upon the structure of institutions and how they spread market information related to such things as weather, prices and future options. The availability of storage, cold chain and transportation and the national roading infrastructure also depends on institutions and their capabilities and how they act in challenging agribusiness activities. Therefore, the following variables relevant to institutional and infrastructure characteristics are included, to measure their impact on FFV growers' participation in institutional channels.

4.3.4.1 Access to formal credit

In agriculture, farm credit is as vital as other inputs used in production. Farm credit is not only considered one of the critical inputs in agriculture but is also an effective means of economic transformation. A large number of agencies, including cooperatives, commercial banks, non-banking financial institutions, self-help groups and informal credit agencies represent a developing country's farm credit delivery system. Credit plays a vital role in agricultural growth and day-to-day farming activities, especially as farming is capital intensive (Goel & Kaur, 2008; Hazarika & Alwang, 2003).

The seasonal nature of farm credit needs and the uncertain nature of most agricultural produce undermines the viability of borrowing groups for farm credit purposes (Hazell, 2007). Low collateral and a lack of availability of farm credit from publicly funded agricultural development banks, means that smallholders often have to rely on informal sources of credit (Doran, McFayden, & Vogel, 2009). A high percentage of small scale farms in developing countries are financed through informal sources of credit (Adebayo & Adeola, 2008; Gill, 2016; Satish, 2006). The primary reason is the interlocking of credit with the product market (Jodhka, 2006). Fresh produce growers take credit from rural money lenders who also work as commissioning agents at the wholesale markets (Singh, Kaur, et al., 2009). An indebted farmer not only has to grow low-risk commodities but must sell them through the same commission agent to whom they are indebted. These commission agents also own retail outlets at the marketplace where they sell inputs (seeds, fertilisers, pesticides) and agricultural equipment. They sell these resources on credit and charge farmers high-interest rates (2 to 3 per cent per month) (Singh, 2016a). This system may prevent fresh produce growers from selling through institutional channels.

The demand for farm credit increases with the transformation of traditional farming to more commercial models. The introduction of high yield varieties, the use of agrichemicals to control weeds, pesticides, fertilisers, and the adoption of modern irrigation techniques and machinery require additional cash inflows for FFV growers. In developing countries, farm credit also plays a significant role in the widespread adoption of modern production and harvesting technologies. Capital investment constraints for the installation of costly machinery, modern irrigation techniques and the availability of quality seeds also hinder smallholder farmers from participating in institutional channels. Foltz (2004) finds that access to farm credit increases the profitability of less endowed farmers in Malawi. Logically, the availability of credit increases small and medium farmers' ability to participate in modern food chains (Ayaz & Hussain, 2011; Minot, 2011; Poulton et al., 2006). Hence, credit provides farmers with the necessary support to purchase quality seeds, buy machinery, arrange/build irrigation, install fences, and pay for any related farm expenses. These features all increase a smallholder's chance of participating in institutional channels. Thus, it is hypothesised that,

H16: Smallholder FFV growers with access to the formal source of farm credit will be more likely to participate in institutional channels than those with limited or no access.

4.3.4.2 Access to cold storage and logistics

Logistics involves all activities that are focused on transporting products; getting the right product, to the right place, at the right time without the loss of its natural form (Christopher, 2016). The perishable nature of fresh produce means that it requires a high degree of coordination between different actors along the chain. Each stage requires a strong emphasis on workforce development to prevent damage and wastage through mishandling or delays. It is particularly significant for countries located in tropical or hot climates who do not possess an integrated cool-chain infrastructure. Hence, logistics and transportation are key supporting activities in the global fresh produce supply chain. These functions ensure that perishable products reach their destinations in good condition. Cooling storage units are used throughout the chain to keep produce fresh. Both air and sea freighting, supported by the cold-chain, are crucial for maintaining the product's shelf-life and timely delivery (Blackburn & Scudder, 2009; Blandon, 2006; Cooper, Lambert, & Pagh, 1997; Salin, 1998).

Logistics infrastructure, such as refrigerated transport, cold storage, and better sharing of market information lower the risk of food losses (Pingali et al., 2005). Institutional channels

require a regular supply of FFV that means that most smallholder farmers are unable to participate due to having a limited marketable surplus (Gulati et al., 2007; Ruben et al., 2007). In developing countries, poor road infrastructure (Minten et al., 2009; Singh, 2009), and high chances of product spoilage (Rienekens, 2011) result in high volumes of post-harvest losses, and as such, smallholder farmers are less likely to participate in institutional channels. Therefore, hypothesis 17 states that;

H17: Smallholder FFV growers who have access to logistics (including cold chain storage and transport) will be more likely to participate in institutional channels than those without access to these resources/facilities.

4.3.4.3 Access to technical assistance

While FFV growers search for markets where they can meet quality requirements and sell their products at a predictable price, they also look for market attributes such as inputs, credit, advice and technical assistance. Technical assistance is also an important part of marketing. The agribusiness literature highlights that funding for technical assistance differs across the globe. In East Asia, South Asia, Latin America, and the Caribbean, donor contributions make up less than 10% of the total expenditure on agricultural technical assistance. In the Middle East and North Africa, donors fund an estimated 21% of the total technical assistance, while in Sub-Saharan Africa, they fund an estimated 55% (Rapsomanikis, 2015).

Technical assistance enables FFV growers to optimise their use of available resources. It also enables them to address risk more efficiently. Technical assistance includes farm preparation, bed width, plantations and the optimum use of fertilisers and pesticides, harvesting techniques and cold storage. With the right technical assistance, FFV farmers should be well equipped with technical knowledge and have a greater understanding of the marketing process. Technical assistance provided by agricultural institutions, such as universities and agricultural research centres, can help farmers with optimal land preparation, how to determine the adequate use of seeds and other inputs, credit, and technical services while guaranteeing FFV buyers' supply. Cooperatives play a vital role in training and providing technical assistance to participating members. Hence, it is hypothesised that;

H18: Smallholder FFV growers with access to technical assistance will be more likely to participate in institutional channels than those with limited or no access.

4.4 Linking the specific research questions with the hypotheses

At this stage, it is essential to step back and review the research questions and hypotheses that have been developed. Table 4.2 below shows the relationships between the specific questions and the relevant hypotheses.

Table 4.2 Linking the specific research questions with the hypotheses

	Research Questions	Hypotheses
RQ1	<i>What is the impact of human capital assets on the participation of FFV growers in institutional channels?</i>	<i>H1 to H4</i>
RQ2	<i>What is the impact of physical farm assets on the participation of FFV growers in institutional channels?</i>	<i>H5 to H8</i>
RQ3	<i>What is the impact of the transaction costs of marketing on the participation of FFV growers in institutional channels?</i>	<i>H9 to H13</i>
RQ4	<i>What is the impact of collective action on FFV growers' participation in institutional channels?</i>	<i>H15a to H15b</i>
RQ5	<i>What is the impact of institutional characteristics on the participation of FFV growers in institutional channels?</i>	<i>H16 to H18</i>

4.5 Chapter summary

This chapter has developed the research hypotheses and contextualised them concerning the pre-existing agribusiness literature and theoretical framework. As noted, this research aims to empirically investigate the drivers of smallholder FFV growers' participation in institutional channels. The literature review identifies various exogenous and endogenous factors that affect FFV growers' production and marketing decisions. The exogenous factors' effects on the macro-level include, changes in macroeconomic policies, trade liberalisation and government investments in extension services, improvement of transportation and communication infrastructure, upgrading credit services and rural markets (Minot & Ngigi, 2004; Von Braun & Kennedy, 1994). They also include urbanisation, population growth, changes in per capita income and growing awareness about food safety and nutrition.

Similarly, various endogenous factors related to farmers and farm characteristics were considered in the development of the research hypotheses. Various farmers related human

and physical farm assets, for example, age, level of education family labour, ownership of land, farm machinery, off-farm income, the experience of FFV production variables were also considered.

Also, in the theoretical light of NIE, the role and effect of transaction cost and collective actions on farmer's decision making is considered significant in the formulation of this empirical investigation. The current study also includes the role of access to information, social capital and group/cooperative membership. However, before testing these hypotheses, it is necessary to explain the research methodology, and this is discussed in the following chapter.

Chapter 5

Research Methodology

5.1 Introduction

All research is based on underlying philosophical assumptions about what constitutes 'valid' research and which research method(s) is/are appropriate for the development of knowledge in a given study. In order to conduct and evaluate any research, it is important to know what these assumptions are. This chapter discusses the philosophical assumptions and the design strategies underpinning this research.

The chapter begins with an overview of the study's geographic scope. The chapter includes information about the research philosophy and strategies along with the framework. The quantitative data is analysed using statistical data analysis techniques: analyses of variance (ANOVA), T-Tests, cross-tabulations, and linear regressions. This chapter outlines all the quantitative methods employed in this study.

5.2 Research philosophy

Research studies differ in their philosophies and how they approach the design, data collection, data analysis, and results from interpretation. Broadly speaking, there are two major research philosophies in the Western tradition of science, namely *positivism* (sometimes called scientific) and *interpretivism* (also known as anti-positivist) (Sekaran & Bougie, 2016).

The positivist approach to social reality is based on the philosophical ideas of the French Philosopher Auguste Comte. According to him, observations and reason are the best means of understanding human behaviour; true knowledge is based on the experience of senses and can be obtained by observation and experimentation (Comte, 2015). At the ontological level, positivists assume that the reality is objectively given and is measurable using properties which are independent of the researcher and his or her instruments; in other words, knowledge is objective and quantifiable. Positivistic thinkers adopt scientific methods and systematise the knowledge generation process with the help of quantification to enhance precision in the description of parameters and the relationship among them (Babbie &

Mouton, 2001). Positivism is concerned with uncovering truth and presenting it using empirical means.

In contrast, the interpretivism paradigm believes that all knowledge is a matter of interpretation. The strength of this approach in the qualitative methods used to understand the phenomenon. The interpretive approach tends to be more flexible, meaning it can adjust to the unexpected. Hence it is more appropriate for producing new theories in areas not previously widely explored (Yin, 2009).

Interpretive researchers believe that reality consists of people's subjective experiences of the external world; thus, they may adopt an inter-subjective epistemology and the ontological belief that reality is socially constructed. Interpretivist researchers believe that there is no single or correct route or a particular method to knowledge (Babbie & Mouton, 2001). In short, the interpretive tradition argues that there are no 'correct' or 'incorrect' theories. Instead, they should be judged according to how 'interesting' they are to the researcher as well as those involved in the same areas (Creswell, 2013). Researchers following this paradigm attempt to derive their constructs from the field using in-depth examinations of the phenomenon of interest (Babbie & Mouton, 2001).

The interpretive paradigm is underpinned by observations and interpretations; to observe is to collect information about events, while to interpret is to make meaning of that information by drawing inferences or by judging the match between the information and some abstract pattern. It attempts to understand phenomena through the meanings that people assign to them (Silverman, 2013). In Summary, Table 5.1 outlines the research methods associated with each approach, ranging from one extreme, the positivist quantitative approach, to the other extreme, interpretivist qualitative approaches. The positivist approach believes in a singular objective reality. With quantitative data in the form of numbers, the singular reality is easy to code numerically. For example, a positivist approach would argue that it is possible to code gender; male =1 female =2. In short, there is no ambiguity.

Table 5.1 Research approaches under epistemological, philosophical positions

Research approach	Researcher should	Method
<p><i>Positivism:</i> This approach promotes the idea of one objective reality</p>	<ul style="list-style-type: none"> • Focus on facts • Look for causality and fundamental laws • Reduce phenomena to the simplest elements • Formulate hypotheses and then test them 	<ul style="list-style-type: none"> • Operationalising concepts • Large samples • Randomisation • Quantitative approach
<p><i>Interpretivism:</i> Is related to constructivism. It holds that social reality is a subjective construction based on interpretation</p>	<ul style="list-style-type: none"> • Focus on meanings • Try to understand what is happening • Look at the totality of each situation • Develop ideas through induction from data 	<ul style="list-style-type: none"> • Use multiple methods to establish different views of the same phenomena • Small samples investigated in-depth over time • Contextualisation • Qualitative approach

Source: Adapted from (Quinlan, Babin, Carr, Griffin, & Zikmund, 2011; Wilson, 2006, p. 160)

5.2.1 Research approach

This research uses a positivist approach as it holds that there is one objective reality; this reality is singular and separate from consciousness (Quinlan et al., 2011). Furthermore, positivism philosophical system is grounded in the rational proof/disproof of scientific assertions; it assumes that there is an objective reality. It deals with the nature of knowledge itself, its possibility, and scope. It also reflects how researchers can determine whether something is good or bad (Rudestam & Newton, 2014). The positivist approach then informs the quantitative methodology used in this study.

Hence, due to the quantitative nature of data, large samples can be used to generalise the findings for policy formulation (Sekaran & Bougie, 2016). The quantitative approach is considered appropriate for scientific enquiry through the formulation of hypothesising to test the theories (Creswell, 2013). Knowledge of the quantitative research method is especially important because of the emphasis on evidence-based practices in the field of social sciences. However, quantitative data is inflexible and cross-sectional. Conversely, this approach has limitations related to understanding behaviour and causality.

Conversely, qualitative data is often too complicated to code numerically. As data sometimes takes the form of thoughts, feelings, ideas, researchers can lose richness and depth when they code it. However, the collection of qualitative data can be very time consuming and costly. Further, in analysis, thematic presentation and coding of complex phenomena can be interpreted differently. Others may also question the results due to a lack of generalisability (Malhotra, Peterson, & Kleiser, 1999).

As a starting point to adopting a research approach, (Sarantakos, 1998) suggests that a positivist approach should be used when existing knowledge on a particular phenomenon has been accepted as robust and comprehensive.

The primary reason for adopting a positivist approach in this study is that prior research uses this technique to measure the effects of components of transaction cost and collective action theories on market participation in Africa, Latin America and Asia. The transaction cost variables and collective action components, along with human capital, farm physical and institutional assets have been examined by various researchers to explore smallholders' market access (Alene et al., 2008; Barham & Chitemi, 2009; Barrett, 2008; De Janvry et al., 1991; Devaux et al., 2009; Makhura, 2001b; Narrod et al., 2009; Pingali et al., 2005). Therefore, the positivist quantitative approach seems more appropriate for examining the market participation of FFV growers in institutional channels.

5.3 Research design

Under the positivist quantitative approach, there are several different data collection techniques that researchers can choose from according to their objectives, research budget, time and knowledge. As such, this research uses a survey approach because;

- The study's primary objective is to produce numeric descriptions of various factors derived from smallholder FFV growers' participation in institutional channels.
- The survey design is an appropriate method for collecting numeric information.
- The components of the survey include sampling, designing questions, and data collection. These activities have many applications outside of the sample survey, but their combination is essential to a good survey design (Fowler Jr, 2013). The survey design starts with the first step of reviewing the previous literature and assessing the reliability and validity of questions used. The time element of data collection and its

acceptability to potential respondents is a crucial point in survey research (Biemer, 2010).

5.3.1 Survey instrument design and scale development

Survey and observations are two basic models for obtaining primary quantitative data. The research objectives determine the information required for the research. Malhotra (2006) believes that there are no rules of thumb for constructing ideal survey instruments. The formulation of survey questions requires creativity, skill, and experience on the part of the researcher. However, method books and previous studies on similar topics can direct researchers and help them to minimise mistakes. The survey instrument design is influenced by various factors, such as the data collection method, respondent group characteristics and administrative issues such as cost, facilities, time and personal availability of interviewees.

The current study uses the survey design process proposed by Malhotra (2006) and Zikmund, Babin, Carr, and Griffin (2013). The current study required a quantitative survey instrument, based on the information needed to meet the study’s objectives. Survey instrument development also includes a review of previous studies in agribusiness on the topic of fresh produce grower’s market participation, as discussed in previous chapters. Figure 5.1 (below) outlines the steps for constructing a survey instrument used for the current study.

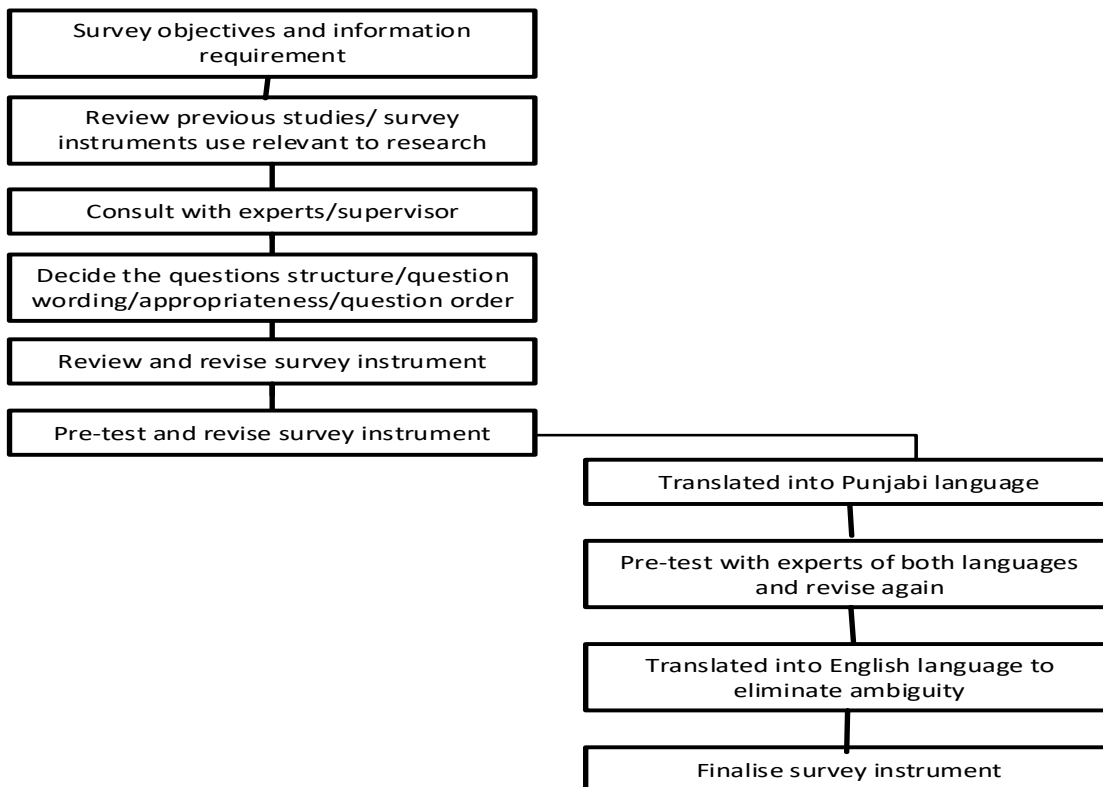


Figure 5.1 Guidelines for formulating the survey instrument

Note that three additional steps were added to the process due to respondents' language preferences. The survey instrument formulation process starts with the research objectives and information required. Previous studies are a good source of information for developing a new survey. Examining questions that have been used by other reviews on a similar topic provides a useful starting point for choosing the wording of the questions. This research considered prior survey instruments used in Master/PhD theses and journal articles published on fresh produce, market participation and developing countries in drafting its questions (Bhattarai, Lyne, & Martin, 2015a; Blandon, 2006; Poliquit, 2006; Riungu, 2011).

An interviewee assisted (personal interview) is structuring the first draft of the survey. Respondents were asked to indicate their degree of agreement by choosing one of five response categories (on a Likert scale). The survey instrument included questions related to each of the different variables in the hypotheses, including socioeconomics, farm and household characteristics, marketing, and organisational characteristics of the farmers and their farms.

5.3.2 Scale development

A scale is defined as the combined set of points that anchor the measurement tool or validate the instrument. Scale development is the process of representing the range of possible responses to a question about a particular construct. The goal of scale development is to precisely triangulate and quantify what is to be measured (Malhotra, 2006). There are three essential elements in scale developments, and these are clarity in terms of the; items, variables and constructs. In this research, scales are used to measure latent variables or constructs: beliefs, satisfaction, and attitudes.

The Likert scale is often used to collect interval scale data to assess agreement or disagreement with or the importance of a particular statement. The latent items in the survey instrument consist of items such as benefits of cooperatives, factor considerations in choosing the market channels, source of price information, lending, the importance of standards and grading are measured through Likert scales 1 to 5, where '1' accounts for the minimum possible value, and '5' accounts for the maximum possible value. Overall, a variety of data types were produced, including nominal, ordinal, interval, and ratio data types.

The high number of values for the Likert scale were reverse coded to obtain an actual meaning and maintain consistency for data analysis. Before responses can be combined into a single

meaningful total score, all items must be in the same direction. To accomplish this, the scores for those items that are in the opposite direction were “reversed.” High scores became low scores, and low scores became high scores.

5.3.3 Survey instrument translation

Once formulated, each question item needed to be reviewed internally before being tested. This way, spelling mistakes and grammar discrepancies could be corrected as early in the process as possible. The internal review was conducted with joint meetings with PhD supervisors. Here decisions were made on issues like question type, structure, wording, appropriateness, and order.

When developing the survey instrument, it was essential to have a clear idea of the sample populations’ characteristics. The respondent groups’ profiles influenced the question design. Hence the chosen format and wording were designed to be applicable and understandable to all respondents, in particular poorly educated farmers in Punjab. Further, the survey instrument needed to be translated into languages commonly spoken by the sample regions (Fowler Jr, 2013).

For this sample, Punjabi is the primary language. While Punjabi is a modern Indo-Aryan language spoken mostly in the Punjab states of both India and Pakistan, it is also used in East Africa, the United Kingdom, and Canada. Approximately 45 million people around the world speak Punjabi either as a first or second language. It is recognised as one of the several national languages of India and Pakistan (Bhatia, 2013, p. 25). Therefore, after the survey instrument was drafted in English, it was then translated into the Punjabi language. The survey instrument was then back-translated into English to ensure that consistency and flow were maintained.

The back-translation of the Punjabi version was conducted by two experts in the Punjabi and English languages by members of the Economics Department from Punjabi University, Patiala (Punjab, India). The back translation ensured that there would be no problems with wording or measurements and that the questions would be easily understood by potential respondents (Sekaran & Bougie, 2016). A paper-based survey instrument, translated into the Punjabi language, was used for data collection.

5.3.4 Pretesting the survey instrument

Pretesting the survey instrument is an important way to pinpoint problem areas, reduce measurement errors, reduce respondent burden, determine whether or not respondents are interpreting questions correctly, and ensure that the order of questions is not influencing the way a respondent answers (Quinlan et al., 2011). In other words, a pretest is a critical examination of the survey instrument that will help determine whether a survey will function as a valid and reliable social science research tool.

By pretesting the survey, researchers can ensure that the questions are formulated and that the response options are relevant, comprehensive, and mutually exclusive - not just in their own estimation, but also from the respondents' point of view (Babbie, 2013). Making sure that researchers and respondents interpret the survey, in the same way, pre-testing must be conducted. Pretesting can bring to light those inevitable instances of obscure terminology, unfamiliar references, and ambiguous words and phrases that the developer may have overlooked. It is essential to remove these issues as they may confound and frustrate respondents and may negatively affect the data quality and response rates. Furthermore, the pretest also allows the researcher to assess response latency, the amount of time it takes to complete individual items in the survey, as well as the full survey, which can then be reported in the introduction of the full-scale survey (Zikmund et al., 2013). The pretesting of the survey instrument was conducted in the selected Majitha and Jandiala blocks of Amritsar district, and the Bhogpur block of the Jalandhar district of the state of Punjab (India). The areas were purposively selected for pretesting, as they have the greatest area of FFV crops in Punjab.

A snowball sampling technique was used to select respondents for the pretest and the main survey. The snowball sampling technique is outlined in Table 5.4. Pretest respondents were chosen based on leads provided from village leaders (the Sarpanch or Numberdar), and lead farmers.

The pretest includes 22 respondents through personal interviews. The pretest was helpful for the researcher in several ways. The pretesting helped to narrow the scope of the study only two major crops (potato and tomato) for subsequent interviews as it was determined that data would be available for both crops. Along with narrowing the scope to the two fresh produce crops, survey responses were recorded, and changes were made to the survey instrument. The pretesting identified some items with ambiguous language that was corrected in the final version. The survey instrument was revised to incorporate the

respondents' suggestions. These changes are described in Table 5.2. The final version of both languages after the pretest of the survey are included in the Appendix.

Table 5.2 Corrections to the survey instrument post-pretesting

SNO	Questions	Item	Description of changes
1	Question 9	Farm labour	Added seasonal labour in farm labour.
2	Question 13	Variable production cost	Added bifurcation of cost with each activity along with family labour and hired labour in production cost.
3	Question 20	Market channel	Changes in market channel options from open-ended to six market selections.
4	Question 27	Source of price information	The added tendency of using source and applied the Likert scale.
5	Question 28	Mode of market engagement	Response limited to 3 options according to pre-test study responses.

The reference period of the study was circa 2017-2018. The data gathering was conducted in the North West region of the Punjab State of India in October – December 2017.

5.3.5 Survey protocol

Survey protocols provide the researcher with a set of general rules, procedures, and steps for engaging with respondents. Data collection should be planned as efficiently as possible and the researcher should aim for consistency across all interviews (Babbie & Mouton, 2001). Survey protocols are a road map the researcher follows to maintain the uniformity of the entire data collection process. Following a protocol, minimises deviations in outcomes (Yin, 2009).

- The interviewer met each respondent with “Sat Siri Akal”, a warm greeting in Punjabi culture. It is a common way to introduce yourself and establish trust. It provides an image of competence; Sat means "truth", Siri is an honorific word, and Akaal (or Akal) means "the timeless being, God". Thus, the phrase can roughly be translated as "True is the name of God". Sat Shri Akaal is exclusively used by Sikhs to greet each other.
- The protocol continued with general information questions designed to ‘break the ice’ and establish rapport. The researcher explained the survey’s purpose, its importance and its use.
- The researcher either met with respondents in their homes or the field.

- Respondents' elder sons or wives were encouraged to help them to complete the survey.
- The wording of the survey instrument was designed to sound like a normal conversation.
- A similar format of a paper-based survey instrument with the same pattern of question numbers was followed to ensure the consistency.
- The researcher recorded the respondents' responses immediately on the survey instrument sheet, ensuring data accuracy and completeness.
- In addition to the survey questions, field notes were also taken to record clarifications, aspects of the environment, non-verbal cues and the respondents' emotions.
- The respondents were formally acknowledged and thanked at the end of the interview for their contribution and time.

5.3.6 Units of analysis

Keller (2010) states that when choosing an appropriate unit of analysis, a researcher should be aware of the ecological fallacy, which states that the conclusion(s) drawn at a group level may not pertain to the individual (that is, the student), and conversely that the conclusion(s) drawn based on the analysis of individual-level (that is, the student) may not be accurate at the group (that is, the school) level. Therefore when choosing the unit of analysis, it is essential to consider the unit of generalisation, as the conclusions and inferences drawn as a result of the investigation may be accurate only at the level of the unit of analysis. Thus, if it is desired to conclude achievement at the school level, the unit of analysis, and generalisation should be at the school level, not at the student level, regardless of the unit of measurement (Keller, 2010).

The objective of the current study is to understand FFV growers' views and what factors they consider in their market selections. Hence, "FFV farmers' market participation" is the unit of analysis in this research. To briefly reiterate, in this research, a smallholder farmer is defined as a farmer who has a farming area of less than 4.99 ha.

5.3.7 Sampling technique, sample frame and sample size

5.3.7.1 Probability sampling

In probability sampling, the selected sample is considered representative of the population. Probability sampling is based on mathematical theories that claim that the research findings

can be generalised to the entire study population. The underlying assumption of the probability sampling technique is that each unit of the population has an equal chance to be chosen in the sample. As this is the case, the researcher must have a complete list of every member of the population from which the sample will be chosen. This comprehensive list of the population is known as the sample frame. Simple random sampling, stratified sampling, systematic sampling and cluster sampling are a few examples of probability sampling techniques used (Quinlan et al., 2011)

5.3.7.2 Non-probability sampling

In non-probability sampling, the sample is selected to represent the target population of interest. In the case where the sampling frame is without a complete list of the population, the non-probability sampling technique is more appropriate. Contrary to probability sampling, all entities do not have equal chances to be chosen (Quinlan et al., 2011). Without a complete sampling frame, it is not possible to use probability sampling. Non-probability sampling techniques include judgemental sampling, quota sampling, snowball sampling and convenience sampling.

5.3.7.3 Sampling technique in the current study

This research uses quantitative methods, with a mix of snowball sampling and purposive sampling. There was no complete list of FFV growers in the sample region, making both purposive and snowball necessary sampling techniques. Kunda-Wamuwi, Babalola, and Chirwa (2017) adopt the same method to investigate the reasons behind the abandonment of jatropha projects using out-grower schemes among smallholder farmers in the Chibombo District of Zambia.

Similarly, Kyomugisha, Mugisha, and Sebatta (2017) use the snowball technique to determine market efficiency and profits from the potato market chain, and factors that influence earnings in Uganda. Further, Mercado, Carsten Nico, and Honig (2018) employ snowball sampling to investigate how smallholders cope with international food safety standards in Bolivia. Similarly, in the Indian context, Kerswell and Pratap (2019) use snowball and purposive sampling to investigate the consequences of worker cooperatives on the economy.

Two districts of the Punjab region were selected for the study. These have the maximum area under fresh produce. In snowball sampling, the most suitable participants are contacted first and asked to recommend other participants. Two blocks of the Amritsar district, namely Jandiala Guru and Majitha, and two blocks of the Jalandhar district, Bhogpur and Adampur,

were selected using the same criterion. That is the maximum area under potato and tomato crop cultivation. Referrals are used to locate others who possess the same characteristics (Biernacki & Waldorf, 1981). These additional persons are contacted and asked to name additional persons in the population. The process continues until an adequate sample size has been obtained or until no new names are elicited from the process.

5.3.7.4 Creating a snowball sample

Snowball sampling was useful for enabling research participants who were contacted first to identify other FFV farmers for participation in the study. Table 5.3 shows the steps used,

1. Identifying the leading farmers of the village or the head of the village in the desired population who grow FFV; and
2. Using these leads to find further FFV growers and so on until the sample size is met.

Table 5.3 Steps for creating a snowball sample

Steps	Market/ Informants
Step 1 meetings	<ul style="list-style-type: none"> • Numbardar: A title in the sample region (Punjab, India), belongs to resourceful families of the village, collects revenue for the state, and has wide-ranging governmental powers, associated social prestige (see Figure 5.2) • Sarpanch (a democratically elected village leader), Ex-Sarpanch of the village • Seed suppliers and lead farmers • Processing company procurement officer
Step2 meetings	<ul style="list-style-type: none"> • Contacting farmers if the phone number is provided. Otherwise personal visit
Step 3 meetings	<ul style="list-style-type: none"> • Reach respondent farmers



Figure 5.2 Meeting with Nambardar and lead farmer at Jodhey village, Punjab, India
Source: Private photo taken during field survey

5.3.7.5 Sample size

A critical aspect of sampling design is deciding upon the sample size. Statistically, a large sample is considered more generalisable and affects the degree of inferences. While small samples tend to produce unreliable results, overly large samples demand a considerable amount of time and resources and possess too much statistical power. Sekaran and Bougie (2016) recommend that the size of the sample should be based on reliable statistical estimates and must reflect the population parameters as closely as possible with a smaller margin of Type 1 errors. Hence, based on statistical inferences, the researcher is required to specify the level of confidence which is established at $\alpha=.05$ or 95%. Hair, Anderson, Tatham, and Black (1998) assert that large sample size produces higher statistical power, provide broader generalised inferences and significant results. In short, the sample size affects the results of the statistical analysis.

Cohen (1992) suggests that the power of a statistical test can be generalised with sample sizes of 100 or more, with predicted moderate sizes at both alpha levels ($\alpha=0.5$ and $\alpha=.01$). However, for the current study, the sample population was not able to be selected randomly because of the non-availability of a census or any other formalised database. A list of FFV growers was not available either. Thus, an alternative approach was used. Lead farmers or village leaders were approached to identify FFV growers in the relevant blocks. General information and FFV growers' addresses were collected from the Sarpanch (democratically elected village leader) and the Nambardar (a government-appointed influential personality of the village) when visiting nearby villages. As the data collection occurred during harvesting

season (for paddy) and the planting season for potatoes, respondents were mostly found working in their fields or at home.

Table 5.4 Sample size crop-wise in both the Jalandhar and Amritsar regions

		Number of FFV growers		
		Region		Total
		Jalandhar	Amritsar	
Crop	Tomatoes	49	49	98
	Potatoes	49	53	102
Total		98	102	200

From the above mentioned two regions crop-wise, Table 5.4 shows the sample of 200 growers added to draw the inferences from the data.

5.3.8 Data collection methods

Before the data collection phase in Punjab, a thorough review of secondary information was undertaken. It consisted of analysing data from local (Punjab) and international sources, including a literature review of previous studies in other countries. Secondary data was collected using Punjab government publications; that is, statistical abstracts of various Punjab volumes and years, and peer-reviewed published journals relevant to studies of fresh produce in developing countries. The initial approach was to use the keywords of ‘smallholder’, ‘farmer participation’, ‘agribusiness’, ‘supply chains’, ‘developing countries’, ‘collective action’, ‘food supply chains’, ‘transaction cost’ and ‘agribusiness supply chain’ in ProQuest, Science Direct and Google scholar. Besides, the researcher also searched discussion papers from the Food and Agriculture Organization of the United Nations (FAO), the International Food Policy Research Institute, in New Delhi (IFPRI), Food Policy (ELSEVIER), the International Fund for Agricultural Development (IFAD), Modernizing Extension and Advisory Services (MEAS), the Centre for Management in Agriculture, Ahmadabad (CMA) and Oxford journals.

The mode of primary data collection was personal interviews (survey interviews). One-on-one meetings were conducted using a structured survey instrument. These meetings enabled the interviewer to establish rapport with the respondent and explain the importance of the research in detail. The researcher is also able to record the conversation and transcribe it after it is finished. In one-on-one interviews, there is less chance of missing data or wrongly interpreting the responses.

However, interviews can be time-consuming due to the amount of data an interviewer must collect. Travelling to multiple locations can also be exhausting and resource-intensive. The non-availability of respondents can delay a research project, and non-cooperative respondents may also hinder data collection (Quinlan et al., 2011).

Personal interviews were deemed an appropriate method for primary data collection, due to the nature of the study. The survey was completed personally, either in the field or at the farmers' houses, and this allowed a better appreciation of the real conditions in which farmers operate. The benefit of personal interviews over paper-based survey instruments is a higher response rate as opposed to mail or email surveys. Furthermore, personal interaction provides the additional benefit of interpreting the questions or concepts when asked and clarifying any responses. It may also provide useful supplementary information relevant to the research (Zikmund et al., 2013). The research was carried out with critical informants selected for their reputation, authoritative status, knowledge or position. The development of trust and rapport was essential and was built up by acknowledging their status and introducing myself as a 'local boy' who was attending an international university.

During the field survey, many lead farmers became friends with whom I then met in the evening. Lead farmers were vital in gaining further referrals, but conversely, in some cases, this restricted my access to others as I was aligned to one group. I tried to ensure that I met a range of key informants who were representative of the different farmer groups. The decision of 'representativeness' was solely the researcher's, based on categories evolving from earlier research (Nair & Singh, 2016), and a deep understanding of the culture and practices of the people as the researcher grew up in the region. Great care was taken to avoid different forms of bias, related to gender, age, ethnicity and wealth (Zikmund et al., 2013). Ownership of land was considered a benchmark for differentiating between the farmers.

5.3.9 Response rate

Personal interviews are considered to have the highest possible response rates in survey research. With personal interviews, the interviewer can boost the personal motivation in respondents by showing them official identification. It has been observed that advanced information derived from interviewing potential respondents enhances the overall response rate (Quinlan et al., 2011). The personal visits to the villages were conducted using a two-wheeled motorbike. The first step was to meet village leaders to gain access or contact potential respondents who grow FFV. The second step was to meet likely respondents.

Mobile phone numbers, along with respondents' physical addresses were recorded to facilitate initial contact. The research initially contacted all potential participants via their mobile phone number. If a mobile phone number was not available, then the researcher visited them personally, at home or in the field. The respondents were told that the interview would take appropriately 40 minutes. After obtaining their consent, participants could either complete the interviews on the spot or arrange a more convenient time. During the data collection, the sampled region farmers were involved in paddy harvesting and planting potatoes. Table 5.5 shows that of the 302 farmers who were contacted, a total of 224 survey instruments were completed (including 22 pilot surveys). Two hundred surveys were included in the analysis. The final response rate was 66%.

Table 5.5 Effective response rate from the survey

<i>Sample selection description</i>	<i>Number</i>	<i>Percentage</i>
Total farmers contacted	302	100 %
Less: Received reference but not contactable (wrong name or refused to meet)	42	14 %
Less: Contacted but not interviewed (landless or marginal) or unsuitable	12	3.9 %
Less: Contacted but busy with ploughing/land preparation of potatoes	24	7.9 %
Total non-responses:	78	20 %
Effective sample size	224	74 %
Less: Pretesting	22	9 %
Less: Number who quit during the interview	2	0.9 %
Interview completed/response rate	200	66 %

5.3.10 Data entry and coding

The paper-based collected data and field notes were entered into an electronic format. Numeric data was coded by assigning numbers to the values or level of each variable. The data coding was completed following Newton and Rudestam (2012) recommendations. Initially, data was fed into a blank datasheet that was generated using Microsoft Excel, then the data file was generated in SPSS (version 25) by labelling the variables.

A first coding sheet was created to assign numeric codes. The researcher followed master coding instructions suggested by Leech, Barrett, and Morgan (2013). The final coding sheet included the variable number, the variable label and the coding range of the variable. Data was analysed using SPSS as this software provides more comfortable and quick access to essential functions, such as frequency analysis (ideal for ungrouped data), exploratory

analysis, independent T-Tests and other descriptive statistics. It is also known for effective data management, its ability to compose or transform a new variable, and better output organisation. It also has a much more extensive range of analytical options when compared to Excel.

It is essential to name and define variables in order to aid data analysis and interpretation. Quantitative research involves examining the interplay among variables after they have been operationalised, thus allowing researchers to measure study outcomes. At the core of quantitative research is studying and measuring how variables change. If a variable does not differ, researchers cannot draw conclusions from the data.

5.3.10.1 Descriptions of the variable used in the current study

An independent variable (IV) in a study is the presumed causal variable. In quantitative research, the independent variable is presumed to influence the other variables. It is an antecedent condition to an observed resultant behaviour (Martin & Bridgmon, 2012). Table 5.6 provides the names and definitions of independent variables used in this study. These variables are known as the stimulus variable, the treatment variable, the experimental variable, and the intervention variable. Conversely, a **dependent variable (DV)** is a variable assumed to depend on, or be caused by, other variables (the independent variables). A dependent variable is the presumed resulting outcome. It is usually observed and measured in response to an IV or more. Researchers look for changes in the DV caused by the IVs in the research study.

The review of the agribusiness literature in Chapter 3 indicated that processors are considered the most institutionalised marketing channels, followed by supermarkets, traders at the farm gate and, finally, the traditional wholesale markets. Institutional channel processors have a shorter supply chain, that consists of a direct relationship with farmers, preferably with written contracts, avoiding the presence of intermediaries (Chen & Stamoulis, 2008; Singh, 2009). Supermarkets are less institutionalised compared to processors, as supermarkets procure FFV products through several channels, such as direct procurement, intermediary firms, specialised wholesalers, and from traditional wholesale markets (Berdegué et al., 2005; Neven & Reardon, 2004; Ruben et al., 2007).

In the current research, the dependent variable (market access to institutional channels) was transformed/computed using SPSS to make inferences about the factors that drive smallholders' participation. It is necessary to transform the dependent variable because FFV

supply chains tend to be multi-layered in the sample region. Fresh produce growers sell products to several buyers. The survey data found that farmers sell potatoes and tomatoes into several marketing channels, such as traditional large wholesale markets, local spot (nearest small town) markets, large institutional food processors, domestic (local) small-scale food processors, supermarket retail chains, traders at farm gate and direct sales to local hotels/restaurants.

Due to the complex nature of the FFV supply chains in the study region, it was necessary to include multiple channels. Fresh produce growers sell their produce to a range of buyers. In order to convert the percentage of each type of buyer into a scale of access, a series of weights were created, and a new variable related to market access to institutional channels was created using the weighting system. The highly institutional chain processors were given the highest weight + 2, then supermarkets which are still considered institutionalised, but not extremely institutionalised, were multiplied by + 1. Similarly, traders at farm gate were given a negative -1 weighting, and the traditional wholesale market was weighted – 2.

After transforming/computing the new variable, we used the normality test to check the assumptions of the dependent variable and assess its suitability for analysis.

Equation 5.1 Computation of dependent variable (DV)

$$\begin{aligned}
 & \textit{Market access to Institutional channels} \\
 & = [(2 * \textit{processor \%} + \textit{Supermarket \%}) \\
 & \quad - (\textit{farm gate traders \%} + 2 * \textit{traditional spot market \%})]
 \end{aligned}$$

Whereas

+2 = highly institutional

0 = neither institutional nor traditional

-2 = highly traditional

5.3.10.2 Assessing Q-Q plots for normality of the dependent variable

Each observed value in the distribution of scores is paired with its expected value from the normal distribution in a normal distribution plot (Q-Q plot). The expected values from the normal distribution are based on the number of cases in the sample and the ranked order of the case in the sample. If the sample is from a normal distribution, it is expected that the points will fall more or less on a straight line.

