

ECONOMICS OF CONTRACT FARMING:
A CASE OF WHITE ONION AND CHIP-GRADE
POTATO CULTIVATION IN SELECTED
DISTRICTS OF MAHARASHTRA

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By

Varun Miglani

Under Guidance of

Dr. Shrikant S. Kalamkar

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Name of the Author : Varun Miglani

Name of the Principal Supervisor : Dr. Shrikant S. Kalamkar

Degree : Doctorate of Philosophy (PhD)

Name of the University : Gokhale Institute of Politics and
Economics
(Deemed to be a University),
Pune 411004, Maharashtra, India

Year of Submission : 2016

Declaration by the Candidate

I, Varun Miglani, hereby declare that my thesis on the topic entitled, “Economics of Contract Farming: A Case of White Onion and Chip-grade Potato Cultivation in Selected Districts of Maharashtra”, is submitted for the award of Degree of Doctor of Philosophy in Economics to the Gokhale Institute of Politics And Economics, Pune 411004.

This thesis has not been submitted by me elsewhere for the award of any degree or diploma-part or full. The information gathered by me elsewhere for the thesis is original true and factual. Such material as has been obtained from other source has been duly acknowledged in the thesis.

Varun Miglani

Certificate

(FORM 'A')

CERTIFIED that the work incorporated in the thesis entitled “Economics of Contract Farming: A Case of White Onion and Chipgrade Potato Cultivation in Selected Districts of Maharashtra”, submitted by **Mr. Varun Miglani** was carried out by the candidate under my supervision. Such material as has been obtained from other sources has been duly acknowledged in the thesis.

Dr. Shrikant S. Kalamkar

(Research Guide)

Date: 11/01/2016

Place: VVN, Anand.

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List of Acronyms

ACF	Attritioned contract farmer
AP	Andhra Pradesh
ATE	Average treatment effect
ATL	Atlantic
BL	Bullock labour
C2M	Modified Cost
CACP	Commission for Agricultural Costs and Prices
CCFH	Credit constrained farming household
CF	Contract farmer
CFAs	Contract farming arrangements
CUFH	Credit unconstrained farming household
FYM	Farm yard manure
GAP	Good Agricultural Practices
GCA	Gross cropped area
GIA	Gross irrigated area
GoI	Government of India
GoM	Government of Maharashtra
ha	Hectares
HL	Hired labour
H-L test	Hosmer and Lemeshow test
HLL	Hindustan Lever Ltd.
IFPRI	International Food Policy Research Institute
JISL	Jain Irrigations Systems Pvt. Ltd.
JNU	Jawaharlal Nehru University
K-S	Kolmogorov–Smirnov
LDCs	Least developed countries
max	Maximum
Mdn	Median
MGP	Minimum guaranteed price
min	Minimum
MIS	Micro-irrigation systems
ML	Machine Labour
MOFPI	Ministry of Food processing Industries
MSAMB	Maharashtra State Agricultural Marketing Board
MT	Metric tons
MTID	Markets, Trade and Institutions Division
NCF	Non-contract farmer
NNCF	Never contract farmer
NSA	Net sown area
OBC	Other Backward Class
p	p-value

PPS	Population Probability to Size
PSM	Propensity score matching
<i>r</i>	Effect size
R&D	Research and Development
SD	Standard deviation
SPSS	Statistical Package for Social Science
ST	Scheduled tribe
<i>t</i>	t-statistic
T.E.	Triennium Ending
TCE	Transaction cost economics
TN	Tamil Nadu
TSS	Total Soluble Solids
U	Mann-whitney statistic
US	United Status
VIF	Variance inflation factor
YASHADA	Yashwantrao Chavan Academy of Development Administration
Z	A data point expressed in standard deviation units

Chapter 1 - Introduction

1.1 Background

1.1.1 Global transformation

Growing urban populations, expanding per capita incomes, changing lifestyles, maturing agribusiness markets and emerging mass media and communication systems have altered the food consumption, production and distribution patterns across the world (Stringer, Sang & Croppenstedt, 2009). With changing times, supermarket revolution has spread across the globe and is rapidly expanding in emerging economies of China, India, Malaysia and Indonesia (Kearney, A. T., 2012; Reardon, Timmer, & Minten, 2010). As per the 2012 Global Retail Development Index, China ranked third, while India ranked fifth in terms of retail investments (Kearney, A. T. , 2012). In India, organised retail¹ or the so called modern food retail has been estimated to have grown 49.9% annually from 2001 to 2010 (Reardon et al., 2010). The emergence of super markets have brought a shift away from traditional wholesale system towards the use of centralized distribution centres', specialized/dedicated wholesalers operating on their preferred set of farmers who maintain private standards for quality and food safety (Wang, Dong, Rozelle, Huang, & Reardon, 2009). Moreover, there has been penetration of modern logistic firms in India which are providing services such as assortment and packaging of produce along with the direct delivery to food chains (Reardon & Minten, 2011). Some of the examples of the dedicated wholesalers providing supply chain support to the retail chains and fast food outlets are McCain (I), Radhakrishna Foodland, Adani Agri Fresh Ltd. and Trikanya Agriculture (Singh S. , 2007).

Reardon and Minten (2011) observes that supply chains are shortening in India, as the role of village brokers are reducing and as mandi (public wholesale markets) wholesalers buy directly from farmers. Also, cold stores have expanded rapidly in case of non-staple crops like potato and have taken on wholesale functions and provide credit to farmers.

¹ Organised retailing includes corporate backed hypermarkets and retail chains and also private owned large retail business (Corporate Catalyst India, 2012).

1.1.2. Transformation in Indian Agriculture

Many studies viz. Gulati, Minot, Delgado, and Bora (2005), Reardon and Minten (2011), and Government of India [GoI] (2012b) have mentioned about the transformation of Indian agriculture. There has been a structural change in the composition of agriculture leading to diversification into horticulture, livestock, and fisheries. In the period 2001 to 2011, all the major cereals except maize, displayed a negative growth in the area, while there has been a significant increase in the area of pulses and cash crops like soyabean, cotton, and sugarcane. The share of horticulture, livestock, fisheries in total output from the agriculture and allied sectors has increased from 39% in Triennium Ending (T.E.) 1990-91 to 50% in T.E. 2009-10 (at 2004-05 prices) (GoI, 2012b). According to Gulati, Joshi, and Landes (2008, p. 2), changing dietary patterns accelerated by higher economic growth, rising income levels, urbanization and gradual increase of female employment have led to consumption of high-value commodities² and processed food items in India. Thus, the spread of supermarkets and rising demand for high-value commodities has given an opportunity for farmers to diversify into activities having the higher income.

Although, India is the world's second largest producer of food next to China, still only two percent of its total agriculture and food produce is processed (MOFPI, n.d.). According to Gulati et al. (2008), some of the major constraints in enhancing our agricultural exports are the lack of public and private investment in infrastructure, logistics, information and technology, which have resulted in inefficient and uncompetitive markets. Gulati et al. (2008, p. 14) argue that *'it is important to step beyond farming and conceive agriculture as a complete agri-food system that incorporates farming, logistics, wholesaling, warehousing, processing and retailing.'* Thus, structural inclusiveness requires collaboration between all the parties operating in and around agri-markets (Woodhill, Guijt, Wegner, & Sopov, 2012, p. 3).

The growth in agro-processing has a big potential to trigger development in other sectors of the economy through the multiplier effect. It can create jobs away from farms and processing units in sectors such as transportation, distribution, retailing, etc. Apart from forward linkages such as processing and marketing, agro-industries help to create

² High-value agricultural goods are generally defined as agricultural goods with a high economic value per kilogram, per hectare, or per calorie. They include fruits, vegetables, meat, eggs, milk, and fish. Other crops that are also considered high-value commodities are spices, flowers, medicinal plants, many industrial crops, and even crops that yield illegal drugs (Gulati et al, 2005).

backward linkages by supplying credit, input, and other services to primary producers (Asokan and Singh, 2003). It is, therefore, essential that post-harvest losses are minimised, and value-addition is increased by strengthening the farm-firm linkages.

With Indian agri-food system undergoing rapid transformation, an important concern in Indian agriculture is that while “front end” activities – including wholesaling, processing, logistics, and retailing – are rapidly expanding and consolidating, the “back end” activities of production agriculture have been continuously fragmented (Gulati et al. 2008). It has been reported that the large agro-processing units often faced the problems of severe underutilization of capacity due to the inadequate and unsuitable supply of raw materials (Pandey, Marwaha, Kumar, & Singh, 2009; Srivastava & Seetaraman, 1989). Srivastava and Seetaraman noted that one of the major reasons for the sickness of Maharashtra sugar factories during late 1980's was the lack of availability of sugarcane. The uncertainty in supply was the major reason for private processing units to forge backward with the farmers for ensuring supplies. Some of the prominent examples of such kind of backward integration found in academic literature are: (a) dairy and sugar co-operatives in Gujarat and Maharashtra respectively during the 1950's; (b) Wimcopolar programme during 1970's, where the company imported the poplar clones and raised the nurseries to introduce poplar cultivation in India; (c) PepsiCo had developed seeds for tomatoes, basmati rice, chilies, groundnut, chip-grade potatoes, citrus cultivation in India for contract farming (Deshpande, 2005; PepsiCo, n.d.); (c) Jain Irrigation Systems (I) Pvt. Ltd. (JISL) developed seeds for white onion contract farming (Jains, n.d.-b). Similarly, there would be much more examples across India. This process of forging backwards for procuring farm produce is termed as “vertical coordination.” Vertical coordination is the general term that includes all the ways of harmonizing the vertical stages of production and marketing (Mighell & Jones, 1963). This coordination occurs along the “vertical” chain of functions: production, grading, packaging, transport, processing, storage, and distribution.

Contract farming is one of the ways of improving the farm-firm linkages and help address existing market imperfections (Gulati et al., 2008). Through contract farming, the farmer gets the required assistance in the form of quality inputs, extension services and the assured market for their output, while the company gets the assured supply of raw materials. Such inter-linked input and output markets contracts can generate efficiency gains which can be shared between farmers and firm (Barrett, et al., 2012)

1.2 Contract farming

1.2.1 Definition of Contract Farming

Following the definitions³, Narayanan (2011, p. 12) defines contract farming related to Indian context *‘as an agreement, oral or written, between farmer or farmer groups and processing and/or marketing firms, commercial or otherwise, for the production and supply of agricultural products under pre-specified conditions, frequently at predetermined prices. The arrangement could also involve the purchaser providing a degree of production support through, for example, the supply of inputs and the provision of technical advice. The basis of such arrangements is thus a commitment on the part of the farmer to provide a specific commodity in quantities and at quality standards determined by the purchaser and a commitment on the part of the company to support the farmer's production and to purchase the commodity’*. This definition excludes sharecropping, where annual tenants are provided with inputs to produce a crop on the farm-owners' land.

1.2.2 History of Contract Farming

The agricultural produce under contract may be a field or horticultural crop, livestock or animal produce. Usually, the buyer in contract farming will be a processor, exporter, marketing firm, input or service provider (Naidu, 2012). Contract farming has existed for agricultural products for a long time. Producing and selling on a contractual basis is a common phenomenon in agriculture around the world (Bijman, 2008). Contract farming as a system of growing certain crops has been prevalent in India since the second half of the nineteenth century. It all started when the East India Company introduced the cultivation of indigo, poppy and the plantation crops of tea, coffee, rubber, tobacco, etc. (Deshpande, 2005; Dev & Rao, 2005). Similarly, contracts were used for sugar production in Taiwan by the Japanese colonial state in the period after 1895 (Ka, 1991). Contract farming as the mode for procurement for perishable commodities and livestock products became more widespread in the middle of 20th century in countries across Northern, Central America, Africa (Roy, 1963; Watts, 1994). By the end of the twentieth century, contract farming became an integral part of the food

³ Narayanan (2011) draw on definitions proposed by Dorward (2001), Eaton and Shepherd (2001, p. 2), Glover and Kusterer (1990), Mighell and Jones (1963), Roy (1963), and Simmons, Winters, and Patrick (2005).

and fibre industry across the world (Bijman, 2008; Rehber, 1998). At the start of the twenty-first century in the USA, contracts governed 36 % of the value of agricultural production compared to 12 % in 1969 (MacDonald, et al., 2004).

Table 1.1: Chronology of Contract Farming in India

Period	Events
1860's	• Plantations for tea & coffee in North-east and the South; indigo & poppy cultivation in plains
1930's	• ITC starts Virginia tobacco contract farming in Andhra Pradesh
1948-50	• Sugar co-operatives emerged in Maharashtra and milk co-operatives in Gujarat incorporating many elements of contract farming
1950's	• Emergence of seed business based on contracts
1980s	• Poplar introduced through contract farming in Northern India • Tomato contract farming introduced in Andhra Pradesh and Karnataka • ITC stops contract farming operations due to Government legislation in 1984
1990's	• Tomato contract farming started in Punjab by PepsiCo • Chillies, groundnut, basmati paddy and potato contract farming started in Punjab • Gherkin and poultry contract farming introduced in Southern India • Palm fruit contract introduced in Andhra Pradesh and other states • Poplar contract farming stopped in 1995
2000 onwards	• Marico introduced safflower contract farming in 2001 • Variant of contract farming introduced for various crops and poultry in many parts of India • Contract farming accepted in new Policy Framework. • The emergence of specialized contract farming firms (Pepsi Co, Siddhivinayak) which carry out contract farming to provide the raw materials to other companies.

Source: Adapted from (Deshpande, Contract farming as means of value added agriculture, 2005); (Dev & Rao, 2005); (Singh & Asokan, 2005)

The history and major events about contract farming in India are presented in Table 1.1. In India, contract farming got prominence after the entry of PepsiCo in India in early 1990's and starting of its tomato contract farming scheme in 1997 with over 400 farmers in Punjab (Deshpande, 2005). Since then, contract farming has been the area of interest. One of the primary reason for the rise in contract farming in India has been the growing food processing sector. As per the reports of Annual Survey of Industries (cited in GoI, 2012a), total output from food products and beverages units has risen from Rs. 204.3 billion in 2004-05 to Rs. 405.4 billion in 2008-09, i.e., it grew at CAGR of 14.7%. Similarly, GDP of registered manufacturing units from food products and beverages sector food has recorded an average annual growth of 15% for the period 2004-05 to 2009-10 (at 2004-05 prices). Most often the processors of agricultural commodities require a qualitatively homogenous raw material for the longer season for the high utilisation of its installed capacity of infrastructure. Due to seasonality, perishability and variability of agriculture produce, processors look to integrate backwards for procuring of the raw material. One of the ways of assuring the supply of raw materials at the required time, quality and price are for the firm to enter into an arrangement with the

farmers (Singh & Asokan, 2005). Thus, vertical coordination in the form of contract farming plays an important role for firms to meet their raw material requirement.

1.3 Statement of Problem

There is growing evidence that contract farming arrangements (CFAs) are expanding across the country (Planning Commission, 2011c). GoI's policy documents⁴ emphasize the need to encourage contract farming as it shall boost crop diversification by providing assured and remunerative market opportunities for farmers. Agriculture, being the State subject, GoI is incentivizing States to amend their APMC (Agricultural Produce Market Committee) Act by making provisions for direct marketing and contract farming. It had also drafted the Model contract farming agreement (2003) and circulated the same among the States (GoI, 2010). At one hand, the policymakers are mulling the benefits while on the other hand there are certain sections of the society that are opposed to the notion of contract farming⁵. Although, most of the States have amended their respective APMC Act to facilitate direct procurement of agricultural commodities by companies from the farmer's fields (Planning Commission, 2011c), however Government in West Bengal and few other states are sceptical about contract farming (BS Reporters, 2012; ET Bureau, 2012; Ghosh, 2013). According to the report of the working group on agricultural marketing infrastructure for the XIIth Five Year Plan (2012-17), contract farming has not benefitted small producers in a meaningful way, as information asymmetry, weak bargaining power and legal ambiguities create insurmountable hurdles to producer-buyer relationships. One of the reasons cited for this is the lack of clarity among farmers on the regulatory framework for contract farming. However, they admit that it shall benefit small producers in the long run (Planning Commission, 2011c). Some opponents of the contract farming remark that the relationship itself is between two unequal parties and there is imbalance of power leading to exploitation of farmers (Clapp, 1994; Minot, 2007; Singh S., 2002)

⁴ viz. Xth and XIth Five Year Plan (Planning Commission, 2002, 2008), National Policy for Farmers (GoI, 2007), Mid-term Appraisal for XIth Five Year Plan (Planning Commission, 2011b), Approach paper to XIIth Five Year Plan (Planning Commission, 2011a). The list is incomplete.

⁵ Some of farmer groups across India have opposed contract farming, as they find it to be exploitative towards farmers. For e.g. Rythu Swarajya Vedika, an umbrella organization of agriculturists and activists has opposed the Andhra Pradesh (AP) Government move to introduce contract farming in the State (TOI, 2012). According to Vidarbha Janadolan Samiti in Maharashtra, contract farming model has not been working well at least for farmers. As many times companies have failed to pick up the whole produce and have been unresponsive towards monsoon failures in setting prices (Raja, 2011).

Thus there seems to be controversy surrounding the functioning of contract farming about exploitation of farmers and inclusiveness aspects, in addition, from the gains associated with it. However, as Mighell & Jones (1963, p.78) point out that contract production (or any form of vertical coordination) is a method of carrying on production; it is a kind of institutional machinery for getting things done. One cannot say that machine is good or bad. A machine may yield good or bad result depending on how and where it is used. Similar is the case with the institution like contract farming and hence it cannot be concluded whether contracting is good or bad; the important thing is how the firms practice it. Clapp (1994) points out that *'the contract is a representation of a relationship rather than the relationship itself, and the divergence between the two may prove crucial in determining the development of contract farming as an institution.'*

Narayanan (2011) observes that economists engaged in micro studies have rarely focused on how the relationship between contract farmer and contracted firm functions, while the question of sustainability of these systems is marginally addressed. This thesis is a modest attempt towards understanding the contract farming as an institutional form of procurement for agro-processing/marketing firms.

1.4 Research Questions

Thesis attempts to address following research questions:

- a) How does contract farming function and what is the nature of relationships among farmer and firm?
- b) Do only socio-economically well-off farmers participate in contracting? i.e., are there any differences in the socio-economic profile of contract farmers (CF) and non-contract farmers (NCF)?
- c) What is the profile of farmers who were earlier adopters and followers in contracting?
- d) What are the factors influencing farmers' decision to participate or not participate in contracting?
- e) What are the economics of crop cultivation in contract farming vis-à-vis non-contract farming?

- f) What are the benefits and problems faced by the contract farmers in contract farming?

1.5 Context and scope of the thesis

For the better understanding of the process of contract farming two horticulture crops viz. chip-grade potatoes and white onion have been chosen for the study. The two case studies pertaining to crops 'chip-grade potato' and 'white onion' are chosen because it's been a decade (since 2002) since the contract farming of both the crops started in Maharashtra. Moreover, contract farming is going on a large scale as there was around 2000 CF for both the crops in the reference season. How these two crops were selected for the thesis has been explained in Section 4.3. Although both white onion and chip-grade potatoes (CGP) are vegetable horticulture crops used for processing, both have diverse market structure. The volume of spot markets for white onion is large, while that of chip-grade potatoes is thin. Also, the mode of the governance structure of contract farming in both the crops is different. In the case of CGP, companies like PepsiCo follow a contract farming scheme having an intermediary, while JISL follows a direct contract farming scheme, where its employees have direct dealing with the farmer. Maharashtra is one of the few states in India, where potato processing variety grows in Kharif season. Now there is a tough competition among potato chips firms to procure CGP from these regions to meet their raw materials requirement. Also, farmers churning in and out of contracting was observed as there were variations in the increase or decrease to the tune of 20-25% from year to year of number of farmers in contract farming (Table 4.1).

The thesis on CGP and white onion contract farming in Maharashtra shall improve the understanding of functioning of contract farming about different governance and market structure in India. The case study of CGP and white onion contract farming is built with the primary and secondary data. Primary data comprises of in-depth interviews of contracting firm's management and field staff, commission agents in APMCs, banking officials, Government officials, hundekari (traders in case of CGP) and input companies involved in the contract farming. Also, structured schedules were used for farmers' survey. The survey for onion crop was carried out in the year 2012, with the reference season of Rabi, 2011-12. CGP survey was carried out in early 2013 with the reference season of Kharif, 2012-13.

1.6 Objectives of the thesis

Based on the research questions (Section 1.4), objectives of the thesis is to study the following:

- a) To study the functioning and inclusiveness aspects of CGP and white onion contract farming in selected districts of Maharashtra.
- b) Motivation and determinants of farmers' participation and non-participation of contract farming
- c) To examine the economics of contract crop cultivation vis-à-vis non-contract (without contract) cultivation in relation to CGP and white onion in Maharashtra.
- d) Benefits and problems faced by contract farmers of selected crops.
- e) Suggest policies required for effective functioning of contract farming

1.7 Significance of the thesis

Most studies on the contract farming in India examine the economics of the contract farming system in specific crops, compared with that of the non-contract situation for a particular season or year. However, empirical evidence on the true cost and benefits of contract farming is scarce and anecdotal due to lack of data (BIRTHAL, Jha, TIONGCO, & NARROD, 2008, p.2; RAMASWAMI, BIRTHAL, & JOSHI, 2006). Similarly, Barrett et al. (2012, p. 6) points that the empirical literature on different dimensions of participation in contract farming is limited in scope partly due to the relative paucity of high-quality survey data. This thesis is a humble attempt to contribute to the contract farming literature.