A Q-Q plot was produced for the distribution of the dependent variable, market access to institutional channels, and the results are displayed in Figure 5.3. The motivation for the development of this scale was to capture the hierarchy of institutional channels from the FFV markets available to the local producers. For the most part, the points were on or near the straight line, so the dependent variable was considered to be suitable for the proposed analysis.

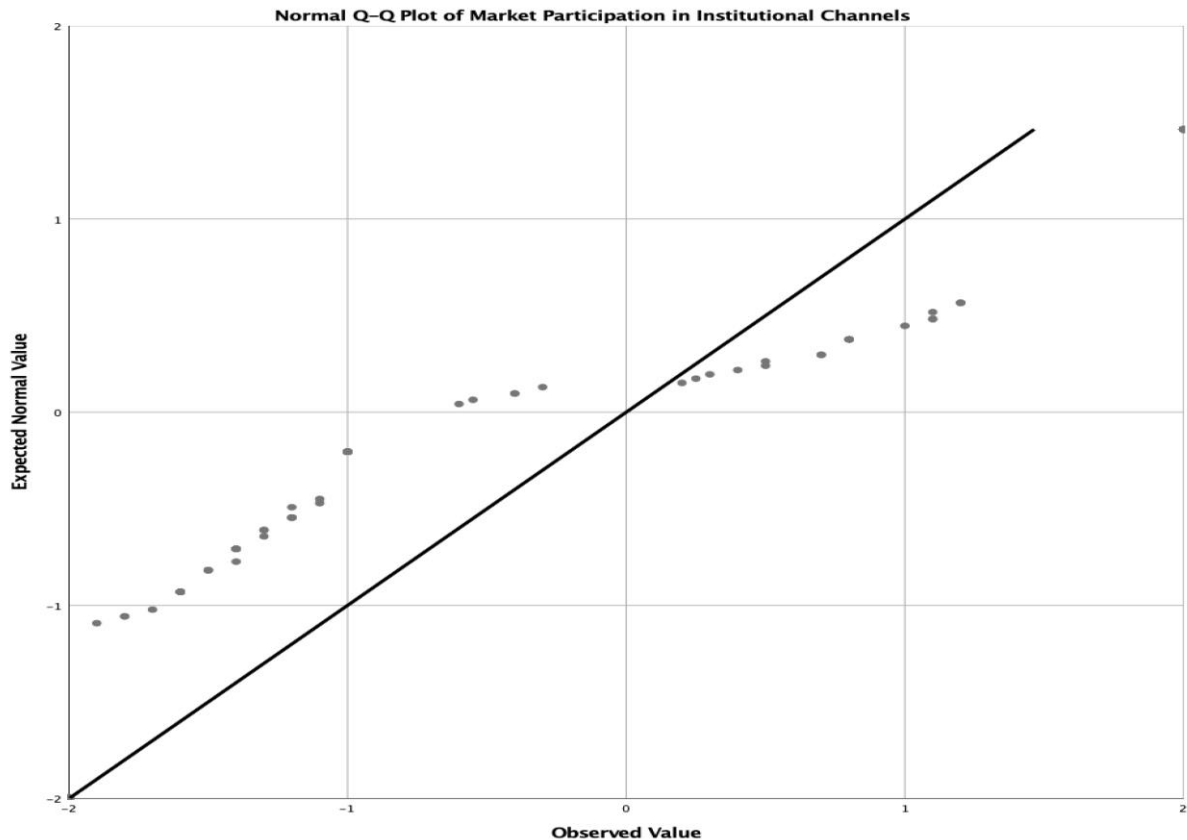


Figure 5.3 Q-Q plot to assess the normality assumption of the dependent variable

The next section explores the data screening methods before analysing the data in relation to the research objectives. In other words, it explains data diagnosis concepts, techniques and the implemented procedures.

5.3.11 Study data diagnostics

Diagnostic assessments are conducted on the sample data after it has been collected but before testing the research hypothesis. Before computing any inferential statistics, it is essential to do data diagnostics, which is also called exploratory data analysis or data preparation (Leech et al., 2013). Study data diagnostics is necessary for;

- Checking the accuracy of data entries

- Checking normal distribution, coding, fixing any missing values, and data entry errors
- Detecting and making decisions about univariate (one dependent variable) outliers
- Confirming statistical assumption before running analysis
- Obtaining demographic information necessary when presenting results

5.3.11.1. Detecting erroneous data entry

The integrity of the data can be significantly compromised by entering wrong data. It is recommended that researchers compare the input data with the original data (Martin & Bridgmon, 2012). Any data that is downloaded, imported, or mined from another data source also needs to be carefully reviewed and checked against its original source.

In the current study, screening analysis was conducted to ensure the completeness and validity of the data. Initial screening analysis assesses whether variable scores are in the expected ranges. Additionally, a researcher should determine whether the frequencies, means and standard deviations seem reasonable. This process includes checking for missing values, incomplete responses, unclear and binary values. Measures of central tendencies, such as mean values and standard deviations, were produced to ensure the completeness and validity of the collected data. The SPSS statistical package was used to compute descriptive statistics such as the mean, minimum and maximum values for all participants, as well as to check for other types of errors or problems. The next section of the chapter explains how missing data and univariate outliers were treated.

5.3.11.2. Identifying and dealing with missing data and univariate outliers

Sometimes, for mail surveys, respondents do not answer all the questions when they fill in a survey instrument. In the current study, the survey was conducted using a face-to-face method between the researcher and FFV growers in the study region. This technique has a distinct advantage of minimising the likelihood of missing data. Indeed, there several ways of handling missing data. Babbie (2013) advises that the best solution for handling missing data is to make every attempt to minimise the problem before and during the study. Tabachnick, Fidell, and Ullman (2007) state that the deletion of cases may be more attractive when only a small subsample of random cases of a large sample of cases has missing data. Hair, Black, Babin, Anderson, and Tatham (2006, p. 55) state that “missing data” under 10% for an individual case or observation can generally be ignored, except when the missing data occur in specific non-random fashion”. In this research, the deletion of cases approach was applied. For example, in the data, two cases, case numbers 97 and 100, were deleted from the farmer’s

level of education variable and 198 cases were added for analysis. Table 5.6 shows the variable name, number of missing cases for each variable and case numbers deleted from the data.

Table 5.6 Identification of missing cases in data

Variable name	Statistic	Number of missing cases	Case numbers deleted
Age groups	200	0	10
Level of education	198	2	97, 100
Family members	199	1	130
Percentage of land used for crop	197	3	9,52,87
Experience in fresh produce farming	199	1	10
Income other than farming	200	0	
Variable production cost	200	0	
Cooperative membership	200	0	
Experience of cooperative in years	156	Only 156 members out of 200	
Farm machinery ownership	200	0	
Price consideration	199	1	61
Price information before the sale	200	0	
Frequency of price information	193	7	197, 66, 24, 70 194, 161, 162
Relationship with buyer	200	0	
Visibility of buyer	200	0	
Access to farm credit	200	0	
Technical assistance	200	0	
Ownership of transport	200	0	
Distance farm to market	200	0	

Along with treating missing data, it is also important to identify and make decisions about outliers. According to Martin and Bridgmon (2012), in statistics, an outlier is a data point that differs significantly from other observations. An outlier may be due to variability in the measurement, or it may indicate an experimental or design error; the latter are sometimes excluded from a data set. An outlier can cause serious problems in statistical analyses.

There are many possible reasons for the existence of outliers. Outliers can be initiated by errors in data entry and the mismanagement of a data file. The current study follows Tabachnick et al. (2007) who provide guidelines for determining if a participant's score on a

continuously scaled dependent variable is a univariate outlier. They state that when the raw score on dependent variables is transferred to a Z-score, any Z-score is greater than ± 3.29 (*two-tailed test*), it is considered a univariate outlier.

There are several approaches for neutralising the effects of outliers. The common method to minimise the effect of outliers is to delete the case of the variable with the outlier based on an assessment of whether the case is representative of the sample population. Tabachnick et al. (2007) advises discarding 5% of the largest scores and doing the same for 5% of the smallest scores. Using Tabachnick et al. (2007), methods, we can state that there are no significant outliers in data.

5.3.12 Data analysis

Quantitative data analyses were conducted to examine the research questions. Descriptive statistics are useful for showing the relative importance of the factors responsible for FFV growers' market participation. Several other methods of quantitative analysis are also used, including ANOVA, the independent sample T-Test, cross-tabulations, and linear regressions. Table 5.7 provides descriptions of the variables and outlines the statistical techniques used for data analysis.

Table 5.7 Descriptions of the variables and statistical techniques used for data analysis

Independent variables	The operational definition of variable	H	Statistical technique
Age	Age of respondent in years	H1	One-way ANOVA
Edu	Household head's education le	H2	One-way ANOVA
Farm Exp.	Farming experience in years	H3	One-way ANOVA
Family Mem. In Farm	Percentage of family members in farming	H4	Linear regression
Land %	Percentage of land use for FFV	H5	One-way ANOVA
Mach-Own	Farm machinery ownership: Yes/ No	H6	Independent sample T-test
Variable Production cost	Per acre cost of production	H7	Linear regression
Other Income	Income other than farming	H8	Independent sample T-test
Mkt- Info.	(a) Access to and (b) Usage of market information	H9	Independent sample T-test
Info-Freq	How frequently information is received	H10	One-way ANOVA
Buyer Proximity	How to further down may the buyer be seen	H11	Independent sample T-test
Farm to Mkt.	Distance between FFV producer and market or delivery points	H12	One-way ANOVA
Grading	Specification and grading requirements: Yes/No	H13	Independent sample T-test
Mkt Eng.	Spot transactions/word of mouth/formal contract	H14	One-way ANOVA
Coop Membership	Cooperative membership: Yes/No	H15a	Independent sample T-test
Coop Experience	Experience with cooperatives in years	H15b	One-way ANOVA
Credit Access	Farmers having access to credit (Formal/Informal)	H16	One-way ANOVA
Cold Storage	Access to logistics (cold chain storage and transport): Yes/No	H17	Independent sample T-test
Tech. Assistance.	FFV growers have access to technical assistance	H18	Independent sample T-test
Dependent Variable;			
Market Access to Institutional Channels	The supply chain where FFV grower sell	DV	

5.3.13 Descriptive analysis

This section explains the ways of describing, representing and analysing the collected data. Quantitative data starts with a set of descriptive statistics. The first step for quantitative data analysis is summarising the data in a way that readers can understand. If quantitative data is presented in rows and columns, it will be hard to see trends, distributions and proportions. Hence, frequency tables and frequency distributions are used to summarise the respondent numbers or to present a clear view of the data. Similarly, to illustrate continuous variables, categories can be created in data using graphs like histograms, pictograms and area and line charts.

Further measures of central tendency, including means, minimum and maximum values, frequencies, percentages, and standard deviations, provide an understanding of the central values of data. This research applies these measures to describe and examine the socio-economic characteristics of different farmer categories and then compared the means to find the significance of different groups of institutional and market characteristics. Means (the average) and standard deviations are theoretically statistically meaningful only for data measured at interval or ratio scales, which is not that useful for Likert scale responses (Field, 2000). The frequency distribution is a tally or count of the number of times each score on a single variable occurs.

5.3.14 Inferential statistics

5.3.14.1 Mean difference and relationship analysis

T-test analysis is used to estimate the probability of whether two sample means are different, and therefore, represent various population means. This test is based on the observed difference between the two sample means and their distribution (Williams & Monge, 2001). For this purpose, two hypotheses are set:

$$H_0: \mu_1 = \mu_2$$

$$H_a: \mu_1 \neq \mu_2$$

Where H_0 is the null hypothesis, H_a is the alternative or research hypothesis, and μ_1 and μ_2 are the samples means one and two respectively. If the probability p estimated is equal to or less than a critical value set by the researcher (for example, $\alpha = 0.05$), the null hypothesis is rejected, and the alternative hypothesis is accepted, this means that the sample means are

significantly different. In this research, T-tests are conducted to statistically compare sample means of different groups of farmers to measure their market participation.

When an analysis does not directly include estimates related to the characteristics of the population, a nonparametric test, such as Chi-square is recommended (Williams & Monge, 2001). Chi-square tests are generally used to make inferences when the data collected is categorical (Dane, 1990). Widely used in cross-tabulations, chi-square is conducted when measurement tools are nominal or ordinal to assess the association between variables (Leech et al., 2013). Its calculation is based on the difference between the observed and expected sample distribution. Like the T-Test, if the probability p estimated is equal to or less than a critical value set by the researcher, the null hypothesis that there is no association between variables is rejected, and the alternative hypothesis (there is an association between variables) is accepted. T-tests and cross-tabulations are used for participants and non-participants.

The independent samples T-test has two assumptions. The Levine's Test for Equality of Variances determines if the two conditions have about the same or different amounts of variability between scores. If a value is more significant than .05, this means that the variability in the two conditions is about the same. If the scores in one condition vary more than the scores in the other condition, this means that the variability in the two conditions is significantly different. SPSS takes this into account by giving slightly different results in the second row. If the 'Sig. Value' in this example is more significant than .05 we would see this in the second row of the output tables.

5.3.14.2 Analysis of variance (ANOVA)

The Analysis of Variance test (ANOVA) applies the logic of statistical significance between two or more groups. Fundamentally, the cases under study are combined into groups representing an independent variable, and the extent to which the groups differ from one another is analysed in terms of a dependent variable. The extent to which the group differs is compared with the standard of random distribution (Babbie, 2013, p. 486).

There is a similarity between the T-test and ANOVA as both are used to test hypotheses about the differences (the variation) in the means in groups. While the T-test is used to test two means, ANOVA can be used to test the differences among the means of more than two groups (Quinlan et al., 2011). The underlying assumptions of ANOVA are that the dependent variable is normally distributed (or close to normal), the group variance and error variance of the dependent variable are equal, or near equal, and all observations are independent of each

other. Independence screening measures have a limitation as to their usefulness given various conditions of the study. Thus, there are several measures to assess normality and homogeneity of variance as described below. The researcher must look at several screening measures to assess the underlying assumptions of the evidence and to decide whether to proceed.

The dependent variable used in ANOVA must be continuously scaled at the level of interval or ratio. The following three underlying assumptions need to be met in order to use ANOVA.

1. *Population normality* - The score on the dependent variable for each condition are normally distributed around their mean.
2. *Homogeneity of variance* - The variance of this course of the independent variable across the condition should be constant. In interpreting output, the researcher must first ensure that the homogeneity assumption has not been violated. Levene's test for homogeneity of variances is not significant ($p > .05$). The researcher can then be confident that the population variances for each group are approximately equal.
3. *Independence of observations* - The observations are independent of one another and not correlated with each other.

The purpose of doing ANOVA is to see if there is any difference between groups on some variable. ANOVA calculates the mean for each of the final grading groups - the group means. It calculates the mean for all the groups combined - the overall mean. Then it calculates, within each group, the total deviation of each's score from the group mean - within-group variation. Next, it calculates the deviation of each group means from the overall mean - between-group variation. Finally, ANOVA produces the *F statistic*, which is the ratio between-group variation to the within-group variation. If the between-group variation is significantly higher than the within-group variation, then there is likely a statistically significant difference between the groups.

The essence of the analysis of variance is to compare variability within groups versus variability among different groups. The larger the F value, the more likely it is that the null hypothesis (H_0) of no differences among the group means (that is, locations) is false. In other words, if the p-value is less than or equal to the significance level, we reject the null hypothesis and conclude that not all of the population means are equal (Quinlan et al., 2011). The only assumption of the test is that the observations (rows of the original data matrix) are exchangeable under a correct null hypothesis. To assume exchangeability under the null

hypothesis is generally to believe that the observations are independent and that they have similar distributions (Zikmund et al., 2013).

ANOVA uses the F distribution as this probability distribution of sample variances changes with the sample size. Post hoc analysis (such as the Scheffe's and Tukey's tests), that generally examine the variation between three or more groups, are not required in this situation (Zikmund et al., 2013). Figure 5.4 shows the justification for using post hoc tests for the current study.

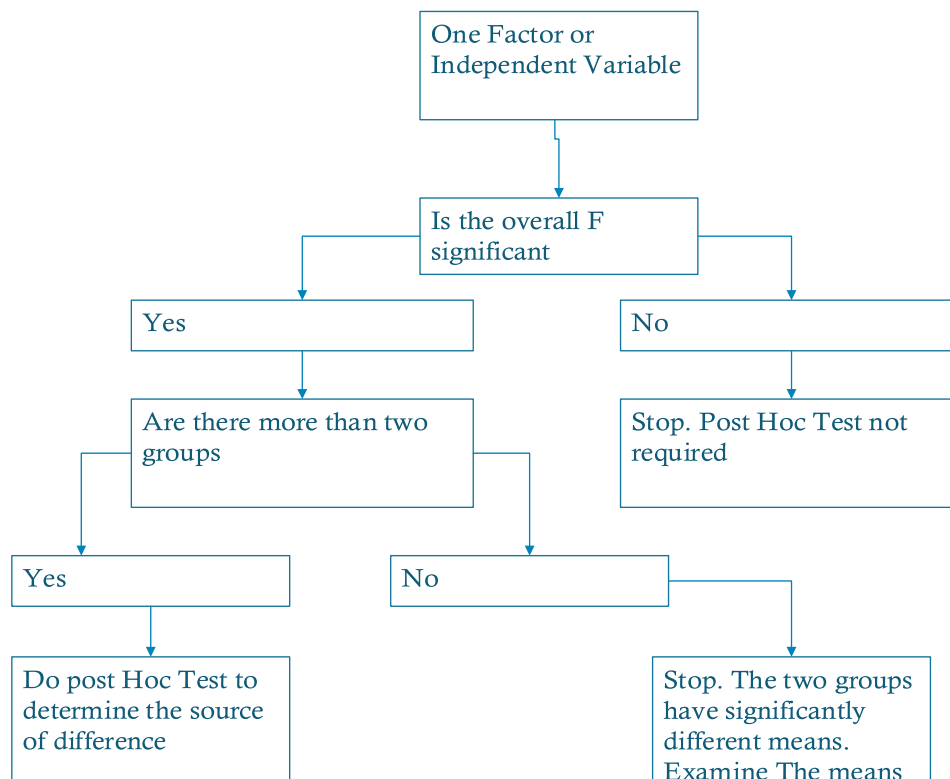


Figure 5.4 Post hoc test justification

Source Leech et al. (2013, p. 190)

Having obtained a significant result, the researcher can go further and determine, using the Tukey HSD test, where the significance lies.

5.3.14.3 Regression analysis

Several of the hypotheses outlined in the literature review are expected to identify a positive or negative relationship between independent variables and a dependent variable and require a different statistical tool. In this case, regression analysis was used to examine the relationship between these independent variables and the dependent variable (institutional engagement). The aim is to predict the dependent variable through the values of the independent variables (Hair et al. 2010).

Linear regression analysis is used along with mean difference analysis. In simple linear regression, independent variables are used to predict the value of a dependent variable. Linear regression attempts to model the relationship between two variables by fitting a linear equation to observed data. One variable is considered to be an explanatory variable and the other is considered to be a dependent variable

The formula given for a single linear regression with one independent variable is:

$$Y_i = \beta_0 + \beta_1 x_i + \xi_i \text{ where } i = 1 \dots n.$$

y = dependent variable,

β_0 = constant,

β_1 = regression coefficient,

x_i = independent variable,

ξ_i = prediction error

The independent variable(s) used to predict the dependent variables should correlate strongly, as this will give the model greater predictive accuracy (Hair et al., 2010). To accept the hypothesis that the model is predicting, several statistical measures must reflect the overall model fit. The coefficient of determination, R^2 , is used to measure how well the prediction is made by the independent variable on a scale from 0 to 1. Values closer to 1 are considered excellent predictors, but anything more than 0.3 is considered a good model. In field studies, lower R^2 values of R^2 are acceptable. Furthermore, ANOVA can be used to check the statistical significance at a predefined level.

In this study, the simple linear regression model is applied to test two hypothesis while the ANOVA model is used as the main statistical method. The most common application of the regression analysis is to estimate the value of the dependent variable for a given value or range of values of the dependent variables. Therefore, the regression analysis is widely used in predicting and forecasting. It is also used to establish relationships in experimental data. On the other side, ANOVA does not involve the analysis of a relation between two or more variables explicitly. Rather it checks whether two or more samples from different populations have the same mean. The fundamental idea of ANOVA is to consider the variation within the sample and variation between the samples. The variation within the sample can be attributed to the randomness, whereas the variation among samples can be attributed to both randomness and other external factors.

ANOVA is the analysis of variation between two or more samples while regression is the analysis of a relation between two or more variables. Both the Regression and ANOVA are the statistical models which are used to predict the continuous outcome but in case of the regression, the continuous outcome is predicted on basis of the one or more than one continuous predictor variables whereas in case of ANOVA continuous outcome is predicted on basis of the one or more than one categorical predictor variables. ANOVA is a statistical tool that is generally used on random categorical variables involves group not directly related to each other to find out whether there exist any common means. A large number of independent variables are categorical, therefore the current study has limited use of the regression model.

5.4 Research constraints

The primary obstacle was locating representative participants from the chosen regions. A second major constraint was the weather. It was the paddy harvesting season, and in both areas, farmers burn the paddy stubble. Smoke created by paddy stubble and the start of winter fog was converted into thick air pollution (smog). Several factors contribute to the smog such as motorised road transport, dust on roads and construction sites and burning of farm residual. This aggravates health problems such as asthma, and other respiratory issues as well as eye infections and reduced resistance to colds and lung infections. The researcher faced mainly eye infections during the data collection period due to travelling on a two-wheeler (motorbike). Another constraint was that farmers had limited time available. Finally, travelling into deep rural areas, where public transport is largely non-existent was also a significant constraint. A two-wheeler motorbike was necessary to both reach the farm and find the farmers on their land. However, these problems were overcome and the research progressed.

5.5 Chapter summary

This chapter has explained the research philosophy, design and methods used in this study. The data collection methods and analysis techniques were also discussed in relation to the research objectives. Assessing the integrity of data used in statistical analysis is essential to enhance the validity of the study's findings. As explained, data diagnostics were used to screen for data accuracy, data representativeness and to ensure that the data met the underlying assumptions of the statistics being used. Similarly, the geographical area selected was the

most representative in terms of the supply and demand of FFV in the country according to the research objectives. The next chapter discusses the survey results.

Chapter 6

Results

6.1 Introduction

The previous chapter explained the research methodology, the design of the survey instrument, the development of scales, sampling techniques, and methods of data collection. The chapter also outlined the data coding process, how missing data was identified and dealt with, and other important practices, such as checking univariate assumptions. It explained statistical data analysis methods and noted the constraints faced by the researcher in the data collection process.

The present chapter explains the results derived from the survey based on the study's frame of reference. The results section aims to report the results of the data analysis concerning the hypotheses. The chapter begins with (section 6.2) a description of the sample including marketing characteristics of the study region, a general overview of the fresh produce supply chains in the Punjab state of India. It provides an integrated map of the food supply chains, including traditional and institutional channels. Section 6.3 discusses the socio-economic characteristics of FFV growers (gender, age, family size, farm assets, and average yield). Section 6.4 discusses the results of the hypothesis testing phase and results are discussed concerning the relevant agribusiness literature. The final section of the chapter draws some conclusions and presents a summary of the results.

6.2 Sample description

6.2.1 Supply chains for FFV in the study region

Agriculture is essential for developing countries' economies. In the sample regions, agribusiness markets are primarily coordinated by traditional wholesale markets where farmers sell their marketable surplus through intermediaries (Singh, 2012b). A study conducted by Sidhu (2016) on marketing system and agriculture development in Punjab state show that the number of Government regulated traditional markets were 149 until the year 2011-2012. The Agricultural Produce Market Committee (APMC) Act regulates the agribusiness markets in the study region, and the APMC is a statutory market committee constituted by the state government in respect of trade in certain notified agricultural, horticultural and livestock products.

The price received by farmers supplying traditional markets can vary greatly between the highest and lowest price, but processors offer the prevailing market rate with a minimum guaranteed purchase price. Typically, in the traditional supply chain where farmers produce is aggregated, there is no premium price for quality produce (Punjabi, 2015). Hence, farmers are not motivated to focus on quality issues. As a result, the state government of Punjab amended the APMC Act in 2003 as follows:

- They phased out restrictions on the movement of fresh produce for selling at regulated markets.
- They allowed direct marketing, and contract farming between farmers and corporates.
- They allowed the establishment of future markets through electronic exchange links.
- They facilitated food processing and value additions (Chandrasekhara Rao & Bathla, 2016).

The APMC regulations require that the purchase of fresh produce takes place in a notified market with registered traders cum commission agents (called 'Aarthia' in the local language). There are two charges levied on the marketed products in the traditional spot market; First, the commission paid to the agent and second, the market fees paid to the market committee as a payment towards the use of the premises and other capital works related to market development (Punjabi & Sardana, 2007).

In the sample region, FFV supply chains tend to be multi-layered. This impacts on farmers' share of the final consumer price and the marketing costs as the various agents add their expenses. Traditional market sales are one-off transactions between farmers and retailers or consumers, with neither promising repeated transactions nor prior agreements on product delivery or price. The study found that at the traditional market, the commission agent is a crucial link between farmers and the market. Most farmers transport their tomato crops to the nearest market immediately after harvesting it. Plastic crates are used for packaging the tomato crop (see Figure 6.1).



Figure 6.1 Packaging of tomatoes at Amritsar wholesale market

Source: Author (taken during field survey)

Some commission agents act as wholesalers as well; in short, they buy from farmers and sell to different retailers from distant small towns. Primary producers use mobile phones to obtain information from wholesalers or commission agents about prices on a day-to-day basis. The price of produce fluctuates widely, depending on the demand and supply of a given day. Farmers who are unable to supply directly to wholesale or retail markets sell their produce to traditional market traders who act as intermediaries. Such traders collect vegetables at the farm gate without any prior agreement, often using word of mouth contracts built on trust and reciprocity due to repeated business transactions.



Figure 6.2 Packaging and transportation of potatoes at the traditional wholesale market.
Source: Author (taken during field survey)

Potatoes meant for the traditional market are typically packed in cotton bags weighing 50kg each (see Figure 6.2), while tomatoes are packed in plastic crates which weigh 20-25 kg each (see Figure 6.1). Other crops such as okra or cauliflower are packed in plastic bags. Farmers transport their own produce to the nearest markets using tractors and trollies. They may also hire small four-wheelers if they intend to travel to a market further away.

In the traditional supply chain of potatoes and tomatoes, farmers sell to traditional markets (regulated by the APMC). The following four chains were identified:

1. FFV growers → commission agent → wholesaler → retailers → consumers
2. FFV growers → commission agent → primary wholesaler → secondary wholesaler → retailers → consumers
3. FFV growers → traders/agents → wholesaler at distant markets → retailers → consumers
4. FFV growers sell seed (in the case of potatoes) → other states rather than Punjab

6.2.2 Marketing of FFV products through traditional wholesale markets

The study found that while farmers have access to multiple channels to sell their produce, they prefer to sell them at the nearest district traditional market using a commission agent, immediately after harvesting. The most frequent channel for both potato and tomato FFV

growers, are open auctions at traditional markets using commission agents. The study also found that traditional markets dominate the FFV trade in the sample region. Table 6.1 shows that out of 200 respondents, 32.0% sell 100% of their crop to traditional markets via commission agents.

Table 6.1 Proportion of tomato and potato output sold to the traditional wholesale market

Crop Type	Percentage of farmers selling at the traditional wholesale market													Total
	0%	10	20	25	30	40	50	55	60	70	80	90	100%	
Tomato	33.7	1.0	5.1	2.0	6.1	4.1	2.0	1.0	10	3.1	3.11	3.11	25.5	98
Potato	49.0	0.0	5.9	0.0	0.0	1.0	1.0	0.0	3.9	0.0	1.0	0.0	38.2	102
Total	41.5	0.5	5.5	1.0	3.0	2.5	1.5	0.5	7.0	1.5	2.0	1.5	32.0	200

Table 6.1 shows that crop-wise, 25.5% of tomato growers and 38.2% of potato growers sell 100% of their crops at traditional wholesale markets. In contrast, 33.7% of tomato growers and 49.0% of potato growers in the sample do not sell any of their produce at the traditional wholesale market.

6.2.3 Marketing of FFV product through traders at the farm gate

The second most frequent traditional channel farmers use is selling directly to traders at the farm gate. The agents (mostly from local households) make contact with farmers before harvesting and verbally fix prices according to the observed quality of the produce. Farmers only see these first buyers in the chain. They sometimes sell to them at a lower price compared to the current market price. The primary benefit in selling to these traders has reduced costs such as packaging costs, loading/unloading costs, transportation costs and waste, especially when delivering to traditional markets located far away.

Table 6.2 Proportion of tomato and potato output sold to traders at the farm gate

Crop Type	Percentage of farmers selling to traders at the farm gate												Total
	0%	10	20	25	30	35	40	50	60	80	100%		
Tomato	72.4	2.00	5.10	1.00	2.00	1.00	5.10	2.00	2.00	1.00	6.10	100.0	
Potato	75.5	0.00	0.00	0.00	2.90	0.00	2.90	1.00	1.00	1.00	15.7	100.0	
Total	74.0	1.0	2.50	0.5	2.50	0.50	4.00	1.50	1.50	1.00	11.0	100.0	

The proportion of farmers who sell their crop to traders at the farm gate varies from 10 to 100%. Out of 200 respondents, 11.0% of farmers sell 100% of their crop to traders at the farm gate, while 74.0% of farmers do not sell any of their produce at the farm gate. Table 6.2 shows that potato growers are more likely to sell their produce at the farm gate compared to tomato growers. The primary reason for this difference is the dual use of the tomato crop. Farmers selling at the traditional market may realise an acceptable price, if not they can sell their crop to food processors (Field Notes). While traders arrange transport this means they often offer farmers a lower price than they would receive at the traditional market.

6.2.4 Marketing of FFV produce through the supermarkets

The current study's findings on the presence of supermarkets in the study region were unexpected. Although there was much discussion about the potential implications of new retail chains and their effect on existing procurement practices, there were almost no supermarkets in the study area. The reason for unexpected results might be because most of the Punjabi population live in villages where local is known as fresh. According to the statistical abstract of Punjab state for the year 2016, the rural population was 62.52% and the urban population was just 37.48% (GOP, 2016).

There is an absence of international supermarket chains and only a few Indian retail brands such as Reliance Fresh, ITC Choupal Fresh, More and Spencer's. The data presented in Table 6.3 shows that out of 200 interviewed farmers, only 17 were selling to supermarkets, and they were only selling a small proportion (between 5 to 15%) of their crops. Indeed, not a single FFV growers sold their entire produce to supermarkets.

Table 6.3 Proportion of tomato and potato output sold to the supermarkets

Crop type	Percentage of farmers selling to the supermarkets						Total
	0	5	10	15	20	30	
Tomato	85.70	1.00	11.20	1.00	0.0	1.0	100.0
Potato	97.10	0.00	2.00	0.00	1.0	0.0	100.0
Total	91.50	0.50	6.50	0.50	0.5	0.5	100.0

The current study found that large retail chains buy directly from farmers and most use traditional markets for their procurement needs. The minimal quantity they buy directly from farmers occurs largely during the season. Institutional channels, mainly Reliance Fresh, have multiple stores in large cities in Punjab, such as Amritsar, Jalandhar, and Ludhiana. Reliance Fresh's variety and amount of fresh produce have significantly declined over the past few

years; instead, they focus on the sale of non-perishable grocery items. These chains only have small quantities of fresh produce. The research contacted the procurement manager of Reliance Fresh stores in Ludhiana and Amritsar. They reported that Reliance Fresh is buying a significant portion of fresh produce from traditional markets (Azadpur Mandi New Delhi) and that they have a collection centre at Sirhind city in Punjab from where they distribute this produce to different stores in Ludhiana, Jalandhar and Amritsar (Source: field survey).

6.2.5 Marketing FFV products through the food processors

Food processors were found to be a significant institutional channel in Punjab. Table 6.4 shows that out of 200 respondents, 29.50% were selling 100% of their crop to food processors, while 57% were not selling to them at all.

Table 6.4 Proportion of tomato and potato output sold to processors

Crop Type	Percentage of farmers selling to processors										
	0	10	20	35	40	50	60	70	80	100	Total
Tomato	52.00	1.00	3.10	1.00	3.10	4.10	3.10	4.10	1.00	27.60	100.0
Potato	61.80	0.00	0.00	0.00	0.00	0.00	1.00	3.90	2.00	31.40	100.0
Total	57.00	0.50	1.5	0.5	1.50	2.00	2.00	4.00	1.50	29.50	100.0

FFV growers in the study region have the option to either sell to multinational or local food processors for both crops. PepsiCo is a major multinational buyer who buys potatoes for processing in the branded potato crisp market. It processes raw potatoes into Lay's Potato Chips, Uncle Chips and other traditional snacks. It has the capacity to process 36,000 metric tonnes of potato annually (Punjabi, 2015; Singh, 2008). The company has a minimum requirement of 5 acres (2.02 Hc) for contract production, but also offers contracts to smaller farmers if they show a progressive attitude towards fulfilling the contract commitments (Singh, 2008). The company employs more than 50 technical experts and began offering contract farming from early 2000. The company also has 300 potato seed growers and offers contracted farmers seed and technical assistance. There are other local potato processors in major Punjab cities.

However, during the field survey, FFV growers identified some issues, including, low processing capacity and delayed payments. In the case of tomatoes, there are a couple of local processors. The Amritsar region farmers supply to Harraj Agro Foods, which was established

in 2011. The company buys tomatoes from farmers to process into tomato paste, tomato puree and tomato juice. Harraj Foods, Maharbanpura, near Amritsar is an Amritsar-based tomato paste manufacturer which supplies Nestle and Del Monte. Other processed food makers in the northern Indian region include Cremica (Hoshiarpur), Kapoorthala and GD foods (Tarn Taran). The field survey found that a significant tomato processing company (manufacturing tomato paste) operating in the Amritsar region, Nijjar Agro foods Lt, established in 1988, shut down, owing hundreds of farmers money (field survey notes). Table 6.5 shows major tomato processing firms operating in the study region.

Table 6.5 Major tomato processors in the study region

No	Processing unit	Location	Year established	Processing Capacity
1	GD Foods	Tarn Taran	2016	42,000 tonnes per annum
2	Cremica Group	Ludhiana/Hoshiarpur	1978	1,34,000 tonnes per annum (Owned +contractual)
3	Harraj Agro Foods	Amritsar	1988, re-established in 2011	30,000 tonnes per annum

Source: Field notes

Except for contracted potato farmers, farmers sell FFV products to a variety of buyers, depending on the price they are offered. A large proportion of farmers sell to multiple buyers including food processors, traders at the farm gate, local village, lead farmers or directly to traditional spot markets. In the case of tomatoes, food processing companies allow farmers to sell at the traditional spot market, but for potato processors, such activity would be considered a breach of contract. Figure 6.3 (below) shows the potato supply chain in the Amritsar district study region.

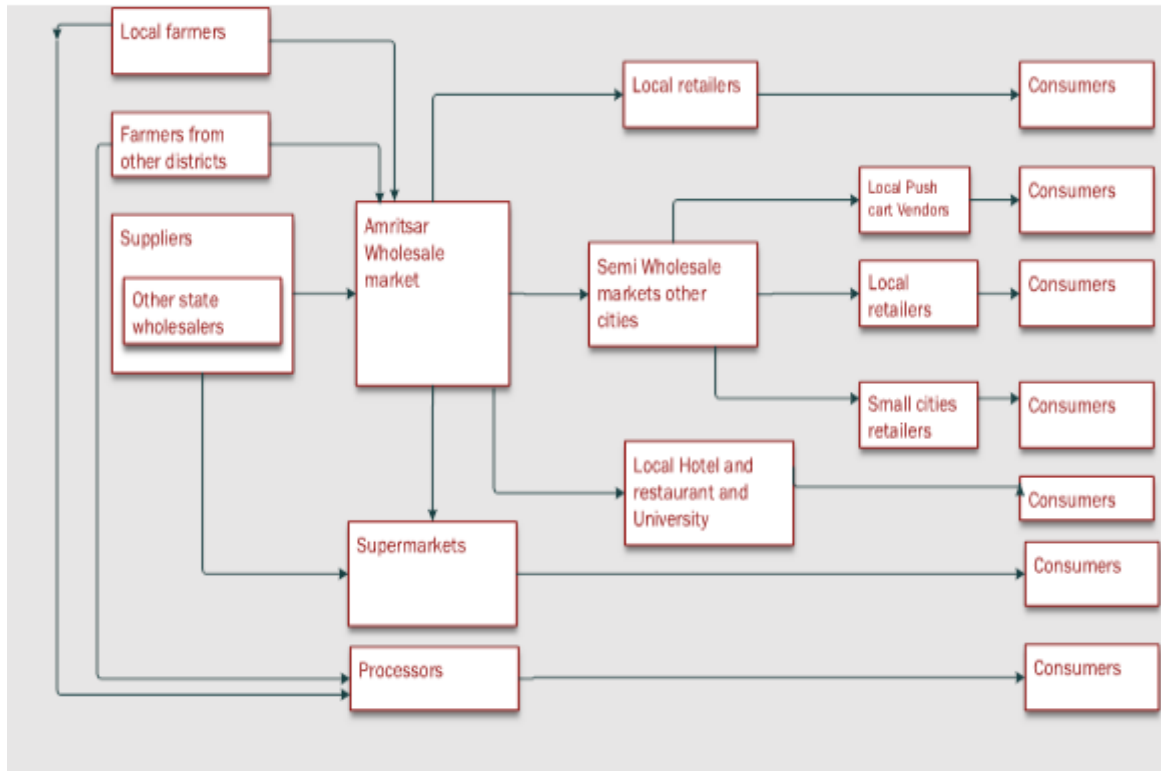


Figure 6.3 Potato supply chains for FFV in the Amritsar study region

Apni Mandi (farmers' market) is another market outlet identified by farmers. After studying the concept of the "Saturday Market" prevalent in the U.K and the U.S.A, the Apni Mandi scheme was launched by the state marketing board to abolish the involvement of middlemen (a form of disintermediation). Under this arrangement, farmers sell FFV directly to consumers at reasonable rates. The profit which was previously consumed by the middleman is now shared by the producers and the consumers (Sidhu, 2016). However, none of the farmers from the sampled regions had participated in this type of market.

6.3 Fresh produce growers' characteristics

6.3.1 Gender, age, education levels and farming experience

This section summarises the respondents' demographic characteristics. Gender is an important factor impacting on participation in institutional channels. All farmers were male, as in the study area, farming is considered a man's job. Thus, men make all production and marketing decisions. The male respondents were contacted and interacted due to the cultural and social norms of the sampled region. In the sample region, men work in the fields. Women play a supporting role, feeding the cattle and cooking for farm labourers. Interestingly, the

current study found that female FFV workers in the sample region are mainly employed to sow seeds, pick fruits and vegetables and sort them. It is believed (falsely or not) that male members of the household have stronger communication skills and business knowledge. These attributes are considered essential for commercialisation (Sebatta et al., 2014).

Age is considered an important determinant of the sale of FFV products in the institutional markets. This is because participation in the market depends on one's position in the family. Major decisions are made by an older member(s) of the household. This is necessary to ensure the welfare of the household. In the study region, the data reveals that FFV growers are indeed older, although most only have basic levels of education. The average age of respondents in this research is 52 years old. About 44.5% of farmers are between 46-55 years old, while approximately 27% of farmers are 36-45 years old. Interestingly, 9% of farmers were 26-35 years old, and only 1.5% were 16-25 years old. Figure 6.4 shows that the age group of 46-55 years are typically in the leading positions of agricultural practices.

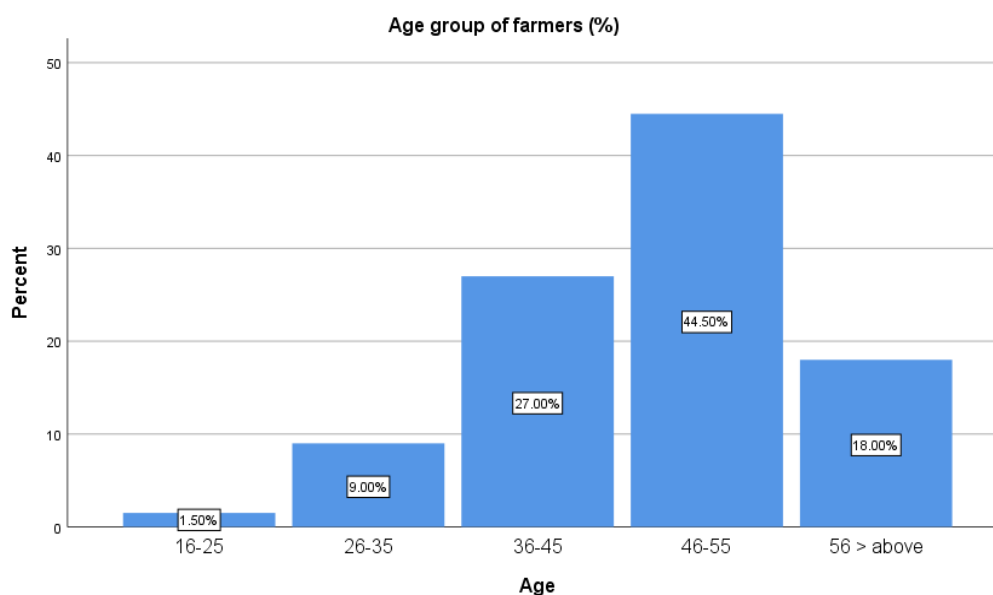


Figure 6.4 FFV growers' ages

Education level plays a vital role in smallholders' decision-making processes, particularly about the adoption of new and changing agricultural practices. Also, the knowledge of agricultural practices is considered critical in ensuring sustainable innovations in new agriculture markets (Barrett et al., 2012). The current study data shows that 45% of FFV growers in the sample region have a high school education, a necessary qualification for the numeric calculations required for farming. Figure 6.5 shows that 18.69% of respondents have completed middle

school, while 17.5% of respondents have college-level qualifications. Only 7.5% of respondents have not completed any formal education, while at the other end of the scale, only 1% of fresh produce farmers have university qualifications.

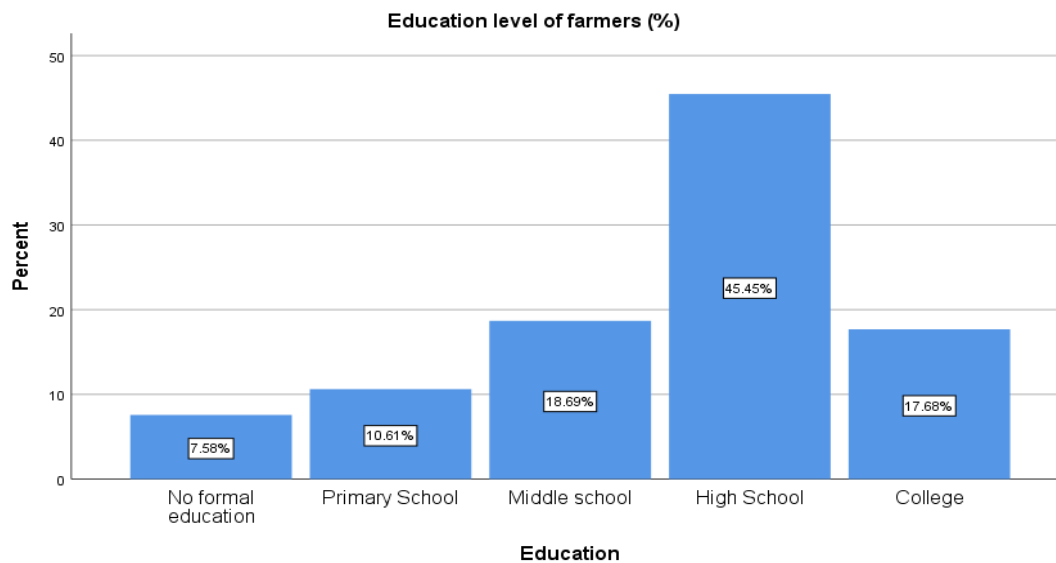


Figure 6.5 Education level of FFV growers

These findings indicate that farmers gain experience in agricultural practices over the years and that as a result of this experience, farmers can manage various production and marketing risks. Figure 6.6 shows the distribution of FFV growers' experience, measured as years of FFV production. The figure shows that while 45% of respondents have between 6 to 10 years of farming experience in fresh produce, 35% of farmers have more than ten years' experience. The data shows that only 2% of respondents are new to FFV agriculture production.



Figure 6.6 Fresh produce growers' experience in fresh produce farming (in years)

Most of the FFV growers who participated in the survey are experienced. Having several years of experience in FFV production means that farmers understand climate conditions, and the production and marketing risks associated with FFV production. Farmers who have spent more years farming are more likely to collaborate with buyers and have long-standing relationships with them. It assumes that as farmers have more extensive experience in farming in years, they become more risk-prone in their FFV production. These findings also imply that buyers rely on more experienced farmers to ensure the quality, quantity and safety of FFV products. The following section discusses family size and the number of family member involved in farming activities.

6.3.2 Family size and number of members participating in farming activities

The current study considers family as a group of people who commonly live together and take their meals from a common kitchen unless they are away working. A family is a basic unit in any society and is influenced by social, economic, political and demographic factors. Demographic factors such as birth rates, mortality rates, migration and sex composition also have an effect on the size of households in society.

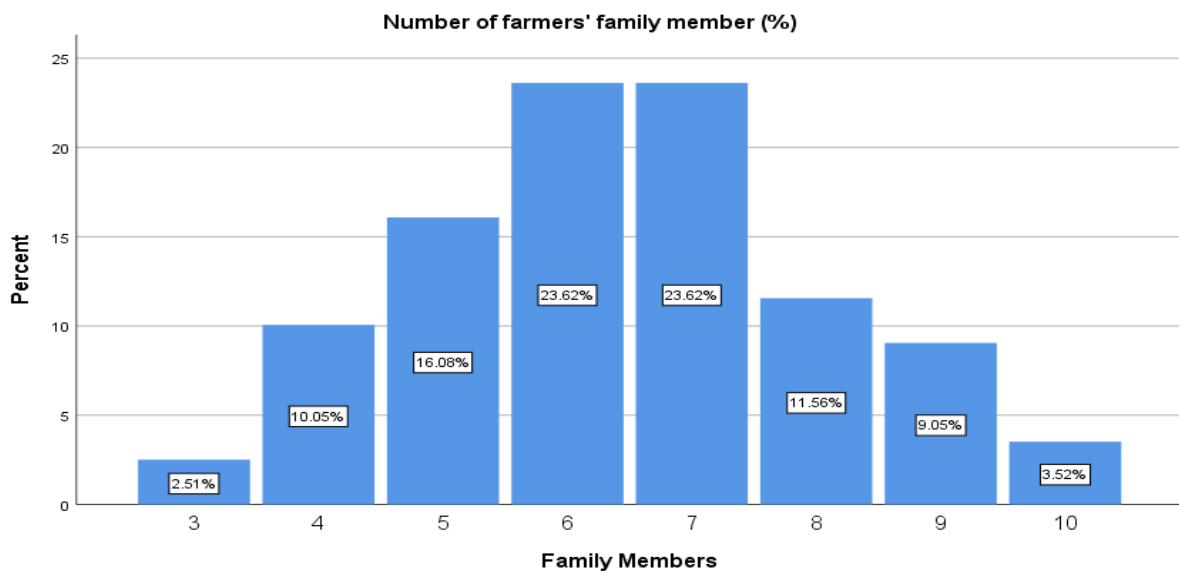


Figure 6.7 Number of family members of FFV farmers in the study region

As FFV production is a labour-intensive activity, it requires family labour, as well as hired labour. Figure 6.7 shows that in the study region the average family size is 6.47 members (for

respondents' families). Larger families (those with six or seven members) constitute 23.5% of the respondents.

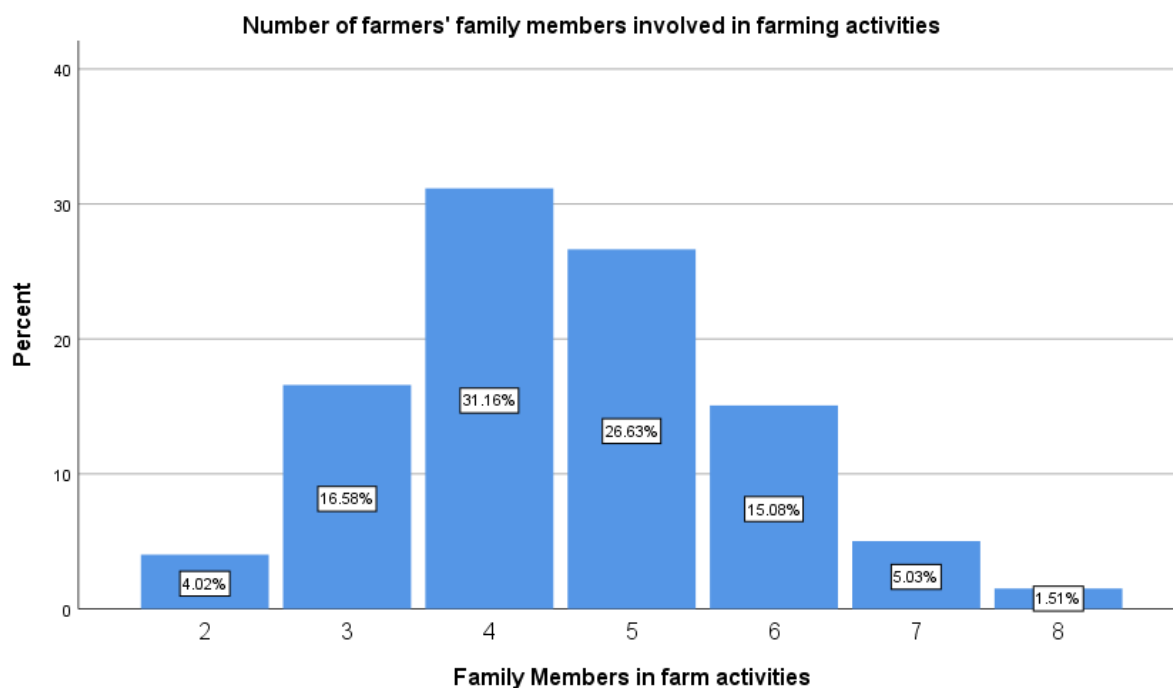


Figure 6.8 Number of family members involved in farm activities

Figure 6.8 shows that 31.16% of respondents have four family members involved in farm activities, while 26.63% have five family members involved in farm activities. Rapsomanikis (2015) states that smallholders use more family labour than capital to produce food. The report also found that in Kenya, on average two family members work full time on one-hectare of land and one family member is involved for half the time. The numbers working on one hectare of land producing FFV varies for other countries; five family members in Nepal, 2.5 family members in Bolivia. The average family consists of four people involved in fresh produce farming activities. The next section discusses the respondents' physical farm assets.

6.3.3 Farm assets, average yields and prices received

Having discussed farmers' demographics, this section explores FFV growers' farm characteristics, such as operational land, farm labour and irrigation structures. Ownership and access to assets determine household participation in various income-generating activities. Table 6.6 shows that smallholder FFV growers own an average of 5.8 acres (2.5 hectares) in the study region. The data from the current study is somewhat similar to a study conducted by (Singh, Kaur, et al., 2009) that reports that operational land in Punjab is larger (considering small, medium and large farmers together) than the national average in India (>4 Hc compared

to just about 1 Hc in India). The land is considered the most important asset in the rural areas and its distribution has a significant influence on income inequality.

Table 6.6 FFV growers owning land in the study region

<i>n</i> = 200	Unit of Measure (in Acres)
Mean	5.818
Median	6.000
Std. Deviation	2.2790
Range	9.0
Minimum	2.0
Maximum	11.0

In Punjab, agriculture on rental land (cash rent tenancy) has become increasingly popular. As such, agriculture on rental land is a universally prevailing institutional mechanism through which marginal or small farmers landowners not wanting to, or unable to cultivate their own land, rent it out to others to cultivate it for a specified period in exchange for a pre-agreed payment (Singh, 2016a).

Table 6.7 FFV growers renting land in the study region

<i>n</i> = 200	Unit of Measure (In Acres)
Mean	2.318
Median	2.000
Std. Deviation	2.1421
Range	15.0
Minimum	0.0
Maximum	15.0

Table 6.7 shows that FFV growers in the study region rent an average of 2.3-acres, along with owned land under agriculture operation. Rental land ranges from a minimum of 0 to 15 acres in the study region.

Table 6.8 FFV growers total operational land (owned+ rental)

<i>n</i> = 200	Unit of Measure (In Acres)
Mean	8.135
Median	8.000
Std. Deviation	3.2761
Range	23.0
Minimum	2.0
Maximum	25.0

Table 6.8 shows the total amount of operational land that FFV growers own and rent (cash rent tenancy). FFV growers in the study region have an average of 8.135-acres (3.4 Hc) of operational land.

Along with the size of operational land, farm machinery (or a means of transportation) is a critical resource for FFV production. Due to the perishable nature of FFV products, farmers require some means of transport to avoid food losses and ensure timely delivery of the product. Generally, the means of transport are either owned, rented or shared by farmers. Table 6.9 shows that out of 200 farmers, 86.5% own tractors, while 13.5% hire tractors for FFV production. The high rate of farm machinery ownership shows that farmers in the sampled regions are resourceful.

Table 6.9 Farm machinery owned by FFV respondents

Ownership of farm machinery (tractor)	Frequency	Percentage
Yes	173	86.5
No	27	13.5
Total	200	100.0

In the sample region, 100% of farmers have access to irrigation. Interestingly, 98% of farmers use groundwater to irrigate FFV, while only 1.5% of farmers use government-managed canals. According to the statistical abstract of Punjab government for the year 2016-2017, the net area irrigated by government canals was 1,201 thousand hectares. In contrast, wells/tubewell cover 2,936 thousand hectares (GOP, 2016).

Access to irrigation is considered a significant productive asset which is necessary for increasing yield. An FAO report on smallholder farming in nine countries finds that irrigation is a significant determinant of higher land productivity. It contributes to lower crop failures (Rapsomanikis, 2015). Moreover, assured irrigation enables farmers to adopt diversified cropping patterns.

In the study region, submersible tube wells are the primary source of irrigation. The dependence on tube wells for irrigation shows that farmers in the study region have low production risks (crop loss) due to drought or lower levels of rain. It also suggests that at some time, the farmers invested money in a bore well or submersible water pump to access groundwater. Table 6.10 shows that 98% of farmers have access to tube wells, while a minority, 1.5% FFV growers, use canals for irrigation.

Table 6.10 Method of irrigation in the study region

Method of irrigation	Frequency	Per cent
Tube Well	196	98.0
Canal	3.0	1.5
Micro-irrigation	1.0	0.5
Total	200	100.0

Cold storage provides smallholders with a support mechanism to enable efficient marketing. Cold storage facilities are crucial to minimising post-harvest losses; however, losses occur at every step in the post-harvest cycle (Fonseca & Njie, 2014). Fresh food products are characterised by their perishability, and levels of vulnerability to pests and spoilage; however, in general, the control of temperature and relative humidity and the prevention of damage can increase shelflife, especially of fresh vegetables and fruits (Pingali, Aiyar, Abraham, & Rahman, 2019) Cold storage increases farmers’ bargaining power as well as reducing food loss. FFV products need a specific temperature to maintain aesthetics, quality and shelf-life.

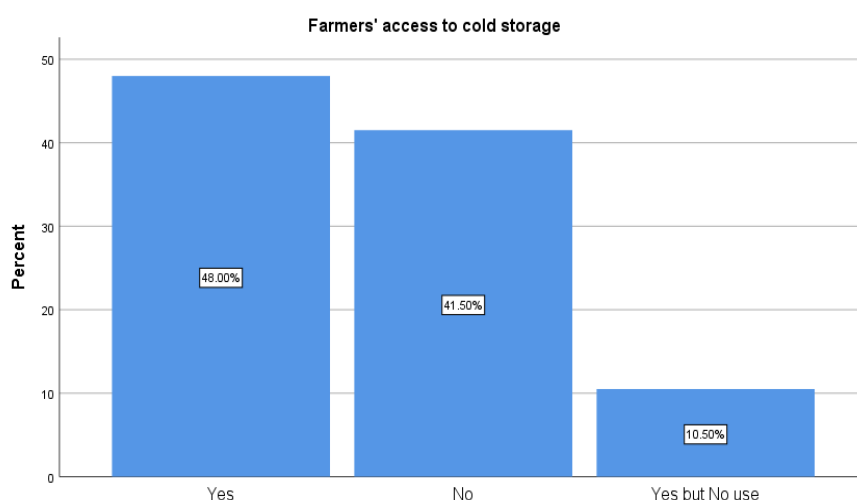


Figure 6.9 Percentage of FFV growers with access to cold storage

Figure 6.9 shows that 48% of respondents have access to cold storage, 41.50% have no access, and 10.50% have access to cold storage but do not use it. Tomato growers prefer to transport their vegetables immediately after picking them, either to a traditional market or food processors thus bypassing the cold chain.

Most potato growers have access to and use cold storage. At the time of harvesting, due to an oversupply of potatoes, the price drops considerably at traditional spot markets. Potato growers prefer to store their produce in cold stores and wait for a rise in demand and price in

the off-season. However, if prices stay constant and new crops come to the market, farmers struggle to pay for storage charges and suffer losses (Field survey notes).

The next section explains the empirical testing of the research hypotheses. The results are used to determine whether individual hypotheses are supported or rejected.

6.4 Assessment of research hypotheses

The research framework suggests that FFV farmers' participation in marketing channels depends on various exogenous and endogenous factors. This section presents the empirical findings on human, physical farm assets, marketing, institutional and infrastructure variables. The first part of the results section covers the impact of human capital assets on FFV growers participation in institutional channels. The first hypothesis considers farmers' age and other influential variables to determine their participation in institutional channels.

H₁: Smallholder FFV growers who are older will be less likely to participate in an institutional channel than those who are younger

ANOVA was used to analyse the differences among group means in the sample. Table 6.11 shows descriptive statistics for the different age groups of FFV growers. The mean score of the 16-25-year-old age group is $\bar{x} = .200$, the 26-35-year-old age group is $\bar{x} = .844$, the 36-45 old age group is $\bar{x} = .2278$, the 46-55-year-old age group is $\bar{x} = .2236$ and the above 56 years old age group is $\bar{x} = .3944$. The mean scores of the age groups are similar, except for the age group of 26-35 years old, which is $\bar{x} = .8444$.

Table 6.11 Group statistics for farmers' age groups

Group statistics			
Age group	N	Mean value of access to institutional channels	Std. Dev
16-25	3	.2000	1.90788
26-35	18	.8444	1.36219
36-45	54	.2278	1.68393
46-55	89	.2236	1.76769
56 > above	36	.3944	1.71763
Total	200	.3110	1.69808

Table 6.12 shows a small $F = .555$, meaning that there are no significant variations across the age groups in terms of participation in institutional channels. ANOVA results indicate that the effect of age on FFV growers' participation in institutional channels was not statistically significant $F(4, 195) = .555, p = .695$.

Table 6.12 ANOVA results for farmers' ages

Market access to institutional channels	ANOVA				
	Sum of Squares	Df	Mean square	F	Sig.
Between groups	6.464	4	1.616	.555	.695
Within groups	567.347	195	2.909		
Total	573.811	199			

The output in Table 6.12 shows that the ANOVA results were not significant. Thus, the first hypothesis (H_1) was not supported. The reason for this contradiction may be that as farmers age, they are more reluctant to change their choice of market channel. In short, if a farmer has been selling to the traditional market channel for an extended period of time, s/he may be reluctant to make the necessary farm investments to sell their produce to institutional channels.

Agriculture, especially FFV production, require special attention, skills and knowledge. It is assumed that as farmers age and gain experience, they may become more productive as a result of their improved skills. There is a common belief that farmers' productivity increases with age reaching a peak in middle-age and then declining thereafter (Tauer, 1995). However, this is not the case in the current study. The current study did not find a significant variation across the age groups in terms of participation in institutional channels. Similar findings have been presented by Blandon et al. (2009), who finds no relevance of age with market selection decisions of smallholders' in Honduras, while price and transaction cost were found significant. Hernández et al. (2007) also report a negative relationship between age and participation in supermarket channels in Guatemala, where older farmers are reluctant to invest in new farm equipment so that they can sell their produce to supermarkets. Similarly, Simmons et al. (2005) find that the farmer's age has no relationship with seed corn contracts in Indonesia. Finally, Bathla (2015) reports that farmers' age has a negative but non-significant impact on grower participation in supermarket channels in Haryana (India).

The second hypothesis tests the effect of farmers' education levels on their participation in institutional channels.

H₂: Smallholder FFV growers with higher levels of education will be more likely to participate in institutional channels than those with lower levels of education.

Hypothesis H₂ was tested using ANOVA to compare participation in institutional channels across education levels. Table 6.13 shows descriptive statistics for FFV's different levels of education levels. The mean score of college-level education is $\bar{x} = .6943$, which is slightly different from the group with no formal education $\bar{x} = .3733$, primary school $\bar{x} = .3714$, middle school $\bar{x} = 1.1257$ and high school $\bar{x} = .3394$.

Table 6.13 Descriptive statistics for different group levels of education

Level of education	N	Group statistics	
		Mean value of access to institutional channels	Std. Dev
No formal education	15	.3733	1.6451
Primary School	21	.3714	1.5972
Middle school	37	1.1257	1.3626
High School	90	.3394	1.6701
College	35	.6943	1.7558
Total	198	.3096	1.6994

ANOVA was used to analyse the differences among group means in the sample. The ANOVA results presented in Table 6.14 shows that the effect of education level on FFV growers' participation in institutional channels was statistically significant, $F(4,193) = 5.702, p = .000$

Table 6.14 ANOVA results for education impact

Market access to institutional channels	ANOVA				
	Sum of Squares	Df	Mean Square	F	Sig.
Between groups	60.135	4	15.034	5.702	.000
Within groups	508.832	193	2.636		
Total	568.967	197			

Multiple comparisons of group mean in Table 6.15 shows how they differ from each other. The table shows a statistically significant difference in the education levels of college and middle school ($p < 0.00$), and between college and high school ($p = 0.14$).

Table 6.15 The Tukey post hoc test, multiple comparisons of different levels of education

Multiple comparisons						
Dependent Variable: Market access to institutional channels						
(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
No formal education	Primary school	-.00190	.54891	1.000	-1.513	1.5097
	Middle school	.75234	.49701	.555	-.6163	2.1210
	High school	-.03389	.45283	1.000	-1.280	1.2131
	College	-1.06762	.50109	.211	-2.447	.3122
Primary school	No formal education	.00190	.54891	1.000	-1.5097	1.5135
	Middle school	.75425	.44362	.436	-.4674	1.9759
	High school	-.03198	.39349	1.000	-1.1156	1.0516
	College	-1.06571	.44819	.126	-2.2999	.1685
Middle school	No formal education	-.75234	.49701	.555	-2.1210	.6163
	Primary school	-.75425	.44362	.436	-1.9759	.4674
	High school	-.78623	.31709	.100	-1.6594	.0870
	College	-1.81996*	.38286	.000	-2.8743	-.7657
High school	No formal education	.03389	.45283	1.000	-1.2131	1.2809
	Primary school	.03198	.39349	1.000	-1.0516	1.1156
	Middle school	.78623	.31709	.100	-.0870	1.6594
	College	-1.03373*	.32345	.014	-1.9244	-.1430
College	No formal education	1.06762	.50109	.211	-.3122	2.4475
	Primary school	1.06571	.44819	.126	-.1685	2.2999
	Middle school	1.81996*	.38286	.000	.7657	2.8743
	High school	1.03373*	.32345	.014	.1430	1.9244

* The mean difference is significant at the $p = 0.05$ level.

These results indicate that a farmer's level of education is important in terms of generating human capital. Farmers who are highly educated are more likely to accept/be open to new ideas as opposed to those with lower levels of education. It also enables smallholders to use adequate quantities of seed, pesticides and harvesting practices. Well-educated farmers bring value via increased human capital (Rapsomanikis, 2015). The FAO published an analysis based on household data from nine countries and confirms that a higher level of education significantly increases farm productivity (Poole, 2017).

The next hypothesis tests smallholder farmers' experience of farming (in years) on participation in institutional channels

H₃: Smallholder FFV growers with more extensive farming experience are more likely to participate in institutional channels than those with less farming experience.

Table 6.16 shows the descriptive statistics for the different levels of experience in FFV farming. The 3-5 years of experience group has the highest mean value, followed by the up to 2 years group at $\bar{x} = .5$. The group with 6-10 years has a mean of $\bar{x} = -.5326$. Above ten years has a mean of $\bar{x} = -0.179$. ANOVA was applied to analyse the differences among group means.

Table 6.16 Descriptions of different groups' experience in FFV farming (in years)

Group statistics			
Experience in years	N	Mean value of access to institutional channels	Std. Deviation
Up to 2years	4	-0.5	1.73205
3-5 years	37	0.0203	1.66631
6-10 Years	89	-0.5326	1.69127
10 >	69	-0.179	1.72598
Total	199	-0.3065	1.70118

Further, Table 6.17 shows the between-group results of the ANOVA, highlighting that the effect of experience in farming in years on FFV growers' participation in institutional channels was not statistically significant, $F(3, 195) = 1.128, p = .339$.

Table 6.17 ANOVA results for different groups' experience in FFV farming

ANOVA					
Market access to institutional channels					
	Sum of Squares	df	Mean Square	F	Sig.
Between groups	9.772	3	3.257	1.128	.339
Within groups	563.245	195	2.888		
Total	573.017	198			

Based on the above results, hypothesis H₃ is not supported. Unexpectedly, the current study reports that experience in farming, the age of FFV growers and family labour do not influence smallholders' participation in institutional channels. This could be due to several factors. For example, farm experience includes the process of gaining knowledge or skill, yet as farmers age, s/he may be more reluctant to change their choice of market channel. Therefore, if the

farmer sells to the traditional market channel for an extended period of time, they may be reluctant to invest in new technology so that they can sell to institutional channels. Institutional channels offer more certainty on prices, but farmers must meet planting and grading requirements. While experienced farmers might be able to meet these requirements and thus participate in institutional channels, the findings show that this is not the case. The next hypothesis tests the effect of family labour on smallholders' participation in institutional channels.

H₄: Smallholder fresh produce growers with a higher percentage of family members involved in farming activities will be more likely to participate in institutional channels than those with a lower percentage.

A linear regression method was used to examine the effect of the independent variable (family members as family labour), on the dependent variable (participation in institutional channels).

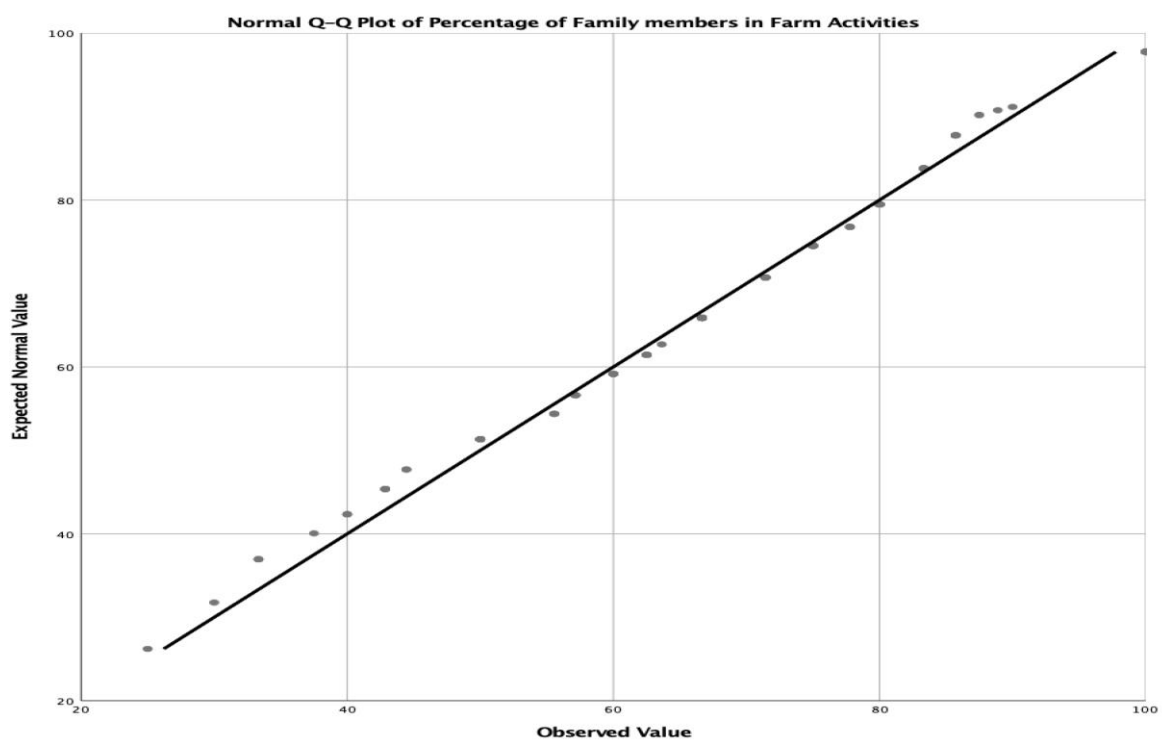


Figure 6.10 Q-Q plot to assess the normality of family members in the farm activities variable

To assess the normality assumption of linear regression, an observed value in the distribution is paired with its expected value from the normal distribution to form the *normal Q-Q plots*. Figure 6.10 shows the *normal Q-Q plots* as the number of cases in the sample fall more or less on a straight line, thus meeting the assumptions of normality.

Simple linear regression was applied to investigate the relationship between smallholders' access to institutional channels and family members in farming activities, the results being presented in the following table.

Table 6.18 Relationship between smallholders' access to institutional channels and family members in farming activities

Model		Coefficients			T	Sig.
		Unstandardized coefficients		Standardised coefficients.		
		B	Std. Error	Beta		
1	(Constant)	-.347	.491		-.707	.480
	Family Members	.007	.074	.007	.094	.926

a. Dependent variable: Market access to institutional channels

The results of linear regression in Table 6.18 were not significant, so Hypothesis H₄ is not supported. A higher percentage of FFV growers' family members engaged in farming activities means the number of family members help in farming activities. While an FAO report suggests that smallholders use more labour than capital in the production of FFV (Rapsomanikis, 2015), the findings of the current study reject this. For example, Bathla (2015) report that family member involvement in farm activities has a positive and significant influence on participation in supermarket chains in Haryana (India).

The findings of this research are also contrary to Makhura (2001b) who suggests that households who participate in the institutional markets have a higher percentage of family members involved in farming. The foremost reason for this unexpected result may be the mechanisation of FFV agricultural practices in the study region. Table 6.6 shows that out of 200 farmers, 86.5% own tractors, while 13.5% hired tractors for FFV production. The current study finds that in the study region, smallholders rely on family labour only for a few tasks, usually those which require human capital. These tasks include timely irrigation, arranging seasonal labour for picking and harvesting the crop and daily supervision.

Another reason for the unexpected results might be the perishable nature of FFV products. This means that institutions cannot wait for long because the quality may deteriorate if crops are not picked quickly, or there are delays in loading and dispatching produce (Kader, 2004). Another reason might be the smaller number of family members involved in farming activities in the study region. The average family consists of four persons involved in FFV activities. The

study finds that older family members participate more in farming than younger family members. Younger family members are generally not interested in farming and seek work in urban locations or study overseas. The declining profits of FFV is another reason why the younger generation may not be interested in participating in agriculture (field survey notes).

The next hypothesis tests the effect of smallholder farmers who use a higher percentage of operational land for FFV on their participation in institutional channels.

H₅: Smallholder FFV growers using a higher percentage of operational land for fresh produce are more likely to participate in institutional channels than those with smaller areas of operational land for fresh produce

Table 6.19 shows descriptive statistics for the percentage of operational land used by FFV growers. The mean score of the group which uses up to 25% of the land is $\bar{x} = -1.4$. The mean score for the group which uses between 25-50% is $\bar{x} = -.36$. The group which uses between 50-75% of the land's mean score is $\bar{x} = .045$. ANOVA was used to analyse the differences among group means.

Table 6.19 Descriptive statistics of percentage use of operational land by FFV growers

Group statistics			
Group	Number of respondents	Mean value of access to institutional channels	Std. Deviation
Up to 25%	16	-1.3031	.88778
25-50%	123	-.3585	1.69807
50-75%	61	.0451	1.76280
Total	200	-.3110	1.69808

In Table 6.20, the ANOVA results show that the effect of percentage use of operational land on FFV growers' participation in institutional channels was statistically significant, $F(2, 197) = 4.255, p = .016$

Table 6.20 ANOVA results for different groups' use of operational land (in percentages)

ANOVA					
Market participation in institutional channels					
	Sum of Squares	Df	Mean Square	F	Sig.
Between groups	23.761	2	11.881	4.255	.016
Within groups	550.049	197	2.792		
Total	573.811	199			

As the ANOVA results show, there are also statistically significant differences across the groups. The Tukey HSD multiple comparisons test shows that the extreme groups differ significantly from each other. Although the Tukey post hoc test is generally the preferred post-hoc test for ANOVA, many other tests can be used (Leech et al., 2013). Table 6.21 shows a statistically significant difference between the up to 25% group and the between 50-75% group. Neither of these groups differs significantly from the middle 25-50% group. These results suggest that the farms with a higher percentage use of operational land are more likely to participate in institutional channels.

Table 6.21 Tukey HSD multiple comparisons for different groups' use of operational land (in percentages)

Multiple comparisons						
Dependent variable: Market access to institutional channels						
(I) % use for Crop	(J) % use for Crop	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence interval	
					Lower bound	Upper bound
Up to 25%	25-50%	-.94459	.44408	.087	-1.9933	.1041
	50-75%	-1.34821*	.46934	.013	-2.4566	-.2398
25-50%	Up to 25%	.94459	.44408	.087	-.1041	1.9933
	50-75%	-.40362	.26167	.273	-1.0216	.2143
50-75%	Up to 25%	1.34821*	.46934	.013	.2398	2.4566
	25-50%	.40362	.26167	.273	-.2143	1.0216

*. The mean difference is significant at the 0.05 level.

Further, the means plot of percentage use of operational land in FFV production presented in Figure 6.11 shows similar findings. The size of operational land under agriculture is considered an essential variable in the farmer's ability to gain scale economies needed to sell to institutional channels.

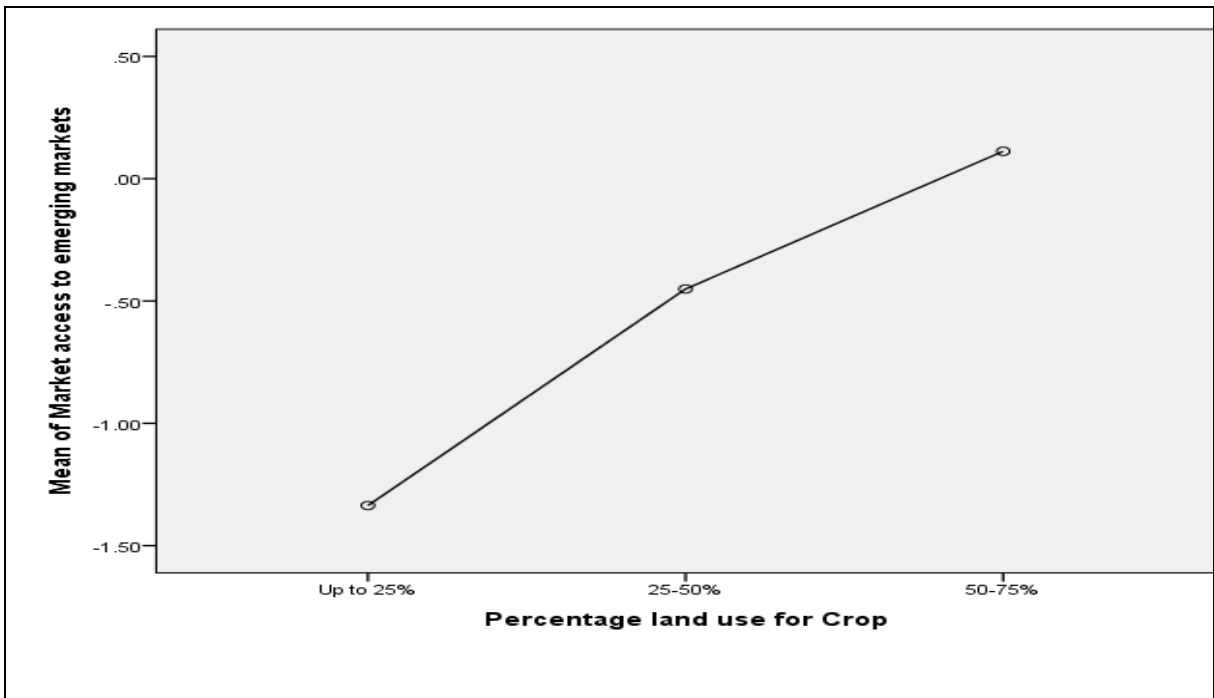


Figure 6.11 Means plot of percentage use of operational land in FFV production

The next hypothesis tests the effect of smallholder FFV growers' ownership of farm machinery on their participation in institutional channels. To reiterate;

H₆: Smallholder FFV growers who have access to farm machinery will be more likely to participate in institutional channels than those with no access.

Table 6.22 (below) shows statistics for FFV growers who own farm machinery ($n = 173$, $\bar{x} = -.2529$) and those who do not ($n = 27$, $\bar{x} = -.6833$). The independent sample t-test method was used to determine if there is a significant difference between the means of the two groups.

Table 6.22 Group statistics for FFV growers' ownership of farm machinery

Group statistics				
	Own farm machinery	N	Mean value of access to institutional channels	Std. Deviation
Market access to institutional channels	Yes	173	-.2529	1.74506
	No	27	-.6833	1.32585

Table 6.23 (below) shows the result of the Independent Sample t-test, which indicates that there is not a statistically significant difference in the mean scores for those who own farm machinery ($\bar{x} = -.25$), and those who do not ($\bar{x} = -.68$). The Independent Sample t-test reflects the conditions; $t(198) = 1.227$, $p = .221$. These results suggest that ownership of farm machinery does not influence FFV growers' participation in institutional channels.

Table 6.23 Independent Samples T-Test of FFV growers' ownership of farm machinery effect on market participation

		T-test for Equality of Means						
		T	Df	Sig. (2-tailed)	Mean Diff	Std. Error Different	95% Confidence Interval of the Diff	
						Lower	Upper	
Market access to institutional channels	Equal variance assumed	1.227	198	.221	.4304	.35093	-.2615	1.122

The independent sample t-test shows no significant P value at .05 confidence level. The results suggest that participation in institutional markets does not differ whether a farmer owns machinery or not. For the farm-to-fork journey, it is essential to transport fresh produce to the market. Thus, due to the perishable nature of FFV, having some form of transport is critical. Generally, in the study region transport is owned, rented or shared by farmers. This variable is defined as a binary variable and captures whether the farm household is equipped with transportation means. The current study hypothesises that owning farm machinery will have a positive effect on participation in institutional channels since it allows farmers to deliver their FFV to the supermarket distribution centres. Ownership means that they do not have to rely on alternative forms of transportation.

Contrary to the current study's results, the agribusiness literature suggests that in less developed countries, ownership of transport provide smallholders with a decisive economic advantage (Alene et al., 2008). Similarly, Osebeyo and Aye (2014) report that ownership of personal transport in Nigeria has a positive influence on smallholders' participation in institutional channels. Similarly, Ali et al. (2017) also report that access to transportation has a positive effect on cotton sales in Pakistan; those with access to transport are more likely to sell their cotton in a modern market than to traders at the farm gate.

The next hypothesis tests the effect of variable production costs on smallholders' participation in institutional channels.

H₇: Smallholder FFV growers with highly variable production costs are more likely to participate in institutional channels than those with lower variable production costs.

Simple linear regression was used to investigate the relationship between smallholders' access to institutional channels and variable production costs.

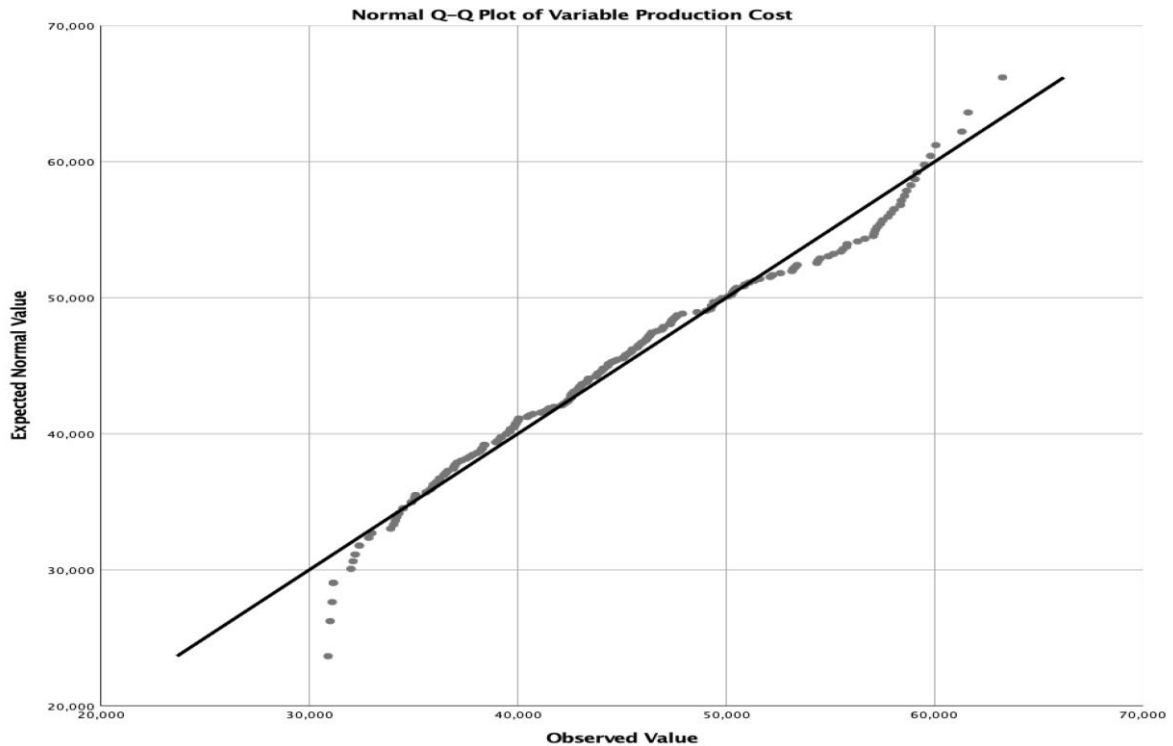


Figure 6.12 Q-Q plot to assess the normality assumption of variable production cost

To assess the normality assumption of linear regression, Figure 6.12 shows the *normal Q-Q plots* of the observed variable. The assumption of normality is satisfied as to the number of cases in the sample fall more or less on a straight line.