Although, Maharashtra is among the leading states regarding fruits and vegetable production and a progressive farming community [Government of Maharashtra (GoM, 2010)], it is also among a leading State for farmers' suicides. There also exist certain constraints and regional disparities in the State regarding agricultural development (Kalamkar, 2011b). Contract farming can play an important role in uplifting farmers' economic conditions. Amidst, controversies surrounding contract farming, from the policy maker and industry's perspective, a thesis about economics and inclusiveness aspects on contract farming with a case study of Maharashtra is timely. Given the

diversity of geographical and regional characteristics, the thesis would build on the literature of contract farming. The thesis also aims to provide suggestions on contract farming regulations that shall facilitate in strengthening the institution of contract farming and protect the rights of both farmers and firm.

Overall, the thesis would be useful for the (a) practitioners (firms and farmers); (b) policymakers; (c) Academics and students of agribusiness and rural development.

1.8 Limitations of the thesis

Given the heterogeneity of crop characteristics and contract-farming relations, it is not possible to have a general theory of contract farming. Rather, the emphasis should be on understanding this phenomenon in relation to local conditions (Little, 1994). This study is a modest attempt to understand the phenomena of contract farming and is confined to two important horticulture crops viz. white onion and CGP in Maharashtra. More such studies are needed on other crops to have a better understanding of contract farming. Hence, results of the thesis have to be inferred with caution. Due to time and cost constraints, the study adopts the cross-sectional research design. However, a longitudinal study would have been better to the understanding of the contract farming scheme. Further, the findings of the study would be based on the responses of the respondents and hence the objectivity is limited to the honesty and memory power of the respondents. However, I do believe that data collected is reliable, because wherever possible, data on the cost of cultivation were cross verified as per the key informants, traders, and company records. I shall like to end this section by a quote from Panse and Rao (n.d.), *'It is possible to detect complete falsity of the information. It may happen that farmers may slightly exaggerate or underestimate information about costs and returns. It is not always possible to detect bias of this kind, but it is claimed that such inaccuracies are cancelled out by the averaging group of farmers'*.

1.9 Chapter Outline

This thesis is organized into nine chapters including this introductory chapter. The second chapter explains the concept of contract farming through the lens of transaction cost economics approach. The third chapter presents the literature review in light of the research questions mentioned in section 1.4. In the fourth chapter, the research design and methodology adopted to fulfil the objectives of the thesis (see section 1.6) has been

presented. Fifth chapter provides a background information on State of Maharashtra and selected districts of study. The crop profile along with the history and functioning of JISL's onion and PepsiCo (I) CGP CFAs is presented in this chapter. Chapters six and seven deals with inclusiveness aspects of contract farming schemes. In chapter six, the socio-economic profile of farmers and determinants of farmers participation in contract farming using descriptive statistics and logit regression is discussed. While in chapter seven, various aspects of contracting from farmers' perspective have been discussed with special emphasis on the profile of early adopter of CFAs and the motivation of farmers' participation or non-participation in CFAs. Benefits, problems, and overall experience of CF of both the crops have also been discussed. Comparative analyses of the cost of cultivation and marketing, yields and profitability of CF and NCF using the data collected through the primary survey of sample households is presented in chapter eight. Chapter nine concludes with a summary of the major findings of the thesis. Based on field survey, suggestions for contracting firms and State Government for the effective functioning is also stated. Future areas of research in the subject of contract farming is also discussed.

Chapter 2 - Theoretical understanding of contract farming

In the previous chapter, the concept of vertical coordination was introduced. In this chapter, the various vertical coordination mechanisms used by agro-processors and exporters to source the commodities is discussed. Contract farming through the lens of transaction cost economics approach is explained in section 2.3. Nature and functioning of contract farming are discussed in section 2.5.

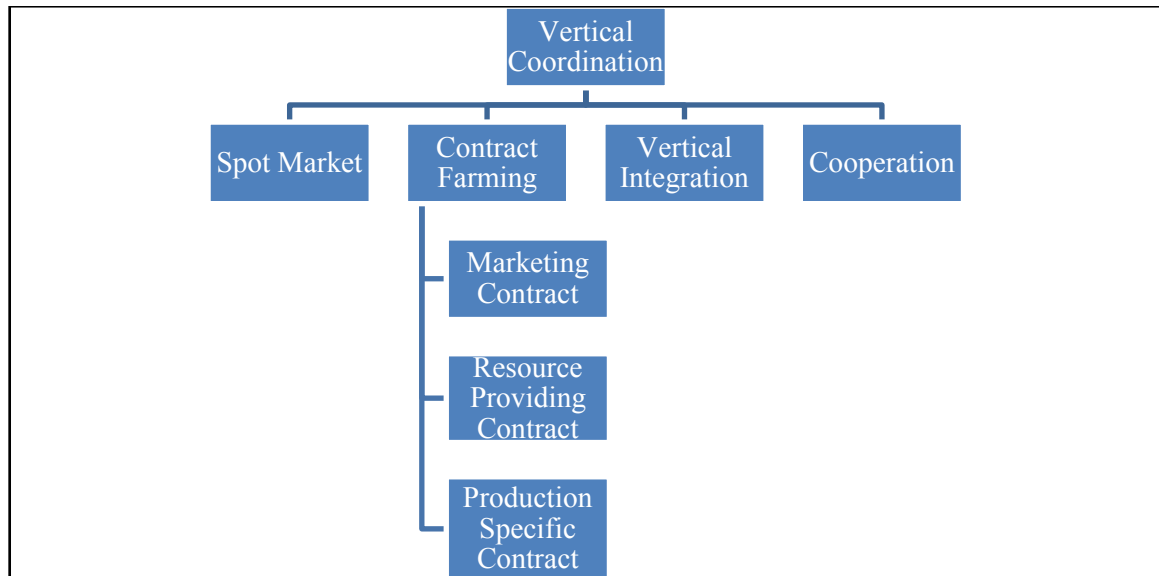
2.1 Vertical Coordination: an Introduction

. Vertical coordination is the general term that includes all the ways of harmonizing the vertical stages of production and marketing. This coordination occurs along the “vertical” chain of functions: production, grading, packaging, transport, processing, storage, and distribution. In this chapter and thesis, the focus is on the coordination mechanism of agro-processors at the production stage. As discussed in the previous chapter that agro-processing firms need continuous supply of raw materials at the right time, price and quantity. Therefore, in the agriculture sector, vertical coordination is required due to its distinctive characteristics like the sharp seasonal fluctuation of supply, delayed supply response, perishability of products, wide variation in quality and geographic dispersal of production (Minot, 1986, p. 5). According to Mighell and Jones (1963), vertical coordination is a process by which supply and demand are adjusted toward each other about product quantity, quality, location and time of delivery. King (1992) refers vertical coordination as “the alignment of direction and control across segments of a production/marketing system”. The factors that are aligned and controlled in vertical coordination are price, quality and terms of exchange (Peterson, Wyoski, & Harsh, 2001, p. 150). These terms of exchange refer to when and how to produce and/or to deliver output, payment terms, penalties in case of default, etc.

2.2 Types of vertical coordination mechanisms

The market-price system, vertical integration, contracting and cooperation singly or in combination are some of the alternative means of coordination (Mighell & Jones, 1963, p. 1). Figure 2.1 gives a diagrammatic presentation of the kinds of vertical coordination.

Figure 2.1 Types of Vertical Coordination Arrangements



Source: Adapted from Mighell and Jones (1963)

2.2.1. Market price system

The market price system is also referred to as open spot markets in which there are no advance agreements about purchase or sale of goods and services. Open spot markets are the simplest institutional context for vertical coordination, in which transactions are arranged and completed relatively quickly and involve no continuing obligations on either side. According to Minot (1986, p. 6), spot markets are highly efficient when conditions approach perfect competition, i.e., relatively homogeneous product, good information about the market and, many small buyers and sellers so that, there is no participant with market power to set the prices. In spot markets, vertical coordination is accomplished primarily through the price mechanism. Price provides an incentive to buyers and sellers in such a way that demand is equal to supply.

In India open spot markets for agricultural commodities is mainly carried out through APMC markets. For e.g., rice millers in India purchase rice mostly from APMC markets (Banerji & Meenakshi, 2004). Similarly, many organized retailers selling fruits and vegetables procure from APMC markets. Therefore, spot markets seem to work well for Indian rice millers to procure the rice, as the product being homogenous and available in plenty. However, the reality may be different for some crops especially, in horticulture. As Collins, Mueller, and Birch (1959) have pointed, prices may not always communicate clearly the requirements of processors needed for mass-production. In the case of India, Singh and Asokan (2005) mention that the presence of a large number of

intermediaries in supply chain results in the weak transformation of price and quality to the farmer. For e.g., grapes exporter would need grapes which are of specific standards set by the importing country. Also, potato chips manufacturer needs chipgrade potatoes which is neither available in APMC markets nor available throughout the year. Moreover, it should be of a certain grade, size, and technical specifications as per the manufacturing requirements. Therefore, spot markets exhibit certain deficiencies, (a) in transferring product information especially technical and food safety norms required in the exporting countries, (b) in transferring marketing information, regarding quality, timing, and future demand, and (c) in overcoming problems resulting from imperfect input markets. These failures are common in agriculture, as supply response is slow, as production is seasonal. Overall, the open spot markets may work well for some commodities but may not in the case of some commodities where it needs to be supplemented or replaced by other coordinating arrangements (Mighell & Jones, 1963).

2.2.2. Vertical integration

Vertical integration is an institutional solution to the problems of spot market failure as the firm itself undertakes all the functions regarding the production and marketing (Minot, 1986, p. 18). From the perspective of agriculture, under vertical integration, an agro-processing firm shall produce the required raw materials by acquiring or leasing in sufficient land (Singh & Asokan, 2005). Vertical integration seems to perform better where the quality of the raw materials or commodities have to be of the specific. For instance, when local growers are unfamiliar with the production technology and when supplies must be carefully scheduled. Many ayurvedic firms, need special herbs which they grow in their own or leased in the land as they want to avoid the risk of contamination. If economies of scale are large and agribusiness firm may not manage it completely efficiently, then vertical integration may not be very efficient. In this case, contract exchange can be seen as the intermediate co-ordination mechanism carried out efficiently.