Table 6.24 Relationship between smallholders' access to institutional channels and variable production costs

Model	Coefficients				t	Sig.
	Unstandardized coefficients		Standardised coefficients	Error		
	B	Std. Error	Beta			
1	(Constant)	-1.063	.705		-1.507	.133
	Variable Production Cost	1.674E-5	.000	.077	1.082	.281

a. Dependent Variable: Market access to institutional channels

Regression analysis results in Table 6.24 show a non-significant correlation coefficient ($\beta = .007$, $p = .281$). The linear regression result was not significant, so it can be concluded that hypothesis H_7 was not supported. FFV growers selling to institutional channels face higher

transaction costs than farmers who sell into the spot market (i.e. they have less variability). Conversely, institutional channels incur greater transaction costs when they deal with a large number of smallholders due to higher levels of variability and these costs are reflected in the prices paid for FFV. Institutional channels rely on large farmers, collective groups and institutional arrangements to minimise their overall transaction costs (Pingali et al., 2005; Singh, Kaur, et al., 2009). The next hypothesis tests the effect of off-farm income on smallholders' participation in institutional channels.

H₈: Smallholder FFV growers who have off-farm income will be more likely to participate in institutional channels than those without off-farm income.

Table 6.25 shows group statistics for FFV growers who have an off-farm source of income. While the no group ($n = 142$) has a mean value of $\bar{x} = -.48$ (SD= 1.6), the yes group ($n = 58$) has a mean value of $\bar{x} = .097$ (SD=1.8).

Table 6.25 Group statistics for FFV growers' off-farm income

	Group Statistics			
	Off-farm income	N	Mean value of access to institutional channels	Std. Deviation
Market access to institutional channels	No	142	-.4778	1.61849
	Yes	58	.0974	1.82974

Table 6.26 reports the result of the Independent Sample T-test which suggests that there is a statistically significant difference in the scores for FFV growers with no income other than farming ($\bar{x} = -.4778$, SD 1.62) and those who work off-farm (the yes response) ($\bar{x} = -.09$, SD 1.83) conditions; $t(198) = -2.19$, $p = .029$. These results suggest that income other than farm income has a statistically significant effect on FFV growers' participation in institutional channels. Specifically, the results indicate that when FFV growers have off-farm income their participation in institutional channels increases.

Table 6.26 Independent Sample Test results for FFV grower farmers' off-farm income and its effect on participation in institutional channels

		Independent Samples Test						
		T-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Diff	Std. Error Diff	95% Confidence Interval of the Difference	
							Lower	Upper
Market access to institutional channels	Equal variance assumed	-2.1	198	.029	-.575	.2621	-1.09	-.058

Off-farm income includes income from other crops, income from dairy farming, government employment and remittances from family members living abroad. The above results indicate that off-farm income is significant in farmers' participation in institutional channels. If farmers have another source of income, they can use better quality seeds, apply fertiliser and pay for labour (labourers demand advanced payment in the busy season). If they rely solely on farm credit, which is time-consuming to organise, this can delay their ability to sell their produce at their preferred market, especially into institutional channels.

The next hypothesis tests the effect of access to market information (H_9) and the effect of checking the price more frequently (H_9) on smallholders' participation in institutional channels.

H₉: Smallholder FFV growers with (a) access to and (b) usage of market information will be more likely to participate in institutional channels than those without these.

And.

H₁₀: Smallholder FFV growers who monitor prices with (a) higher frequency and (b) using multiple sources will be more likely to participate in institutional channels than those who do not.

Table 6.27 shows the result for FFV growers who have access to price information (H_9) before the sale (the yes response), and those do not (the no response). While the mean value of the 'yes' response was $\bar{x} = -.2935$, the mean value of the 'no' response was $\bar{x} = .3711$.

Table 6.27 Group statistics for FFV growers' price information before the sale

Group statistics				
	Price information before the sale	N	Mean	Std. Deviation
Market access to	No	45	-.3711	1.56737
institutional channels	Yes	155	-.2935	1.73862

The independent sample t-test determines whether there is a statistically significant difference between the means in two unrelated groups. Table 6.28 shows the results of the Independent Sample t-test. This test assumes the variances of the two groups measured are equal in the population.

Table 6.28 Independent Samples T-Test for FFV growers' price information effect on participation in institutional channels

		T-test for Equality of Means						
		T	df	Sig. (2-tailed)	Mean Diff	Std. Error Diff	95% Confidence Interval of the Difference	
							Lower	Upper
Market access to institutional channels	Equal variance assumed	-.27	198	.788	-.07756	.28821	-.646	.4908

The result suggests no statistically significant difference in the scores for FFV growers who have no access to price information ($\bar{x} = -.295$, $SD = 1.7$) and the yes response ($\bar{x} = -.37$, $SD = 1.6$) conditions; $t(198) = -.27$, $p = .778$. There is no significant difference between farmers who have access to market information before the sale and those who do not. In short, having access/not having access to information does not affect participation in institutional channels. Hence, the results do not support the research hypothesis H_9 .

Table 6.29 FFV growers' frequency of obtaining price information

Group Statistics			
Frequency of obtaining price information	N	Mean value of access to institutional channels	Std. Deviation
Once a day	30	-1.04	1.17256
Twice a day	101	-1.0129	1.36334
Once a week	32	1.4375	1.22784
Twice a week	30	0.8833	1.62355
Total	193	-0.3161	1.70054

Table 6.29 reports descriptive statistics for FFV growers' frequency of obtaining price information. The mean scores are: once a day $\bar{x} = -1.04$, twice a day $\bar{x} = -1.01$, once a week $\bar{x} = 1.4$, twice a week $\bar{x} = .88$. An ANOVA test was used to analyse the differences among the group means.

Table 6.30 ANOVA results for different groups' frequency of obtaining price information

ANOVA					
Market access to institutional channels					
	Sum of Squares	df	Mean Square	F	Sig.
Between groups	206.318	3	68.773	37.253	.000
Within groups	348.917	189	1.846		
Total	555.235	192			

Table 6.30 shows a statistical significance between the groups. The results $F(3, 189) = 37.253$, $p = .000$ indicate that there is a strong and significant difference in the participation levels in institution channels across the frequency of market information groups.

The Tukey HSD method was used to determine differences between the groups (see Table 6.31). Participation in institutional channels is higher for those who source information once a week. This result indicates that farmers do not need to constantly search for information.

Table 6.31 Tukey HSD multiple comparisons for different groups' frequency of price information

Multiple comparisons							
Dependent variable: Market access to institutional channels							
	(I) Frequency of price information	(J) Frequency of price information	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower bound	Upper bound
Tukey HSD	Once a day	Twice in a day	-.0271	.282	1.000	-.759	.705
		Once in week	-2.47	.345	.000	-3.375	-1.52
		Twice in week	-1.923	.350	.000	-2.827	-1.01
	Twice a day: Morning /afternoon	Once in a day	.0271	.282	1.00	-.702	.759
		Once in week	-2.45	.275	.000	-3.16	-1.73
		Twice in week	-1.896	.282	.000	-2.65	-1.16
	Once a week	Once in a day	2.477	.345	.000	1.58	3.37
		Twice in a day	2.450	.275	.000	1.73	3.16
		Twice in a week	.554	.345	.378	-.340	1.44
	Twice a week	Once in a day	1.923	.350	.000	1.01	2.83
Twice in a day		1.896	.282	.000	1.19	2.62	
Once in a week		-.554	.345	.378	-1.44	.340	

*. The mean difference is significant at the 0.05 level.

The results confirm the statistical significance of H10. While the hypothesis results are significant, they contradict the original assumption. Interestingly, the results suggest that groups who spend less time searching for information about prices have higher levels of participation in institutional channels. Table 6.32 shows the group statistics for the frequency of price information and relationship with the buyer.

Table 6.32 Frequency of price information and relationship with the buyer

		Group statistics			
		Spot transaction	Word of mouth contact	Written contract	Total
Frequency of price information	Once a day	9	17	4	30
	Twice a day	54	35	12	101
	Once a week	5	13	14	32
	Twice a week	5	12	13	30
Total		73	77	43	193

The reason for these results might be that farmers from the sample region mostly sell their produce in traditional markets. The price volatility in the spot market may also be a reason for this non-significant result. The philosophy of, 'produce first and then look for the market' might explain the contradictory results in the study region. Table 6.32 shows that FFV growers who sell at the spot markets check the prices twice a day, while contracted farmers check once or twice a week. This seems logical as contracts are usually negotiated at a fixed price.

The next hypothesis addresses the effect of supply chain visibility on smallholders' participation in institutional channels.

H₁₁: Smallholder FFV growers who have greater visibility of their supply chain will be more likely to participate in institutional channels than those who cannot.

The results in Table 6.33 shows that fresh produce growers have visibility up to the immediate buyer and up to the second buyer in the chain. Inspection of the two groups' means indicates that the first response is $\bar{x} = -.16$ and the second group's response is $\bar{x} = -.75$.

Table 6.33 Group statistics for buyer visibility

Group statistics				
	Buyer visibility	N	Mean value of access to institutional channels	Std. Deviation
Market access to institutional channels	The immediate buyer in the chain	124	-.2823	1.76976
	Up to two buyers in the chain	76	-.3579	1.58451

Table 6.34 shows the result of the Independent Sample t-test. These results suggest that there is no statistically significant difference in the scores of FFV growers who can see the immediate buyer ($\bar{x} = -.283$, SD 1.7), and those who can see two buyers ($\bar{x} = -.358$, SD 1.5) conditions, $t(198) = .305$ $p = .761$.

Table 6.34 Independent Samples T-Test for the effect of visibility on participation in institutional channels

		T-test for Equality of Means						
		t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper	
Market access to institutional channels	Equal variances assumed	.305	198	.761	.07564	.24794	-.4133	.5645

The table shows that there is no statistically significant difference. Thus, the results do not support the research hypothesis H₁₁. Indeed, buyer visibility represents the interaction between primary producers and buyers, and in some cases, communication with end customers. It is argued that, if primary producers know a buyers' requirements, for instance, the quality, quantity, frequency, changing trends, and sensitivity to food safety, they can then plan production more accurately (Caridi, Moretto, Perego, & Tumino, 2014).

The contradiction of the current study results with supply chain literature might have several reasons that say the greater the visibility, the more efficient they are. The lack of processing capacity of institutional processors might be the one reason for the contradiction between supply chain literature reflections and results produced by the current study. According to the World Processing Tomato Council (WPTC), an estimated 41.37 million tonnes (MT) of tomatoes (26% of global production) worldwide were processed into value-added products in 2018 (WPTC, 2018). By comparison, less than 1% of India's tomato production currently gets processed into such products. An estimated 130,000 tonnes of tomato was processed in India in 2015, which is 0.3% of the global tomato processing market. So it can be argued that if there is a lack of ventures to absorb FFV production, suppliers visibility can not influence smallholders' participation in institutional chains.

Another reason for this contradiction might be the lack of institutional supermarkets in the study region. The current study reveals that supermarkets are not significant FFV buyers in the study region. Supermarkets prefer to buy from the wholesale market and have limited quantities of FFV in their stores. Individual farmers sell a small portion of FFV (5% to 10%) to supermarkets after meeting strict grading and quality checks. The current study reports that smallholders prefer to sell their stock to those who offer the highest prices; however, this is usually the spot market, buyers at the farm gate or processing firms. Similar to the lack of

processing firms discussed in the previous section, lack of presence of supermarkets can be another reason suppliers visibility can not influence smallholders' participation in institutional chains.

The next hypothesis tests the effect of the market's proximity (geographically) on smallholder farmers' participation in institutional channels.

H₁₂: Smallholder FFV growers who are closer to their primary market will be more likely to participate in institutional channels than those who are not.

Table 6.35 shows the descriptive statistics for the distance in kilometres for four groups. The mean score of distance to primary markets of more than 50 km has the highest institutional channel mean of .951. The mean of the group who must travel up to 10 km is $\bar{x} = -1.20$, the mean of the group who must travel between 10 km -25 km is $\bar{x} = -1.29$, and the mean of the group which must travel between 25 km-50km is $\bar{x} = -1.27$.

Table 6.35 Descriptive statistics of FFV growers' distance to market

Group statistics			
Distance to market	N	Mean	Std. Deviation
Within 10Km	20	-1.2	0.433
Between 10 & 25 Km	11	-1.29	0.63
>25 Km & <50 Km	83	-1.27	1.21
More than 50 Km	86	0.9512	1.54
Total	200	-0.311	1.69

Table 6.36 shows that the ANOVA results confirm the effect of distance to the primary market on FFV growers' participation in institutional channels: $F(3,196) = 47.121, p = .000$.

Table 6.36 ANOVA results for FFV growers' distance to primary markets (in km)

ANOVA					
Market access to institutional channels					
	Sum of Squares	df	Mean Square	F	Sig.
Between groups	240.441	3	80.147	47.121	.000
Within groups	333.370	196	1.701		
Total	573.811	199			

As the Tukey HSD results in Table 6.37 show, there are statistically significant differences between the 'more than 50 km' group and all other groups. There are no significant differences between the other groups.

Table 6.37 Tukey HSD multiple comparisons for FFV growers' distance to primary markets

Multiple comparisons						
Dependent Variable: Market access to institutional channels						
(I) Distance: Farm to market	(J) Distance: Farm to market	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Within 10kms	Between 10 & 25kms	.08591	.48956	.998	-1.1826	1.3545
	>25kms & <50kms	.06849	.32486	.997	-.7733	.9103
	More than 50kms	-2.15616*	.32376	.000	-2.9951	-1.3172
Between 10 & 25kms	Within 10kms	-.08591	.48956	.998	-1.3545	1.1826
	>25kms & <50kms	-.01742	.41847	1.000	-1.1018	1.0669
	More than 50kms	-2.24207*	.41761	.000	-3.3242	-1.1599
>25kms & <50kms	Within 10kms	-.06849	.32486	.997	-.9103	.7733
	Between 10 & 25kms	.01742	.41847	1.000	-1.0669	1.1018
	More than 50kms	-2.22466*	.20067	.000	-2.7446	-1.7047
More than 50 km	Within 10kms	2.15616*	.32376	.000	1.3172	2.9951
	Between 10 & 25kms	2.24207*	.41761	.000	1.1599	3.3242
	>25kms & <50kms	2.22466*	.20067	.000	1.7047	2.7446

*. The mean difference is significant at the 0.05 level.

The hypothesis H_{12} is supported but contradict the original assumption of proximity to market and smallholders' participation in institutional channels. This is discussed further in the next chapter. The next hypothesis tests the effects of quality standards on smallholder farmers' participation in institutional channels.

H₁₃: Smallholder FFV growers who can meet quality standards will be more likely to participate in institutional channels than those who do not.

Table 6.38 shows the FFV growers who have grading requirements ('yes' responses) and those who do not ('no' responses). While the yes response's mean was $\bar{x} = -.11$, the no response's mean was $\bar{x} = -1.1$.

Table 6.38 Group statistics for FFV growers' grading requirements

Group statistics			
Groups	N	Mean value of	Std. Deviation
access to institutional channels			
No	44	-1.0409	1.42475
Yes	156	-0.1051	1.71609
Total	200	-0.311	1.69808

The independent sample t-test results in a statistically significant difference for participation in institutional channels in Table 6.39 shows between the grading and no-grading groups. The results support hypothesis H₁₃.

Table 6.39 Independent Samples T-Test for FFV growers' grading requirements' effect on farmers' participation in institutional channels

		T-test for Equality of Means						
		T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Market access to institutional channels	Equal variances assumed	-3.31	198	.001	-.9357	.28288	-1.494	-.378

Grades and standards define quality parameters that segregate similar products into categories and describe them with consistent terminology that can be commonly understood by market participants. The specific quality (for example, appearance, cleanliness, and taste), safety (for example, pesticide or artificial hormone residue, microbial presence), and authenticity (guarantee of the geographical origin or use of a traditional process), help to maintain grades and standards (Giovannucci & Reardon, 2000). The next hypothesis tests the effect of formal contracts on smallholder farmers' participation in institutional channels.

H₁₄: Smallholder FFV growers with a formal contract, will be more likely to participate in institutional channels than those without.

Table 6.40 shows the descriptive statistics for the three different modes of relationships with buyers of FFV products have with the farmers. The mean value of spot transactions is $\bar{x} = -1.44$, word of mouth $\bar{x} = -.26$ and written contracts $\bar{x} = 1.45$.

Table 6.40 Descriptive statistics for FFV growers' relationship with buyers

Group statistics			
Relationship with buyers	N	Mean value of access to institutional channels	Std. Deviation
Spot transactions	74	-1.4358	1.0793
Word of mouth contract	81	-0.2623	1.55265
Written contract	45	1.4511	1.19061
Total	200	-0.311	1.69808

Table 6.41 shows a statistically significant difference between groups determined using ANOVA ($F(67.606) = 2, 197, p = .000$). Further, the Tukey post hoc test results show that institutional channel participation was statistically significantly higher in the case of farmers who have formal contracts with buyers as compared to those who only have a verbal contract or sell by spot transactions.

Table 6.41 ANOVA results for FFV growers' relationship with buyers

ANOVA					
Market access to institutional channels					
	Sum of Squares	df	Mean Square	F	Sig.
Between groups	233.543	2	116.772	67.606	.000
Within groups	340.268	197	1.727		
Total	573.811	199			

From the results so far, there are statistically significant differences between the groups supports the H_{14} . Figure 6.13 (below) shows that the groups differ from each other. The figure indicates that contracted farmers have higher levels of participation in institutional channels than the other two groups.

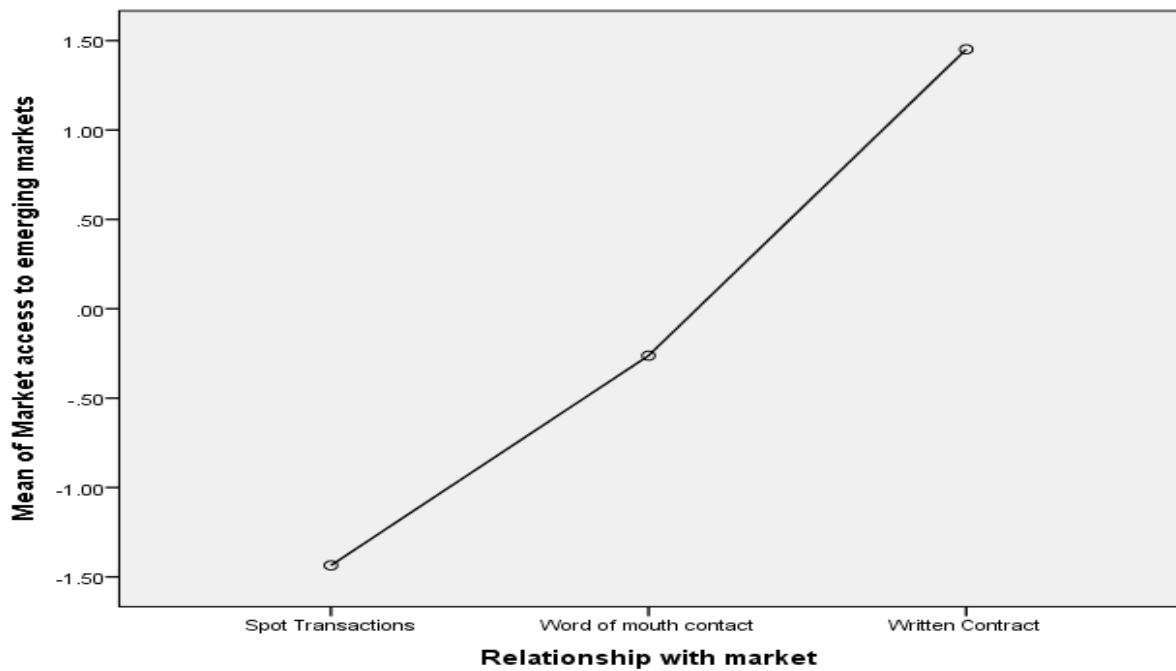


Figure 6.13 FFV growers' market membership and experience with cooperatives

The mode of market engagement includes the type of marketing arrangement farmers have with buyers. The mode of market participation is a critical factor for FFV growers. The results of the current study imply that the contract mode of relationship has a positive impact on smallholder FFV growers' participation in institutional channels. However, only 22.5% of farmers have written contracts with buyers. Smallholders are motivated to participate in institutional channels by the fixed price, quantity and technical assistance.

The next hypothesis tests the effect of cooperative membership (H_{15a}) and cooperative experience (H_{15b}) on smallholder farmers' participation in institutional channels.

H_{15a} : Smallholder FFV growers who participate in collective action will be more likely to participate in institutional channels than those without membership.

The group statistics in Table 6.42 show that FFV growers who are members of cooperatives ($n = 156$) have a mean value $\bar{x} = .0788$ (SD 1.8). By comparison, non-members have a numerically smaller ($n = 44$) mean value of $\bar{x} = -1.1341$ (SD 1.1).

Table 6.42 Group statistics for FFV growers' cooperative membership

Group statistics				
	Members of Cooperative	N	Mean value of access to institutional channels	Std. Deviation
Market access to institutional channels	Yes	156	-.0788	1.7652
	No	44	-1.1341	1.1060

The independent sample t-test in Table 6.43 shows a significant P value ($p = .000$). This result indicates that variability in both conditions is significantly different. It suggests that there is a statistically significant difference between those who are members of a cooperative, and those who are not, and participation in institutional channels, thus supporting H_{15a} is supported.

Table 6.43 Independent Samples Test for FFV growers' cooperative membership effect on participation in institutional channels

		T-test for Equality of Means						
		t	Df	Sig. (2-tailed)	Mean Diff	Std. Error Diff	95% Confidence Interval of the Difference	
						Lower	Upper	
Market access to institutional channels	Equal variances assumed	3.759	198	.000	1.05524	.28074	.50161	1.60888

The findings of the current study are partially in line with existing studies that show that collective action among farmers enhances their chances of participating in high-value crops (Berdegué Sacristán, 2001; Boselie et al., 2003; Henson et al., 2005; Minten et al., 2005). Indeed, Jagwe (2011) notes that group membership lowers transaction costs and increases smallholder market participation in high-value crops in Africa. The next test (H_{15b}) determines the impact of cooperative experience on participation.

H_{15b}: Smallholder FFV growers with more collective action experience will be more likely to participate in institutional channels than those not engaged in collective action.

The descriptive statistics in Table 6.44 show FFV growers' experience with cooperatives in years. The mean score of the up to 2 years' experience group is $\bar{x} = -.8000$, the 3-5 years group is $\bar{x} = .2820$, the 6-10 years group is $\bar{x} = -.0404$, and the above ten years group is $\bar{x} = -.0775$. ANOVA was used to analyse the differences among group means in the sample.

Table 6.44 Descriptive statistics for FFV growers' experience with cooperatives

Group statistics			
Experience with coop	N	Mean value of access to institutional channels	Std. Deviation
Up to 2 years	15	-0.8	1.65314
3-5 years	25	0.282	1.53751
6-10 Years	57	-0.0404	1.76937
Above 10 years	60	-0.0775	1.84929
Total	157	-0.0758	1.76

The ANOVA results in Table 6.45 show that the significance value ($p = .311$), is higher than 0.05. The F is also small (3, 153 = 1.20), and shows no significant difference between the groups. Therefore, the results do not support hypothesis H_{15b}. In other words, there is no statistically significant difference in the mean of experience with cooperatives on participation in institutional channels.

Table 6.45 ANOVA results for FFV growers' experience with cooperatives

ANOVA					
	Market access to institutional channels				
	Sum of Squares	Df	Mean Square	F	Sig.
Between groups	11.139	3	3.713	1.203	.311
Within groups	472.084	153	3.086		
Total	483.223	156			

The study finds experience in years with cooperatives has no significant impact on smallholder farmers' participation in institutional channels. It may be because of a lack of cooperative initiatives among FFV growers (other than their membership in government cooperative societies).

The next hypothesis tests the role of formal sources of farm credit on smallholder farmers' participation in institutional channels.

H₁₆: Smallholder FFV growers with access to the formal source of farm credit will be more likely to participate in institutional channels than those with limited or no access.

Table 6.46 shows the descriptive statistics for FFV growers' sources of farm credit. The mean score of credit obtained from a commercial bank had a mean of $\bar{x} = -.0953$, relatives and friends $\bar{x} = -.1167$, commission agent $\bar{x} = -.9061$, and cooperatives $\bar{x} = -.1638$.

Table 6.46 Descriptive statistics for FFV growers' credit agencies

Group statistics			
Credit agencies	N	Mean value of access to institutional channels	Std. D
Relatives and friends	9	-0.1167	1.56
Commission agents	49	-0.9061	1.31
Cooperatives	47	-0.1638	1.82
Commercial banks	95	-0.0953	1.76
Total	200	-0.311	1.69

Further, in Table 6.47 the ANOVA results show that the effect of different credit agencies on FFV growers' participation in institutional channels was statistically significant, $F(3,196) = 2.745, p = .044$), thus supporting hypothesis H₁₆.

Table 6.47 ANOVA results for FFV growers' source of credit

ANOVA					
Market access to institutional channels					
	Sum of Squares	df	Mean square	F	Sig.
Between groups	23.134	3	7.711	2.745	.044
Within groups	550.677	196	2.810		
Total	573.811	199			

There are statistically significant differences between the groups. Table 6.48 shows that farms which use credit from commercial banks have greater levels of participation in institutional channels than those who use commission agents.

Table 6.48 Tukey HSD multiple comparisons for FFV growers' sources of credit

Multiple comparisons						
Dependent variable: Market access to institutional channels						
(I) Credit agency	(J) Credit agency	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Relatives and friends	Commission agents	.78946	.60788	.565	-.7857	2.3646
	Cooperatives	.04716	.60988	1.000	-1.5332	1.6275
	Commercial banks	-.02140	.58459	1.000	-1.5362	1.4934
Commission agents	Relatives and friends	-.78946	.60788	.565	-2.3646	.7857
	Cooperatives	-.74229	.34222	.136	-1.6291	.1445
	Commercial banks	-.81086*	.29481	.033	-1.5748	-.0469
Cooperatives	Relatives and friends	-.04716	.60988	1.000	-1.6275	1.5332
	Commission agents	.74229	.34222	.136	-.1445	1.6291
	Commercial banks	-.06857	.29892	.996	-.8431	.7060
Commercial banks	Relatives and friends	.02140	.58459	1.000	-1.4934	1.5362
	Commission agents	.81086*	.29481	.033	.0469	1.5748
	Cooperatives	.06857	.29892	.996	-.7060	.8431

*. The mean difference is significant at the 0.05 level.

Generally, farm credit provides financial liquidity and encourages FFV growers to employ agricultural technology and buy quality seeds. It also enables them to pay advanced labour costs, repair machinery, arrange transportation and pay other agriculturally related expenses.

The next hypothesis tests the role of access to logistics (including cold chain storage and transport) on smallholder farmers' participation in institutional channels.

H₁₇: Smallholder FFV growers who have access to logistics (including cold chain storage and transport) will be more likely to participate in institutional channels than those without access to these resources/facilities

Table 6.49 group statistics suggest that there is a statistically significant difference in the scores for FFV growers: 'no access to cold storage' category (\bar{x} = -.83, SD 1.4) and 'yes'

response ($\bar{x} = .22$, SD 1.8). Independent sample t-test results in Table 6.54 show significant conditions; $t(177) = -4.278$, $p = .000$, thus supporting hypothesis H₁₇.

Table 6.49 Group statistics for FFV growers' access to cold storage

Group Statistics			
Access to cold storage	N	Mean	Std. Deviation
No	86	-0.8285	1.41481
Yes	93	0.2183	1.81617

The results in Table 6.50 suggest that access to cold storage has a statistically significant effect on FFV growers' participation in institutional channels. Specifically, the results indicate that when FFV growers have access to cold storage, their participation in institutional channels increases.

Table 6.50 FFV growers' access to cold storage on market participation

		T-test for Equality of Means						
		t	Df	Sig. (2-tailed)	Mean Diff	Std. Error Diff	95% Confidence Interval of the Difference	
							Lower	Upper
Market access to institutional channels	Equal variances assumed	-4.278	177	.000	-1.04677	.24471	-1.5297	-.5638

Cold storage is considered an essential component of efficient marketing of FFV products. It increases farmers' bargaining power and reduces their food losses. Fresh produce needs to be kept at a specific temperature to maintain its quality and shelf-life.

The final hypothesis tests the role of access to technical assistance on smallholder farmers' participation in institutional channels

H₁₈: Smallholder FFV growers with access to technical assistance will be more likely to participate in institutional channels than those with limited or no access.

An independent sample t-test was carried out to test the hypothesis. Table 6.51 presents the group statistics for both FFV grower groups, those who have access to technical assistance

and those who do not. The 'yes' response to technical support has a higher mean score ($\bar{x} = -.0811$), compared to the 'no' response ($\bar{x} = -.9654$)

Table 6.51 Group statistics for FFV growers' access to technical assistance

Group statistics			
Technical Assistance	N	Mean	Std. Deviation
No	52	-0.9654	1.2284
Yes	148	-0.0811	1.7819

The independent sample test results (see Table 6.52) suggest that there is a statistically significant difference in the scores for FFV growers with no access to technical assistance (in the 'no' response $\bar{x} = .9654$, SD 1.4), and the 'yes' response ($\bar{x} = -.0811$, SD 1.22) conditions; $t(198) = -3.331$ $p = .001$. The results indicate that having technical assistance has a statistically significant effect on smallholders' participation in institutional channels, thus supporting hypothesis H₁₈.

Table 6.52 FFV growers' access to technical assistance on market participation

		T-test for Equality of Means						
		t	Df	Sig. (2-tailed)	Mean Diff	Std. Error Diff	95% Confidence Interval of the Different	
							Lower	Upper
Market access to institutional channels	Equal variances assumed	-3.31	198	.001	-.884	.267	-1.41	-.357

Technical assistance enables FFV growers to optimise their available resources. It also allows them to deal with risky situations more efficiently. Technical support is used for farm preparation, plantation bed width, the optimum uses of fertilisers and pesticides, harvesting techniques and cold storage.

6.5 Chapter summary

This chapter has described the sample, a general overview of the FFV supply chain in the study region, a map of the FFV supply chains, along with FFV growers' socio-economic characteristics (gender, age, family size, farm assets and average yield). Finally, the chapter has provided a summary of the results for each specific hypotheses. Of the eighteen hypotheses tested, 11 were found to be supported while seven were not supported.

The hypothesis test results reveal that except for a higher level of education, other human capital asset variables such as age, farming experience and a higher percentage of family members involved in farming activities do not impact on smallholders' participation in institutional channels.

Similarly, only two of the physical farm asset variables (a higher percentage use of operational land for fresh produce and off-farm income) were supported. The other two variables (access to farm machinery and highly variable production costs) were not supported.

The five transaction costs of marketing variables have some interesting results. The access to and usage of market information and buyer visibility variables are not supported while higher frequency and in multiple sources of price information, proximity to the primary market, and meeting quality standards variables were supported. Interestingly two variables (a) higher frequency and (b) multiple sources of information were supported. As were proximity to the primary market variables, in the case of contract farming with an assured price offered by institutional channels.

For the impact of collective action, one of the two variables was supported while the other was not. While the membership of a cooperative variable was supported, the experience with cooperatives was not. Finally, in terms of the impact of institution variables, all three variables (access to farm credit, access to logistics, and access to technical assistance) were supported in smallholders' participation in institutional channels.

Finally, the following chapter discusses the results of the hypothesis testing and provides a list of theoretical and managerial implications. Table 6.53 provides a summary of the results.

Table 6.53 Summary of results

Hypothesis	Result
<i>H₁: Smallholder FFV growers who are older will be less likely to participate in an institutional channel than those who are younger.</i>	<i>Not supported</i>
<i>H₂: Smallholder FFV growers with higher levels of education will be more likely to participate in institutional channels than those with lower levels of education.</i>	<i>Supported</i>
<i>H₃: Smallholder FFV growers with more years of farming experience are more likely to participate in institutional channels than those with less farming experience.</i>	<i>Not supported</i>
<i>H₄: Smallholder fresh produce growers with a higher percentage of family members involved in farming activities will be more likely to participate in institutional channels than those with a lower percentage.</i>	<i>Not supported</i>
<i>H₅: Smallholder FFV growers using a higher percentage of operational land for fresh produce are more likely to participate in institutional channels than those with smaller areas of operational land for fresh produce.</i>	<i>Supported</i>
<i>H₆: Smallholder FFV growers who have access to farm machinery will be more likely to participate in institutional channels than those with no access.</i>	<i>Not supported</i>
<i>H₇: Smallholder FFV growers with highly variable production costs are more likely to participate in institutional channels than those with lower variable production costs.</i>	<i>Not supported</i>
<i>H₈: Smallholder FFV growers with off-farm income are more likely to participate in institutional channels than those with no off-farm income.</i>	<i>Supported</i>
<i>H₉: Smallholder FFV growers with (a) access to and (b) usage of market information will be more likely to participate in institutional channels than those without these.</i>	<i>Not supported</i>
<i>H₁₀: Smallholder FFV growers who monitor prices with (a) higher frequency and (b) using multiple sources will be more likely to participate in institutional channels than those who do not.</i>	<i>Supported</i>
<i>H₁₁: Smallholder FFV growers who have greater visibility of their supply chain will be more likely to participate in institutional channels than those who cannot.</i>	<i>Not supported</i>
<i>H₁₂: Smallholder FFV growers who are closer to their primary market will be more likely to participate in institutional channels than those who are not.</i>	<i>Supported</i>
<i>H₁₃: Smallholder FFV growers who can meet quality standards will be more likely to participate in institutional channels than those who do not.</i>	<i>Supported</i>
<i>H₁₄: Smallholder FFV growers with a formal contract, will be more likely to participate in institutional channels than those without.</i>	<i>Supported</i>
<i>H_{15a}: Smallholder FFV growers who participate in collective action will be more likely to participate in institutional channels than those without membership</i>	<i>Supported</i>
<i>H_{15b}: Smallholder FFV growers with more collective action experience will be more likely to participate in institutional channels than those not engaged in collective action.</i>	<i>Not supported</i>
<i>H₁₆: Smallholder FFV growers with access to the formal source of farm credit will be more likely to participate in institutional channels than those with limited or no access.</i>	<i>Supported</i>

<i>H₁₇: Smallholder FFV growers who have access to logistics (including cold chain storage and transport) will be more likely to participate in institutional channels than those without access to these resources/facilities.</i>	<i>Supported</i>
<i>H₁₈: Smallholder FFV growers with access to technical assistance will be more likely to participate in institutional channels than those with limited or no access</i>	<i>Supported</i>

Chapter 7

Discussion

7.1 Introduction

The previous chapter described the sample, a general overview of the fresh produce supply chains in the study region and FFV growers' socio-economic characteristics. It has also shown that the farmers participating in this research have good levels of access to farm machinery, road infrastructure and assured irrigation, with an average of four family members being involved in farming activities. The current chapter discusses the results of this study and assesses the research objectives considering agribusiness literature and theories.

7.1.1 Objective 1: Identify the factors influencing fresh produce growers' participation in institutional channels

While the relative importance of FFV is increasing in developing countries, agribusiness supply chains are transitioning from price-driven traditional wholesale spot markets to well-coordinated institutional channels (Chowdhury et al., 2005; Delgado, 1999; Ehret & Haase, 2012; Hobbs & Young, 2000). The speedy rise of institutional channels has had significant impacts on smallholder FFV growers (Minten, Reardon, & Chen, 2011). While the transitioning of food systems offers smallholders an opportunity to participate and compete in institutional channels, a variety of factors constrain them from doing so (Reardon & Swinnen, 2004; Reardon & Timmer, 2007; Reardon et al., 2003; Reardon et al., 2012).

Institutional channels feature shorter supply chains, with a smaller number of intermediaries. In contrast, traditional spot markets feature multi-level and fragmented chains (Poulton et al., 2006). Institutional channels also focus on scale economies, grading, quality standards and a regular supply of FFV. Agribusiness researchers have reported that farmers receive a higher price selling to institutional channels. For example, supermarkets in Honduras, Sri Lanka, and Kenya pay smallholders higher prices (Blandon et al., 2009; Chowdhury et al., 2005; Ratnadiwakara et al., 2008). Due to the conditions and requirements of institutional channels, smallholders face several entry barriers that discourage them from participating in these channels (Rao & Qaim, 2011). Prior agribusiness literature discusses the critical role collective action plays in lowering individual farmer's transaction costs (Barham & Chitemi, 2009; Hellin et al., 2009; Kaganzi et al., 2009; Markelova et al., 2009). Indeed, the agribusiness industry

and FFV agriculture, in particular, is assumed to be highly volatile because of the production and marketing risks. Various biological predators like disease, insects, and pathogens, along with variable climate patterns result in significant variability in FFV production and processing (Gustavsson, Cederberg, Sonesson, Van Otterdijk, & Meybeck, 2011). These variable conditions affect the output and efficiency of the entire agribusiness supply chain.

Agribusiness researchers have identified various endogenous and exogenous factors that affect FFV growers' market participation in Asia, Africa and Latin America. Specifically, endogenous factors are related to farm and farmer characteristics; for example, resource endowments (social, physical, human, and financial capital), household size, age and gender of the household head (Von Braun & Kennedy, 1994). Endogenous factors, such as low-yielding environments, a lack of essential farm assets, and high transaction cost are considered obstacles for smallholders wanting to participate in institutional channels (Holloway et al., 2000; Omiti et al., 2007; Pingali et al., 2005).

Further, Boughton et al. (2007) find household assets (first and foremost land, but also livestock, family labour and ownership of equipment as found in this study), are strongly positively associated with primary producers' market participation. Jaleta, Gebremedhin, and Hoekstra (2009) review the literature on smallholder participation in commercial markets and find that human capital elements (education, experience, and family members' skills) are essential in commercialising smallholder agriculture. Narrod et al. (2009) find that group membership (cooperatives) enhance the possibility of fresh produce growers' participation in institutional channels. Similarly, Reardon et al. (2009), and most recently, Mercado et al. (2018), consider food safety standards to be a significant obstacle for smallholder farmers' participation in institutional markets in Bolivia.

The current study finds that endogenous factors related to farm and farmer characteristics, such as a smallholder's level of education, off-farm income, access to technical assistance, a higher percentage of operational land use for growing FFV, access to formal sources of credit, a farmer's grading capability variables significantly affects his/her participation in institutional channels. Also, the contract mode of market engagement and cooperative membership is positively associated with smallholder farmers' participation in institutional channels. The next sections of this chapter discuss in further detail the factors that support or hinder smallholders' participation in institutional channels (see Table 7.1 below).

Table 7.1 Summary of variable which supports smallholder participation in institutional channels

Variable	Factor description	Influence on market participation
Age	Higher the age of the FFV farmer (in years)	-
Education	Higher levels of education (of farmers)	+
Experience	More extensive farming experience (in years)	-
Family labour	A higher percentage of family members involved in farming activities	-
Operational land	A higher percentage of operational land use for FFV	+
Farm machinery	Ownership of farm machinery	-
Variable production cost	Highly variable production costs	-
Off-farm income	Income other than FFV	+
Price information	(a) access and (b) usage of market information,	-
Frequency and source of price information	(a) higher frequency and (b) multiple sources of price information	+
Visibility of buyers	FFV growers who can see further down their supply chain	-
Proximity to market	Close to their primary market	+
Quality and grading	Capacity to meet quality standards	+
Mode of market engagement	FFV growers with a formal contract	+
Cooperative membership	FFV growers who are members of a cooperative	+
Cooperative experience	FFV growers who have more extensive experience with cooperative	-
Farm credit	FFV growers who have access to formal sources of farm credit	+
Access to logistics	FFV growers who have access to logistics (including cold chain storage and transport)	+
Technical assistance	FFV growers who have access to technical assistance	+

+ sign = supported, - sign = not supported

As shown in Table 7.1, of the 18 hypotheses tested, 11 were supported, while seven were not. The next section includes a detailed discussion of the factors supported by the research hypotheses, extracted from the results.

7.1.1.1 Farmers' levels of education

The current study finds that farmers who have higher market participation in institutional channels generally also have higher levels of education. The positive results for this hypothesis might be related to several reasons. One reason for the positive influence of education on farmers' decisions to sell in institutional channels in the study region may be that there are more educated farmers in the Punjab state compared to the national average.

Table 7.2 Education level in Punjab state (2010-11) and current study data

No	Education level	Punjab	India	Current study
1	Not literate	27.67	34.53	7.58
2	Up to primary	21.28	24.72	10.61
3	Middle	12.99	16.72	18.69
4	High school	19.08	10.11	45.45**
5	Higher secondary	8.79	5.21	
6	Diploma/certificate	1.7	1.9	
7	Degree and post-graduate studies	8.49	6.81	17.68***
Total (1-7)		100	100	
Mean years of schooling		6.551	5.482	

Source: Adapted from (Brar, 2016, p. 299)

** High school data includes senior secondary

*** Degree and post-graduate include vocational training certificate and college education

Indian census data collected by the planning commission of India in the year 2011 shown in Table 7.2 reveals that the number of farmers who have high school and college-level education is significantly higher than the total Indian level (Brar, 2016, p. 299). The current study data shows variations from the previous census (2011) data from the Planning Commission of India. The reason for this variation might be a general improvement in smallholders' education or the sample data-focused on particular study regions. The positive results of the current study can be also related to an increase in educational institutions in the Punjab state after the previous census. In the year 2015, the number of universities in the state increased from 6 to 14. Similarly, the number of middle schools have increased from 3,792 to 5,445. Likewise, the number of high/senior secondary schools have increased from 8,810 to 9,171.