Vertical coordination, vertical integration and contract production are often used interchangeably especially in American literature (Allen, 1972; Cramer and Jensen, 1988). However, British literature makes a distinction between contract farming and vertical integration, whereby vertical integration is meant that processors grow a large part of the raw materials required of the own (Rehber, 1998).

2.2.3. Contract farming

The concept of contract farming was introduced in Section 1.2. Contract farming as a governance strategy lies primarily in between the two ends of vertical coordination continuum i.e. between spot markets (in which supply and demand are coordinated through prices alone) and vertical integration (in which supply and demand are coordinated by having one firm, carrying out multiple stages in the market channel) (Minot N. , 2007, p. 1). Contract farming is a form of vertical coordination between the producer and contractor (processing or marketing firm or a third party such as input manufacturing or service provider⁶) where latter directly influences the production decisions under the obligation of purchasing the produce. Contracting is most likely when coordination requirements are high. For instance, in the case for commodities which are highly perishable, high quality specificity⁷, and/or exported, which have large input requirement and are labor intensive and/or involve careful husbandry, high value to weight ratio and which have economies of scale in production and marketing. Moreover, contract farming, which normally incorporates new agricultural practices, needs constant feedback and communication with farmers. Such interaction between farmer and the firm is needed especially for the products that are destined for export markets, which require traceability and/or food certification. There farmers need extension services and have to be advised on acceptable plant protection measures, new varieties, etc. (Delgado, Narrod, & M. Tiongco, 2008; Eaton & Shepherd, 2001, p.115; Hobbs & Young, 2001). Contract farming is a strategy by agribusiness firms through which farmers remain a source of reliable and inexpensive raw materials (Singh & Asokan, 2005). Nature and functioning of contracts is discussed in detail in section 2.5

2.2.4. Cooperation

Farmer cooperative is also an instrument using which farmers can exercise joint control over production and marketing stages preceding or following production on the firm' (Mighell & Jones, 1963, p. 2). Farmers come together and aggregate their output

⁶ To name a few agri-input manufactures which are also involved in contract farming in India are Rallies Limited (a pesticide manufacturer), JISL, Deepak Fertilizers, etc. these firms provide extension service to the growers and mostly encourage farmers to adopt good agricultural practices using their respective firms' products (Deepak Fertilisers and Petrochemicals Corporation Ltd., 2014; Ferroni & Zhou, 2012; Singh & Asokan, 2005)

⁷ High quality specificity refer to color, size, grade, Total soluble solids (TSS), etc. of the commodity. These things are very important for processors as their products consistency is dependent on these qualitative parameters of agro-commodities.

via a cooperative, which essentially makes them one larger supplier from the firm's perspective. For e.g., there are many village level or district level cooperatives supplying milk to Gujarat Cooperative Milk Marketing Federation Ltd. (Gandhi & Jain, 2011). Staal, Delgado, and Nicholson (1997) described the prevalence of specialised producer co-operatives, such as dairy co-operatives that process and market milk in East Africa. Delgado (1999, p. 177) mentions that cooperatives often play a similar role to CFAs in facilitating access to technology, information, services, and markets, especially for perishable items.

Cooperatives can also act as an intermediary between the processing firms and farmers. These kinds of cooperative are also referred to marketing cooperative. In South Africa, the companies in the snacks industry procure maize (e.g., GM-free, other) through cooperative, which acted as an intermediary between the processor and the farmers (Vermeulen, Kirsten, & Sartorius, 2008, p. 214). Similarly, in China's Shandong province, Wang, Zhang, and Wu (2011, p. 496) found the prevalence of cooperatives supplying vegetable crops to firm. Farmers sell their crops to their cooperatives, which in turn pass it on to the firm. The reason being firms do not want to sign contracts directly with a large number of individual small farmers because of the high transaction costs.

2.3 Choice of vertical coordination mechanism: Transaction cost economics approach

Vertical coordination may not be an end in itself but is a means to accomplish some objective. The objective could be any task such as procuring the raw materials or selling the output. One of the approach to understanding, which type of vertical coordination mechanisms should be adopted and the complications arising from the same is explained within the transaction cost economics (TCE) framework.

Whether, firm wants to buy its raw materials from the spot market or customized made as per the specifications, all this depends on the business strategy of the firm (Mighell & Jones, 1963). Coase (1937) contributed to literature of economics organisation by developing a framework to predict whether the firm would 'make or buy', i.e., whether the firm would perform certain economic tasks by itself or through markets. Using the theory of marginalism, Coase explains that firm would undertake those operations, whose costs borne by the firm are lesser compared to the costs of carrying out the same transaction by means of an exchange in the open market or through

another firm (p. 395). Coase introduces transaction costs, whereby he mentions that alongside production costs, there are costs for preparing, entering into and monitoring the execution of all kinds of contracts, as well as costs for implementing allocative measures within firms in a corresponding way. Coase (1937) and Williamson (1985) considered that economising on transactions costs, by assigning transactions to those different governance structure (market exchange, own production or arrange it through other firm), whichever would cost less. This principle is one of the important basis of theory of TCE.

Coase (1937) and Williamson (1985) considered the firms and markets as alternative means of economic organisation. TCE applies to study of all kinds of economic organization. The focus of TCE runs from market exchange at one end to centralized hierarchical organisation at the other, with the intermediate modes like relational contracting filling in between (Williamson, 1985, p. 16). Relational contracting is in contrast with the neoclassical system, where the reference point for effecting adaptations remains the original agreement between the two parties. However in relational contracting the “entire relation as it is developed through time. This may or may not include an original agreement, and if it does, may or may not result in great deference being given it” (Macneil (1978, p. 890) as cited in Williamson (1985, p. 72). Relational contracting is associated with forms of procurement that place more reliance on reputation and trust in small numbers contracting (Parker & Hartley, 2003, p. 101). According to Baker, Gibbons, and Murphy (2002, p. 39), relational contracts are informal agreements involving unwritten codes of conduct that powerfully affect the behaviours of firms. Eaton, Meijerink, and Bijman (2008) term relational contracts as self-enforcing contracts, whereby the parties have economic and social incentives to honour it in all contingencies. In case of India, contract farming of agriculture and livestock commodities is line with the relational contract theory, given the fact the problems associated with legal ordering.

2.3.1 Assumptions of TCE

TCE is more micro analytic and self-conscious about its behavioural assumptions⁸. When dealing with contracts, the assumption of bounded rationality helps us to

⁸ TCE assumes humans are subject to bounded rationality (i.e., they are intendedly rational, but in a limited way) and opportunism, which is a condition of self-interest seeking with guile (Simon, 1961, p. xxiv; Williamson, 1985, p. 30)

understand the existence of incomplete contracts. As bounded rationality makes it impossible or prohibitively costly to attempt to write the comprehensive contract. Cox (1958) cited in Williamson, (1975, p. 75) mentions that one cannot simply spell out the each and every detail of life in an industrial setting. Similarly, Hart (1995) cited in Gow, Streeter, & Swinnen (2000, p. 254)] mentions “contracts are naturally incomplete as agents find it difficult and expensive to foresee all possible contingencies and to enforce these contracts, especially when outcomes are unobservable or non-verifiable by a third party”. However, parties try to make provisions for unforeseeable contingencies in contracts in a general and flexible manner. While assumption of uncertainty and opportunism makes us aware that ex-post institutions especially private ordering (kind of arbitration machinery) matter as compared to court ordering.

2.3.2 Asset Specificity

TCE also focusses on asset specificity and uncertainty involved in transactions. Asset specificity as a concept important in functioning of relational contracting type of vertical coordination mechanisms. According to Williamson (1985, p. 55), asset specificity refers to “durable investments that are undertaken in support of particular transactions, the opportunity costs of which investments is much lower in best alternative uses or by alternative users should the original transaction be prematurely terminated.” When both the parties have made some transaction specific investments, then continuity of relationship is valued by them and they work towards it. As both the parties, do not want to jeopardise the relationship, as finding a new business partner entails time and transaction costs.

Asset specificity could be non-specific, mixed, or highly specific. Therefore, highly specific asset specificity may lead to self-enforcing contracts, as breaking down of relationship would lead to losses. For e.g., in case of broiler production, farmers would have made investments in infrastructure such as shed, brooders, lighting, feeders, drinkers, etc. such investments are specialized and do not have alternate uses. Therefore, in absence of other broiler contracting firms, farm firm would value continuity of relationship. Whereas when assets undertaken pertaining to transactions are not specific, then the parties would be ready to leave the contractual relationship, if it is not beneficial. For e.g., farmers investing in drip irrigation for CGP cultivation under contract is a non-specific or mixed type. Here, if the farmer finds CGP cultivation under

contract less profitable compared to the other crops. Then farmers can switch over to other crop cultivation and use the irrigation investment for other crops.

Williamson (1983) also distinguishes asset specificity as site specificity, physical asset specificity, human asset specificity, and dedicated assets. Site specificity refers to assets that are highly immobile. For e.g., land allocated for farming or broiler production or farm building or shed built on farm, such assets are immobile, and once a set-up is made its costs and/or reallocation costs are very high.

Physical asset specificity refers to when one or both parties to the transaction make investments in equipment and machinery that involves design characteristics specific to the transaction and which have lower values in alternative uses (Williamson, 1983, p. 526). Examples of physical asset specificity for farmers refers to fencing undertaken for grape cultivation or potato planters and harvesters for potato cultivation or investments in irrigation facilities like wells, pipeline, submersible pumps, drip and sprinklers. Physical asset specificity is going to be important if large fraction of production requirement is associated with specific supplier.

Human asset specificity refer to investments in relationship-specific human capital (human skills) that often arise through a learning-by-doing process (Williamson, 1983, p. 526). In case of agriculture, if the contracting firm contract with a farmer and who adopts a new crop, then the contracting firm has to train him with agriculture practices needed for crop cultivation. The farmer gains those skills through learning by-doing. If the farmers breaks the relationship, then the contracting firm would have to search for other farmers and need to train them as well. These would involve certain transaction costs.

Another asset specificity relates to dedicated assets, i.e. a discrete investment in a plant that cannot readily be put to work for other purposes. These investments are specifically made by a supplier with the intent to be used in the process with the prospect of selling a significant amount of product to a particular customer. If the contract were terminated prematurely, it would leave the supplier with significant excess capacity (Williamson, 1983, p. 526). In agriculture, dedicated assets include tree crops, livestock structures, crop processing facilities, and specialized machinery. Key and Runsten (1999) mention that high asset specificity on the part of firms serves to discourage firms from contract farming, while high asset specificity on the part of farmers has the opposite effect (p. 390). Investment in specific assets by the farmer, may lead to becoming overly

dependent on their contract crops, which may lead to a loss in bargaining power versus the firm. Thus, contracting firms may take advantage of such situation and exploit farmers (Warning & Key, 2002, p. 256).