Table 7.3 Number of education institutions in the state of Punjab in India

Name of the institution	Institutions in the state (year 2010)	Institutions in the state (year 2015)	Institutions in the study district Amritsar (2015)	Institutions in the study district Jalandhar (2015)
Universities	6	14	1	1
Arts, commerce, home science and science colleges	234	272	8	16
High/senior secondary schools	8,810	9,171	700	732
Middle schools	3,792	5,445	535	409
Primary schools	13,950	14,372	1,026	1,119

Source: (GOP, 2016)

Along with it, modern agriculture is based on the philosophy of knowledge-based coordination among supply chain partners. This is different from the traditional market that typically is based on the 'produce first and then look for the market later' philosophy (Boehlje, 1996, 1999; Collins, 2006). The TCE theory suggests that information, searching, and negotiation costs are significant in shaping exchange relationships. Educated farmers tend to negotiate better deals as compared to uneducated farmers; they can ask for better terms and conditions in their contracts. Further, they are better able to apply for new agricultural and technical knowledge (Hobbs & Young, 2001). As a farmer's level of education increases, they tend to be more risk-averse, able to understand the buyers' requirements and be rational users of farm inputs, extension services and financial planning (Hewett, 2012; Lawal et al., 2004; Slamet et al., 2017).

Several studies have suggested that farmers' increased levels of education have improved their livelihoods in several ways. Similar to the current study, Makhura (2001b) finds that educated smallholder FFV farmers in South Africa have better economic viability compared to less educated farmers. The current study's findings also support Bathla (2015) and Rao et al. (2012), who both report that FFV growers who sell to supermarkets have higher levels of education than those who sell to traditional channels.

Similarly, Neven et al. (2009) report that farmers who supply to institutional channels in Kenya are more likely to have completed secondary school compared to those who sell to traditional channels (most only have primary school education). A certain level of education is required, as the marketing of fresh produce includes various activities such as communicating with buyers, price negotiations, the arrangements of shipments and warehousing.

Education level also affects the adoption of allied activities that help in agriculture. Crop insurance, credit arrangements, buying and use of agribusiness machinery, use of quality inputs and seeds are few significant activities that require knowledge. Ghimire and Huang (2016) report that the household head's age and level of education has a positive impact on a farmer's decision to adopt new varieties of rice in Nepal. Similarly, Bishu et al. (2018) find that a farmer's education level positively affects their decision to participate in cattle insurance as a risk management strategy in northern Ethiopia. Asante-Addo et al. (2017) find a positive association between the household head's level of education and the adoption of microcredit programmes in Ghana. Osebeyo and Aye (2014) present similar findings for tomato growers of Nigeria. Giné and Yang (2009) find a farmer's education level is positively correlated with insured loans and lower default costs in Malawi. Kumar et al. (2016) report that ginger growers' education levels have a positive association with participation in institutional channels in the adoption of contract farming in Nepal. In the current study region, Vatta and Pavithra (2016) find a positive correlation between the level of education and size of land asset holdings. The authors conclude that new employment opportunities require education, and educated farmers are more concentrated in the larger sized farming categories. This provides further evidence of the concentration of income from sources other than agriculture. Indeed, Minten et al. (2009) also point out that educated households may have a better awareness of business opportunities with global retail chains in Madagascar.

Knowledge and a certain level of education help farmers to incorporate advanced agriculture technology (Giné & Yang, 2009). Farmers with agricultural knowledge and technological skills can more efficiently utilise the land, water and agrichemical products (Ghimire & Huang, 2016; Lawal et al., 2004). For example, Lawal et al. (2004) find that the household head's level of education has a positive influence on a farmer's decision to adopt new, improved seed varieties of cassava in Ghana. Likewise, educated farmers with limited operational land, are more likely to form groups to collectively market their agricultural products (Fischer & Qaim, 2012). Education is also critical in the production of specific agribusiness products that require more human supervision, knowledge and training, like organic FFV products (Singh, 2008). Smallholders can achieve a competitive advantage in these products by producing FFV at a lower cost with the use of local climate knowledge and family labour.

A farmer's level of education also affects their ability to adopt a viable mode of market engagement to sell FFV (discussed separately in section, 7.2.2.). The complex nature of a

contract's terms and conditions (product specifications, size, and quality attributes), require a perfect exchange of information between parties (Abebe et al., 2013; Minot, 2011). Besides, the production of FFV under contract requires several prerequisites, namely a suitable climate, land preparation and the use of a specific variety of seeds (Barrett, 2008). Therefore, a higher level of education plays a vital role in smallholder farmers' adoption of vertical coordination (Barrett et al., 2012). To gain access to formal credit, farmers also need to understand the procedures, arrange the necessary collateral and understand the terms and conditions of credit. Tangible outcomes associated with educated farmers are improved financial management and loan repayments (Alene et al., 2008; Temu, Mwachang'a, & Kilima, 2001).

7.1.1.2 Higher percentages of operational land in FFV

Along with other endogenous factors, higher percentages of operational land use in FFV is instrumental for smallholders' participation in institutional channels. The current study finds that study region farmers owing average 5.8 acres land that meets the minimum requirements of institutional processors in the case of Potatoes. Similar to the results of the current study, Neven et al. (2009) report that in Kenya supermarkets prefer using FFV growers with higher operational land under the production of fresh fruits and vegetables. In a later study, Rao et al. (2012) also report a higher operational land size for growers supplying supermarkets in Kenya. The current study data reveal that along with owned land, study region farmers cultivating average 2.3 acres rental land. Along with owing and rental, average operational land in the study region was 8.2 acres.

Smallholders' economic viability depends on their ability to compete in the market (Poulton et al., 2006). While institutional channels focus on creating economies of scale and frequent and graded quantities, smallholders are more likely to be excluded due to inadequate physical, legal, capital and regulatory infrastructure (Kirsten & Sartorius, 2002; Reardon & Barrett, 2000; Reardon et al., 2003). It has been documented that institutional channels often avoid working with farmers who farm on less than 2 ha (Barrett, 2008; Jayne et al., 2005). Farmers who sell to institutional channels are five times larger than traditional farmers; 9-18 ha compared with 1.2 - 2.4 ha in Kenya (Neven et al., 2009).

The current study finds the factors, higher percentages of operational land use in FFV is increases smallholders' participation in institutional channels There might be several reasons for the positive results in the current study. First, farmers using a higher percentage of the

area under FFV production have better bargaining power compared to those who have a smaller percentage of land use. Institutional channels prefer to deal with large farmers to obtain scale economies (Kirsten & Sartorius, 2002). They often seek discounts from producers during festive seasons, which may be challenging for smallholders. Along with festive discounts, institutional channels require fixed quantities of FFV in periodic shipments to maintain continuity of production. Various researchers have examined the positive relationship between a higher percentage of area under FFV production and primary producers' participation in institutional channels in different geographical locations (Boselie et al., 2003; Dolan & Humphrey, 2000; Key & Runsten, 1999; Michelson, 2013; Reardon & Barrett, 2000). Further, while large farmers have advantages in terms of scale, it is difficult for smallholders to access high-value markets due to high marketing and transaction costs (Blandon et al., 2009; Delgado, 1999; Key & Runsten, 1999; Kirsten & Sartorius, 2002; Reardon & Barrett, 2000; Reardon et al., 2003; Weatherspoon et al., 2001).

Bellemare (2012) also reports similar findings, where the size of operational land has a positive relationship with contract farming. The current study also endorses these findings because Potato processors in the study region have a minimum threshold requirement to offer the contract to FFV growers was 5 acres of minimum operational land. Jagwe (2011) also finds that operational land size has a positive influence on banana growers' participation in institutional channels in Burundi. Bathla (2015) reports that seasonal and moderate demands by institutional channels are the primary reasons for the insignificant impact on farmers' participation in supermarket chains in Haryana (India).

It is essential to understand that the study region has larger farms compared to the national average in India (>4 Hc compared to just 1 Hc in India) (Singh, Kaur, et al., 2009). All the smallholders interviewed were larger than five acres (2.023 ha), which is the minimum size required to sell to potato processors. However, the tomato processors do not impose a minimum size requirement.

7.1.1.3 Off-farm income

Off-farm income significantly influences smallholder farmers' participation in institutional channels in the current study. Alene et al. (2008) find that off-farm income positively affects the adoption and use of fertiliser, which increases overall farm productivity. Off-farm income empowers farmers to use cash liquidity and time-saving options without waiting for credit

(Cadilhon et al., 2006). Off-farm income plays a critical role in the arrangement of farm inputs, farm labour and agricultural-related daily expenses. In particular, farm labour is critical in the production of FFV, especially in the case of products which have a short shelf-life. The farmers in the current research noted that there was often an issue hiring farm labour at the time of potato planting and tomato harvesting. Due to the high demand in the busy season, farm labourers often ask for advanced payments. In such cases, farmers rely on informal moneylenders who charge high-interest rates (Singh, 2016a). Consequently, off-farm income plays a vital role in the arrangement of farm labour in the current study.

Several research studies have offered reasons why off-farm income leads to improved participation in institutional channels. Firstly, it facilitates FFV growers' access to, and adoption of new, improved agribusiness inputs and production technology. Secondly, it enables small scale farmers to invest in day-to-day agricultural expenses without delay (Fenwick & Lyne, 1999; Masuku et al., 2001). Smallholder farmers need financial support to buy inputs and hire services to improve production and marketing activities. Smallholders' access to cash encourages them to participate in agricultural markets (Lukangu, 2005; Makhura, 2001b). Ali et al. (2017) also report that income from off-farm activities has a positive effect on selling in the markets in Pakistan.

In the study region, the service sector is a significant contributor to off-farm income. Generally, the service sector requires employees to have a certain level of education/training/skills. The current study finds that 45% of farmers have a high school education. In fact, a high school certificate is required for most entry-level jobs in India. In the study region, Vatta and Pavithra (2016) find a positive relationship between farmers' levels of education and the size of land asset holdings. The authors conclude that new employment opportunities require education and that these are concentrated in the larger sized farming categories. This further indicates the concentration of income from sources other than agriculture.

The survey revealed that migration to developed countries and joining the armed forces are preferred employment options over farm labour income (field survey notes). Table 7.4 shows the major sources of off-farm income in the study region.

Table 7.4 Major source of income other than FFV in the study region

Source of off-farm income	Frequency	Percentage
Dairy	35	17.5
Family member employment	27	13.5
Family member abroad	25	12.5
Traditional crops and other sources	44	22.0
Total	131	65.5

Punjabi youth who migrate to developed countries are simply following agricultural development strategies designed by the Indian government through successive five-year plans that stifled the development of industry and knowledge economies in Punjab (Singh, 2012a). Table 7.4 shows that 12.5% of respondents have a relative employed in a foreign country. Complaining of a lack of opportunities for high-skilled work in Punjab, young people explained that they had no alternative but to migrate overseas. Indeed, skilled migration routes from Punjab start with overseas study, which is one of the few remaining routes for young people to migrate overseas in the present regime of intensely managed and regulated migration. In Punjab, the overseas study has generated a multi-million-dollar industry comprised of agents, brokers, English language coaches and assessment institutions that are profiting from the dreams of prospective migrants (Al Ariss et al., 2013). Another study on migration issues conducted by Hussain (2018) highlights that skilled Indian migrants prefer to move to New Zealand despite having to work in low-skilled jobs on their arrival in the country.

Another source of off-farm income is dairy farming in Punjab. The dairy sector in this region provides significant off-farm income options for smallholder farmers. There are three options for the farmers; to join the extensive network of cooperatives run by the Punjab State Cooperative Milk Producers' Federation Limited (Milkfed) established in 1973, be an independent milk supplier for the urban population or link up with the private sector (Kanupriya & Devesh, 2012).

7.1.1.4 Access and frequency of price information

Efficient flow of marketing information results in positive benefits to farmers, traders, and policymakers, but only if they respond to the information. Efficient flow of marketing information facilitates price negotiation between farmers and traders, supports spatial

distribution of products from rural to urban areas, and creates consumer awareness about prices and market conditions (Shepherd, 2007).

In the current study, the results of the access and frequency of obtaining price information variable were unexpected. Limited market information and market access are two major obstacles for increased smallholder farmers' economic viability in developing countries. Access to market information is crucial in smallholders' development because it creates the necessary demand and offers remunerative prices, thereby increasing smallholder incomes (Fonseca & Njie, 2014).

Initially, it was hypothesised (H₉) that smallholder FFV growers with (a) access to and (b) usage of market information would be more likely to participate in institutional channels than those without these. Similarly, for hypothesis (H₁₀), smallholder FFV growers who check prices with (a) higher frequency and (b) using multiple sources would be more likely to participate in institutional channels than those who do not. From the results, Table 7.5 shows FFV growers frequency of obtaining price information. The hypothesis results are significant but contradict in the opposite way to the original assumptions related to the frequency of price information and participation in institutional channels.

Table 7.5 FFV growers' frequency of obtaining price information

FFV grower's frequency of obtaining market information	Frequency	Percentage
Once a day	30	15.0
Twice a day morning/afternoon	101	50.5
Once a week	32	16.0
Twice a week	30	15.0
Total	193	96.5

Interestingly, the results suggest that the group with a lower frequency of obtaining price information have higher levels of participation in institutional channels. Table 7.6 shows the group statistics for FFV growers' frequency of obtaining price information in the study region. It also includes price information and the relationship with the buyer.

Table 7.6 Frequency of price information and relationship with the buyer

		Group statistics			Total
		Spot transaction	Word of mouth contact	Written contract	
Frequency of price information	Once a day	9	17	4	30
	Twice a day	54	35	12	101
	Once a week	5	13	14	32
	Twice a week	5	12	13	30
Total		73	77	43	193

The reason for these results might be that in the sample region, farmers still largely rely on traditional markets to sell their produce. The price volatility of the spot market might explain the need for repeated price interrogation and hence the non-significant result. The philosophy of ‘produce first and then look for the market’ might also explain the contradictory results. Table 7.6 shows that those who search for information twice a day are more likely to sell at spot markets while contracted farmers search for information once or twice a week. Another explanation might be that contracts tend to have firm conditions, such as price, and hence farmers do not need frequent information updates.

Access to up to date market information enables FFV growers to select the right market outlet. Information sharing between buyers and seller is considered one of the primary means of enhancing supply chain performance. It allows supply chain partners to better coordinate their activities that will enhance their performance (Baihaqi & Sohal, 2013). Market information consists of information about prices in different markets, new markets, and the demand for commodities on a particular day. Thus, access to market information may enable fresh produce growers to participate in economically viable markets. Another variable (price information before the sale), was not significant in FFV growers’ participation in institutional channels in this study. It was hypothesised (H_{10}) that farmers who have price information before they sell would be more likely to participate in institutional channels, but surprisingly, this was not the case.

Access to market information affects whether a buyer will purchase FFV or not. The demand for products varies between the different markets. In the study region, most farmers harvest

at the same time of the season, thus the price drops due to an oversupply of the product in the market. Due to the perishable nature of FFV, high transportation costs, uncertainty around obtaining a higher price at markets further away, and storage expenses, farmers prefer to sell at lower auction prices at traditional markets. Zanello and Srinivasan (2014) suggest that market information is only helpful when it enables farmers to make marketing decisions. Otherwise, it would be an activity to increase the quantum of knowledge about farming without implications and that was the case in the sample region.

Table 7.7 FFV growers' mode of obtaining price information

Mode of obtaining price information	Numbers	Mean	Std. Deviation
Self-enquiry	198	4.25	0.974
Speaking with commission agent/trader	198	3.70	1.459
Speaking with other farmers	198	3.17	1.442
Farmer organisation or cooperative	197	1.90	1.300

Smallholders receive asymmetrical and incomplete market information (Zanello & Srinivasan, 2014) because the information comes from a variety of agencies, government departments and private sector organisations. This means that it is difficult for smallholder farmers to access information. Table 7.7 shows the various ways that FFV growers obtain price information in the study region. The data shows that FFV growers prefer to ask themselves (self-enquiry, $\bar{x}=4.25$). The next preferred sources were commission agents or local trader ($\bar{x}=3.70$) and speaking with other farmers ($\bar{x}=3.17$). The least preferred source of information was farmer organisations or cooperatives ($\bar{x}=1.90$).

In order to overcome asymmetrical and inadequate information problems, developing countries must improve their Market Information System (MIS). This would encourage a more competitive economic environment by reducing informational asymmetry between agricultural buyers and sellers. The current study findings in Table 7.7 show that farmers rely on self-enquiry or information from traders. As traders are interested in making a profit, they may provide inaccurate information. Other sources, such as the government, cooperatives, and processing companies may provide better or more accurate information. Smallholder farmers need better access to market information (prices, quality, quantities, where to sell, and production technologies), that could be provided through the establishment of MIS overseen by the government and/or agricultural development partners.

7.1.1.5 Proximity to market

The distance from the farm gate to the market also affects fresh produce growers' participation in institutional channels. The distance to the farm gate variable is important as some smallholders have limited access to farm machinery and transportation. It assumes that farmers prefer to sell at the nearest market because it not only reduces their transportation costs but also the risk of food losses during transit. Smallholders who face high transportation costs might prefer to sell their produce at traditional wholesale markets. There are very few other studies that have examined this aspect of market participation, hence these findings are of some interest.

Table 7.8 FFV growers' distance from farm to market

Proximity to market	Frequency	Percentage
Within 10kms	20	10.0
Between 10 & 24kms	11	5.5
Between 25kms & 49kms	83	41.5
More than 50kms	86	43.0
Total	200	100.0

In the study region, the major traditional markets are within 50—70 kilometres, compared to institutional channels (processors), who, in the case of potato growers, are 170-180 kilometres away. The proximity of tomato growers to the closest processor varies from 30 - 60 kilometres. Interestingly, the current study reports that with proximity to the market of between 10 km to 25 km, not a single farmer found involved in the contract farming. Whereas Forty-five farmers in the +50km away group found selling to institutional processors via contract farming. This means they have a guaranteed market and a pre-arranged price giving assurance of compensation for the additional distance covered. Farmers who sell to processors must transport their stock on average 170km (from the Jalandhar region) and an estimated 200 km (from Amritsar). In the case of potatoes, processors reimburse the growers for transport costs in the final pay-out. The study's findings suggest that with an assured contracted price and timely payments, fresh grower farmers can supply produce for a distant market. Hence, traditional markets are favoured when nearby and this discourages institutional participation, but when more formalised exchange mechanisms are used such as contracts, institutional markets at some distance become viable.

7.1.1.6 Meeting grading and quality standards

The current study finds that the farmers who can meet grading and quality standards have higher levels of participation in institutional channels. Grades and standards are the quality parameters that segregate similar products into categories and describe them with consistent terminology that can be understood by market participants and priced accordingly. The specific quality (for example, appearance, cleanliness, taste), safety (for example, pesticide or artificial hormone residue, microbial presence), authenticity (guarantee of the geographical origin or use of a traditional process), are the main components of grades and standards (Giovannucci & Reardon, 2000). The grading requirements vary according to the nature of the crop and the mode of engagement. The ex-post costs for potato grading relate to size and sugar content, whereas for tomatoes, aesthetics (ripe red tomatoes) are important when selling to tomato processors.

The current study finds that in case of potatoes, food processors rely on written as well as verbal contracts with farmers to ensure that they have access to a stable supply of commodities that satisfy specific quality requirements, rather than relying on products purchased at the farm gate or from spot markets. Some contracts have specified requirements for processing such as a minimum landholding threshold. For example, in the case of potatoes, PepsiCo will only work with farmers who own a minimum of five acres of land. In the case of tomatoes, buyers are not required to have a particular sized farm. In terms of tomatoes, the only major processing requirement is the colour of the tomatoes. However, for spot markets, the size of the tomatoes is important for gaining higher prices and tomatoes must be packed in specific plastic crates (20 to 25kg each).

The current study finds that some contracts specifically mention a quality requirement, such as sugar content, or solids (between 15 and 20%) in case of potato processing for chips. PepsiCo is HACCP and ISO-certified and ensures quality compliance at every stage of farm to fork activities including, planting, field monitoring of production, storing, processing, and packaging. They seek to maintain quality at every step of the value chain.

Interestingly, the current findings show that traditional spot market buyers have stricter quality and grading requirements for tomatoes, whereas institutional channels have stricter quality standards for potatoes. The packaging requirements also less strenuous in case of tomatoes (field survey notes) for the institutional channel food processors. The tomato

growers must sell green tomatoes in the local markets at a lower price because processors will only accept ripe/red tomatoes. This study finds that despite being paid more if they use institutional channels, many growers prefer to sell at local spot markets because there is less chance of their produce being rejected based on quality, size, and aesthetics.

7.1.1.7 Access to technical assistance

The current research shows that access to technical assistance is positive and significant in smallholders' participation in institutional channels. Technical assistance such as vocational training increases farmers' understanding which leads to higher levels of production. Those farmers who have undertaken vocational training, have a greater probability of participating in institutional channels. As a result of the knowledge and skills farmers' received in vocational training, they have a greater ability to produce more. The current study results are positive and confirm this finding. Extension services provide agribusiness support for FFV producers in the study region, particular information about improved agricultural technology. Alwang et al. (1996) find that extension support helps reduce poverty in Zambia. However, for extension services to be effective, there must be institutions to disseminate knowledge, such as government institutes and universities.

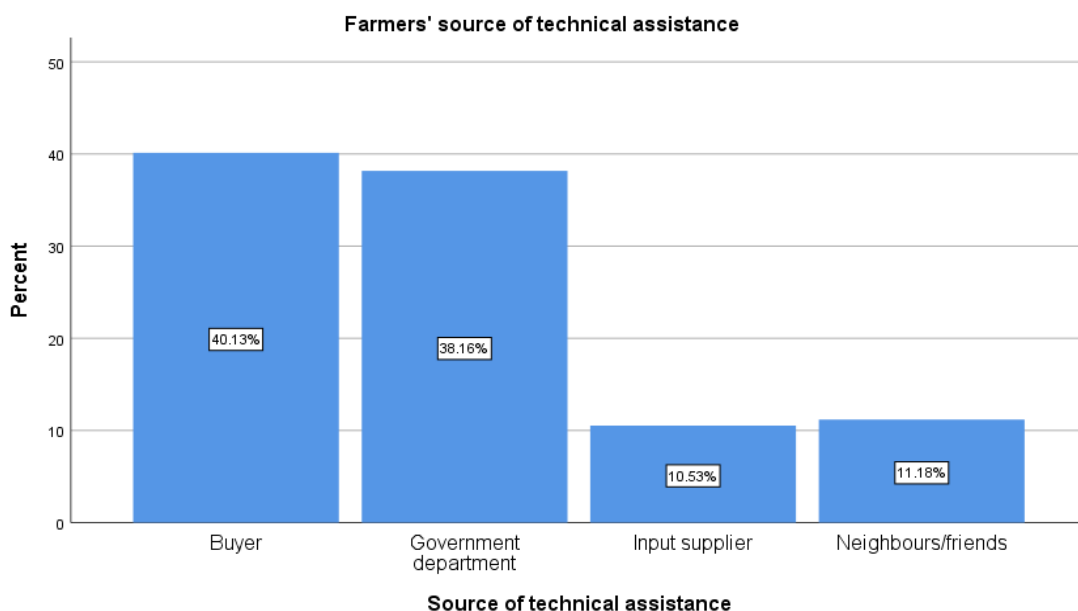


Figure 7.1 Sources of technical assistance in the study region

The field survey finds that many contracting firms (buyers) provide technical assistance in the study region. The processing firm's field officer offers technical support in terms of land preparation, nursery raising and adequate use of fertilisers, pesticides and herbicides. Figure

7.1 shows that circa 40% of FFV growers receive farm-related technical assistance from their buyers, thus reinforcing the relationship over the longer term.

The second source of technical assistance was from the Punjab Government Agricultural Department and the Punjab Agricultural University (PAU). PAU was established in 1962 to serve the state of Punjab. They organise open field days to introduce new technology and farm machinery and encourage the use of quality seeds and fertilisers and pesticides. Indeed, nearly 40% of FFV farmers obtain information from the Punjab Government Agriculture Department or Punjab Agricultural University (PAU), Ludhiana. PAU provides agricultural-related professional courses, advisory services and conduct agribusiness research (Singh et al., 2019). The study found that farmers who are in touch with university scientists benefit from the application of new knowledge.

Table 7.9 FFV growers’ source of technical assistance

		Relationship with buyer			Total
		Spot transactions	Word of mouth	Written contract	
Source of technical assistance	Buyer	8	24	29	61
	Government dept	20	26	12	58
	Input supplier	9	7	0	16
	Neighbours/friends	11	6	0	17
Total		48	63	41	152

The study also finds that farmers who have a written contract with buyers have a higher level of technical assistance. Table 7.9 shows that contracted farmers have greater access to technical assistance compared to spot transactions and word of mouth relationships. Further, the application of new agribusiness technology and dissemination of current knowledge to improve post-harvest handling systems (especially packaging and cold chain maintenance) require institutions. Because perishable fresh produce has both qualitative and quantitative food losses, to ensure quality and safety, farmers need this technical assistance to participate in institutional channels.

The current study finds that technical support institutions play a vital and positive role in smallholder farmers’ access to institutional channels. Interestingly, only partial support was found for the influence of farmer cooperatives on smallholder farmers’ market participation (discussed separately in section 7.2.3.). The current study also finds that informal collective action by farmer groups such as neighbours, family, friends and local religious groups also provides support for participation in institutional channels.

7.1.1.8 Access to formal credit

Similar to off-farm income, farm credit plays a vital role in agricultural growth, especially when farming practices are capital intensive. For many farmers, farm credit is essential for a growing number of day-to-day farm activities (Goel & Kaur, 2008; Hazarika & Alwang, 2003). The current study found that farm credit from a formal source positively affects smallholder participation in institutional channels. Agriculture-related activities cost money at different stages (from the planting stage to transporting products to end consumers). The need for credit can arise at any stage of FFV production.

Table 7.10 Effects of access to farm credit on FFV growers' agricultural practices

Effects of farm credit	N	Mean	Std. Deviation
Farm credit helps in paying advanced labour costs	196	4.71	.658
Farm credit helps in arranging transportation	196	4.55	.718
Farm credit helps me to buy quality seeds	196	4.50	.762
Farm credit Increase productivity	196	3.30	1.021
Farm credit helps me to buy farm machinery	196	3.20	1.104
Farm credit helps in arranging irrigation	196	3.16	1.273
Farm credit improves post-harvest practices	196	2.98	1.084

Table 7.10 outlines the effects of access to farm credit on FFV growers' agricultural practices in the study region. All cost segments are important, but arranging transport (\bar{x} 4.55), paying advanced labour costs (\bar{x} 4.71), and buying quality seeds (\bar{x} 4.50), are the primary reasons that farmers need credit.

Credit is a significant variable for fresh produce growers' market access. Various research studies suggest that farm credit has a positive influence on farmers' access to institutional channels. Osebeyo and Aye (2014) find a positive impact of credit on market participation of smallholder tomato growers in Nigeria. Lawal et al. (2004) find a positive association between access to farm credit and the adoption of an improved variety of cassava in Ghana. For the current study, while 100% of farmers have access to credit, non-institutional credit (informal credit) is recognised as a significant contributor over formal credit. However, the share of formal sources of credit has been increasing in Punjab over the years. Gill (2016) examines the nature, extent and evolution of the credit market and its relationship with agricultural development in Punjab. Comprising of both formal and informal sources of finance, the credit markets have gone through major structural transformations. While the cooperative banks were contributing more than 82% of total institutional finance in 1970, in 2012-2013 it is now

the commercial banks that contribute 78% of the agricultural credit in Punjab. Table 7.11 summarises various research studies conducted in Punjab on institutional credit markets. Most studies find commission agents are the most significant contributors.

Table 7.11 Agency (%) share of agricultural credit in Punjab

Credit agency	Shergill (1998)	Satish (2006)	India (2005)	2005-2006 (Singh, Kaur, et al., 2009)	2010 (Shergill, 2010)	Current study
Commercial banks	19.42	24.43	28.40	44.65	31.78	47.5
Cooperatives	27.14	30.12	17.60	17.28	18.91	23.5
Commission agents	46.32	45.45	44.50	31.98	43.36	29**

** Commission agent includes credit raised from relatives. Source: (Gill, 2016)

The current study's findings are similar to Singh, Kaur, et al. (2009) who also find that commercial banks are the main contributors of farm credit in Punjab. It may be because contributions from commercial banks have increased over time. Table 7.12 presents the rising share of formal credit in the total percentage of farm credit in Punjab.

Table 7.12 Institutional credit flows to agriculture in Punjab (in percentage form)

Year	Commercial banks	Cooperative banks	Regional rural banks	Total
1970-71	17.62	82.38	-	100
1980-81	37.54	62.46	-	100
1995-1996	38.99	59.02	1.99	100
2000-2001	50.67	46.75	2.58	100
2004-2005	60.15	36.59	3.26	100
2010-2011	80.83	14.75	4.42	100
2012-2013	78.11	15.83	6.06	100

Source: (Gill, 2016, p. 172)

Another study conducted by Singh (2016a) highlights the function of the informal and interlinked agrarian credit markets using a survey of commission agents (rural moneylenders) in the state of Punjab. The study concludes that imperfect information makes the rural credit market favourable to commission agents. This current study supports these findings, although there has been a marked shift in the agrarian credit market, from informal moneylenders to the formal source of credit, yet informal lenders still exist.

7.1.2 **Objective 2: Identify the mode of market engagement to ensure FFV growers' participation in institutional channels**

The second objective of this study is to identify the mode of market engagement that ensures smallholder farmers can participate in institutional channels. The current study finds that it is contract farming that increases smallholders' participation in institutional channels. These findings are partially consistent with previous research and this will be explained in the following section. The current study shows that contracted farmers have higher rates of participation in institutional channels; however, only approximately 21% of the farmers in the sample have written contracts. This is because agribusiness transactions for FFV are highly uncertain due to the products' perishable nature and sensitivity to climate conditions. The risk of crop loss due to uncertain weather conditions, pest attack and value loss due to changes in product characteristics is higher for FFV production compared to staple crops.

NIE provides a useful theoretical framework for explaining the existence of, and theoretical rationale, for contract farming. This is because market failure problems and missing markets are typically caused by asymmetric information and a range of other factors that impact on transaction costs. The current study suggests that transaction costs play a critical role in smallholders' participation in institutional channels. Traditional spot market transactions benefit buyers and suppliers only in two conditions; first, the presence of standards and rules in the industry, second, parties must have perfect information about product attributes (North, 1995). When there are no rules, standards and information are asymmetric, either party may choose to maximise their self-interests as opposed to serving the interests of the supply chain as a whole (Williamson, 1979). In these situations, the application of power serves to extract rent, and this power is typically wielded by the larger buyers over the smallholder farmers. Indeed, there are various transaction cost components that farmers consider when selling to institutional channels. The survey results in Table 7.13 show the various requirements smallholders' consider when selling to institutional channels.

Table 7.13 Requirements smallholders consider when selling to institutional channels

Requirements to sell to institutional channels	N	Mean	Std Deviation
Quantity	169	4.63	0.669
Variety	166	4.07	1.042
Frequency	166	3.88	1.164
Food Safety	164	3.83	0.957
Quality	166	3.70	1.07
Packaging	166	3.67	1.028

While the descriptive statistics show that all requirements are significant, quantity ($\bar{x} = 4.63$) and variety ($\bar{x} = 4.07$) are the two top requirements, followed by frequency ($\bar{x} = 3.88$), safety ($\bar{x} = 3.83$), quality ($\bar{x} = 3.70$), and packaging ($\bar{x} = 3.67$). FFV growers consider each of these aspects when deciding whether to sell to institutional channels.

As noted previously, the transaction costs associated with uncertainty, asset specificity and the frequency of transactions affect smallholders' participation in institutional channels (Blandon, 2006). Asset specificity, uncertainty and frequency are three critical components of TCE and affect all agribusiness transactions. In this research context, asset specificity includes transportation, collection and distribution centres available for FFV products. The frequency includes the number of FFV product delivery and months of crop production. Similarly, uncertainty occurs when farmers have no prior information about the production and marketing of FFV products. The uncertainty involved in agribusiness includes output risks, FFV quality requirements and price variability (Blandon, 2006), as well as climatic and biological variables. The next section discusses the factors that smallholder FFV growers consider before agreeing to contract farming.

7.1.2.1 Pre-agreed price

The current study finds that a pre-agreed price lowers farmers' uncertainty about the crops harvest price. These findings are in line with the NIE framework, that suggests that factors, such as uncertainty, asset-specific investment and frequency shape the buyer/supplier relationship. Indeed, this study finds that smallholders are initially motivated to sell to institutional channels by the higher price (compared to the traditional wholesale market). Notably, contracted farmers receive a higher average price for both potatoes and tomatoes by selling through contracts than when selling through the traditional wholesale markets. Table 7.14 shows that the price that contracted farmers received by selling through

institutional channels was higher compared to those non-contracted sellers who at the traditional market in the case of potatoes. In the case of tomatoes, the maximum price received by traditional market farmers find slightly higher but the average price received by contracted farmers was higher at institutional channels.

Table 7.14 Average price received by contracted selling through institutional channels (potato processors) and non-contracted farmers selling at traditional wholesale markets (Rupees per KG)

Crop	Tomato			Potato		
	Min	Max	Ave	Min	Max	Ave
Non-contracted	2	6	4	1.3	7	4.15
Contracted	3.5	4.75	4.125	6	12	9

These findings are similar to Miyata et al. (2009), who reports that in China, 53% of farmers sign contracts with supermarkets because they receive a stable or guaranteed fixed price. Ngugi, Gitau, and Nyoro (2007) also report similar findings in the case of supermarkets in Kenya, where contracted smallholders realise higher prices compare to non-contracted farmers.

The reason for this preference might be the pre-agreed fixed rate of the minimum guaranteed price offered in institutional channels, that is otherwise volatile in the traditional markets. The current study finds that at the start of the harvesting season when fresh produce first comes to market, and supply is limited; the price is higher in the traditional markets. In short, farmers who sell their produce at the traditional wholesale market at this time are better off. However, as the supply increases, the price naturally decreases. In contrast, while the price remains the same in institutional channels, farmers who sell their products to this market are overall better off when viewed over the entire growing season. Yet, the temptation to speculate in the early season sales is strong for smallholders.

7.1.2.2 Smallholders' access to resources

Along with the higher price offered by institutional channels, this study identifies technical assistance as another factor that motivates farmers to join sign contracts. Contracting allows farmers to overcome barriers associated with entry into risk-prone high-value crops. Farmers usually enter into contract production in order to reduce their costs and gain access to information, technology, marketing channels, managerial skills, technical expertise, plants and

equipment and patented production procedures (Gulati et al., 2007). Contract farming also means that FFV growers can gain access to capital and farm credit (Alene et al., 2008).

In the study region, FFV growers reported that the potato processing company’s field officer visits multiple times over the entire season (from crop planting to harvesting). The tomato processor’s field officer also visits farms multiple times to advise them on various technical issues, from planting to harvesting. Potato processors offer seeds and inputs. Some potato growers prefer to buy seeds from the market at a lower price but use the specified variety. Tomato growers generally used their nursery or seeds locally sourced from large, nearby farms.

Table 7.15 Technical assistance related to the mode of market engagement

		Relationship with market			Total
		Spot transactions	Word of mouth	Written contract	
Technical assistance	Yes	46 (63.0%)	62 (76.5%)	40 (88.9%)	148 (74.4%)
	No	27 (37.0%)	19 (23.5%)	5 (11.1%)	51 (25.6%)
Total		73 (100.0%)	81 (100.0%)	45 (100.0%)	199 (100.0%)

Table 7.15 shows that farmers with written contracts have a higher percentage of technical assistance from buyers, 88.9% compared to; 76.5% word of mouth and 63% spot transactions. Along with above-discussed motivations, institutional channels have minimum quality and quantity or acreage (minimum/maximum) standards and timely delivery requirements. The current study finds that in case of potatoes, food processors rely on written as well as verbal contracts with farmers to ensure that they have access to a stable supply of produce that satisfies specific quality requirements rather than relying on commodities purchased at the farm gate or in spot markets

7.1.2.3 Avoiding uncertainty

FFV products are highly perishable and seasonal. The supply of vegetables is volatile, due to unpredictable weather and biological hazards. Food quality and safety issues are especially important in FFV production. These characteristics mean that there is a high degree of uncertainty associated with FFV transactions.

While contractual certainty offers assured and relatively higher prices compared to traditional spot markets, farmers must meet strict quality and grading requirements. In the study region

farmers faces strict quality requirements from Potato processors. The quality requirements mainly associated with size, and sugar content in chip grade potatoes. The farmers contracted with PepsiCo realised higher price compared to those selling at the traditional market. Some occasions they face rejections those offset the higher realised price and farmers left with only option to sell at the local market at a lower price. Similar to the current study, in Mexico, supermarkets pay higher prices to contract farmers, but higher standards and quality rejections offset the final value received by farmers (Schwentenius & Gómez, 2002). Consequently, the strict quality and grading restrictions offset the higher contract prices, bringing them closer to the spot price found at the traditional market.

These characteristics mean that there is a high degree of uncertainty associated with FFV transactions. Considering the first component of TCE (uncertainty), the current study reports that farmers who have been offered contracts with an assured price and quantity tend to participate in institutional channels. From an agribusiness firms' point of view, the benefits associated with contract-farming are reduced costs, the ability to control quality and less uncertainty about the supply of raw material (Kirsten & Sartorius, 2002).

Transaction costs are reduced as a result of a more coordinated input-output processing function. The company can ensure that the quality of large volumes of the raw commodity is better controlled and that producers adopt the company's technology (Minot, 2011; Miyata et al., 2009). Another benefit of contract farming to agribusiness firms are owing to a relatively stronger bargaining position in the contractual arrangement. The agribusiness is also able to influence commodity prices in festive seasons (Delgado, 1999). Agribusiness retail chains benefit from contracting because the quality of inputs is more consistent and there is less customer dissatisfaction (Singh, 2009).

However, there are disadvantages associated with contracting as well. The main disadvantage associated with contract farming in developing countries is the high transaction costs due to dealing with a large number of smallholders from the buyers perspective. Transaction costs are often excessive in projects involving numerous smallholders who are spatially dispersed, require high levels of inputs and support and who make smaller, more frequent deliveries to the agribusiness (Key & Runsten, 1999).

From the FFV growers' point of view, the first reason farmers prefer contract farming is due to the uncertainty around the final output and the volatile price in the spot market (due to

seasonal oversupply). Contracting thus the farmers' production risks to an acceptable level' and reduces the uncertainty of large volumes of input (raw material) supply (Kirsten & Sartorius, 2002). The second reason might be that institutional channels usually adopts vertical coordination to ensure control over the production processes. This enables buyers to procure specific FFV products that meet their processing requirements and standards (Young & Hobbs, 2002).

Consumers face a high degree of uncertainty in terms of quality, making them less inclined to pay a premium for produce. This often means that farmers are hesitant to improve product quality. Farmers face high levels of demand uncertainty because of the perishable, seasonal nature of their products, and changing consumer preferences. Farmers need timely information, targeted training, and guaranteed markets to deal with demand uncertainty. Through the provision of appropriate inputs, market information, technical assistance, and quality inspection and sorting, contract farming arrangements or cooperatives may help to reduce uncertainty. These institutions provide quality control and reduce the quality and quantity of information asymmetry between farmers and buyers (Minot, 2011; Royer, Bijman, & Bitzer, 2016).

7.1.2.4 Input support

Contract farmers can reduce their production costs and increase production and income as a result of the adoption of new technology and access to company inputs (Kirsten & Sartorius, 2002). Contract farmers can reduce marketing risk and stabilise their income. In this sense, the integrator provides a form of insurance (Key & Runsten, 1999). Contracted farmers in developing countries can increase profit opportunities through a greater product range and differentiated FFV products, or by growing high-value crops rather than traditional ones (Delgado, 1999).

In the current study, potato processors provide quality seeds on advanced credit to contracted farmers. The processing company's agricultural field officer provides technical assistance and information about land preparation, width and depth of planting, use of fertilisers and agrichemicals. Moreover, the field officer conducts three farm visits to monitor plant growth according to company requirements. Similarly, tomato processors provide quality plants to contracted farmers, raised at the company's nursery. Similar to potato processors, they appoint a field scientist who provides farmers with technical assistance. Some companies

deduct the cost of seeds from the farmer's final payout. Agribusiness literature suggests that institutional channels assist smallholders by providing advanced input, credit and technical support. They provide these input services to ensure that the FFV meet their quality, size, and grades. Hernández et al. (2007) report that institutional channels provide input supply, credit and technical assistance to producers in Guatemala. Boselie et al. (2003) report similar findings in the case of Zimbabwe, where Hortico supermarkets provide FFV growers with production inputs and credit. Louw et al. (2006) also find that the SPAR supermarket in South Africa offers interest-free loans to smallholder FFV growers. All of these factors have been confirmed as pertinent in this research.