Another type of asset specificity was added by Malone, Yates, and Benjamin (1987, p. 486) to Williamson's list was time specificity. An asset is time specific if its value is highly dependent on its reaching the user within a specified, relatively limited period. This concept is very relevant in the case of agriculture very perishability is high. For e.g., a perishable commodity like milk will spoil unless it arrives at its processing plant within a short time after its production. Similarly, in the case of sugarcane, the recovery reduces, if the sugarcane is not harvested and reached to sugar factory within a certain time frame.

2.4 Advantages and disadvantages of vertical coordination mechanisms: Indian agriculture perspective

Advantages and disadvantages of vertical coordination mechanisms based on price, quantity, quality and timeliness parameters are presented in Table 2.1. Based on section 2.2 and Table 2.1, it seems contract farming is better than vertical integration from the cost perspective. This is so because, as firms would have to buy or hire resources to produce the commodities, which may involve additional transaction costs. Many times, it would not be feasible to buy or lease out land if the requirement of commodities is high. This, is when the firm would prefer to procure through intermediary mechanisms' such as procuring through spot markets or contract farming or cooperatives. However, in India, except milk and sugar, cooperatives, there are few functional across some commodities. As forming and functioning of cooperatives requires dynamic leadership and commitment of all the members. Dynamic and committed leaders in cooperatives may not be present in reality.

Contract farming is better than spot markets on quantity, quality and timeliness parameters. But under perfect market conditions⁹, spot markets are more efficient especially due to costing considerations, hence, then there contract farming would not be

⁹ In economics, perfect market involves homogenous products, perfect market information i.e., there is a perfect information, on prices and quality of products are assumed to be known to all consumers and producers. Perfect market further includes where there is no participant with market power to set the prices, no barrier to entry and exit for the buyers and seller, equal access to technology for the producers, etc. (Stonier & Haque, 1980)

needed (Singh & Asokan, 2005, p. 12). As organizing contract farming, also has its set of transaction costs. Transaction costs of agribusiness processor refer to the costs of searching for suppliers, establishing a contractual relationship, training, providing raw materials, monitoring the production process, and procurement, etc. (Sartorius & Kirsten, 2007, p. 642).

Table 2.1: Advantages and disadvantages of procurement options

	Price	Quantity	Quality	Timeliness
Spot markets	Low	Uncertain	Uncertain	Low
Vertical integration	High	Certain	Certain	High
Contract farming	low	Certain	Certain	High
Cooperation	Low	Certain	Certain	High

Source: Adapted from Singh and Asokan (2005, p. 12)

2.5 Nature and functioning of contracts

2.5.1 Process of contracting

Barrett et al. (2012) provide a conceptual framework for the process of how the firm contracts with the farmer.

Stage 1: Firm choice of a procurement location

Initially the firm look for the regions based on agro-climatic suitability, proximity to the processing plant, irrigation facilities. After selection of a region, companies identifies the villages which are suitable for cultivation based on soil, cropping pattern, ownership of irrigation, labour availability, and access to the motorable road (Barrett et al. 2012, p. 717; Singh & Asokan, 2005). Barrett et al. and Singh and Asokan argue that firms generally would procure from regions whose expected profits are greater than the other regions', balancing the risk management and quality considerations according to the firm's priorities. The firm would only consider regions that yield expected profits exceeding the firm's reservation level, i.e., that it would satisfy the firm's participation constraint'. As was observed in the case of gherkin, the company adopted cluster approach for procurement. Companies in gherkin strategically selected those villages which were not dominated by horticulture crops. The reason being these farmers increase or decrease the acreage of crops based on the expected market trend. Such kind of behaviour would not have suited the company's requirement as it wanted to have famers who can provide a steady supply of gherkins (Singh & Asokan, 2005).

Stage 2: Firm contract offer

After selection of the region, firms try to identify best contracting partners. In the case of gherkin in Karnataka, the company identified the influential people in the village, and through them, they tried to reaching out to other farmers. It is observed that where quality control is important to firm it takes great care in the selection of the contract farmer. As was observed in basmati paddy, safflower, where quality control was not important, the company welcomed whosoever evinces the interest in growing crop. However, companies do verify progressiveness, resourcefulness, and commitment of farmer towards contract (Singh & Asokan, 2005). Different forms and nature of contracts are dealt in the section 2.5.2.

Stage 3: Farmers' contract acceptance

A farmer accepts the contract if his subjective perception of welfare is greater in participating in the contract than he not doing so (Barrett et al., 2012, p. 719)

Stage 4: Firm and farmer decision to contract

Having agreed on a contract, the firm and the farmer each decide whether to honour or renege on the agreement. A farmer can renege on contract by selling the total or part of produce to other firm or in alternate markets. Farmers also have opportunities to breach by diverting some of the firm-provided inputs to non-contracted crops, by not adhering to the production schedule agreed upon with the firm or by failing to deliver the agreed volume and quality on time. The firm may breach by not showing up to collect contracted harvest, by inappropriately rejecting produce, by lowering the sales price after the supplier has incurred production costs, or by delaying or defaulting on final payment. The opportunities for breach of contract are many because of the multidimensional nature of contract terms and because of the time lags and the relationship-specific investments involved (Barrett et al., 2012, p. 720).

After the transaction in the contract is complete, both the farmer and firm update their prior belief based on the contract performance before reevaluating the decision whether to follow the stages of 1-4 again. This part of farmers participating and exiting from contract has been dealt in section 3.1.

2.5.2 Nature of Contracts

Contracts can be distinguished through the concept of timing. For e.g., there are the contracts between the firms made before production is undertaken or the arrangements for sales made between stages or after production is complete. The advance contract method is sometimes called forward contracting or contract production, whereas the later or the method in which no advance agreements are involved is often called open production. For e.g., there are firms who procure from farmers directly at the time of harvest. Firms' employees or agents may visit the farms and then try to fix the sale. Contract production is production for a forward market. A forward market is one in which transactions have to do with goods and services to be delivered at a later time. A standard farming contract regulates in advance price, production practices, product quality, and credit facilities, if any.

Contract farming could range from just buying certain quantity at a pre-negotiated price to have complete control over production from supplying inputs to harvesting. Classification of agricultural production contracts was developed by Mighell and Jones (1963, p. 13-14) by the number of functional stages and degree of coordination¹⁰:

2.5.2.1. Market-specification contracts:

In market-specification contracts, only quality standards of the commodity are specified and input provision is often minimal (Eaton & Shepherd, 2001). The farmer transfers the part of the risk and management function to the contractor. The farmer becomes more certain of his market for at least one production period, and the price or the basis for the price is stated. Thus, farmer need not worry about finding the buyer for the produce, and also price risks are reduced. However, the farmer maintains most of the decision rights over his farming activities. Farmer continues to make the production operating decisions, provides and finances inputs, assumes the uncertainties of production. The management function transferred, is limited to that part related to the decisions as to what shall be produced and as to when and where it is to be marketed. But some functions transferred are small relative to the number remaining in the farm firm.

2.5.2.2. Production-Management Contract:

¹⁰ Degree of coordination means the number of farmers' decisions controlled by firm (Collins et al. 1959, p. 61).

Production-management contracts are like market-specification contracts but call for more direct participation by the contractor in production management. Such contracts are adopted when the quality of output is important to the buyer. Such kind of contract gives more control to the buyer than the market specification contract, as the buyer would inspect production processes and specify input usage. Under this type of contract, farmers agree to follow precise production methods and input regimes; he is willing to do so because the buyer takes on most of the market risks and some of the production risks (Eaton et al. 2008). The farmer needs the assistance of the firm especially when new crop or technology is adopted.

2.5.2.3. Resource-providing contracts:

In resource-providing contracts, the contracting firm not only furnishes a market and participates in production management, but also provides important inputs like seeds, plant protection chemicals, etc. Providing inputs is a way of providing in-kind credit, the cost of which is recovered either partly or fully at the start or upon product delivery. How much decision-rights and risk is transfer from the farmer to the buyer, depends on the actual terms of the contract (Eaton et al., 2008, p. 24). Examples of resource providing contracts are common in broiler contracts where firm provides day-old chicks, feed, veterinary products, other chemicals, extension and advice to broiler growers (Kalamakar, 2011; Ramaswami et al., 2006; Simmons et al., 2005; Singh & Asokan, 2005). Broiler producers in India, relinquish to the contractor, the function of providing most of the operating resources, such as chicks, feed, and medicine. The contractor owns the commodity produced and is responsible for its sale. The contractor assumes the additional risk of losing his investment inputs. Because of this, he usually controls production more closely and claims most of any profits. Thus, regarding the number of stages or functions that the traditional farm firm transfers to the processing or marketing firm, this kind of coordination is next to complete vertical integration.

A form of the contract depends on the economic characteristics of a good or services traded (Williamson (1975) cited in (MacLeod, 2007)). The type of the contract and the degree of coordination depend on the nature of the commodity, the company's objective, technological and market conditions, etc. (Asokan & Singh, 2005; Mueller & Collins, 1957). For instance, in vegetable and fruit processing industry, quality attributes such as colour, size, the degree of maturity and absence of insect damage, together with

the timing and rate of deliveries to the plant would be vital for the final good production. Thus, if the need for quality control for the farmer produce is high, greater would be the degree of coordination between farm and firm.

Stigler (1951) argues that size and the state of development of industry also strongly influences the extent of degree of coordination. When market exists for seed or other inputs required for the produce of that particular commodity, the company may then only go for market specification contract. Examples of such contracts were observed in the case of basmati paddy, safflower (Singh & Asokan, 2005); organic banana and cotton (Sarkar, 2003). But when the market for seed or other inputs is thin or does not exist, then the company would like to go in for resource providing contracts by providing the required inputs on entirely or partly on cash or credit. Planting material is provided by the company (not necessary other inputs are provided) which is common for crops viz., seed farming; gherkin in AP, Karnataka; potatoes, cotton in Tamil Nadu (TN) (MANAGE, 2003), white onion in Maharashtra (Jain, 2008), etc. Birthal et al. (2008) reported that in the case of dairy in Rajasthan, milk processors followed market specification or resource providing contract or combination of both of them.

2.5.3 Formal or informal contract

Contracts may take the form of an informal (oral) agreement or of a formal (written) agreement. Generally, written contract clearly mentions the role of the farmer and company. Acreage, sowing dates, inputs, and services provided by the company, contract duration, details of the delivery arrangement, rates for different grades of produce, payment schedule, a method of payment, conflict resolution mechanisms, etc. Most of the vegetable and fruit contracts are exclusive in nature, i.e., a farmer cannot sell the produce to any other party without the consent of the contracting party (Narayanan, 2011; Roy, 1963; Singh & Asokan, 2005).

Written contracts were also reported in the case of poplar (Deshpande, 2005), and various vegetables in Punjab by FieldFresh (Pandey, Sudhir, Ahuja, & Tewari, 2010), marigold in TN (Narayanan, 2011). Singh and Asokan (2005) in their study reported that written contracts for many of the crops were in vernacular languages viz. Kannada for gherkin in Karnataka, Tamil or Telugu for broilers in TN, Gurumukhi for roses and tomatoes in Punjab. Out of these only roses and broiler contracts were in stamp paper rest on ordinary paper. Thus, in many crops, as mentioned above, contracts were not

legally binding. PepsiCo experienced in case of tomatoes in Punjab that written agreement did not serve any additional purpose than just to record the relation. Thus it had oral contracts (verbal understanding) in the case of basmati paddy. Oral contracts were also observed in crops like gherkin, oil palm in AP, (Dev & Rao, 2005), baby corn, chillies, maize, in Karnataka (Nagaraj, Chandrakanth, Chengappa, Roopa, & Chandakavate, 2008), papaya and broilers in TN (Narayanan, 2011). It is observed that where quality control is not very important, companies tend to follow oral contracts.

Narayanan (2011) in her literature review says the contract is a very broad representation of the relationship, where agreements on particular aspects are no more than notional. Given the nature of farming, it is impossible to specify every contingency in a way, thus rendering contracts incomplete (Morvaridi, 1995). Moreover, across the globe, it has been observed written contracts were seldom legally enforceable (Eaton & Shepherd, 2001; Minten, Randrianarison, & Swinnen, 2009; Narayanan, 2011; Singh, 2002). Thus, companies try to build the relationship with farmers which is based not on written agreement but trust.

2.6 Concluding remarks

In this chapter, the ways in which agro-processors procure their raw materials, or agribusinesses fulfil their requirement is explored, and contract farming is one of them. Contract farming has to be viewed from the relational contracting theory within TCE literature. TCE is principally concerned with finding out which governance structures are more useful for which type of transaction (Williamson, 1985, p. 46).

The strategy to procure the commodities from spot market or through contract farming is purely that of the firm. Which kind of vertical coordination mechanism is chosen by the firm, depends on kind of market imperfections, firm faces in regard to commodities required?

Literature so far suggests that CFAs are often informal and are based on trust. In the next chapter, the past literature about research questions (section 1.4) is reviewed.

Chapter 3 - Literature review

Contract farming has been the area of academic interest in the western world since 1950's (Roy, 1963; USDA, 1963). While studies on contract farming in third world started to appear in late 1960's (De Treville, 1986). Studies on contract farming in India date back to late 1990's after the start of Pepsico (I)'s tomato contract farming scheme in Punjab. The subject of contract farming has been dealt by the researchers across the various disciplines viz. economics, sociology, anthropology, law, management, etc. In this chapter, the review of the earlier works (both in India and around world) in light of the research questions (section 1.4) are discussed.

The sources of review literature are academic journals, books, conference proceedings, Government publications, selected company's annual reports, periodicals, newspapers, etc. An attempt has been made to carry out the extensive review dating from the 1960s till 2015.

3.1. Farmer inclusiveness aspects of CF

Farmer inclusiveness refers to when farmers are integrated into the whole value chain or are a part of the value chain whereby there is an exchange of information between consumers, retailers, processors and farmers (Vis, 2012). According to Rosenberg (2012), inclusiveness from business firm perspective is the understanding of the fact that by improving smallholders' business, firms improve their business. It is about recognising that by supporting farmer to produce more and better raw materials and by improving their incomes; firms become their preferred buyers which in turn make them reliable suppliers for firms' business chain. Lundy (2012) remarked "about the need to be realistic about who can be included and who cannot be included in this value chain! In some cases it is feasible to include small farmers in the value chain while in other cases it is not". In this section, the past work on when, where and in which kind of crops, small farmers, and large farmers¹¹ are preferred is discussed. Also, what are the factors behind the inclusion or exclusion of small farmers in the value chain?

¹¹ There is no universally accepted definition of small and large farmers. The term is commonly based on to the size of the landholding or livestock owned (Narayanan & Gulati, 2002). For the purpose of this review, small farmers are, who have limited resource base for e.g., in India farmers owning less than two hectares are considered as small farmer, whereas large farmers are considered who have larger land holding and better resource base compared to small farmers

3.1.1. Small versus large farmer debate

Most of the literature related to inclusiveness aspects of CF looks into whether small farmers are excluded from CF or not. Literature so far has seemed to provide the mixed results. Some of the Indian studies such as Birthal, Joshi, and Gulati (2005) on dairy, vegetables, and poultry; Erappa (2008) for gherkin in Karnataka; Nagaraj et al. (2008) for baby corn, chillies in Karnataka; as well as many studies conducted in other countries, viz. Warning and Key (2002) for peanuts in Senegal, Simmons et al. (2005) for broiler in Indonesia, Ruben and Saenz (2008) for pepper in Costa Rica; and Wang et al. (2009) for horticulture crops in China, have observed that CFAs favoured small farmers. However, in case of palm fruit in AP (Dev & Rao, 2005); tomatoes in Punjab (Rangi & Sidhu, 2000, Singh, 2002) and Haryana (Dileep, Grover & Rai, 2002); for multiple crops in Punjab (Kumar, 2006; Singh M. P., 2007; Singh, 2009); for multiple crops in Odisha (Regional Centre for Development Cooperation, 2011); seed farming in Indonesia (Simmons et al., 2005) and AP (Swain, 2011), mango and bean crops in Senegal (Dedehouanou, Swinnen, & Maertens, 2013), several crops in Madagascar (Bellemare, 2012) and United States (US) (MacDonald & Korb, 2006) found that landholding size was positively associated with contract farming participation¹².

Most of the studies mentioned above in India have used the proportion of farmers about landholding size among total sample farmers, as the indicator of inclusiveness of the contract farming scheme. While some of the farmer participation studies, for e.g., for India Birthal et al. (2008), Narayanan (2011), Ramaswami et al. (2006), Pandit, Lal, and Rana, 2014; Swain (2012); while for outside India viz. Bellemare (2012), Hernández (2009), Miyata, Minot, and Hu (2009), Simmons et al. (2005), Warning and Key (2002) has involved modelling the probability of a farmer's contracting based on a set of explanatory variables such as land size and socio-economic variables

Birthal et al. (2008) found that probability of dairy producers participating in contract farming in India was significantly higher for the large farmers. Similarly, Pandit et al. (2014) for potato in West Bengal, Swain (2012) for gherkin and seed rice in AP; Cai, Ung, Setboonsarng, and Leung (2008) in case of rice in Cambodia; Maertens and Swinnen (2009); Miyata et al. (2009) for green onion in China; Awotide, Fashogbon, and Awoyemi (2015) for rice in Nigeria found large farmers had higher probability to grow

¹² The list of studies highlighting farmers' participation is not complete.

crop under contract. In contrast, Narayanan (2011) for papaya in TN and Miyata et al. (2009) for apple in China found, small farmers had a higher probability to grow under contract compared to larger farmers. Similarly, Ramaswami et al. (2006) and Simmons et al. (2005) observed that experienced and large broiler farmers¹³ have a higher probability of not participating in contracting. Moreover, Ramaswami et al. observed 36% of contract broiler producers had poultry as the main occupation compared to 72% of non-contract broiler producers. Thus, those farmers, who did not have poultry as a primary occupation were more likely to grow broilers under contract. Simmons et al. (2005) found participation in the broiler contract in Indonesia was negatively influenced by ownership of irrigated land and positively influenced by the credit constraint status of a farmer, indicating that the contract may be more attractive to smaller farmers who have limited potential for crop production. One of the reasons, for preference of contract for small poultry growers, is that the growing broilers require high investment upfront. Thus, farmers wanted to reduce the price and market risks by growing broilers under contract.

When trying to answer the question, whether agribusiness firms exclude marginal and small farmers? It is important to understand to understand, who selects whom. Is it the firm which selects farmers or is it a farmer who decides whether to grow the crop with contracting firm. Narayanan (2011) mentioning about the paucity of data in this regard writes that many studies often refer to a static, binary notion of participation in CF, i.e., whether the farmer is CF or NCF¹⁴. It is rare that studies highlight whether it is the firm who strategically chooses the farmers or is it farmer who self-selects to be in the contract or whether it is both (p. 159). However, some of the studies have reflected upon these aspects. Narayanan further notes that firm's selection of which farmers to contract with depends on their perceptions of the alternatives. Thus if the number of farmers is more than what the firm requires, it may choose to select the farmers. If its requirement is more or it would be more costly to go to a new location, then the firm would welcome all the farmers who are capable of growing the crop in the particular region.

Farmers on their own coming forward and contacting the firm for growing crop under contract was observed in the case of basmati paddy in Punjab by Singh and Asokan (2005). Similarly, in the case of broilers producers in Indonesia, there was the

¹³ Broiler growers are classified small or large farmers, according to the flock size they maintain. For e.g., less than or equal to 5000 birds (small farm), farms with 5001-10000 birds (medium farm), and farms with more than 10000 birds (large farm) (Kalamkar, 2011a).

¹⁴ Farmer cultivating the crop without any contract.

occurrence of self-selection by farmers', i.e., small farmers having credit constraints¹⁵ approaching the company itself (Simmons et al., 2005). Miyata et al. (2009, p. 1787) also observed some self-selection in becoming a contract farmer, but it regards labour availability and location rather than land size that influenced the decision to grow under contract. Therefore, the anecdotal literature suggests that many times, it is the farmer who decides whether to grow the particular crop with the firm under contract or not. The further question that arises are about what are the factors that induce the farmer to grow the crop under contract? The review about the factors influencing farmers to join contract farming is discussed in the section 3.1.3.

3.1.2. Spatial dimension

Another dimension to be considered is the geographical and agro-climatic factors. As the choice of contracting partner shall also depend on the nature of commodity and local conditions (Minot, 2007; Simmons et al., 2005). Contracting firms' choice of regions (villages) from where it would source the produce depends on agro-climatic suitability, proximity to the processing plant, availability of irrigation facilities, etc. (Section 2.5.1). For instance, rubber cultivation is carried out in some districts of Kerala, apples in Himachal Pradesh, and Jammu and Kashmir. Narayanan (2011) observed contracting firm sourced marigold from the mid-elevation regions in the northern part of the TN, where cooler temperatures are conducive to higher yields. In the case of broiler in TN, firm choose those village which are large, but sparsely populated villages, and where cultivation is not on a large scale. As this would help in better availability of family labour for broiler production.