7.1.2.5 Asset specific investments

Asset specificity deals with the degree to which a particular asset can be redeployed for alternative uses. Asset specificity is a term related to the inter-party relationships of a transaction. It is defined as the extent to which investments made to support a particular transaction have a higher value to that transaction than they would have if they were redeployed for any other purpose. On one side, FFV producers require specific investments for land preparation, specific seeds and inputs, greenhouses, and irrigation systems, that might not be required for staple crops like wheat and rice (Gulati et al., 2007). On the other side, processing firms have asset-specific investments in plant and machinery and have limited alternative uses for these assets. These asset-specific investments force FFV growers and institutional channels to theoretically use vertical coordination.

Interestingly, the current study finds that contracted FFV growers are not influenced by distance to market or frequency of obtaining market information. But asset specificity was higher for farmers due to the nature of FFV products and specific food processor product requirements. Maturity at harvest also affects its marketability and storage life, nutritional content, freshness and flavour. In the current study, tomato processors will only accept ripe red tomatoes (they reject all green coloured produce). A specific variety of tomato is used for groups of products use different varieties such as ketchup, sauce, juice, puree, pasta sauce, salsa, tomato-based powders, sun-dried tomatoes, curries and ready-to-eat products. Thus, tomato growers must wait for harvesting until the product has completely ripened or reached to expectations of the buyers. This condition makes it difficult for farmers because they often have to organise labour on short notice. Farmers reported that they are often expected to provide accommodation, fuel and food options to retain farm labour in busy harvesting times.

If they delay picking the tomatoes, they may lose some of their crops and ultimately their profits.

In contrast, at the traditional market, wholesalers demand that tomatoes are harvested at the colour break stage (so they can transport them to distant markets), and the fully red/ripe stage for local markets. Due to a lack of temperature-controlled logistics, farmers sometimes sell their produce at a lower price in the nearby wholesale market to avoid suffering food losses.

Similarly, potato processors demand a specific variety, with low sugar content and a minimum size (45 mm size potatoes) for chip processing (field survey notes). In the case of potato growers, asset specificity is very high, because when growers sign contracts with potato processors, they use a specific sized variety of chip grade potato, with a low sugar content that has a higher production cost (Rs 8 to Rs 9 per kg) compared to the table potato variety which has an average production cost Rs 4.5 to Rs 5. Potato processors reject more produce based on quality standards, meaning that growers are particularly vulnerable because they receive prevailing market price (a lower price compared to the contracted price) at the wholesale markets for the rejected volumes. During the field survey farmers reported that, overall, they were better off contracting with institutional processors. However, they noted that they lost money on the stock that was rejected by the processors.

7.1.2.6 Frequency of transactions

The third component of TCE, transaction frequency, is applicable for this study as the frequency of transactions affects transaction costs. Institutional channels consider consistency in terms of quality, aesthetics of the product, and frequent shipments to ensure year-round production (Berdegué et al., 2005). Table 7.13 (located at the start of this section) shows that the frequency of transactions was the third most important consideration for farmers who sell to institutional channels.

In the study region, tomato processors require three shipments of ripe/red tomatoes three times a week. In contrast, contracted potato growers coordinate with the company procurement officer before harvesting and transporting the produce. However, the procurement of raw material from traditional spot markets is problematic for institutional channels. This is because institutional channels consider consistency in quality and regular shipments that involves high transaction costs if they have to procure from spot markets. Therefore, appropriate governance structures or high-levels of trust between parties are

needed to lower transaction costs. Williamson (2004) suggests the adoption of appropriate governance structures according to the level of assets specificity, uncertainty and frequency of transactions. They can be in the form of spot markets, hybrids, or hierarchy, but must be based on the quantum of transactions (Peterson et al., 2001).

The next section of the chapter discusses the third objective, which was to determine the role of collective action on FFV growers' participation in institutional channels.

7.1.3 Objective 3: Determine the role of collective action on FFV growers' participation in institutional channels

The current study hypothesised (H_{15a} and H_{15b}) that cooperative membership and experience in years would be a statistically significant influencer of FFP grower participation in institutional channels. However, there were mixed results. While cooperative membership is a significant factor in participation in institutional channels, experience (in years) is not.

The findings of the current study are partially in line with existing studies that suggest that collective action among farmers enhance their chances of participating in high-value crops (Berdegué Sacristán, 2001; Boselie et al., 2003; Henson et al., 2005; Minten et al., 2005). Similarly, Jagwe (2011) finds that group membership lowers the transaction costs and increases smallholders' market participation in high-value crops in Africa. Indeed, the current study finds that collective institutions perform some functions that benefit smallholders. In the study area, approximately 81% of farmers were members of either state-run cooperatives or farmer organisations. The production and marketing services offered to FFV producers from state-run cooperatives were limited in the study area. Researchers have argued that the role of collective efforts and farmer organisations should not be limited to just the initial establishment, but also in organising them in such a way that they contribute to joint marketing and value-adding operations (Barham & Chitemi, 2009; Hellin et al., 2009; Kaganzi et al., 2009; Markelova et al., 2009).

In Punjab state, state-run cooperatives provide credit and input supply services; seemingly the only two motivations for farmers to participate in state cooperatives. According to the statistical abstract of the government of Punjab for the year 2016-2017, there were 17,902 cooperatives societies and 5.313 million members and 67,304 rs crore working capital (GOP, 2016). While several farmers' organisations exist in the study region, they mostly exist to lobby the government for better staple food prices. Collective actions for marketing and

collaborative mechanism were low to non-existent in these farmers' organisations. Overall, there was no evidence of any collective marketing for FFV by cooperatives, either state-run or farmer organisations in the sample.

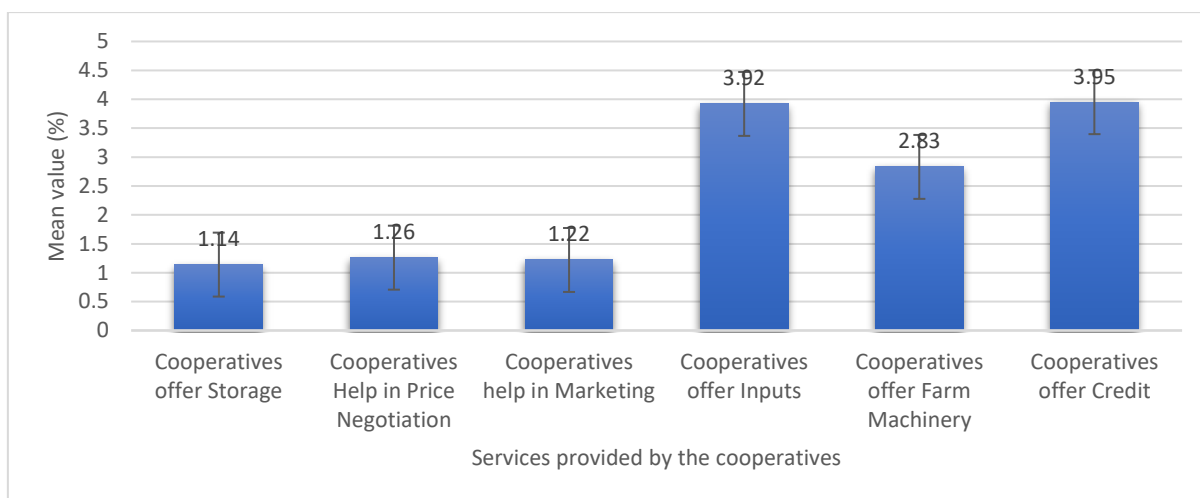


Figure 7.2 Services offered by FFV cooperatives in the study region

Even though farmers are cooperative members, these groups offered very limited marketing services. Figure 7.2 shows that production services (inputs and credit) are the highest values in term of services offered by cooperatives. In the sample region, the Punjab Agro Industries Corporation (PAIC), is the premier cooperative organisation. It was established by the Punjab government, and is entrusted with the promoting and facilitating FFV production, including agro-processing (GOP, 2016). However, the PAIC has a limited impact on FFV collective marketing and processing as found in these results.

From a smallholder's viewpoint, collective action leads to economies of scale and lowers transaction costs (Poole, 2017). The NIE framework suggests that institutions help to lower individual farmer's transaction costs (Alene et al., 2008; Hobbs, 1996; Hobbs & Young, 2000). Along with formal institutions (contracting), informal institutions (customs, traditions, religious groups) also influence smallholder marketing (North, 1995). The current study findings suggest that neighbours and family friends create socio-religious solidarity to help each other, especially in relation to small farm credits and agricultural machinery.

These informal farmer networks are significant in the study region. Farmers help each other by sharing new production methods, price information, and agricultural machinery. They also

help each other with small amounts of microcredit. Neighbours and family friends are common forms of informal networks in the farming community.

Table 7.16 Source of technical assistance for FFV growers in the study region

Source of technical assistance	Frequency	Per cent
Buyer	61	30.5
Government department	58	29
Input supplier	16	8
Informal cooperatives (Neighbours/friends)	17	8.5
Sub Total	152	76
No technical assistance	48	24
Total	200	100

The current study finds that farmers sometimes share agricultural machinery or help each other in varying amounts, share information about the production, product handling and post-harvest disposal of products. Table 7.16 shows that 8.5% of smallholders access technical assistance informally through neighbours/friends. The major component of technical assistance includes information about the right quantity and quality of seeds, pesticides and fertilisers. These informal groups are connected through social and religious solidarity. Similarly, Table 7.17 shows that 23.5% of smallholders share agricultural machinery with neighbours and friends.

Table 7.17 Percentage of FFV growers who share machinery with neighbours/friends

Share machinery with neighbours/friends	Frequency	Percentage
Yes	47	23.5
No	152	76
Total	199	99.5

Interestingly Punjab is a highly mechanised state with an average of one tractor per 8.71 hectares of the net cultivated area which is much higher compared to the national average of one tractor per 62 hectares in India (Singh & Singh, 2016). There are several reasons in the lower percentage of farm machinery shared by study region's farmers. One reason might be the ownership of farm machinery, especially tractor considered as a symbol of social status in Punjab. Another reason is the limited period between the crop farmers harvest and the next crop they plant. To avoid delay (uncertainty) in plantation, harvesting and transportation of agriculture produce to the market, farmers prefer to own the farm machinery (Singh & Singh, 2016).

While the limited function of cooperatives in FFV marketing in India has been discussed by various researchers (Negi, 2018), there are examples of successful marketing by other cooperatives in Punjab. The Punjab State Cooperative Milk Producers' Federation Limited (Milk Fed) has been a success story in the sample region in milk collection and value-adding. Milk Fed's three-tier structure comprises of 6,500 producer cooperative societies at the village level (VCS – the site of milk procurement every morning and evening), with approximately 0.4 million farmers that form 11 milk unions (MUs) at the district level. Milk Fed collects an average of 0.74 million litres per day, with a peak of one million litres. Kanupriya and Devesh (2012) find that many farmers have profited by becoming members of the dairy cooperative Milk Fed in Punjab (India). The processing and value addition of milk which meets international food safety standards has made Milk Fed a success story. Sadly, this is not true in the case of FFV cooperatives in the sample region.

The current study finds two types of collective action organisations work for farmers in the study region. An informal farmer group called the 'Kisan Union' unites farmers at the local level and offers them organisational services. These informal groups are religiously and socially associated and are influenced by political parties to some extent. During the field survey, several informal farmers' organisations were found in the study region, but their functions are primarily to act as a pressure group on the government to gain better prices for staple foods.

The second type of farmer organisations are the state-run traditional cooperatives. The state-run cooperatives focus primarily on providing services to farmers who grow staple crops, produce dairy or process sugar but not FFV. Figure 7.3 depicts the major state-run apex cooperative federations:

Punjab state cooperative bank ltd (PSCB)
The Punjab state cooperative agricultural development bank (PSCADB)
The Punjab state cooperative milk producers federation ltd (Milk fed)
The Punjab state cooperatives supply marketing federation ltd (Mark fed)
The Punjab state federation of cooperative sugar mills ltd (Sugar fed)
The Punjab state federation of cooperatives house building societies ltd (Housefed)
The Punjab state cooperative labour and construction federation ltd (Labour fed)
The Punjab cooperative of institute training (PICT)
The Punjab state cooperative development federation ltd (Puncofed)

Figure 7.3 Major apex cooperative federations in the state of Punjab

In the study region, the Punjab State Cooperative Supply and Marketing Federation (Markfed) seems to be the most relevant state-run cooperative. Markfed, one of Asia’s most extensive marketing cooperative, established in 1954, has over 3,000 cooperative societies at a block-level, and an annual turnover of INR 11,600 crores (in the year 2013-14). Markfed has emerged as a reliable cooperative organisation committed to providing agricultural procurement and allied services like insurance, technical assistance, and agrichemical products at reasonable rates in Punjab (Singh & Singh, 2016).

The agribusiness literature discusses various services offered by collective organisations, including, production, marketing, financial, education and welfare services (Hellin et al., 2009; Markelova et al., 2009; Narrod et al., 2009). Table 7.18 compares the services that have been identified by previous research and the current study findings.

Table 7.18 Services offered by farmer organisations to members

Services	Description of services	Study region findings
Organisational services	Organising farmers, building capacity, establishing internal monitoring systems	Partial, limited only to organising
Production services	Input supply, facilitation of production activities	Provide input supply and agrichemical products
Marketing services	Transport and storage, processing, market information, branding, certification	No
Financial services	Savings, loans, and other forms of credit, financial management	Yes
Technology services	Education, extension, research	Partial
Education services	Business skills, health, production	No
Welfare services	Health, pasture, fisheries, forests, soil conservation policy advocacy	Partial, health insurance limited access

Source: (Kaganzi et al., 2008; Markelova et al., 2009)

The current study finds that traditional state-run cooperatives only partially work for smallholder farmers. Indeed, cooperatives primarily provide production services to smallholder farmers: input, fertilisers, credit and farm machinery. Overall, cooperatives provide limited services for FFV growers. Various researchers have discussed the inefficiencies of cooperatives in FFV marketing in India (Negi, 2018; Trebbin & Hassler, 2012). The apex body designated for agricultural supply and marketing (Markfed) is not efficient in procuring and processing FFV in the study region. Markfed procures wheat, rice, and oilseeds on behalf of the Indian government and offers guaranteed minimum support prices. Markfed has a limited role in the marketing and supply of FFV; it only provides technical assistance, credit and agrichemical products.

Most of the FFV growers sell directly to either to processors or traditional markets. Many farmers choose not to participate in cooperatives because of a lack of transparency and political interference. Figure 7.4 shows the factors responsible for FFV growers' dissatisfaction with cooperatives in the study region.

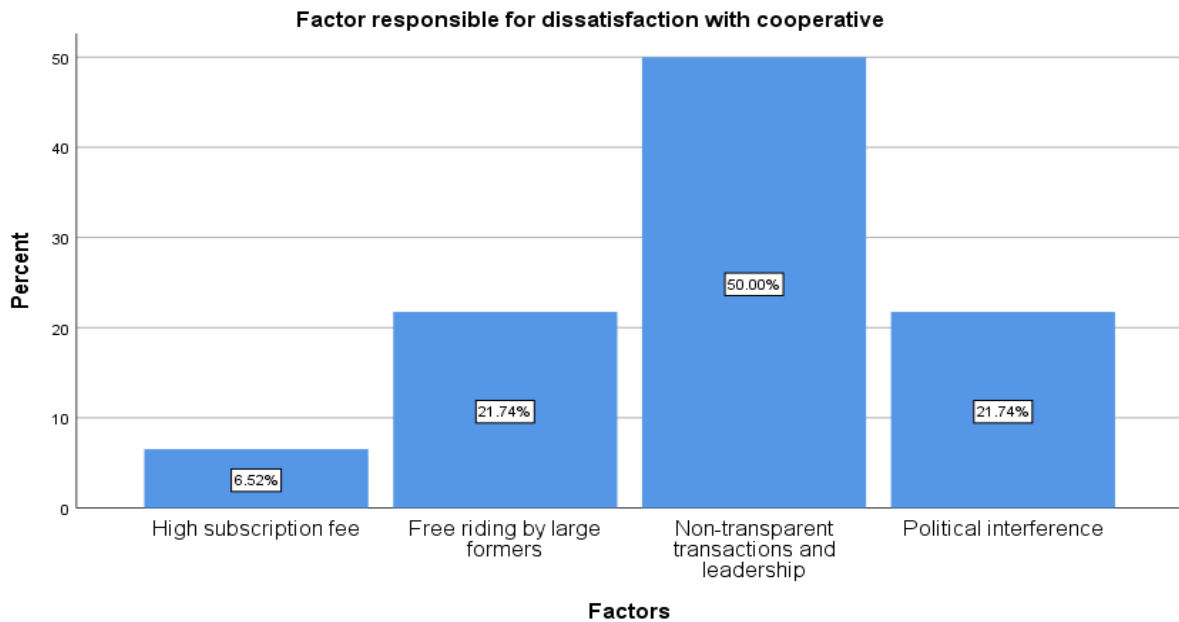


Figure 7.4 Factors responsible for FFV growers' dissatisfaction with cooperatives

During the field survey, there were several issues discussed by respondents that restrict them to join cooperatives. The cooperatives societies in the study region found under the enormous pressure of politicians. The ruling political party local leaders have control over the positions

of the board of directors and other decision making positions. It was found in most of the cooperative institutions such as cooperative banks and other cooperative societies. The local politician uses their power to influence local processors to give priority to their party supporter FFV growers' when they deliver fresh produce (in case of tomatoes) in Amritsar region (Field survey notes). Therefore political interference becomes major issue farmers dissatisfaction with cooperatives in the study region. These unexpected results could also be due to the fragmented nature of farmers in the region and no collective voice. In the sampled region, farmers' unions were found to be ineffective. The collective farmers' movements are highly fragmented. Although there were fifteen active farmers' unions in the region, none of them provides marketing and storage facilities (Singh, 2012b).

For the solution of this problem, the critics and agribusiness researcher in India have been advised new generation cooperatives and farmers producer companies to include smallholder farmers in institutional chains (Trebbin & Hassler, 2012). Co-operatives, in general, have suffered from the problems globally and failed with some exceptions. In the light of the previous experience of the poor performance of traditional cooperatives in India, it was felt that there was a need to give more freedom to cooperatives to operate as business entities in competitive markets. Producer companies came into existence with the amendment of Section 581 of the Companies Act, 1956, in 2003 (Trebbin & Hassler, 2012). A producer company operates under the regulatory framework that applies to companies, which is distinctly different from that of the cooperatives, which was seen as arbitrary and corrupt. A producer company can be registered in India under the provisions of Part IX-A, chapter one of the Companies Act, 1956. The objective of the said company can be production, harvesting, procurement, grading, pooling, handling, marketing, selling, the export of primary produce of the members or import of goods or services for their benefit. Its membership can be 10 or more individual producers, or two or more producer institutions or a combination of both. It retains the one member-one vote principle irrespective of shares or patronage, except during the first year when it can be based on shares. Like traditional cooperatives, it provides a limited return on capital but can give a bonus or bonus shares based on patronage (Singh & Singh, 2012).

7.1.4 Objective 4: Provide recommendations to enhance market participation and maximising FFV growers' returns

In India agriculture has always been the most important sector. It currently accounts for more than 17% of GDP. More importantly, 51% of the population is dependent upon it for their livelihoods (Singh & Singh, 2016). Punjab is known as an agriculturally developed state in India. There is good roading infrastructure, the farmers have assured irrigation and produce a surplus of staple crops such as wheat and rice (Sidhu, 2016). The favourable climate provides a comparative advantage in terms of the production of several FFV crops, and for some crops, more than one harvest per season (Birthal et al., 2005). The current study finds that despite having a surplus and various agricultural and allied commodities, the level of processing and value addition of FFV products is low in the study region. The next section provides some recommendations for enhancing market participation and maximising FFV growers' returns.

7.1.4.1 Recommendations for Policymakers

7.1.4.1.1 *Enhance the capacity of the food processing sector*

The current rate of post-harvest losses is between 7.5-20% of the volume. Several weak inter-sectoral linkages contribute to this wastage (Singh & Singh, 2016). The processing of fruits and vegetables is minimal in the State compared to more developed countries (Singh, 2012b). Indeed, agricultural production is focused on two main crops (wheat and paddy) that contribute to the national food basket and food security. In the year 2010-2011, Punjab with 1.53% geographical land area of India, contributed approximately 39% of wheat and 27% of rice to the central pool of food grains in India (Sidhu & Vatta, 2012). While a small proportion of FFV products is processed, the current study finds that due to the limited number of food processing actors within the industry, there are numerous food losses. Food losses occur during harvesting, transportation and as a result of quality rejections (value loss). The current study also finds that farmers selling to institutional channels have high rejection rates, between 20-30% in the case of potatoes. Table 7.19 shows the main reasons for food losses in the study region.

Table 7.19 FFV growers' major reasons for food losses

Reason for food losses	N	Mean	Std. Deviation
Price does not cover the expenses	195	3.64	0.997
Quality based rejection	196	3.35	1.147
Shortage of labour	193	2.91	0.947
Distance from market	194	2.18	0.971
Lack of cold storage	194	1.77	0.822

Quality rejections ($\bar{x} = 3.35$), and 'price does not cover production expenditures' ($\bar{x} = 3.64$) are the two major reasons for food losses highlighted in the study region. Due to institutional food processors' specifications, approximately 5% of small-sized potatoes are dropped in the field at harvest time because chip grade potatoes must be a minimum of 45 mm size (field survey notes). Quality based rejections are high in the case of potatoes because of strict quality and grade requirements. Farmers must also test the sugar content at local laboratories before transporting their produce to the factory. Rejections at the factory gate remain high, and farmers are forced to sell rejected produce at traditional spot markets or to other small less-organised processors nearby (field survey notes).

One farmer of Lahdara village said;

"Sometimes, we face high rejection due to the quality and high level of sugar content. Then we sell rejected potatoes at Jalandhar traditional wholesale market. The price at the traditional market depends on the supply of crop on that day. After rejections at the processor, sometimes we cover the production cost or not even that" (field survey notes).

Loss can also occur due to the long delivery times at the factory gate. A few tomato farmers said it was because of the low processing capacity of the processing firms;

"We have been reducing the area of tomatoes under cultivation due to lack of market arrangements and increasing demand for 'chilli's'. Both processors have not adequate processing capacity, and we must wait for a long time, which results in loss of value and dripping tomato juice" (field survey notes).

Another farmer said;

"We have a word of mouth contract with the tomato processing plant. If processing plant breakdown and not working for a few days, we forced to sell tomatoes at the

open market. It is almost impossible to sell ripe red tomatoes of the final stage at the spot market which has strict requirements.”

Due to low processing capacities and rejections at institutional channels, farmers rely on traditional spot markets. The current study finds that FFV growers could produce larger quantities of good quality fresh produce, but if they do not have a reliable, fast and cost-efficient means of getting their produce to consumers, there is no profit in doing so. The inefficient marketing system and a lack of processing capacity lead to food losses which are reflected in reduced final profits for the farmers.

The current study recommends that the food processing industry be inter-linked sectorally to absorb FFV output. The state of Punjab should also consider exporting excess produce to neighbouring states and/or different countries. Some farmers noted that if the Indian government promoted bilateral trade with Pakistan, their livelihood would be improved. Pakistan has a high demand for tomatoes and borders the study region.

7.1.4.1.2 Provide infrastructure for integrated communication systems and temperature-controlled transportation

Along with enhancing the capacity of the food processing sector to avoid food losses and realise better price for FFV growers, another option includes developing integrated communication systems and introducing temperature-controlled transportation of FFV to other states. This would be possible with public and private investment in infrastructure (Singh (2005) because market access for smallholders depends on; (a) their ability to compete in the market and their understanding of the markets; (b) organisation of the firm or operations; (c) communication and transport links; and (d) an appropriate policy environment. When FFV products are rejected by institutional channels, 70.5% FFV growers sell them at the nearest traditional spot market at a lower price (see Table 7.20).

Table 7.20 FFV growers’ disposal of rejected produce

Disposal of rejected produce	Frequency	Percentage
Sell at low price	141	70.5
Dump	49	24.5
Eat (family & friend)	4	2.0
Store and sell later	3	1.5
Other	1	.5
Total	198	99.0

The second most frequent mode of disposal of rejected produce is dumping (24.5%) the rejected/unsold FFV products. Due to the perishable nature and short self-life of these products, farmers are left with limited options. In short, dumping the products may be the most economical method of disposal. In the case of tomatoes, one farmer said;

“Sometimes, we wait at the farm gate more than 48 hours to deliver tomatoes. Due to hot temperature and perishable nature of tomatoes, produce start dripping and resulted in net weight loss to us” (field survey notes).

The study notes some similarities with the potato supply chain, that is a principal vegetable crop in Punjab. During 2012–13, about 70% of the area under vegetable cultivation was potatoes (GOP, 2016). In the case of a good harvesting season, the price of the potato crop goes down considerably in the wholesale market. In cases like these, farmers store potatoes in cold stores and wait for a higher price (like a rise in demand in the off-season). Alternatively, if the price stays constant in the off-season and the new crop arrives at the market same time, then there is a glut in the market. Left with the limited options, farmers must sell at the prevailing price in the market or dump their products to clear the cold stores (field survey notes) otherwise storage charges become excessive. One farmer referred to the 2016-2017 season;

“We have the best harvesting season this year, but with cold stores still stocked with 25 per cent of last year’s harvest, the wholesale rate of the crop is dropped to Rs 2.50 to Rs 3.50 per kg, almost the same as in 2015 and 2016. Consumers, on the other hand, are paying retail prices of Rs 15 to 20 per kg in other states. if we have an arrangement of temperature-controlled logistics or a coordinated link with the buyers of neighbour states of India who are with a high demand of table potato, we can at least cover our production cost which is Rs 4.5 to Rs 5 per kg.

The above discussion highlights the need for integrated logistics infrastructure so that FFV growers can realise better prices in neighbouring markets and lower their product losses.

7.1.4.1.3 Invest in enhancing smallholders' access to commercial-oriented education and technical assistance

The current study finds that the level of education of smallholder farmers has a significant effect on their participation in institutional channels. Their level of education positively influences off-farm income, the adoption of new varieties of seeds and the use of new technology. This study finds that educated farmers are more likely to adopt contract modes of market engagement resulting in higher yields and relatively higher prices in the market. Along with school education, this study recommends the establishment of several agribusiness technical education centres in the study region to encourage increased skills and knowledge among smallholders. This study finds that farmers have better access to institutional channels when they have skills and knowledge about post-harvest handling and marketing.

Public-private investment should support extension systems designed to sharpen and improve the impact of these services, in particular, by incorporating new technologies and best practices from around the world. Extension programmes should be more explicitly linked to agricultural research centres and national development plans, and the government should provide the private sector with incentives when they work with smallholders.

7.1.4.1.4 Promote diversification in agriculture

Diversification offers an attractive option and is a major source of growth in the agricultural sector. This study shows that a higher percentage of operational land under FFV is associated with greater participation in institutional channels. A higher percentage of operational land under FFV production involves two motivations for farmers. First, it brings economies of scale and lowers the per-unit transaction cost. Punjab is dominated by wheat (86%) followed by other crops (12%) and potatoes (2%) in the Rabi season. The rabi crops are sown around mid-November, preferably after the monsoon rains are over, and harvesting begins in April/May. There are paddy (63%), cotton (14%) and other crops (23%) in the Kharif season (Singh, 2016b). Kharif crops are those crops which are sown at the beginning of the rainy season; for example, between April and May. While agribusiness researchers in the state suggest an increase in the area under operational FFV, it is only possible if the market can absorb these products. Otherwise, there will simply be an oversupply of FFV that will lead to lower prices and greater food loss. Agricultural economists advise farmers to diversify in terms of FFV to

gain better economic viability and to control the decreasing groundwater table in the state (Singh, 2004). Further, some effort should be made to bring FFV production in the focus area to open private companies to buying directly from farmers and provide contract farming and farmer producers' companies to enable participation of fresh produce growers.

7.1.4.1.5 *Promotion and formulation of marketing cooperatives*

The current study finds that collective action only partially works for smallholder farmers. The transitioning of agribusiness systems in developing countries offer new opportunities in institutional channels (supermarkets) and value-adding food processing (Reardon et al., 2009; Reardon & Berdegue, 2002; Reardon, Codron, Busch, Bingen, & Harris, 2000). This study strongly recommends that the formulation of marketing cooperatives should be encouraged to help create linkages between FFV growers and new market opportunities. Different forms of marketing collective action can be encouraged, such as self-help groups, cooperatives, and farmer producer associations. The advantages of marketing cooperatives include providing central cold storage points for harvested goods, purchasing harvesting and packing supplies and materials in bulk, providing proper preparation for the markets and storage when needed, facilitating transportation as needed and acting as a standard selling unit for members, coordinating marketing programmes, and distributing profits among members. While the ownership of farm machinery does not significantly impact market participation, this study finds an over-mechanisation of tractors in the study region, and sharing machinery through collective action, could reduce farmer debt if sharing becomes a viable alternative to individual ownership.

A new form of marketing-oriented, demand-driven collective action in the form of farmer producer associations and new generation cooperatives can also be encouraged to enhance farmers' collective betterment along with the forms mentioned above. Farmer producer companies could be a solution to ineffective marketing cooperatives in the region. Farmer producer companies are a new organisational form in agricultural production and marketing designed to imitate large firms. A key aim would also be to encourage groups of small-scale primary producers to connect with corporate buyers. With the amendment of the Companies Act 1956 in 2002, the Indian government introduced the concept of 'producer companies', that constitutes an attempt to establish basic business principles within farming communities, to bring industry and agriculture closer together, and to boost rural development (Trebbin & Hassler, 2012). While the amended Companies (Amendment) Act (2003) permits the

registration of producer companies, there is a general lack of awareness related to this issue. There has also been no support from state agencies and non-government organisations in establishing such cooperative companies, which means there has been no momentum for it (Singh, 2012b).

7.1.4.1.6 *Provide a favourable policy framework for the establishment of large retail chains*

Future studies should examine large scale retail supermarkets' perspectives to offer FFV growers more options. The current study suggests that while growers could produce larger quantities of good quality FFV if they do not have a reliable, fast and cost-efficient means of delivering their produce to the consumer, there is a little point from an economic standpoint. The inefficient marketing system and lack of firm processing capacity will only result in further food losses and decreased profits.

In the study region, there is a lack of negotiation between collective farmer organisations and institutional channels. The current study reveals that supermarkets are not significant FFV buyers in the study region. Supermarkets prefer to buy from the wholesale market and have limited quantities of FFV in their stores. Individual farmers sell a small portion of FFV (5% to 10%) to supermarkets after meeting strict grading and quality checks. The current study reports that smallholders prefer to sell their stock to those who offer the highest prices; however, this is usually the spot market, buyers at the farm gate or processing firms. Supermarkets have a limited presence in the study region(which can be grown in future), and negotiating with supermarkets is still considered costly for smallholders. Farmers note that even though they get a higher price selling to the supermarket, they also have higher rejection levels. Supermarkets prefer to deal with larger farmers because of the high transaction costs associated with having contracts with multiple smaller individual farmers.

7.1.4.1.7 *Establishment of new value-adding food processing*

Along with promoting large scale retail chains, the establishment of new value-adding food processing and enhancing the capacity of existing units would be beneficial, especially if it could overcome scale limitations in the aggregation of dispersed production and distribution of inputs and services. According to the World Processing Tomato Council (WPTC), an estimated 41.37 million tonnes (MT) of tomatoes (26% of global production) worldwide were processed into value-added products in 2015. By comparison, less than 1% of India's tomato

production currently gets processed into such products. An estimated 130,000 tonnes of tomato was processed in India in 2015, that is 0.3% of the global tomato processing market (WPTC, 2018). In order to make this a reality, there needs to be greater state funding or the establishment of public/private partnerships. Policymakers must provide a conducive environment for the public/private sector processing units. An example of a successful public/private partnership for food processing in India is 'Mahagrapes' in the Maharashtra state. A similar set-up would ensure better economic viability for FFV growers (Roy & Thorat, 2008).

While farmers face substantial marketing risks in the study region, the establishment of food processing must be the utmost priority for the State government. It has multiple benefits;

- It will create employment in regions where the rural population will be involved in the processing, transportation, and marketing of food products.
- It will increase both the adoption of new agribusiness technology and the use of improved inputs and higher yield. It will reduce food losses and value losses related to a glut in the market.
- The proximity of primary markets increases the economic viability of smallholder FFV growers.
- It will diminish the influence of intermediaries in traditional markets, which will end non-institutional forms of credit and low-quality input supply to farmers.

With the expansion of international trade in food commodities, food safety and quality issues can be addressed by investment in new or improved post-harvest technology. Developing countries experience between 20-100% post-harvest losses due to poor post-harvest handling and inefficient marketing (Aulakh & Regmi, 2014; Hodges et al., 2011; Kitinoja, Saran, Roy, & Kader, 2011) This study finds that, due to assured irrigation, fertile land and favourable climate conditions for growing FFV, the study's region farmers have acceptable production risks. However, at wholesale spot markets, price determines everything. One day's oversupply can lower the price. Moreover, the institutional channel's limited capacity to absorb excess FFV produce results in product spoilage and food losses.

7.1.4.1.8 Provide a policy framework to promote contract farming

Smallholders cannot participate in institutional channels without an effective policy environment that facilitates greater participation. Generally, the poorly developed legal

institutions in developing countries contribute to higher transaction costs as a result of the legal costs and lack of procedural efficiency for breach of contract and tort litigation. Enforcing contracts strains the relationship between farmers and processors or institutional firms, as well as between the agribusiness and the community in general. Adding to these high costs in terms of financial and community relations is the fact that in many countries, the contracts are often viewed as legally unenforceable. Thus, the only real threat at the disposal of the contracting firm is to discontinue the contract with those farmers not complying with their terms and then to write off lost income. As a result of these costs, firms only deal with growers who are trustworthy and less likely to default (often larger growers) and screen applicants. These screening and enforcement costs are fixed costs and can be minimised by reducing the number of small contract farmers.

Contract farming performance is determined not only by resources and technology but also by the relationships between the state, agribusiness companies, and farmers, who interact with formal and informal institutions. In many respects, States don't want to regulate the transaction itself, but rather provide a legal and policy framework where markets can flourish. For this reason, the policy framework and environment of contract farming should be enhanced. It is challenging to regulate contract farming because of the multiple variables involved, including input and output prices, supply, payments and quality standards (Singh, 2008). In many cases, contracting firms do not honour the contracts because they will incur losses and producers are left high and dry. It is necessary that the contractor has a substantive stake in the agreement and farmers' produce is only suitable for processing. A dual-purpose crop puts buyers, at a disadvantage. It must be realised that sustainable processing cannot be based on the producer surplus of consumption purposes available during the glut period only. For seasonal crops and perishable products, processing must be a multi-product system and directly related to the value signals from the final consumer.

7.1.4.2 Recommendations for farmers

7.1.4.2.1 *Enhance social solidarity to ensure that agriculture resources are shared*

The current study also finds that informal collective action by farmer groups such as neighbours, family friends and local religious groups provide support for participation in institutional channels. Smallholder farmers should build their capacities by sharing knowledge and information within these existing informal farmer groups. The different farmer unions in

the study region must also unite under one banner to strengthen the collective voice of smallholder farmers.

in the sample region, the study discovered a capital intensive form of agriculture. Several other researchers have highlighted the overcapitalisation of machinery in Punjab agriculture. For example, a study conducted by Sidhu and Vatta (2012) reported that smallholders operating less than 2Ha owned more than 30% of the total number of tractors in use in Punjab. The lack of full utilisation of agricultural machinery may be a factor in the unexpected results. Singh, Kaur, et al. (2009) note that the average use of tractors in Punjab did not exceed 25% of their economic threshold level. Similarly, Nair and Singh (2016) found that in the year 1970, there was an average of one tractor per 1000 hectare land. This increased to an average of 28 tractors per 1000 hectares in 1980-81, an average of 68 tractors per 1000 hectares in 1990-91, and 1,000 tractors per 1000 hectares in the year 2000-2001.

Many farmers buy tractors through non-institutional moneylenders and, as a result of this, tractor-owning farm households in Punjab owe almost 2.5-times more compared to other farming households. Where agricultural production has a marketable surplus and markets are driven by factors other than transportation, ownership of farm machinery has a non-significant effect on smallholders' participation in institutional channels.

7.1.4.2.2 Initiative to form marketing cooperatives

The current study strongly recommends the formulation of farmers' marketing cooperatives due to the following antecedents.

- They increase farmers' bargaining power. If farmers form a cooperative society, they will increase their bargaining strength because their products will now be marketed by a single agency. The cooperatives can also obtain data on market prices, demand and supply and other related information from the markets regularly and plan their activities accordingly.
- Direct dealings with final buyers: It will decrease the number of intermediaries in the supply chain. This will eliminate exploiters and ensure fair prices for both the producers and consumers.

- The capability of resources: Marketing cooperative societies can provide farmers with credit that would mean they would not have to sell their produce immediately after harvesting. This will ensure they receive better returns. It may also reduce the cost of transporting produce to the market. Cooperative marketing societies could also provide storage facilities. Thus, the farmers would be able to wait for better prices. Storage facilities would also lower the risk of spoilage or damage to crops as a result of natural disasters.
- Grading and standardisation: This task can be done more easily by a cooperative agency than by an individual farmer. For this purpose, they can seek assistance from the government or can even create their own grading arrangements. Having a cooperative means that farmers will have a greater say in market prices.
- Provision of inputs and consumer goods: The cooperative marketing societies can easily arrange for bulk purchase of agricultural inputs like seeds, manures, fertilisers, pesticides, and consumer goods at lower prices and can then distribute them to their members.
- Processing agricultural produce: Cooperative societies can undertake processing activities like tomato processing to make ketchup, tomato puree, and pizza sauce as a value-adding service to members.

Chapter 8

Conclusions and suggestions for future research

8.1 Introduction

Smallholder agriculture is one of the principal economic occupations in the world. It is a major source of income and employment for 70% of the world's poor who live in rural areas. There are 570 million farms operated by smallholders around the globe. This figure indicates that smallholders operate 75% of the world's agricultural land (Poole, 2017). India is known as the land of small and marginal farmers. Prior studies have shown that smallholders play a crucial role in feeding the rising urban population (Singh, 2008), thus it is essential to support smallholders so that they can meet the increasing domestic and international demand for high-value crops. While smallholders rely on agriculture for their livelihoods, the rapidly evolving food systems provide new opportunities for participation in institutional markets for smallholders and hence higher returns. Agribusiness markets in the developing countries are transitioning from traditional to modern food systems. Several micro-level factors have been identified as drivers of this change;

- The rapid urbanisation of the rural population and income growth in the rising middle classes (Reardon & Hopkins, 2006).
- Changes in macroeconomic policies, trade liberalisation and government investment in extension services, improvement of transportation and communication infrastructure, upgrading credit services and rural markets (Minot & Ngigi, 2004; Von Braun & Kennedy, 1994).
- Changing lifestyles and increasing female participation in the workplace. Traditionally, women have assisted with agricultural production and food preparation, but with their increased numbers in the workforce, they often have less time to devote to these activities (Pingali, 2007; Reardon et al., 2003).
- Access to agribusiness technology that allows for the use of different foods and food preparation methods (Cook & Chaddad, 2000).
- Industry-level access to better food packaging technology (Reardon et al., 2009; Saxowsky & Duncan, 1998).

- Perhaps most importantly, the rapidly changing consumer preferences and awareness of food safety (Von Braun & Kennedy, 1994).

Further, several macro-level factors are responsible for changes in agribusiness systems. Notably; the industrialisation of traditional agribusinesses (Cook & Chaddad, 2000), changes in agribusiness technology (Reardon et al., 2009; Saxowsky & Duncan, 1998), trade liberalisation (Pingali, 2007; Reardon et al., 2003), rising urbanisation (Reardon & Barrett, 2000), the rising per-capita income of the middle class, changes in consumer tastes and preferences (Reardon & Barrett, 2000; Reardon & Hopkins, 2006), increased awareness of nutrition, and finally, changes in macroeconomic policies are all significant factors in the transition of traditional food systems. These changes have led consumers in developing countries to demand a different food basket, such as;

- The quantity of food per-person and overall demand from urban food markets is increasing faster than in rural areas (Delgado, 1999).
- The composition of the food basket is different, as consumers with more money often shift away from grains and consume more high-value products such as fruits and vegetables, dairy products, meat, and fish. There is also greater demand for more processed food for convenience.
- The changing requirements of urban consumers lead to a restructuring of food supply chains (Gulati et al., 2007). The final food supply chain arrangements are not only shaped by these demand factors, but also by conditioning factors such as geography.
- There is a demand for more choices per product and a greater variety of food products in general (Holloway et al., 2000).
- Urban customers in developing countries are also increasingly concerned about food quality and safety issues, especially as safety issues tend to be associated more with non-staple foods (Kirsten & Sartorius, 2002). Demand by urban customers is transmitted through the marketing sector or supply chain to the rural producer. This chain ensures that a primary agricultural product is delivered to the customer in the right form, at the right time, and the right location (Henson et al., 2005).

These changes in the food system have been affecting farmers' traditional agricultural practices, especially smallholder farmers. Farming practices have also been affected by institutional channels (supermarkets or processors) procurement modes. While, there is an

opportunity for smallholders to participate and compete in institutional channels, a variety of factors constrain them from doing so (Reardon & Swinnen, 2004; Reardon & Timmer, 2007; Reardon et al., 2003; Reardon et al., 2012). The agribusiness literature suggests that smallholders' economic viability depends on how efficiently they participate in the market. There is some evidence to suggest that smallholders who participate in institutional channels receive a higher price compared to those who sell at traditional channels (Singh & Singla, 2011). The current study presented similar results as farmers have a contract with institutional processors realised higher price compared to those who sell to traditional markets. The institutional channels focus on scale economies, quality, continuity of supply, food safety and extending shelf-life. However, these all increase farmers' overall production and marketing costs (Dabas et al., 2012).