The average farm holding size in the state of Punjab and Haryana is 3.77 and 2.25 hectares respectively compared to 0.22 and 0.77 hectares in Kerala and West Bengal respectively (GoI, 2010-11). Thus, there is more likelihood of medium and large farmers participating under contract in Punjab. While in states like Kerala and West Bengal, there is the likelihood of large participation of small farmers in contracting. Narayanan (2011, pp. 20-21) also mentions in her literature review citing Miyata et al. (2009), Ramaswami et al. (2006) and (Warning & Key, 2002) that supermarket and contracting firms would source their produce from smallholders if the region is dominated by them.

¹⁵ Credit constraint refer to that farming household have an excess demand for credit (Guiringer & Boucher, 2008)

Stringer et al. (2009) in their study of vegetable processors in China observed that processors preferred to have large producers and also those villages that were nearer to the processing plant. The reason being to economise on transaction costs (negotiation costs and supervision costs) in dealing with farmers to keep unit costs low. Therefore, agro-climatic and geographical conditions are an important factor in determining the selection of regions for contract farming. Often crops grown under contract farming are those which are used in agro-processing. For e.g., chip-grade potatoes for wafer manufacturing, sugarcane for the production of sugar, cotton for textiles, etc. this means that there is a derived demand for these crops. i.e., demand for these crops depends on the finished products. As long as there is demand for the finished product, the firm will continue to produce it and keep sourcing the agro-commodities for the same.

3.1.3. Determinants of farmers' participation in contract farming

Beyond the small-large farmer debate, the other key determinants viz. socioeconomic characteristics that influence farmers' participation is discussed.

3.1.3.1. Social group and household Characteristics

In this sub-section, the social group and demographic characteristics of the household are reviewed. One of the important things in India is to review whether marginalised social group or the backward groups are excluded from contract farming. After the regions are selected for contract farming. The composition of the farmers as per social group depends on the actual situation. As in some villages majority (for e.g., more than 70%) would belong to Other Backward Class (OBC) caste category. Then, in that case, it is likely that majority of CF would also belong to OBC. Similarly, if the majority of the farmers within a village belong to general category, then it is likely that majority of farmers participating in contract farming would also belong to general category.

Literature review indicated that there have not been any biased approach towards backward castes by contracting firms. Swain (2012) in his study of AP found that upper castes were less likely to be in contract farming of gherkin and paddy seed. A study by Regional Centre for Development Cooperation (2011) comprising of 505 sample from seven districts in Odisha found only 15% of total farmers belonging to a general caste, while rest is belonging to the backward caste of which 50% belong to Scheduled Tribe (ST). Narayanan (2011) observed that higher likelihood of marginalised social groups participating in marigold and papaya contract farming (p. 197). Kalamkar (2011) did not

found any caste biases in a sense any differences in caste distribution among contract and non-contract broiler growers in Maharashtra.

Randel (2005) points out that younger farmers are progressive and are likely to be receptive to new ideas. In contract farming literature, the influence of age variable on contract participation has been found out heterogeneous. Birthal et al. (2008) for milk producers in Rajasthan, Nagaraj et al. (2008) for baby corn in Karnataka, Awaited et al. (2015) for rice in Nigeria founded as age to positively associated with contract farming participation. In contrast, Narayanan (2011) for cotton in TN, Swain (2012) for gherkin in AP, Cai et al. (2008) for rice in Cambodia, Ruben and Saenz (2008), and Simmons et al. (2005) for seed rice and broilers in Indonesia found households with younger household heads were more likely to join the contract. There are also studies viz., Narayanan (2011) for papaya, marigold, gherkin and broilers in TN, Swain (2012) for rice seed, Miyata et al. (2009) for green onion and apple in China, and Warning and Key (2002) for peanuts in Senegal, did not found significant age differences across contract and NCF

Farm experience (i.e., number of years in farming) is another variable, which would be correlated with the age variable. Birthal et al. (2008) for dairy producers in India found the experience to be significantly and positively associated with the probability of contract participation. In contrast, Simmons et al. found experienced farmers do not need the support of the company and were ready to grow broilers on their own without a contract. Ruben and Saenz (2008) observed that experienced choyate farmers in Costa Rica were more aware of spot market conditions and are likely to get a good deal in it. Whereas less experienced farmers prefer to grow choyate in contracts, as it provides a certain level of security against market and price uncertainties. Thus, we can infer contract farming helps inexperienced farmers adopting new crops and technology

Household size is another variable that seems to influence the farmers' participation in contract farming. Household size is a rough measure of labour availability and dependency ratio is a proxy for the quality of the household's labour endowment (Bellemare, 2012). Bellemare, Birthal et al. (2008), Cai et al. (2008), Dedehouanou et al. (2013), Maertens and Swinnen (2009), Miyata et al. (2009), and Narayanan (2011), found households with larger family size were more likely to join the contract. This is so because many of the contracted crops need labour for supervision.

Higher dependency ratio would mean carrying for children and serving the elderly in household and all this would lead to increase in the demand for household work. This may in turn affect the availability of family labour for farm work (Bellemare, 2012). Maertens and Swinnen (2009), Miyata et al. (2009) and Randel (2005) found dependency ratios negatively associated with contract farming participation. This means that households with higher dependencies were less likely to join contract farming. However, Bellemare did not find dependency ratio influencing contracting participation.

Thus, overall literature suggests that influence of household characteristics on participation in CFAs is varied.

3.1.3.2. Education

Education of the farmer and its association with CF participation studies provide diverse results. Most of the studies take years of formal schooling as a proxy to indicate education of the farmer. Arumugam, Fatimah, Eddie, and Zainalabidin (2010) in Malaysia, Narayanan (2011) for papaya and broilers in TN, Swain (2012) for rice seed in AP, Simmons et al. (2005) for broilers in Indonesia, and Cai et al. (2008) for rice in Cambodia found years of schooling to be positively associated with contract farming participation. There are also studies viz., Narayanan (2011) for marigold in TN, Swain (2012) for rice seed, Miyata et al. (2009) for green onion and apple in China found schooling to be negatively associated with contract farming participation. Thus, these studies found no evidence of bias against less educated farmers.

3.1.3.3. Agricultural Assets

In this section, the relation between agricultural assets and contract farming participation is discussed. Agricultural assets of the farmer are one of the good indicators of his financial position (Chauhan, Mundle, Mohanan, & Jadhav, 1973). Agricultural assets comprise of physical farm assets and livestock possessed¹⁶. Livestock is considered as a proxy for liquidity and wealth (Hernández, 2009). According to Randel (2005), ownership of farm assets as well as access to non-farm income are linked to

¹⁶ Physical farm assets include ownership of bullock cart, electric/diesel motor, farm building, heavy agricultural machinery (plougher, rotravator, threshers, tillers, trolley, etc.), irrigation, and equipment.

undertake higher risk activities such as growing cash crops, which may include up-front investments.

Many studies have highlighted that contract farmer need have specific assets like irrigation facilities to grow the contracted crop (Erappa, 2008; Escobal, et al., 2000; Morvaridi, 1995; Simmons et al. 2005; Swain, 2011). This is mainly due to the nature of crop which required irrigation. Arya and Asokan (2011, p. 68) also pointed out that certain high-value crops require irrigation facilities and greater investments, thus only those farmers who could undertake those risks and investments become eligible for contracting. For instance, for growing asparagus crop in Peru, farmers having sufficient amount of capital, quality land and irrigation facilities could enter into CF (Escobal, Agreda, & Reardon, 2000). Similarly, for commodities like seed corn (Indonesia) and seed rice (India), only farmers' having irrigation facilities got eligible for participation in the contract (Simmons et al., 2005; Swain, 2011). Morvaridi (1995) for citrus in Cyprus and Nagaraj et al., (2008) for babycorn and chilies in Karnataka, observed that firms had criteria whereby only farmers are having irrigation were selected. The reason being that above mentioned crops need irrigation facilities. Otherwise, the crop would fail.

Birthal et al. (2008) for dairy, Dedehouanou et al. (2013) and Maertens and Swinnen (2009) in Senegal, and Simmons et al. for broilers found those who had a higher value of livestock was positively associated with contract farming participation. Miyata et al. (2009), in the case of apple, found CF having a greater value of agricultural assets compared to NCF. In contrast, Cai et al. (2008) for rice in Cambodia that those households having a lower value of assets were more likely to join contract. According to Key & Runsten (1999) firms favor small farmers because they are more likely to lack productive assets and have limited alternative income and production opportunities, which strengthens the firms' bargaining power (p. 390).

3.1.3.4. Access to non-farm income and credit constraint

Narayanan (2011) for broilers, Singh M. P., (2007) in Punjab and Swain (2012) for gherkin in AP found higher non-farm employment and income to have a negative relation with the probability of adoption of contract farming. Non-farm employment and income are associated relaxing credit constraint which encourages the farmer to self-finance for farm assets and crop inputs (Hernández, 2009). Thus, those farmers having access to non-farm income would not need the support of contracting firm to grow crops.

Similarly, Awotide et al. (2015), Ruben & Saenz, (2008) and Simmons et al. (2005) found that those with credit constraints had a higher probability of contract farming participation.

3.1.3.5. Proximity to highway or market

The distance of farm to the metaled road, highway or market also plays an important role in from farmers' perspective. For e.g., Awotide et al. (2015) and Leung, Sethboonsarng, and Stefan (2008) for rice in Nigeria and Laos respectively, Narayanan (2011) and Randel (2005) for cotton in India and South Africa respectively, found that further away they are from market, more likely they would participate CF. Wang, Wang, and Delgado (2014) mentions that farmers who are farther from the market may find additional security in contracting given their relative remoteness, and thus may be more likely to contract. Hence, CF effects may also be dependent on infrastructural development. Miyata et al. (2009) found the closer farmer is in proximity with village leader, more likely he would participate in contract farming. Cai et al. (2008) found households that were closer to the highway were more likely to join the contract.