Considering the above factors, the current study's goal was to identify what drives smallholder farmers to participate in institutional channels. The Punjab state of India was chosen for the current study. Four specific research objectives were set, and these objectives have been examined in the previous chapter in the light of prior agribusiness literature and theories. This study has highlighted some interesting findings that have been highlighted in the context of the study region and have provided recommendations for both policymakers and farmers. The current chapter provides conclusions and suggestions for future research. The next section discusses the research objectives of the current study.

8.1.1 Research objectives

The current study is significant as it addresses the question of smallholder participation in institutional channels. The current study extracts various factors from the agribusiness literature and uses various theoretical perspectives to investigate what drives smallholder farmers to participate in institutional markets. Derived from this, the four research objectives outlined in Chapter 1 are reiterated as follows:

1. Identify the factors influencing FFV growers' participation in institutional channels.
2. Identify which mode of market participation provides FFV growers with greater economic benefits.
3. Determine the role of collective action on FFV growers' participation in institutional channels.

4. Provide recommendations to enhance market participation and maximise FFV growers' returns.

8.1.2 Research questions

Derived from the research objectives, this study investigates various factors that drive smallholder farmer market participation in institutional channels. The factors include individual characteristics of smallholder farmers such as; gender, age, education, and experience of the farmer, as well as farm characteristics, such as land, machinery and production costs. Secondly, this study investigates various other marketing, institutional and infrastructure variables, such as the role of collective action and institutions in farmers' market preferences. Hence, the following five research questions are formulated to specifically address the research objectives, these are:

- **RQ1:** *What is the impact of human capital assets on smallholder FFV growers' participation in institutional channels?*
- **RQ2:** *What is the impact of physical farm assets on smallholder FFV growers' participation in institutional channels?*
- **RQ3:** *What is the impact of transaction costs on smallholder FFV growers' participation in institutional channels?*
- **RQ4:** *What is the impact of collective action on smallholder FFV growers' participation in institutional channels?*
- **RQ5:** *What is the impact of institutional characteristics on smallholder FFV growers' participation in institutional channels?*

To answer these research questions, a total of 18 hypotheses were formulated using transactions cost (Coase, 1937; Hobbs, 1996; Williamson, 1979) and collective action (Olson, 1965) theories as well as the agribusiness supply chain literature. The next section reviews the methodology and provides a summary of the findings.

8.1.3 Method and findings of the study

The current study believes that smallholders have a distinct identity. It thus explores the drivers of their participation in institutional channels. The theoretical underpinnings discussed in Chapter 2 and agribusiness literature discussed in Chapter 3 provide insight into various factors that drive smallholders' participation in institutional channels. The agribusiness

literature reviewed highlighted that smallholders' participation in institutional channels may depend on multiple factors.

As such, a positivist quantitative approach was considered the most appropriate method for this research. The main reason for adopting a quantitative approach was that it has been used in the past to measure the effects of different transaction costs and is the best method to address the research questions. This study also uses collective action theories, that have also been used in studies on market participation in Africa, Latin America and Asia (Alene et al., 2008; Barham & Chitemi, 2009; Barrett, 2008; De Janvry et al., 1991; Devaux et al., 2009; Makhura, 2001b; Narrod et al., 2009; Pingali et al., 2005).

This research used a survey design because of its ability to produce numeric descriptions about various factors that drive smallholder FFV growers' participation in institutional channels. A structured survey instrument was used to obtain information using an interviewee assisted (personal face-to-face survey interview) method. The sample was made up of 200 FFV growers. Two blocks of the Amritsar district, namely Jandiala Guru and Majitha; and two blocks of the Jalandhar district, Bhogpur and Kartarpur of the Punjab state, were selected using the same criteria, that is, with the maximum area under potato and tomato crops. A mix of snowball and purposive sampling was employed for data collection. These techniques were the most appropriate due to the non-availability of secondary data and the lack of a sample frame database of FFV growers in the sample region.

Quantitative data analysis techniques were applied to examine the research questions. Descriptive statistics, along with several other methods of quantitative analysis were used, including ANOVA, the independent sample t-test, cross-tabulations, and linear regressions. Table 6.53 in Chapter 6 provides a summary of the results for the hypothesis testing phase of this research. The next section highlights the results of each of these research questions.

RQ1: *What is the impact of human capital assets on smallholder FFV growers' participation in institutional channels?*

Except for a higher level of education, other human capital asset variables (age, experience in farming and a higher percentage of family members involved in farming activities), do not have a significant impact on smallholders' participation in institutional channels.

There is no dispute that knowledge of basic agricultural practices and access to inputs is also critical, but smallholders must shift their focus from pure production to a commercial focus. To mention a few issues, commercially viable farmers can;

- Estimate production costs.
- Assess household consumption needs.
- Plant crops according to the market signals.
- Select buyers who are offer quality premiums.
- Meet institutional buyers' quality, grading requirements and private standards.
- Identify the factors which increase/decrease market prices and learn how to form price expectations.
- Obtain access to providers of essential agribusiness services.
- Operate as a valued member of a producer cooperative.

As a result of the perishable nature of FFV products, farmers require skills and knowledge to lower their production risks (Lawal et al., 2004). The application of the right amount of fertilisers and agrichemicals require a certain level of training and knowledge to avoid yield loss. Post-harvest management includes coordination with the buyer to ensure that crops are harvested at the right time. Growers must also have information about market trends and know-how to arrange transport to minimise post-harvest losses (Fonseca & Njie, 2014). The perishable nature of FFV and their short self-life means that post-harvest management requires coordinated linkages between farmers and buyers (Gulati et al., 2007).

While education can be provided in many ways, given the heterogeneity of smallholders, a local approach with a national perspective is best. Long-term partnerships with the private sector can be developed to provide practical education as part of agribusiness services. However, without support, it is difficult for agribusiness service providers to work with smallholders if they must provide both the services themselves and the basic agribusiness education needed to make the services truly beneficial to the farmers, for example, in planning, FFV quality management and credit management.

RQ2: *What is the impact of physical farm assets on smallholder FFV growers' participation in institutional channels?*

Of the four physical farm assets variables identified, two variables (higher percentage use of operational land for fresh produce and off-farm income) were found to support participation,

while the other two variables (access to farm machinery and highly variable production costs), did not.

The current study recommends that the area under production of FFV must be increased as farmers who use a higher percentage of area under FFV production have better bargaining power compared to those who have smaller land use. Institutional channels often avoid working with land farmers who have land smaller than 2 ha (Barrett, 2008; Jayne et al., 2005). Farmers who sell to institutional channels are five times larger than traditional farmers, 9-18 ha compared with 1.2 - 2.4 ha (Neven et al., 2009). The larger the operational land size, the larger the marketable surplus farmers have to sell. Further, as landholdings increase; (1) FFV growers have greater economic viability due to scale economies; (2) with a higher marketable FFV, there is a reduction in the farmers' degree of uncertainty, (3) with fewer risks, farmers are more willing to adopt new market channel opportunities.

Off-farm income empowers farmers to use cash liquidity and time-saving options without waiting for credit (Cadilhon et al., 2006). Off-farm income plays a critical role in the arrangement of farm inputs, farm labour and agriculture-related daily expenses. In particular, farm labour is critical in FFV production, especially in the case of short shelf-life products. The farmers in the current research stated that there is often a lack of labour during busy harvesting periods. Due to the high demand in the busy season, farm labourers often ask for advanced payment. In such cases, farmers rely on informal moneylenders who charge high-interest rates (Singh, 2016a). Consequently, off-farm income plays a vital role in the arrangement of farm labour.

RQ3: *What is the impact of transaction costs of marketing on smallholder FFV growers' participation in institutional channels?*

In terms of the transactions costs, access to, and usage of, market information and visibility of buyers variables were not supported, while (a) higher frequency and (b) in multiple sources of price information, proximity to the primary market, and meeting quality standards variables were seen as supportive of smallholder participation. Interestingly two variables (a) higher frequency and (b) in multiple sources of information, and proximity to the primary market variable were supported in the case of contract farming with the assured price offered by institutional channels.

Food system transformations affect the overall transaction costs to produce food products according to changing consumer requirements and growers profit margins. The costs incurred in the process of delivering food includes handling costs, transaction costs, and potentially rents. These differ per channel, as the cost of transportation, handling, processing, storage, and traceability vary by product characteristics. The degree of perishability often affects the material costs, as higher losses, as well as higher risks, are expected to be reflected in the final price of more perishable goods (Singh, 2008). On top of the substantial delivery costs (transport and handling), marketing margins are also significant costs incurred in the process of conducting transactions between different agents who have imperfect information (Alene et al., 2008).

Due to transaction cost factors such as uncertainty, asset-specific investment and frequency, the act of searching, negotiating and monitoring the supply chain partners incurs high transaction costs (Hobbs, 1996). Furthermore, the need to fulfil specifications such as grading, constant supply and seasonality makes the situation more challenging for smallholder producers.

RQ4: *What is the impact of collective action on smallholder FFV growers' participation in institutional channels?*

In terms of the impact of collective action, one of two variables was supported while the other one was not. While the cooperative membership variable was supported, the length of experience with cooperatives is not supported. Collective action provides smallholders with a potential solution for mitigating the challenges of participation in the commercial markets (Barham & Chitemi, 2009; Devaux et al., 2009; Hellin et al., 2009; Kaganzi et al., 2009; Markelova et al., 2009; Narrod et al., 2009; Staatz, 1987). Institutional arrangements, such as farmer cooperatives, enable smallholders to reduce their high transaction costs and meet product specifications enforced by institutional channels. They range from spot market exchanges to full vertical integration where the stages of marketing, transactions, and production are linked through ownership rather than through market exchanges (Swinnen et al., 2013).

From a smallholder's view, collective action leads to economies of scale and lowers transaction costs (Poole, 2017). The NIE framework suggests that certain institutions help to lower individual farmer's transaction costs (Alene et al., 2008; Hobbs, 1996; Hobbs & Young,

2000). Along with formal institutions (contracting), informal institutions such as customs, traditions, religious groups also influence smallholders' transaction costs and marketing success (North, 1995). The current study findings indicate that informal collective groups such as neighbours and family friends use their socio-religious solidarity to help each other, especially with the provision of farm micro-credit and agricultural machinery.

RQ5: *What is the impact of institutional characteristics on FFV growers' participation in institutional channels?*

All three institutional variables, access to farm credit, access to logistics (including cold chain storage and transport), and access to technical assistance were supportive of smallholder participation in institutional channels. Technical assistance includes farm preparation, bed width, plantations and optimum use of fertilisers and pesticides, harvesting techniques and cold storage. With optimal technical assistance, fresh produce farmers will be well equipped with technical knowledge and to understand the delicate process of marketing through different channels.

The current study also finds that technical assistance is highly effective in helping smallholder farmers improve their agronomic skills, business and financial skills, and hence facilitate access to markets. The study recommends that technical assistance providers should increase coordination with one another to establish common standards and measurement systems, improve the transfer of knowledge, share best practices and lessons learned, improve quality of delivery, and coordinate complementary programmes. At the farm level, technical assistance enables fresh produce growers to optimise available agricultural resources. It also enables FFV growers to address risky situations more efficiently, such as production and marketing uncertainties.

Along with technical assistance, the current study finds that the arrangement of farm credit through formal sources such as commercial banks, cooperative banks and dedicated agricultural banks, is vital for agricultural growth, especially in capital intensive forms of farming. Besides, farm credit is essential for day-to-day farming activities such as arranging inputs, fertilisers, farm labour and repairs/up-grading farm machinery and processes (Goel & Kaur, 2008; Hazarika & Alwang, 2003).

Similarly, logistics infrastructure, such as temperature-controlled refrigerated transport, and access to cold-chains lower the risk of post-harvest losses (Pingali et al., 2005). These elements are vital, as institutional channels require a regular supply of quality-assured FFV. Smallholder FFV farmers are often excluded from participating in these channels due to limited marketable surplus (Gulati et al., 2007; Ruben et al., 2007). In developing countries, a lack of temperature-controlled refrigerated transportation (Minten et al., 2009; Singh, 2009), and high chances of product spoilage (Rienekens, 2011) result in high volumes of post-harvest losses.

Overall, the study found that assured price, associated with the contract mode of market engagement, plays a significant role in farmers' participation in institutional channels. Also, the size of operational land, farmers' education levels, off-farm income, access to formal sources of credit, and technical assistance significantly influence farmer participation in institutional channels. Also, membership and experience with cooperatives show partial but significant support in smallholders' participation in these channels.

8.2 Significance and contribution of the study

The current study provides several theoretical, policy and practice contributions. Most importantly, this research identifies and quantifies the various factors that farmers consider before selling their produce to institutional channels. The existence of regulated markets and dedicated procurement agencies backed by the minimum support price for cereals, and to a large extent, pulses, do not pose many problems for FFV producers. However, problems associated with inadequate marketing in terms of poor regulation of markets, a large number of middlemen, a lack of infrastructure for packing, storing and transporting perishable crops not only results in low returns for producers but also a significant amount of wasted produce. Furthermore, price asymmetry and high transportation costs contribute to the disintegration of markets.

Addressing the issue of smallholder farming and participation in new markets is a continuing focus for both agribusiness scholars and practitioners. The emphasis seems to be that smallholder FFV growers must consider commercialisation if they wish to maximise their incomes and increase overall economic viability. As such, this study is significant because 570 million farms in the world are small and smallholders supply 80% of the overall food produced in Asia, sub-Saharan Africa and Latin America (Poole, 2017). The issue attracts further attention as food systems transform in developing countries, and institutional FFV channels

emerge around the globe. This study is especially significant as it concentrates on smallholder FFV growers' farm operations and livelihoods in some detail.

Notably, the study region has villages that have access to cemented roads and reliable irrigation. They also have a surplus of wheat, rice, cotton, fruits vegetables, meat and poultry, mushroom and honey (Sidhu, 2016). This study finds, despite surplus production and various agricultural and allied commodities, the level of processing and value addition is low, resulting in between 7.5 - 20% losses in the case of FFV. This is because there are a limited number of processing firms and they have limited processing capacity. Yet, despite the emergence of new markets, farmers still rely on traditional markets. The study highlights that smallholders' participation in institutional channels depends on how educated they are and whether they can understand the market's requirements. The second major factor is an appropriate policy environment that involves understanding value chains, networks, and their dynamics from the smallholder's perspective.

This research is significant from several points of view. First, this research identifies different human capital, physical farm, marketing and institutional factors that drive smallholder FFV growers to participate in new markets. Second, this research advises policymakers to adopt institutional interventions to link smallholder to new market opportunities with changing food systems. Collective action is also suggested as a viable way of decreasing transaction costs associated with entry into institutional channels.

8.2.1 Contribution to theory

The main contribution to the theory of this research is the application of the NIE framework to dynamic changes in the local and global agribusiness systems. Despite the recognised advances of the NIE, this research fills the gap that needs for empirical research that supports its theoretical assumptions. In this research, the NIE framework has been used to explain the economic behaviour of small farmers in developing countries regarding current changes in their traditional agribusiness systems. The role of contractual uncertainty, specifically transaction costs, and collective action for determining smallholders' participation in the institutional channels has been assessed in a new geographic location that is Punjab region of India. Indeed, the results of this study generally support the NIE framework in the new geographic location. By considering asset specificity, uncertainty and frequency factors of FFV production, TCE theory suggests smallholder farmers adopt an appropriate mode of market

engagement that revolves around contracts. Along with market imperfections, information asymmetry forces farmers to choose institutional arrangements in terms of contract farming to participate in institutional channels.

Institutional channels like supermarkets and processors, often aim to control agriculture practices to ensure a year-round FFV supply. They also place a greater focus on food safety and quality requirements of FFV products to gain a competitive advantage over traditional retailers. The TCE approach states that as business transactions increase in complexity, institutional channels would tend to adopt vertical integration to bring these transactions in-house (Hobbs, 1996). This study shows that the conditions necessary for vertical integration do not exist in the context of this study, as FFV transactions, while frequent, have only moderate levels of specificity and the bargaining numbers are high. Yet, transaction costs for firms dealing with smallholders are particularly high for several reasons; the small units of output per farming household, low capacity, low levels of information, and other uncertainties in dealing with farmers. Also, due to the perishable nature of FFV, product and logistic requirements are exceptionally high, making transactions somewhat complex (Blandon et al., 2009).

The study also added knowledge in the academic literature of collective action theory by identifying the role of informal collective groups in agribusiness activities in the study region. Informal farmers collective groups can have the power build upon the social solidarity and sharing resources among smallholder farmers that enhance their participation in institutional channels.

To reduce transaction cost, farmer associations can influence the contract characteristics of the supply of FFV products by managing the frequency of interaction by coordinating the logistics and communication of their members. Also, they can deliver cost-effective inputs include training extension and technology acquisition. The study identifies that through these collective organisations (specific institutional forms), smallholders can lower transaction costs and thus have a greater chance of participating in institutional channels.

8.2.2 Contribution to policy

The current study has several policy implications. The performance of the agriculture sector is not only determined by the level of production but also depends on the efficiency of the existing marketing system and policy environment for agricultural commodities. In developing

economies, the marketing of farm produce plays an equally important role in increasing the income of the producers and bringing them out of poverty. However, the marketing of produce largely remains ineffective, particularly in the case of perishable crops such as fruits and vegetables.

The policy must be focused on enhancing smallholders' access to education that focuses on the commercial aspects of production planning and marketing for smallholders. Knowledge of agribusiness technology, changes in demand patterns and the ability to react to changes in the market are major factors in market participation. Commercial education also provides farmers with a way to generate income other than through FFV production. Smallholders can generate income through the service sector and other allied agricultural services.

The policies need to encourage and establish new and larger-capacity food processing units in the State and provide support to enhance the capacity of existing units. The current study finds that despite having surplus FFV production and various agricultural and allied commodities, the level of processing and value addition of FFV products is currently low.

This research contributes to the policy by recommending the development of integrated communication systems and introducing temperature-controlled transportation. This will be resulted in realising higher price and lower the food losses for smallholder farmers. This would be possible with public and private investment in infrastructure.

The policies would also focus on the formulation of marketing cooperatives to encourage linkages between FFV growers and new market opportunities. Perishable commodities such as FFV incur high transaction costs. The marketing of perishable commodities requires more efficient marketing coordination along with suitable infrastructure such as cold storage. Currently, the agricultural marketing systems in India are dominated by monopolistic private traders who handle approximately 80% of the marketed surplus (Singh, 2009). The private traders, driven by self-interest, are not investing in the marketing infrastructure due to excessive government regulations and the dominance of the traditional wholesale markets. As such, this study recommends that the government invest in critical infrastructures such as building cold storage units, dependable roads, railways and other transport assets. These investments will have multiple on-going benefits to the economy beyond just FFV markets. The significant and high transaction cost between the supply chain partners are also due to the differences in marketing fees, taxes, commission fees, and licenses fees. Thus, there is an

urgent need to reform the existing market structure where the actors of the market are unconscionably leveraging different fee structures in each market for each commodity.

The particular form of collective action advocated by the findings of this research is that of 'marketing cooperatives' formed by farmers and farmer organisations. Mobilising producers into groups and the establishment of contractual arrangements between farmers and buyers can be an important entry point to link farmers with buyers, hence providing farmers and buyers with a greater degree of certainty. As opposed to the current (unsuccessful) form of state-regulated cooperatives found in the study region that only really focus on securing better terms for inputs, the new form of cooperative will focus on the downstream marketing and selling activities. Indeed, Kaganzi et al. (2009) indicate that collective action helps farmers meet basic market requirements (minimum quantities, quality, and frequency of supply), which they cannot achieve as individuals.

This study suggests policymakers to encourage the formation of these new forms of cooperatives to encourage smallholder farmer participation in institutional channels. Supermarkets certainly are useful marketing innovation from the smallholder point of view and the consumer's point of view. The future growth of supermarkets in the study region will likely provide an opportunity to smallholder farmers to establish a supply chain relationship through the new form of cooperatives.

Finally, the key reforms for policymakers would be the strengthening of contract enforcement mechanisms (legislation, enforcement agencies), increasing the legal efficacy of the courts such as timeliness of proceedings, and reducing legal costs so that smallholders can protect themselves. As such, this research recommends new laws that provide legal protection for contract FFV growers to protect them from the harmful effects of some opportunistic institutional contractors.

8.3 Limitations and future research

The researcher acknowledges that this study has many limitations but believes that these provide opportunities for further research in this field. The first limitation of this research relates to the non-availability of published secondary data. There is no reliable published data on the number of FFV growers in the study region, hence a random selection of farmers was not possible. Instead, a snowball sampling technique was employed, and this proved

reasonably successful. Since snowball sampling does not select units for inclusion in the sample based on random selection (unlike probability sampling techniques), it is challenging for researchers to determine the possible sampling errors and make statistical inferences for the wider population. Snowball sampling techniques also have limitations in terms of time and space, and the researcher was dependent on gaining approval and the contacts from the village heads (sarpanch) and lead farmers.

Another limitation relates to the geographic location and the selection of two particular FFV crops - potatoes and tomatoes. The survey sample covered a specific geographical area in the Punjab state of India. Even though it was the most important and representative, according to the research objectives, other areas and FFV crops deserve to be included in the survey. Further, the context of the study limits its findings to FFV growers only. Indeed, future research still needs to be conducted on other allied agriculture-related supply chains, such as milk supply chains, to determine if these findings still hold true. Due to the limited geographical focus of this study, researchers should conduct surveys in other geographical locations and compare their results with the current study. This will show how far-reaching the conclusions are. Similarly, it is recommended that future studies conduct interviews with supermarket executives and processing firm managers so that we have a greater understanding of their phenomenon and thus can formulate relevant policy. Hence, this study does not represent the entire supply chain view, rather that of smallholders only.

Future research can be conducted on other constraints and challenges smallholders face in participating in institutional channels. The cross-comparison of both institutional channels and traditional markets may be another specific area for further research. Finally, the current study focuses only on smallholder farmers' participation in institutional channels. A comparative study could compare the economic viability of institutional versus traditional wholesale markets. Yet given these limitations, it is suggested that this study is still a significant contribution to the important research area of smallholder participation in institutional channels in order to improve their profitability. Finally, the researchers desire that these findings be used to help smallholder farmers, industry agencies, policymakers and governments lift smallholder FFV farmers out of the cycle of poverty.

Respondents' consent form and survey instrument
Faculty of Agribusiness and Commerce,
Lincoln University, Christchurch, Canterbury, New Zealand
Informed Consent Declaration

This survey is part of a research study titled "Smallholders and Agribusiness Supply Chains: Participation and Implications. Mr Gursharan Singh (Gursharan.singh@lincolnuni.ac.nz), a PhD student, is conducting the research work under the supervision of Mark M.J. Wilson, PhD. Senior Lecturer in Supply Chain Management, Department Global Value Chains and Trade, both from Lincoln University, Faculty of Agribusiness and Commerce. The purpose of the research is to identify the position of smallholder fresh produce growers in the supply chain and the key constraints and motivations for incorporating them into the supply chain. Participation in this survey is voluntary, and the respondent is free to withdraw at any time. Individual responses will be treated confidentially. In this regard, the identity of the interviewee or his/her household will be coded during the analyses to preserve anonymity. The survey interview is expected to take about 60 minutes.

The results of the research will be published without references to the name of the respondents or the organisations they work for. Copyright to the thesis resides with the researcher and the university. Should you have any questions regarding the nature of the survey, please contact the supervisors or the researcher at the e-mail addresses listed above or call the researcher at 0064224615575. Please express your full consent to participate in this survey by writing your name and signing below.

I _____ (Full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participate in the research project. I understand that I am at liberty to withdraw from the project at any time, should I so desire.

Signature: _____ Date: _____

Village Name _____ Tehsil/ District _____

If no, what position does the respondent have in the household?

Duration of the interview Started ____:____ Finished ____:____

Enumerator's Name: _____ Signature: _____ Date: _____

1. Gender Male Female

2. What is your age group?

16-25 26-35 36-45 46-55 56 and above

3. What is the highest educational qualification you hold? No formal education Primary School Middle School High School College University

4. Do you have any technical education relevant to farm activities? Yes No

5. How many of your family members are involved in farming activities?

Adult			Children	
Family details	Male	Female	Male	female
Total number of family members				
Family members, who help with farm activities?				

6. What is the effective area of your farm in acres?

Type of land	Area in Acres
Owned land	
Land rented	
Net cultivated area	

7. What are your fresh produce crops growing pattern?

Fresh produce crop name	Area in acres	
	Current	Three years back

8. What percentage of land do you use for cultivating fresh produce crops?

Up to 25% 25-50% 50-75% 100%

9. How many farmworkers are employed in farming activities other than family members (per acre)

	Full time	Part-time	Seasonal
Farm labour employed in farming activities other than family members (per acre)			

10. How many years of experience do you have in the farming of fresh produce crops?

Up to 2years 3-5 years 6-10 Years above 10 years

11. What is your preferred irrigation method?

Method of irrigation	% of the total cultivated land
Canal	
Tube well	
Micro-irrigation (Drip/sprinkler)	
Un-irrigated area	

12. Do you have income other than farming fresh produce? Yes No if yes, please specify the source?

13. What is your average production cost per acre?

Cost components>		Crop
The rental value of land (Rs. /unit of land)		
Land preparation	Rent of tractor/diesel costs	
	Hired labour (No. x days x rate)	
	Family labour	
Seed purchasing & planting cost	Cost (amount x price)	
	Hired labour (No. x days x rate)	
	Family labour	
Fertilizers (Chemical/Bio-fertilizer)	Cost (amount x price)	
	Hired labour (No. x days x rate)	
	Family labour	
Pesticides/Bio-pesticides	Cost (amount x price)	
	Hired labour (No. x days x rate)	
	Family labour	
Irrigation charges	No. of irrigation x rate	
	Total irrigation cost	
Weeding	Cost (amount x price)	
	Hired labour (No. x days x rate)	
	Family labour	
Harvesting	Harvester rental charges	
	Hired labour (No. x days x rate)	
	Family labour	

14. Are you a member of any farmers' organisation or cooperative? Yes No (If No go to Q18)

15. How many years have you been a member of a farmers' organisation?

Up to 2years 3-5 years 6-10 Years above ten years

16. How satisfied are you with cooperatives?

Not satisfied	
Slightly satisfied	
Moderately satisfied	
Satisfied	
Very satisfied	

17. What type of farmers' group/organisation or cooperative are you a member of?

- Government-regulated cooperative society Local-level cooperative society other than government-controlled Farmer producer's company any other types of local farm-related association (kisaan Union)

18. What benefit do you get through the farmers' organisation?

Benefit from farmers' organisation	Always	Most of the time	About half the time	Sometimes	Never
To negotiate better prices					
Offer storage facilities					
Marketing of your product					
Offer inputs					
Offer farm machinery					
Offer credit (in cash or kind)					
Another benefit (please specify)					

19. If No to Q14 then what are the following factors which stop you from becoming a member of a farmers' organisation, please specify?

- High subscription fee Freeriding by large farmers Non-transparent transactions and leadership Political interferences Other reasons

20. How do you get access to the farm machinery?

- You own farm machinery Farmer organisation or cooperative provide Buyer provides Arrange to rent privately Farm machinery shared by neighbours and friends

21. List the markets you sell to and what quantity (%) of your product is sold there?

Types of markets	Yes/No	% Sold There
Wholesale market		
Traders at the farm gate		
Processing company		
Supermarkets		
Fast food restaurants/hotels		
Locally open markets		
Others		

22. Did you change the market channel in the last three years Yes No (if yes name the channel)?

23. What factors do you consider in choosing the market channels?

Factor	Not important	Slightly Important	Moderately Important	Important	Very important
Better price					
Ability to meet					
Volume of sales					
Time commitment					
Distance from market					
Reliable payment					
Direct interaction					
Access to information					
Trust and					
Any other (please					

24. Which of the following options do you consider most in determining the price of your products in the chosen market?

Options	Circle one option that applies
According to the grade (quality) of the produce	
Expected marketed value	
Market price + premium	
Cost of production + margin	
Combination of any two methods or flexible pricing method (method chosen by the farmer)	

25. Do you receive market information before the sale Yes No

26. How frequently are you receiving price information from the relevant market?

Once in a day Twice in a day morning /afternoon Once a week Twice a week

27. Which is the preferred tool of communication you use for accessing price information?

Smartphone Radio Television Internet Newspaper Any other

28. What is your source of price information?

Source	Always	Most of the time	About half the time	Sometimes	Never
Self-enquiry					
Speaking with other farmers					
Speaking with commission agent/trader					
Farmer organisation or cooperative					
Any other (please specify)					

29. What is the mode of engagement to market?

Individual Collectively Mixed

30. What type of relationship do you have with the buyer?

- Contract Word of mouth On the spot transaction

31. How far do you know your buyer at different levels in the supply chain?

- The immediate buyer in the chain Up to the two buyers in the chain
 Up to the end buyer in the chain

32. Who makes decisions on the following? (Tick the appropriate)

Decisions	You decide	Buyer decides	Joint planning
Variety of seeds to use			
How much seed to plant			
What chemicals to use			
How and when to water			
How much to harvest			
Which crop/heads/variety to harvest			
When to harvest			

33. Do you have access to a formal source of credit Yes No (if yes go to question 34)?

34. If the answer is no, then what is the reason for not having access to a formal source of credit?

- Small landholding Low collateral Excessive paperwork Less marketable surplus Lack of knowledge Any other, please specify

35. What is your preferred source of credit?

Source	Always	Most of the time	About half the time	Sometimes	Never
Commercial banks					
Buyer					
Farmers' organisation/cooperatives					
Traditional rural money lender					
Neighbours/friends					

36. Please give your response to the following statements

Statement "Farm credit ..."	Not important	Slightly Important	Moderately Important	Important	Very important
... increases farm productivity					
... helps to buy quality seeds					
... helps to buy farm machinery					
... helps in arranging irrigation					
...helps in arranging transportation					

... helps in paying advance labour cost					
... improves post-harvest practices					

37. Do you receive any technical assistance Yes No, if "No" go Q 38?

38. If yes what is the primary source of technical assistance

- Buyer Government department Input supplier Neighbours/friends
 Farmer's organisation or cooperative

39. Do you have access to cold storage Yes No?

40. What are the advantages of access to a cold storage warehouse?

Advantage	Always	Most of the time	About half the time	Sometimes	Never
Better selling price later					
Less post-harvest loss					
Better marketing options					
Increase in the ability for regular supply					
Increased bargaining power					
Any other					

41. How is your product transported to the market point?

- Own transport Hired privately Vehicle from farmer organisation or cooperative (collective) Public transport Buyer pick up from farm gate Any other, please specify

42. How far is your farm from the road?

- Within 2km Between 3-5km More than 5km

43. How far is the market point?

- Within 10km Between 10 & 25km >25 km & <50 km More than 50 km

44. How do you rate the market infrastructure?

Particulars	Extremely good	Somewhat good	Neither good nor bad	Somewhat bad	Extremely bad
Condition of the road to market					
Warehouse facilities					
Cold storage					
Transport facilities					

45. How much do you spend to sell fresh produce per acre?

The total cost of selling fresh produce	Cost (₹INR)
---	-------------

Transportation	
Loading & unloading	
Sorting, weighing & packing	
Market fee	
Commission of middlemen	
Any other related expenses (please specify)	
Total:	

46. What percentage of post-harvest losses do you suffer approximately? Please specify

47. Are there any standards and grading requirements you need to comply with to supply your chosen market? Yes No

48. If yes, then how relevant are those standards and gradation?

Standard	Not important	Slightly Important	Moderately Important	Important	Very important
Quantity					
Quality					
Frequency					
Variety					
Packing					
Food safety					
Others					

49. If yes how much in percentage (%) of grade A, B, and C do you sell to the chosen market

Grade	Percentage (%)	Market

50. What percentage of fresh produce goes unsold in the chosen market?

Up to 10% 10-20% 20-30% above 30%

51. What are the reasons for unsold fresh produce in the chosen market?

Factors	Always	Most of the time	About half the time	Sometimes	Never
Lack of cold storage facilities					
Distance from market					
Unable to meet quality standards					

Price does not cover the expenses of production					
Lack of labour available to harvest, handle and deliver					
Any other, please specify					

52. If you cannot sell, what will happen to unsold fresh produce?

- Dump Eat (family & friend) Sell at a low price Store and sold later Any other

53. What is your average yield, price, gross income (per acre)

	In the main channel	In second channel (if sold in more than one channel)
Yield (Kg/Acre)		
Price (Rs/kg)		
Gross income (Rs.)		

54. Is there anything else you would like to say?

A.1 Respondents consent form and survey instrument (Punjabi version)

ਸਰਵੇਖਣ ਪ੍ਰਸ਼ਨਾਵਲੀ

ਸਹਿਮਤੀ ਅਤੇ ਘੋਸ਼ਣਾ

ਇਹ ਸਰਵੇਖਣ, Smallholders and Agribusiness Supply Chains: Participation and Implications: ਸਿਰਲੇਖ ਦੇ ਹੇਠ, ਜੋ ਕੇ ਪੀਐਚਡੀ ਖੋਜ ਵਿਦਿਆਰਥੀ, ਸ੍ਰੀ ਗੁਰਸ਼ਰਨ ਸਿੰਘ (gursharan.singh@lincolnuni.ac.nz) ਦੁਆਰਾ ਡਾਕਟਰ ਮਾਰਕ ਵਿਲਸਨ ((ਪੀਐਚਡੀ. ਸਪਲਾਈ ਚੇਨ ਮੈਨੇਜਮੈਂਟ,) ਜੋ ਕੇ ਖੇਤੀਬਾੜੀ ਅਤੇ ਵਪਾਰਕ ਫੈਕਲਟੀ ਤੋਂ ਸੀਨੀਅਰ ਲੈਕਚਰਾਰ ਹਨ ਦੀ ਨਿਗਰਾਨੀ ਹੇਠ, ਲਿੰਕਨ ਯੂਨੀਵਰਸਿਟੀ ਦੇ ਡਿਪਾਰਟਮੈਂਟ ਗਲੋਬਲ ਵੈਲਯੂ ਚੇਨਜ਼ ਐਂਡ ਟ੍ਰੇਡ ਅਧੀਨ ਕੀਤਾ ਜਾ ਰਿਹਾ ਹੈ। ਖੋਜ ਕਾਰਜ ਦਾ ਉਦੇਸ਼ ਛੋਟੇ ਕਿਸਾਨ ਜੋ ਫਲ ਐਂਡ ਸਬਜ਼ੀਆਂ ਦੀ ਪੈਦਾਵਾਰ ਕਰਦੇ ਹਨ ਦਾ ਮੰਡੀ ਦੇ ਨਵੇਂ ਮੌਕਿਆਂ ਵਿੱਚ ਨਵੀਆਂ ਸੰਭਾਵਨਾਵਾਂ ਦਾ ਪਤਾ ਲਗਾਉਣਾ ਅਤੇ ਪ੍ਰਮੁੱਖ ਰੁਕਾਵਟਾਂ ਅਤੇ ਪ੍ਰੇਰਣਾ ਦੀ ਪਛਾਣ ਕਰਨਾ ਹੈ। ਇਸ ਸਰਵੇਖਣ ਵਿੱਚ ਹਿੱਸਾ ਲੈਣਾ ਸਵੈਇੱਛੁਕ ਹੈ, ਅਤੇ ਜਵਾਬ ਦੇਣ ਵਾਲਾ ਕਿਸੇ ਵੀ ਸਮੇਂ ਵਾਪਸ ਲੈਣ ਲਈ ਸੁਤੰਤਰ ਹੈ। ਵਿਅਕਤੀਗਤ ਹੁੰਗਾਰੇ ਗੁਪਤ ਰੂਪ ਵਿੱਚ ਵਰਤੇ ਜਾਣਗੇ। ਇਸ ਸੰਬੰਧ ਵਿੱਚ, ਗੁਪਤਨਾਮ ਨੂੰ ਬਰਕਰਾਰ ਰੱਖਣ ਲਈ ਵਿਸ਼ਲੇਸ਼ਣ ਦੌਰਾਨ ਇੰਟਰਵਿਓ ਕਰਨ ਵਾਲੇ ਜਾਂ ਉਸਦੇ ਪਰਿਵਾਰ ਦੀ ਪਛਾਣ ਕੇਡ ਕੀਤੀ ਜਾਏਗੀ। ਸਰਵੇਖਣ ਦੀ ਇੰਟਰਵਿਓ ਵਿੱਚ ਲਗਭਗ 60 ਮਿੰਟ ਦਾ ਸਮਾਂ ਲੱਗਣ ਦੀ ਉਮੀਦ ਹੈ।

ਖੋਜ ਦੇ ਨਤੀਜੇ ਉੱਤਰ ਦੇਣ ਵਾਲਿਆਂ ਜਾਂ ਸੰਸਥਾਵਾਂ ਦੇ ਨਾਮ ਦੇ ਹਵਾਲਿਆਂ ਤੋਂ ਬਿਨਾਂ ਪ੍ਰਕਾਸ਼ਤ ਕੀਤੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਲਈ ਉਹ ਕੰਮ ਕਰਦੇ ਹਨ। ਥੀਸਿਸ ਦਾ ਕਾਪੀਰਾਈਟ, ਖੋਜਕਰਤਾ ਅਤੇ ਯੂਨੀਵਰਸਿਟੀ ਦੇ ਕੋਲ ਹੈ। ਜੇ ਤੁਹਾਡੇ ਕੋਲ ਸਰਵੇਖਣ ਦੀ ਪ੍ਰਕਿਰਤੀ ਦੇ ਸੰਬੰਧ ਵਿੱਚ ਕੋਈ ਪ੍ਰਸ਼ਨ ਹੈ, ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ ਉਪਰੋਕਤ ਸੂਚੀਬੱਧ ਈ-ਮੇਲ ਪਤੇ 'ਤੇ ਸੁਪਰਵਾਈਜ਼ਰ ਜਾਂ ਖੋਜਕਰਤਾ ਨਾਲ ਸੰਪਰਕ ਕਰੋ ਜਾਂ ਖੋਜਕਰਤਾ ਨੂੰ 0064224615575 'ਤੇ ਕਾਲ ਕਰੋ। ਕਿਰਪਾ ਕਰਕੇ ਆਪਣਾ ਨਾਮ ਲਿਖ ਕੇ ਅਤੇ ਦਸਤਖਤ ਕਰਕੇ ਇਸ ਸਰਵੇਖਣ ਵਿੱਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਆਪਣੀ ਪੂਰੀ ਸਹਿਮਤੀ ਜ਼ਾਹਰ ਕਰੋ। ਹੇਠਾਂ।

। (ਭਾਗੀਦਾਰ ਦੇ ਪੂਰੇ ਨਾਮ) ਇਸ ਦੁਆਰਾ ਪ੍ਰਸ਼ਟੀ ਕਰਦੇ ਹਨ ਕਿ ਮੈਂ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਸਮੱਗਰੀ ਅਤੇ ਖੋਜ ਪ੍ਰੋਜੈਕਟ ਦੀ ਪ੍ਰਕਿਰਤੀ ਨੂੰ ਸਮਝਦਾ ਹਾਂ, ਅਤੇ ਮੈਂ ਖੋਜ ਪ੍ਰੋਜੈਕਟ ਵਿੱਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਸਹਿਮਤ ਹਾਂ। ਮੈਂ ਸਮਝਦਾ / ਸਮਝਦੀ ਹਾਂ ਕਿ ਮੈਨੂੰ ਕਿਸੇ ਵੀ ਸਮੇਂ ਪ੍ਰਾਜੈਕਟ ਤੋਂ ਪਿੱਛੇ ਹਟਣ ਦੀ ਆਜ਼ਾਦੀ ਹੈ, ਕੀ ਮੈਨੂੰ ਇੱਛਾ ਕਰਨੀ ਚਾਹੀਦੀ ਹੈ।

ਹਸਤਾਖਰ: _____ ਤਾਰੀਖ: _____

ਪਿੰਡ ਦਾ ਨਾਮ _____ ਤਹਿਸੀਲ / ਜ਼ਿਲ੍ਹਾ _____

ਜੇ ਨਹੀਂ, ਤਾਂ ਜਵਾਬ ਦੇਣ ਵਾਲੇ ਦੀ ਘਰ ਵਿੱਚ ਕਿਹੜੀ ਸਥਿਤੀ ਹੈ?

ਇੰਟਰਵਿਓ ਦਾ ਸਮਾਂ ਸ਼ੁਰੂ ਹੋਇਆ ___: ___ ਪੂਰਾ ਹੋਇਆ ___: ___

ਗਣਨਾ ਕਰਨ ਵਾਲੇ ਦਾ ਨਾਮ: _____ ਦਸਤਖਤ: _____ ਤਾਰੀਖ

1. ਲਿੰਗ ਮਰਦ ਔਰਤ
2. ਤੁਹਾਡਾ ਉਮਰ ਗਰੁੱਪ ਕੀ ਹੈ?
 16-25 26-35 36-45 46-55 56 ਅਤੇ ਉਪਰ
3. ਤੁਹਾਡੇ ਕੋਲ ਸਭ ਤੋਂ ਵੱਧ ਵਿਦਿਅਕ ਯੋਗਤਾ ਕੀ ਹੈ?
 ਕਈ ਰਸਮੀ ਸਿੱਖਿਆ ਨਹੀਂ ਪ੍ਰਾਇਮਰੀ ਸਕੂਲ ਮਿਡਲ ਸਕੂਲ ਹਾਈਸਕੂਲ ਯੂਨੀਵਰਸਿਟੀ ਪੱਧਰ
4. ਕੀ ਤੁਹਾਡੇ ਕੋਲ ਖੇਤੀਬਾੜੀ ਦੀਆਂ ਗਤੀਵਿਧੀਆਂ ਨਾਲ ਸੰਬੰਧਿਤ ਕੋਈ ਤਕਨੀਕੀ ਸਿੱਖਿਆ ਹੈ? ਹਾਂ ਨਹੀਂ
5. ਤੁਹਾਡੇ ਪਰਿਵਾਰ ਦੇ ਕਿੰਨੇ ਮੈਂਬਰ ਖੇਤੀ ਦੀਆਂ ਸਰਗਰਮੀਆਂ ਵਿਚ ਸ਼ਾਮਲ ਹਨ?

ਪਰਿਵਾਰ ਦੇ ਵੇਰਵੇ	ਮਰਦ	ਔਰਤ
ਪਰਿਵਾਰਿਕ ਮੈਂਬਰ		
ਮਜ਼ਦੂਰ ਖੇਤੀ ਦੀਆਂ ਸਰਗਰਮੀਆਂ ਵਿਚ ਮਦਦ ਕਰਦੇ ਹਨ?		

6. ਖੇਤੀ ਲਈ ਤੁਸੀਂ ਕਿੰਨੀ ਕੁ ਜ਼ਮੀਨ ਵਰਤਦੇ ਹੋ?

ਜ਼ਮੀਨ ਦੀ ਕਿਸਮ	ਜ਼ਮੀਨ ਹੈਕਟੇਅਰ ਵਿਚ
ਮਲਕੀਅਤ ਜ਼ਮੀਨ	
ਕਿਰਾਏ ਤੇ ਜ਼ਮੀਨ	
ਕੁੱਲ ਕਾਸ਼ਤ ਖੇਤਰ	

7. ਤੁਸੀਂ ਕੇਹੜੀ ਫ਼ਸਲ ਬੀਜਦੇ ਹੋ

	ਮੌਜੂਦਾ	ਤਿੰਨ ਸਾਲ ਪਹਿਲਾਂ
ਤਾਜ਼ਾ ਉਤਪਾਦ ਫ਼ਸਲ		

8. ਫਲ ਸਬਜ਼ੀਆਂ ਦੀ ਪੈਦਾਵਾਰ ਲਈ ਤੁਸੀਂ ਕਿੰਨੀ ਜ਼ਮੀਨ ਦੀ ਵਰਤੋਂ ਕਰਦੇ ਹੋ?

- 25% ਤੱਕ 25-50% 50-75% 100%

9. ਫਲ ਸਬਜ਼ੀਆਂ ਦੀ ਕਾਸ਼ਤ ਵਿੱਚ ਤੁਹਾਡੇ ਕੋਲ ਕਿੰਨੇ ਸਾਲ ਦਾ ਅਨੁਭਵ ਹੈ?

- 2 ਸਾਲ ਤੱਕ 3 ਤੋਂ 5 ਸਾਲ 6-10 ਸਾਲ 10 ਸਾਲ ਤੋਂ ਵੱਧ

10. ਕਿੰਨੇ ਖੇਤ ਮਜ਼ਦੂਰਾਂ ਨੂੰ ਪਰਿਵਾਰ ਦੇ ਮੈਂਬਰਾਂ ਤੋਂ ਇਲਾਵਾ ਹੋਰ ਖੇਤੀ ਸੰਬੰਧੀ ਕੰਮ ਵਿਚ ਲਗਾਇਆ ਜਾਂਦਾ ਹੈ (ਪ੍ਰਤੀ ਹੈਕਟੇਅਰ)

ਵੇਰਵੇ	ਮਰਦ	ਔਰਤ

ਪਰਿਵਾਰਕ ਮੈਂਬਰਾਂ ਤੋਂ ਇਲਾਵਾ ਖੇਤੀਬਾੜੀ ਦੇ ਕੰਮਾਂ ਵਿਚ ਲਗਾਏ ਖੇਤ ਮਜ਼ਦੂਰ (ਪ੍ਰਤੀ ਏਕੜ)		
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11. ਤੁਹਾਡੀ ਸਿੰਚਾਈ ਵਿਧੀ ਕੀ ਹੈ?

ਸਿੰਚਾਈ ਦੀ ਵਿਧੀ %	% ਕੁੱਲ ਕਾਸ਼ਤ ਜ਼ਮੀਨ
ਨਹਿਰ	
ਟਿਊਬ ਨਾਲ ਨਾਲ	
ਮਾਈਕ੍ਰੋ-ਸਿੰਚਾਈ (ਡ੍ਰਾਇਪ / ਸਪ੍ਰੈਕਲਰ)	
ਅਣ ਸਿੰਚਾਈ ਖੇਤਰ	

12. ਫਲ ਸਬਜ਼ੀਆਂ ਦੀ ਪ੍ਰਤੀ ਹੈਕਟੇਅਰ ਤੁਹਾਡੀ ਔਸਤਨ ਉਤਪਾਦਨ ਲਾਗਤ ਕੀ ਹੈ?

ਲਾਗਤ ਦਾ ਭਾਗ	ਫਸਲ
ਜ਼ਮੀਨ ਦਾ ਕਿਰਾਇਆ ਮੁੱਲ (ਰੁਪਏ ਦਾ / ਯੂਨਿਟ ਜ਼ਮੀਨ)	
ਜ਼ਮੀਨ ਦੀ ਤਿਆਰੀ	ਟਰੈਕਟਰ ਦਾ ਕਿਰਾਇਆ / ਡੀਜ਼ਲ ਦੀ
	ਲੇਬਰ ਦਾ ਖਰਚਾ (ਨੰਬਰ x ਦਿਨ x ਰੇਟ)
	ਪਰਿਵਾਰਕ ਕਿਰਤ
ਬੀਜ ਖਰੀਦਣ ਅਤੇ ਲਾਉਣ ਦੀ ਲਾਗਤ	ਖਰਚਾ (ਗਿਣਤੀ x ਕੀਮਤ)
	ਲੇਬਰ ਦਾ ਖਰਚਾ (ਨੰਬਰ x ਦਿਨ x ਰੇਟ)
	ਪਰਿਵਾਰਕ ਕਿਰਤ
ਖਾਦ (ਰਸਾਇਣਕ / ਜੈਵਿਕ ਖਾਦ) ਲਾਗਤ	ਖਰਚਾ (ਗਿਣਤੀ x ਕੀਮਤ)
	ਲੇਬਰ ਦਾ ਖਰਚਾ (ਨੰਬਰ x ਦਿਨ x ਰੇਟ)
	ਪਰਿਵਾਰਕ ਕਿਰਤ
ਕੀਟਨਾਸ਼ਕਾਂ / ਜੀਵ-ਕੀਟਨਾਸ਼ਕਾਂ ਦੀ ਲਾਗਤ	ਕੀਮਤ (ਗਿਣਤੀ x ਕੀਮਤ)
	ਲੇਬਰ ਦਾ ਖਰਚਾ (ਨੰਬਰ x ਦਿਨ x ਰੇਟ)
	ਪਰਿਵਾਰਕ ਕਿਰਤ
ਸਿੰਚਾਈ ਲਾਗਤ	ਸਿੰਚਾਈ ਦੀ ਗਿਣਤੀ x ਰੇਟ
	ਕੁੱਲ ਲਾਗਤ
ਨਦੀਨਾਂ ਦੀ ਸਫਾਈ ਖਰਚਾ	ਖਰਚਾ (ਗਿਣਤੀ x ਕੀਮਤ)
	ਲੇਬਰ ਦਾ ਖਰਚਾ (ਨੰਬਰ x ਦਿਨ x ਰੇਟ)
	ਪਰਿਵਾਰਕ ਕਿਰਤ
ਕਟਾਈ ਦੀ ਲਾਗਤ	ਕੰਬਾਈਨ ਦਾ ਕਿਰਾਇਆ
	ਲੇਬਰ ਦਾ ਖਰਚਾ (ਨੰਬਰ x ਦਿਨ x ਰੇਟ)
	ਪਰਿਵਾਰਕ ਕਿਰਤ

13. ਕੀ ਤੁਹਾਡੇ ਕੋਲ ਖੇਤੀ ਕਰਨ ਤੋਂ ਇਲਾਵਾ ਹੋਰ ਆਮਦਨ ਹੈ? ਹਾਂ ਨਹੀਂ
ਜੇ ਹਾਂ, ਤਾਂ ਕ੍ਰਿਪਾ ਕਰਕੇ ਸਰੋਤ ਦੱਸੋ?

14. ਕੀ ਤੁਸੀਂ ਕਿਸੇ ਕਿਸਾਨ ਦੇ ਸਮੂਹ/ ਸੰਗਠਨ ਦੇ ਮੈਂਬਰ ਹੋ? ਹਾਂ ਨਹੀਂ (ਜੇ ਜਵਾਬ ਨਹੀਂ ਸਵਾਲ 16 ਤੇ ਜਾਓ)

15. ਤੁਸੀਂ ਕਿੰਨੇ ਸਾਲ ਕਿਸਾਨ ਸੰਗਠਨ ਦੇ ਮੈਂਬਰ ਹੋ?
 2 ਸਾਲ ਤੱਕ 3 ਤੋਂ 5 ਸਾਲ 6-10 ਸਾਲ 10 ਸਾਲ ਤੋਂ ਵੱਧ

16. ਸਹਿਕਾਰੀ ਸਭਾਵਾਂ ਤੋਂ ਤੁਸੀਂ ਕਿੰਨੇ ਸੰਤੁਸ਼ਟ ਹੋ?

ਸੰਤੁਸ਼ਟ ਨਹੀ	
ਥੋੜ੍ਹਾ ਸੰਤੁਸ਼ਟ	
ਅੰਸਤਨ ਸੰਤੁਸ਼ਟ	
ਸੰਤੁਸ਼ਟ	
ਬਹੁਤ ਸੰਤੁਸ਼ਟ	

17. ਕਿਸ ਕਿਸਾਨ ਗਰੁੱਪ / ਸੰਗਠਨ ਦਾ ਤੁਸੀਂ ਮੈਂਬਰ ਹੋ?

ਸਰਕਾਰੀ ਨਿਯੰਤਰਿਤ ਸਹਿਕਾਰੀ ਸੰਸਥਾ ਲੋਕਲ ਪੱਧਰ ਦੀ ਸਹਿਕਾਰੀ ਸੰਸਥਾ ਕਿਸਾਨ ਉਤਪਾਦਕ ਕੰਪਨੀ ਕਿਸੇ ਵੀ ਹੋਰ ਕਿਸਮ ਦੇ ਖੇਤ-ਸਬੰਧਤ ਐਸੋਸੀਏਸ਼ਨ (ਕਿਸਾਨ ਯੂਨੀਅਨ)

18. ਕਿਸਾਨ ਸੰਗਠਨ ਦੁਆਰਾ ਤੁਹਾਨੂੰ ਕਿਹੜੇ ਲਾਭ ਮਿਲਦੇ ਹਨ?

ਲਾਭ	ਹਮੇਸ਼ਾਂ	ਜ਼ਿਆਦਾਤਰ	ਅਕਸਰ	ਲਗਭਗ ਅੱਧਾ ਸਮਾਂ	ਕਦੇ ਨਹੀਂ
ਬਿਹਤਰ ਭਾਅ ਲਈ ਗੱਲਬਾਤ ਕਰਨ ਲਈ					
ਸਟੋਰੇਜ ਸਹੂਲਤਾਂ					
ਤੁਹਾਡੇ ਉਤਪਾਦ ਦੀ ਮਾਰਕੀਟਿੰਗ					
ਬੀਜ ਤੇ ਖਾਦਾਂ					
ਫਾਰਮ ਮਸ਼ੀਨਰੀ					
ਖੇਤੀ ਕ੍ਰੈਡਿਟ					
ਹੋਰ (ਵੇਰਵਾ ਦਿਓ)					

19. ਜੇਕਰ ਪ੍ਰਸ਼ਨ 12 ਦਾ ਉੱਤਰ ਨਹੀਂ ਹੈ ਤਾਂ ਹੇਠ ਲਿਖੇ ਕਾਰਨਾਂ ਵਿੱਚੋਂ ਕਿਹੜਾ ਤੁਹਾਨੂੰ ਸੰਗਠਨ ਦਾ ਮੈਂਬਰ ਬਣਨ ਤੋਂ ਰੋਕਦਾ ਹੈ, ਕਿਰਪਾ ਕਰਕੇ ਦੱਸੋ?

ਉੱਚ ਗਾਹਕੀ ਫੀਸ	
ਵੱਡੇ ਕਿਸਾਨਾਂ ਦਾ ਉੱਚ ਪ੍ਰਭਾਵ	
ਗੈਰ-ਪਾਰਦਰਸ਼ੀ ਲੈਣ-ਦੇਣ ਅਤੇ ਅਗਵਾਈ	
ਸਿਆਸੀ ਦਖਲ ਅੰਦਾਜ਼ੀ	
ਹੋਰ ਕਾਰਨ	

20. ਤੁਸੀਂ ਕਿਸਾਨੀ ਦੀ ਮਸ਼ੀਨਰੀ ਤਕ ਕਿਵੇਂ ਪਹੁੰਚ ਪ੍ਰਾਪਤ ਕਰਦੇ ਹੋ

ਤੁਸੀਂ ਮਾਲਕ ਹੋ ਕਿਸਾਨ ਸੰਗਠਨ ਪ੍ਰਦਾਨ ਕਰਦਾ ਹੈ ਖਰੀਦਦਾਰ ਮੁਹੱਈਆ ਕਰਦਾ ਹੈ ਖੁਦ ਕਿਰਾਏ ਉੱਪਰ ਲੈਂਦੇ ਹੋ ਹੋਰ (ਵੇਰਵਾ ਦਿਓ)

21. ਤੁਸੀਂ ਆਪਣਾ ਤਾਜ਼ਾ ਉਤਪਾਦ ਕਿੱਥੇ (ਮਾਰਕੀਟ ਚੈਨਲ) ਅਤੇ ਕਿੰਨੇ ਪ੍ਰਤੀਸ਼ਤ ਉਸੇ ਮਾਰਕੀਟ ਚੈਨਲ ਵੇਚਦੇ ਹੋ?

ਮਾਰਕੀਟ ਚੈਨਲ	ਕਿੰਨੇ ਪ੍ਰਤੀਸ਼ਤ
ਥੋਕ ਬਾਜ਼ਾਰ	
ਫਾਰਮ ਗੇਟ 'ਤੇ ਵਪਾਰੀ	
ਪ੍ਰੋਸੈਸਿੰਗ ਕੰਪਨੀ	
ਸੁਪਰਮਾਰਕੀਟ	
ਫਾਸਟ ਫੂਡ ਰੈਸਟਰਾਂ ਹੋਟਲ	

ਸਥਾਨਕ ਤੌਰ 'ਤੇ ਖੁੱਲ੍ਹੇ ਬਾਜ਼ਾਰ	
ਹੋਰ	

22. ਕੀ ਤੁਸੀਂ ਪਿਛਲੇ ਤਿੰਨ ਸਾਲਾਂ ਵਿੱਚ ਮਾਰਕੀਟ ਚੈਨਲ ਨੂੰ ਬਦਲਿਆ ਸੀ? ਹਾਂ ਨਹੀਂ
23. ਜੇ ਹਾਂ, ਤਾਂ ਤੁਸੀਂ ਮਾਰਕੀਟ ਚੈਨਲਾਂ ਨੂੰ ਬਦਲਣ ਵੇਲੇ ਕੀ ਸੋਚਦੇ ਹੋ?

ਫੈਕਟਰ	ਅਹਿਮ ਨਹੀਂ	ਥੋੜ੍ਹਾ ਮਹੱਤਵਪੂਰਨ	ਮੱਧਮ ਮਹੱਤਵਪੂਰਨ	ਮਹੱਤਵਪੂਰਨ	ਬਹੁਤ ਹੀ ਮਹੱਤਵਪੂਰਨ
ਬਿਹਤਰ ਕੀਮਤ					
ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ ਮਿਲਣ ਦੀ ਸਮਰੱਥਾ					
ਵਿਕਰੀ ਦੀ ਮਾਤਰਾ					
ਟਾਈਮ ਪ੍ਰਤੀਬੱਧਤਾ					
ਬਾਜ਼ਾਰ ਤੋਂ ਦੂਰੀ					
ਭਰੋਸੇਯੋਗ ਭੁਗਤਾਨ					
ਖਪਤਕਾਰਾਂ ਨਾਲ ਸਿੱਧੀ ਗੱਲਬਾਤ					
ਜਾਣਕਾਰੀ ਤੱਕ ਪਹੁੰਚ					
ਭਰੋਸਾ ਅਤੇ ਵਚਨਬੱਧਤਾ					
ਕੋਈ ਹੋਰ (ਕਿਰਪਾ ਕਰਕੇ ਦੱਸੋ)					

24. ਜਿਸ ਮਾਰਕੀਟ ਚੈਨਲ ਵਿਚ ਤੁਸੀਂ ਉਤਪਾਦ ਵੇਚਦੇ ਹੋ, ਕੀਮਤ ਨਿਰਧਾਰਤ ਕਰਨ ਲਈ ਹੇਠ ਲਿਖੀਆਂ ਵਿੱਚੋਂ ਕਿਹੜੀਆਂ ਵਿਕਲਪਾਂ ਨੂੰ ਮੰਨਦੇ ਹੋ?

ਚੋਣ	ਸਰਕਲ ਇਕ ਵਿਕਲਪ ਜੋ ਲਾਗੂ ਹੁੰਦਾ ਹੈ
ਉਤਪਾਦਾਂ ਦੇ ਗ੍ਰੇਡ (ਗੁਣਵੱਤਾ) ਦੇ ਅਨੁਸਾਰ	
ਲੋੜੀਂਦੇ ਮੰਡੀਕਰਨ ਮੁੱਲ	
ਮਾਰਕੀਟ ਕੀਮਤ + ਪ੍ਰੀਮੀਅਮ	
ਉਤਪਾਦਨ ਦੀ ਲਾਗਤ + ਮੰਡੀ ਦੀ ਕੀਮਤ ਦਾ ਫਰਕ	
ਕਿਸੇ ਵੀ ਦੋ ਤਰੀਕਿਆਂ ਜਾਂ ਲਚਕਦਾਰ ਕੀਮਤ ਦੀ ਵਿਧੀ ਦਾ ਸੰਯੋਗ (ਕਿਸਾਨ ਦੁਆਰਾ ਚੁਣਿਆ ਤਰੀਕਾ)	

25. ਕੀ ਤੁਸੀਂ ਉਤਪਾਦ ਵਿਕਰੀ ਤੋਂ ਪਹਿਲਾਂ ਬਾਜ਼ਾਰ ਦੀ ਜਾਣਕਾਰੀ ਪ੍ਰਾਪਤ ਕਰਦੇ ਹੋ? ਹਾਂ ਨਹੀਂ
26. ਤੁਸੀਂ ਮਾਰਕੀਟ ਤੋਂ ਕਿੰਨੀ ਵਾਰ ਕੀਮਤ ਦੀ ਜਾਣਕਾਰੀ ਪ੍ਰਾਪਤ ਕਰ ਰਹੇ ਹੋ?
 ਦਿਨ ਵਿੱਚ ਇੱਕ ਵਾਰੀ ਦਿਨ ਦੀ ਸਵੇਰ / ਦੁਪਹਿਰ ਦੇ ਵਾਰੀ ਹਫ਼ਤੇ ਵਿਚ ਇਕ ਵਾਰ ਹਫ਼ਤੇ ਵਿਚ ਦੋ ਵਾਰ
27. ਕੀਮਤ ਜਾਣਕਾਰੀ ਨੂੰ ਐਕਸੈਸ ਕਰਨ ਲਈ ਸੰਚਾਰ ਦਾ ਕਿਹੜਾ ਸਾਧਨ ਤੁਸੀਂ ਵਰਤਦੇ ਹੋ?
 ਸਮਾਰਟ ਫੋਨ ਰੇਡੀਓ ਟੈਲੀਵਿਜ਼ਨ ਇੰਟਰਨੈਟ ਅਖਬਾਰ ਕੋਈ ਹੋਰ
28. ਕੀਮਤ ਜਾਣਕਾਰੀ ਪ੍ਰਾਪਤ ਕਰਨ ਦਾ ਤੁਹਾਡਾ ਸਰੋਤ ਕੀ ਹੈ?

ਸਰੋਤ	ਹਮੇਸ਼ਾਂ	ਜ਼ਿਆਦਾਤਰ	ਅਕਸਰ	ਲਗਭਗ ਅੱਧਾ ਸਮਾਂ	ਕਦੇ ਨਹੀਂ
ਸਵੈ-ਪੜਤਾਲ					
ਹੋਰ ਕਿਸਾਨਾਂ ਨਾਲ ਗੱਲ ਕਰਨਾ					
ਕਮਿਸ਼ਨ ਏਜੰਟ / ਵਪਾਰੀ ਨਾਲ ਗੱਲ ਕਰਨਾ					
ਕਿਸਾਨ ਸੰਗਠਨ ਜਾਂ ਸਹਿਕਾਰੀ ਸੰਸਥਾ					
ਕੋਈ ਹੋਰ (ਕਿਰਪਾ ਕਰਕੇ ਨਿਰਧਾਰਤ ਕਰੋ)					

29. ਮਾਰਕੀਟ ਵਿਚ ਰੁਝੇਵੇਂ ਦਾ ਤਰੀਕਾ ਕੀ ਹੈ?
 ਵਿਅਕਤੀਗਤ ਸਮੂਹਕ ਦੋਵੇਂ ਤਰਾਂ ਨਾਲ
30. ਖਰੀਦਦਾਰ ਨਾਲ ਤੁਹਾਡਾ ਕਿਸ ਤਰ੍ਹਾਂ ਦਾ ਰਿਸ਼ਤਾ ਹੈ
 ਲਿਖਤੀ ਇਕਰਾਰਨਾਮਾ ਕਰਾਰਨਾਮਾ ਮੂੰਹ ਜਬਾਨੀ ਇਕਰਾਰਨਾਮਾ ਮੌਕੇ ਦੇ ਲੈਣ-ਦੇਣ
31. ਸਪਲਾਈ ਚੇਨ ਵਿਚ ਵੱਖਰੇ ਪੱਧਰ 'ਤੇ ਤੁਸੀਂ ਆਪਣੇ ਖਰੀਦਦਾਰ ਨੂੰ ਕਿੰਨਾ ਕੁ ਜਾਣਦੇ ਹੋ?
 ਚੇਨ ਵਿੱਚ ਤੁਰੰਤ ਖਰੀਦਦਾਰ ਚੇਨ ਵਿੱਚ ਅਖੀਰ ਖਰੀਦਦਾਰ ਤਕ
32. ਹੇਠ ਦਿੱਤੇ ਫੈਸਲਿਆਂ ਤੇ ਕੌਣ ਫੈਸਲਾ ਕਰਦੇ ਹਨ? (ਢੁਕਵੀਂ ਸਹੀ ਦਾ ਨਿਸ਼ਾਨ ਲਗਾਓ)

ਫੈਸਲੇ	ਤੁਸੀਂ ਫੈਸਲਾ ਕਰਦੇ ਹੋ	ਖਰੀਦਦਾਰ ਫੈਸਲਾ	ਸਾਂਝੀ ਯੋਜਨਾ ਬਣਾਉਂਦੇ ਹੋ
ਬੀਜਾਂ ਦੀ ਕਿਸਮ			
ਕਿੰਨੇ ਬੀਜ ਲਗਾਏ ਜਾਂਦੇ ਹਨ			
ਕੀ ਰਸਾਇਣ ਇਸਤੇਮਾਲ ਕਰਨਾ			
ਕਿਵੇਂ ਅਤੇ ਕਦੋਂ ਸਿੰਜਣਾ ਹੈ			
ਕਿੰਨੀ ਮਾਤਰਾ ਵਿਚ ਵਾਢੀ			
ਕਿਹੜਾ ਫਸਲ / ਸਿਰ / ਕਿਸਮਾਂ ਨੂੰ ਪਹਿਲੀ ਵਾਰ ਵਾਢੀ			
ਵਾਢੀ ਕਦੋਂ			

33. ਕੀ ਤੁਹਾਡੇ ਕੋਲ ਕ੍ਰੈਡਿਟ ਦੇ ਰਸਮੀ ਸਰੋਤ ਤੱਕ ਪਹੁੰਚ ਹੈ ? ਹਾਂ ਨਹੀਂ (ਜੇ ਹਾਂ ਪ੍ਰਸ਼ਨ 34 ਤੇ ਜਾਓ)
34. ਜਵਾਬ ਨਹੀਂ ਹੈ ਤਾਂ ਕ੍ਰੈਡਿਟ ਦੇ ਰਸਮੀ ਸਰੋਤ ਦੀ ਪਹੁੰਚ ਨਾ ਹੋਣ ਦਾ ਕੀ ਕਾਰਨ ਹੈ?
 ਛੋਟੀ ਜ਼ਮੀਨ ਦੀ ਹੋਲਡਿੰਗ ਘਟ ਮੁੱਲ ਦੀ ਸੰਪਤੀ ਗਾਰੰਟੀ ਵਾਸਤੇ ਬਹੁਤ ਜ਼ਿਆਦਾ ਪੇਪਰ ਵਰਕ ਵੇਚਣ ਯੋਗ
ਉਤਪਾਦ ਦਾ ਕਰਜ਼ ਦੀ ਰਕਮ ਦੇ ਬਰਾਬਰ ਨਾ ਹੋਣਾ ਜਾਣਕਾਰੀ ਦੀ ਕਮੀ ਕੋਈ ਹੋਰ ਕਿਰਪਾ ਕਰਕੇ ਦੱਸੋ
35. ਤੁਹਾਡੇ ਕ੍ਰੈਡਿਟ ਦਾ ਪਸੰਦੀਦਾ ਸਰੋਤ ਕੀ ਹੈ?

ਸਰੋਤ	ਹਮੇਸ਼ਾਂ	ਜ਼ਿਆਦਾਤਰ	ਅਕਸਰ	ਲਗਭਗ ਅੱਧਾ ਸਮਾਂ	ਕਦੇ ਨਹੀਂ
ਵਪਾਰਕ ਬੈਂਕਾਂ					
ਖਰੀਦਦਾਰ					
ਕਿਸਾਨ ਸੰਗਠਨ ਜਾਂ ਸਹਿਕਾਰੀ ਸੰਸਥਾ					
ਰਵਾਇਤੀ ਪੇਂਡੂ ਪੈਸਾ ਦੇਣ ਵਾਲਾ					

ਗੁਆਂਢੀ / ਦੇਸਤ					
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36. ਕ੍ਰਿਪਾ ਕਰਕੇ ਹੇਠਾਂ ਦਿੱਤੇ ਕਥਨਾਂ ਤੇ ਆਪਣਾ ਜਵਾਬ ਦਿਓ

ਫਾਰਮ ਕਰੈਡਿਟ ਮਦਦ ਕਰਦਾ ਹੈ	ਅਹਿਮ ਨਹੀਂ	ਬੇੜ੍ਹਾ ਮਹੱਤਵਪੂਰਨ	ਮੱਧਮ ਮਹੱਤਵਪੂਰਨ	ਮਹੱਤਵਪੂਰਨ	ਬਹੁਤ ਮਹੱਤਵਪੂਰਨ
ਖੇਤੀ ਉਤਪਾਦਕਤਾ ਨ					
ਚੰਗੀ ਕੁਆਲਟੀ ਦੇ ਬੀਜ					
ਫਾਰਮ ਮਸ਼ੀਨਰੀ ਖਰੀਦਣ					
ਸਿੰਚਾਈ ਦਾ ਪ੍ਰਬੰਧ ਕਰਨ ਵਿੱਚ					
ਟਰਾਂਸਪੋਰਟੇਸ਼ਨ ਦਾ ਪ੍ਰਬੰਧ					
ਅਗੇਤ ਲੇਬਰ ਲਾਗਤ					
ਕਾਸ਼ਤ ਦੇ ਅਮਲ ਵਿੱਚ ਸੁਧਾਰ					

37. ਕੀ ਤੁਹਾਨੂੰ ਕੋਈ ਤਕਨੀਕੀ ਸਹਾਇਤਾ ਪ੍ਰਾਪਤ ਹੈ ਹਾਂ ਨਹੀਂ (ਜੇ ਜਵਾਬ ਨਹੀਂ ਹੈ ਤਾਂ ਸਵਾਲ 38 ਤੇ ਜਾਓ)

38. ਜੇ ਹਾਂ, ਤਾਂ ਤਕਨੀਕੀ ਸਹਾਇਤਾ ਦਾ ਮੁੱਖ ਸ੍ਰੋਤ ਕੀ ਹੈ?

ਖਰੀਦਦਾਰ ਸਰਕਾਰੀ ਵਿਭਾਗ ਇੰਪ੍ਰੋਟ ਸਪਲਾਇਰ ਗੁਆਂਢੀ / ਦੇਸਤ ਕਿਸਾਨ ਸੰਗਠਨ ਜਾਂ ਸਹਿਕਾਰੀ ਸੰਸਥਾ

39. ਕੀ ਤੁਹਾਡੇ ਕੋਲ ਭੰਡਾਰਨ ਲਈ ਵੇਅਰਹਾਊਸ ਦੀ ਵਰਤੋਂ ਹੈ? ਹਾਂ ਨਹੀਂ

40. ਵੇਅਰਹਾਊਸ ਤੱਕ ਪਹੁੰਚ ਕਰਨ ਲਈ ਤੁਸੀਂ ਕੀ ਫਾਇਦੇ ਪ੍ਰਾਪਤ ਕਰਦੇ ਹੋ?

ਫਾਇਦੇ	ਹਮੇਸ਼ਾਂ	ਜ਼ਿਆਦਾਤਰ	ਅਕਸਰ	ਲਗਭਗ ਅੱਧਾ ਸਮਾਂ	ਕਦੇ ਨਹੀਂ
ਬਿਹਤਰ ਵੇਚਣ ਦਾ ਭਾਅ ਬਾਅਦ ਵਿੱਚ					
ਵੇਚਣ ਯੋਗ ਉਤਪਾਦ ਦਾ ਘਟ ਨੁਕਸਾਨ					
ਨਿਯਮਤ ਸਪਲਾਈ ਦੀ ਯੋਗਤਾ ਵਿੱਚ ਵਾਧਾ					
ਸੰਦੇਬਾਜ਼ੀ ਦੀ ਸ਼ਕਤੀ ਵਧੀ ਹੈ					

41. ਤੁਹਾਡੇ ਉਤਪਾਦ ਨੂੰ ਮਾਰਕੀਟ ਪੁਆਇੰਟ ਤੱਕ ਕਿਵੇਂ ਲਿਜਾਇਆ ਜਾਂਦਾ ਹੈ?

ਆਪਣੇ ਆਵਾਜਾਈ ਦੁਆਰਾ ਭਾੜੇ ਵਾਲੇ ਵਾਹਨ (ਵਿਅਕਤੀਗਤ) ਭਾੜੇ ਵਾਲੇ ਵਾਹਨ (ਸਮੂਹਿਕ ਕਿਸਾਨ ਸੰਗਠਨ) ਜਨਤਕ ਟ੍ਰਾਂਸਪੋਰਟ ਖਰੀਦਦਾਰ ਟ੍ਰਾਂਸਪੋਰਟ ਕੋਈ ਹੋਰ ਕ੍ਰਿਪਾ ਕਰਕੇ ਦੱਸੋ

42. ਸੜਕ ਤੋਂ ਕਿੰਨੀ ਦੂਰ ਤੁਹਾਡਾ ਫਾਰਮ ਹੈ

2 ਕਿਲੋਮੀਟਰ ਵਿੱਚ 3-5 ਕਿਲੋਮੀਟਰ ਵਿਚਕਾਰ 5 ਕਿਲੋਮੀਟਰ ਤੋਂ ਜ਼ਿਆਦਾ

43. ਮਾਰਕੀਟ ਤੁਹਾਡੇ ਫਾਰਮ ਤੋਂ ਕਿੰਨੀ ਦੂਰੀ ਤੇ ਹੈ?

10 ਕਿਲੋਮੀਟਰ ਦੀ ਦੂਰੀ ਤੱਕ 10 ਤੋਂ 25 ਕਿਲੋਮੀਟਰ ਵਿਚਕਾਰ 25 ਤੋਂ 50 ਕਿਲੋਮੀਟਰ 50 ਕਿਲੋਮੀਟਰ ਤੋਂ ਵੱਧ

44. ਤੁਸੀਂ ਮਾਰਕੀਟ ਤਕ ਪਹੁੰਚਣ ਲਈ ਬੁਨਿਆਦੀ ਢਾਂਚੇ ਨੂੰ ਕਿਵੇਂ ਰੇਟ ਕਰਦੇ ਹੋ?

ਵੇਰਵੇ	ਬਹੁਤ ਖਰਾਬ	ਔਸਤ ਤੋਂ ਥੱਲੇ	ਔਸਤ	ਔਸਤ ਤੋਂ ਉੱਪਰ	ਸ਼ਾਨਦਾਰ
ਮਾਰਕੀਟ ਤਕ ਸੜਕ ਦੀ ਹਾਲਤ					

ਵੇਅਰਹਾਊਸ ਸਹੂਲਤਾਂ					
ਕੋਲਡ ਸਟੋਰੇਜ					
ਆਵਾਜਾਈ ਦੀਆਂ ਸਹੂਲਤਾਂ					

45. ਤਸੀਂ ਪ੍ਰਤੀ ਹੈਕਟੇਅਰ ਵਿਚ ਤਾਜ਼ਾ ਉਤਪਾਦ ਵੇਚਣ ਲਈ ਕਿੰਨਾ ਖਰਚ ਕਰਦੇ ਹੋ?

ਤਾਜ਼ਾ ਉਤਪਾਦਨ ਲਾਗਤ ਵੇਚਣ ਦੀ ਕੁੱਲ ਲਾਗਤ	ਲਾਗਤ (₹ INR)
ਆਵਾਜਾਈ	
ਲੋਡਿੰਗ ਅਤੇ ਅਨਲੋਡਿੰਗ	
ਗਰੇਡਿੰਗ ਅਤੇ ਪੈਕਿੰਗ	
ਮਾਰਕੀਟ ਫੀਸ	
ਦਲਾਲਾਂ ਦਾ ਕਮਿਸ਼ਨ	
ਕੋਈ ਹੋਰ ਸੰਬੰਧਿਤ ਖਰਚੇ (ਕ੍ਰਿਪਾ ਕਰਕੇ ਦੱਸੋ)	
ਕੁੱਲ:	

46. ਫ਼ਸਲ ਕੱਟਨ ਤੋਂ ਲੈ ਕੇ ਮੰਡੀ ਤਕ ਉਤਪਾਦ ਦਾ ਕਿੰਨੇ ਪ੍ਰਤੀਸ਼ਤ ਨੁਕਸਾਨ ਹੁੰਦਾ ਹੈ? ਕਿਰਪਾ ਕਰਕੇ ਨਿਰਧਾਰਿਤ ਕਰੋ

47. ਕੀ ਕੋਈ ਅਜਿਹੇ ਮਾਪਦੰਡ ਹਨ ਜੋ ਤੁਹਾਨੂੰ ਆਪਣੇ ਚੁਣੇ ਹੋਏ ਬਾਜ਼ਾਰ ਦੀ ਸਪਲਾਈ ਕਰਨ ਦੀ ਪਾਲਣਾ ਕਰਨ ਦੀ ਲੋੜ ਹੈ?
 ਹਾਂ ਨਹੀਂ

48. ਜੇ ਹਾਂ, ਤਾਂ ਇਨ੍ਹਾਂ ਮਿਆਰਾਂ ਦੀ ਅਹਿਮੀਅਤ ਕਿੰਨੀ ਮਹੱਤਵਪੂਰਨ ਹੈ?

ਸਟੈਂਡਰਡ	ਅਹਿਮ ਨਹੀਂ	ਥੋੜ੍ਹਾ ਮਹੱਤਵਪੂਰਨ	ਮੱਧਮ ਮਹੱਤਵਪੂਰਨ	ਮਹੱਤਵਪੂਰਨ	ਬਹੁਤ ਮਹੱਤਵਪੂਰਨ
ਗਿਣਤੀ					
ਗੁਣਵੱਤਾ					
ਬਾਰੰਬਾਰਤਾ					
ਵੱਖ ਵੱਖ ਕਿਸਮ					
ਪੈਕਿੰਗ					
ਭੋਜਨ ਸੁਰੱਖਿਆ					
ਹੋਰ					

49. ਕੀ ਤੁਹਾਨੂੰ ਮਾਰਕੀਟ ਵਿਚ ਉਤਪਾਦ ਵੇਚਣ ਲਈ ਗ੍ਰੇਡਿੰਗ ਕਰਨੀ ਪੈਂਦੀ ਹੈ ਹਾਂ ਨਹੀਂ
ਜੇ ਹਾਂ, ਤਾਂ ਤੁਸੀਂ ਚੁਣੀ ਹੋਈ ਮਾਰਕੀਟ ਨੂੰ ਵੇਚਦੇ ਹੋ ਕਿ ਗ੍ਰੇਡ ਏ, ਬੀ ਅਤੇ ਸੀ ਦੇ ਕਿੰਨੇ ਪ੍ਰਤੀਸ਼ਤ (%) ਹਨ

ਗ੍ਰੇਡ	ਪ੍ਰਤੀਸ਼ਤ	(%) ਮਾਰਕੀਟ

50. ਕਿੰਨੇ ਪ੍ਰਤੀਸ਼ਤ ਉਤਪਾਦ ਵਿਕਣ ਤੋਂ ਰਹਿ ਜਾਂਦਾ ਹੈ?

10% ਤੱਕ 10-20% ਤੱਕ 20-30% ਤੱਕ 30% ਤੋਂ ਵੱਧ

51. ਉਤਪਾਦ ਵਿਕਣ ਤੋਂ ਰਹਿ ਜਾਨ ਦੇ ਕੀ ਕਾਰਨ ਹਨ?

ਫੈਕਟਰ	ਸਰਕਲ ਜੋ ਲਾਗੂ ਹੁੰਦਾ ਹੈ
ਨੰਡੇ ਸਟੋਰੇਜ਼ ਸਹੂਲਤਾਂ ਦੀ ਘਾਟ	
ਬਾਜ਼ਾਰ ਤੋਂ ਦੂਰੀ	
ਗੁਣਵੱਤਾ ਮਾਨਕਾਂ ਨੂੰ ਪੂਰਾ ਕਰਨ ਵਿੱਚ ਅਸਮਰੱਥ	
ਮੁੱਲ ਉਤਪਾਦਨ ਦੇ ਖਰਚਿਆਂ ਨੂੰ ਸ਼ਾਮਲ ਨਹੀਂ ਕਰਦਾ	
ਵਾਢੀ ਕਰਨ, ਸਾਂਭਣ ਅਤੇ ਵੰਡਣ ਲਈ ਉਪਲਬਧ ਕਿਰਤ ਦੀ ਕਮੀ	
ਕਟਾਈ ਤੋਂ ਬਾਅਦ ਫਸਲ ਲੋੜਾਂ ਲਈ ਸਹੂਲਤਾਂ ਦੀ ਘਾਟ	
ਕੋਈ ਹੋਰ, ਕਿਰਪਾ ਕਰਕੇ ਨਿਰਧਾਰਤ ਕਰੋ	

52. ਜੇਕਰ ਵੇਚਣ ਵਿਚ ਅਸਮਰੱਥ ਰਹਿੰਦੇ ਤੋਂ ਉਤਪਾਦ ਨੂੰ ਕੀ ਕਰਦੇ ਹੋ

□ ਡੰਪ □ ਘਰੇਲੂ ਖਪਤ (ਪਰਿਵਾਰ ਅਤੇ ਦੋਸਤ) □ ਘੱਟ ਕੀਮਤ ਤੇ ਵੇਚ ਦਿੰਦਾ ਹੈ □ ਸਟੋਰ ਕਰਕੇ ਬਾਅਦ ਵਿਚ ਵੇਚ ਦਿੰਦਾ ਹੈ □ ਕੋਈ ਹੋਰ

53. ਤੁਹਾਡੀ ਔਸਤ ਝਾੜ, ਕੀਮਤ, ਕੁੱਲ ਆਮਦਨ (ਪ੍ਰਤੀ ਹੈਕਟੇਅਰ) ਕੀ ਹੈ?

	ਮੁੱਖ ਚੈਨਲ ਵਿੱਚ	ਦੂਜੇ ਚੈਨਲ ਵਿੱਚ (ਜੇ ਇੱਕ ਤੋਂ ਵੱਧ ਚੈਨਲ ਵਿੱਚ ਵੇਚੇ ਜਾਂਦੇ ਹਨ)
ਉਪਜ (ਕਿ.ਗ. / ਹੈਕਟੇਅਰ)		
ਕੀਮਤ (ਰੁਪਏ / ਕਿ.ਗ.)		
ਕੁੱਲ ਆਮਦਨ (ਰੁਪਏ)		

54. ਕੀ ਕੋਈ ਹੋਰ ਚੀਜ਼ ਹੈ ਜਿਸ ਬਾਰੇ ਤੁਸੀਂ ਕਹਿਣਾ ਚਾਹੁੰਦੇ ਹੋ?

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