3.1.4. Motivation behind farmers growing under contract

Masakure and Henson (2005, p. 1731) assert that motivations to participate in contract farming vary according to the prevailing situation of producers and that these relate to the existence, or not, of alternative economic opportunities and/or imperfections in local input and output markets. One of the major factor influencing participation is CF is that it provides a valuable source of income. Anecdotal evidence suggests that farmers decision to contract are associated with unobservable factors such as smallholder risk aversion, social networks, entrepreneurial and technical abilities, how much the grower trusts the firm or its representatives, etc. (Barrett et. al. 2012, p. 720). Many studies have reported that it is the farmers' perception of high returns and low risk involved, that influences farmers' decision to contract. Access to credit and timely supply of inputs are the other important factors that induce farmers to join contract farming (Barrett et al., 2012; Deshpande, 2005; Eaton & Shepherd, 2001; Guo (2008) cited in Wang et al. (2011); Keshavmurthy, 2005; Singh & Asokan, 2005).

Kliebenstein & Lawrence (1995, p. 1215) in their study of US pork industry, found a reduction in production and income risks as the primary reason for contracting followed by lack of capital. Wang et al. (2011, p. 502) found Chinese farmers' primary

motivation of contracting was not market price risk management, but rather seeking higher price and lower marketing transaction costs (i.e., the cost of planning, implementation, and supervision of market transactions). Wang et al. further notes that farmers consider contracting as a way to access demand. Delgado (1999) mentions the high perishability of certain products such as milk, which motivates to have an assured buyer. Also, for certain products such as cut flowers and vegetables that are exported may require a cold chain for handling. Thus, for dairy and meat producers, time specificity and up-front investment are high therefore having assured buyer is the prime importance. Similarly, Arumugam et al. (2010) and Masakure and Henson (2005, p. 1731) found that farmers perceived contracts to lessen the uncertainties associated with local markets, example, regarding input supply, market demand, and market prices. Randel (2005) also found assured buyer and lack of alternative market as major reasons to grow cotton under contract in South Africa. Similarly, assured market and good prices were major reasons cited by CF for preference of tree cultivation under contract in Tamil Nadu (Rohini, Selvanayaki, & Selvi, 2015)

Arumugam et al. (2010) and Masakure and Henson (2005, p. 1731) also found that farmers participated to acquire skills and receive extension services for producing new and existing crops. Farmers also perceived contract farming participation as prestigious and a source of self-satisfaction and social esteem. Arumugam et al. (2010), further notes that access to marketing information, transfer of technology and access to inputs as another important reason to join CF.

Keshavmurthy (2005) in his study of gherkin contract farming in Karnataka observed that fellow farmers and relatives play a key role in encouraging the farmer to enter into a contract. Thus, it seems are farmers are influenced by the success of co-farmers to join contract farming.

3.1.5. Disadoption of farmers from contracting

According to Barrett et al. (2012), farmers might exit the CFA if they find that the CFAs delivers less than anticipated returns, i.e., if new outside opportunities emerge, or if their circumstances change. Thus, changing firm and smallholder attributes and learning from imperfect contract performance by both parties may lead to change in contracting status on both sides. However, this phenomenon has remained an understudied area.

Some of the studies have reported that over a period, either the farmer participation in CFAs has reduced or the CFAs had discontinued. In Ghana, 56% of surveyed farmers who ever joined the pineapple agro-export value chain had exited by 2009. Around half of these farmers mentioned the lack of buyers or problems with exporters as the main reason for exit (Harou & Walker, 2010 cited in Barrett et. al.). Bachke (2010) cited in Barrett et al. found that the rate of exit of farmers from farmers' organizations in Mozambique was also high (64% between 2002 and 2005). This is despite the estimated positive effects on welfare for smallholders who belong to those organizations.

Narayanan (2011) observed that the farmers routinely dropped out of CFAs. In her study of southern India, it was found that there was considerable in and out movement of farmers in CFAs. Among currently contracting farmers during the study, 73% of marigold farmers had at least one year when they did not contract after they had entered the contract farming. The corresponding figure was 64% for gherkins, and 93% for cotton. Similarly, Michelson (2010) cited in Barrett *et al.* (2012), found that 38% of all Nicaraguan farmers who supplied horticulture crops to supermarkets since 2001 had exited the channel by 2008. The study observes that there is a transition to a new equilibrium of profits for the farmers who exited the supply chain. As farmers had invested in irrigation, productive technologies and built new market relationships which allowed them to meet the transaction and quality requirements of the supply chain. Once these investments were made, farmers, no longer felt the need of contracts to insure against price risk, nor do they wish to abide by the other constraining prescriptions of the contract. Cai et al. (2008) found formerly CF's household income as well as non-farm income higher compared to CF. The study mentions that although progressive farmers in the village were first to participate in rice CF in Cambodia, they were also first ones to leave contract farming. The attrition of CF in remote areas was low; this was validated by data as formerly CF' farm were closer to market-road compared to CF. The reason for attrition of farmers cited in Cai et al. (2008) was that as later on, more market opportunities arose with the development of infrastructure, farmers switched to more profitable opportunities. Deshpande (2005) reported in the case of poplar and tomato that as farmers become specialized and experienced, they were found to leave contracts. In case of poplars in India, after few years of the introduction of the crop by Wimco Company, a competitive market developed for it. There was a huge demand emerging for poplar from furniture and paper industry where it can also be used in for raw materials.

Price at which poplars was sold in the market was higher compared to contracted price, which led to farmers dishonouring the contracts. Due to the rising demand of the crop, many firms started specializing in providing the nurseries of the plant. Thus, farmers no longer felt the need of contracting with the company. The company finally stopped the contracting scheme due to the opportunistic behaviour of farmers (Deshpande, 2005).

Narayanan (2010) observed that firm dropout has been quite significant in India. Firms have faced difficulties in maintaining contractual relationships in light of difficult contract enforcements, uncertain export markets or losing its market share due to domestic competition from other firms. Uncertainty in the domestic or foreign markets due to competition from domestic and foreign players leads to uncertainty in demand for the final products, which in turn leads to uncertainty about continuation of contract farming operations. Narayanan (2011) observed that a couple of the marigold firms stopped contracting when they failed to secure export orders. In gherkin, it was observed that the number of farmers and region contracted expands or shrinks depending on the market conditions crop at farm level stems from the consumer demand. Similarly, Campbells Ltd. abandoned vegetable contraction production in Mexico when bust followed boom in the economy (Warning et al., 2002). Similarly, around half of those farmers who had exited pineapple agro-export value chain mentioned, lack of buyers or problems with exporters as the main reason for exit (Harou & Walker, 2010 cited in Barrett et. al. (2012)). Thus consumer demand of the product is a basic determinant of farm demand for a processing variety crop. This point was also emphasized by Collins et al. (1959). Thus, market conditions play a crucial role in the continuation of CFAs

Barrett et al. (2012) report that due to the consistency of uncertain welfare results across the globe, CFAs had stopped at various places. In the case of tomatoes in Punjab, with the availability of cheaper Chinese tomato pastes, HLL and few other companies stopped contracting. Moreover, since revenue from tomato products did not contribute significantly to the overall revenues of the company, it did not take much care about the contract farming operations (Deshpande, 2005). Deshpande concludes that contract farming is a step in the evolution of competitive marketing and not a permanent substitute for it. It states that contract farming emerges due to certain market imperfections and once those market imperfections cease, contract farming as an institutional form of raw material procurement may come to an end.

3.2. Economics aspects of contract crop cultivation

Most of the studies on contract farming in India have focused on aspects profitability and efficiency of farmers. The studies mainly examine the economics of the contract farming system in specific crops, compared with that of the without contract and/or competing traditional crops of a given region (Singh S. , 2009). In this section, the review of contract farming literature about the impact of contract farming is presented.

3.2.1. Introducing new crops

It has been found that contract farming has helped to introduce new crops, facilitated crop diversification in many states. For e.g., poplar in northern India, tomato in Punjab, gherkin in southern India, barely in Rajasthan, medicinal plants in various parts of the country, etc. (Deshpande, 2005; Paty, 2005; Rangi & Sidhu, 2000; Singh & Asokan, 2005). Many studies have observed that contract farming does lead to a shift in the cropping pattern of the area. For e.g., Korovkin (1992) observed that agribusiness boom in Chile led farmers to shift from traditional crops like foodgrains to fruits and vegetables. Similarly, institutional innovations in Peru and profit differences led farmers to shift from traditional crop like cotton to asparagus, oranges, apples, etc. (Escobal, et al. 2000).

Delgado (1999, p. 185) notes that contract farming in Africa has facilitated the integration of smallholders into commercial agriculture. With contract farming, farmers diversified into various sub-sectors such as aquaculture, export-quality green vegetables, sugarcane, cotton, cocoa, arabica coffee, tea, dairy and cut flowers. Delgado further argues that in the context of missing markets in Africa, these are sectors where smallholders would otherwise unlikely be involved due to lack of the appropriate assets, technology, information, access to services and possibilities of marketing.

3.2.2. Technology transfer

Contracting has facilitated the transfer of new technology to farmers (Arumugam et al. 2010; Eaton & Shepherd, 2001; Glover & Kusterer, 1990; Narayanan, 2011; Randel, 2005). As Eaton & Shepherd (2001, p. 12) point out that new techniques are often required to upgrade agricultural commodities for markets that demand high-quality standards. Similarly, new production techniques are often necessary to increase

productivity as well as to ensure that the commodity meets market demands. Private agribusiness offers technology diligently and supports it with their extension services.

PepsiCo introduced tomato crop in Punjab along with new technology like deep chiselling, new methods of transplantation, besides introducing new varieties of seeds. This resulted in significant increase in yields after contracting (Deshpande, 2005; Dileep et al., 2002; Rangi & Sidhu, 2000). Similarly, PepsiCo also introduced a direct seedling method of rice in Haryana and Punjab, which resulted in a reduction of cultivation costs of Rs. 1,500 per acre and 50% labour (PepsiCo India, 2012). Simmons et al. (2005) in the study of contract farming in Indonesia observed that farmers grew certain complex crop because of the company's help in the form of technical advice and extension services otherwise it was unlikely that they would have grown that crop. Eaton & Shepherd (2001) citing different studies provide numerous examples of such technology transfer across the globe through contract farming.

Glover and Kusterer (1990, p. 9) mention that input supply is weak in the least developed countries (LDCs). The rural agro-input shops are unable to supply seeds, agro-chemicals and fertilizers in sufficient quantities. Participation in contract farming helps small farmers in LDCs to access these inputs. Glover and Kusterer (1990, p. 102) also mentions the instances of technology transfer in Kenya, where sugarcane out growers learned about the importance and application of fertilizers, which they replicated to the other crops as well. Thus, contract farming helps pass on knowledge of modern technological inputs and its applications to farmers which they would use for other crops.

However, not all firms provide the extension services, Glover and Kusterer (1990, p. 9). For e.g. majority of asparagus contracted farmers in Peru reported of not received technical assistance from the company due to the negligent attitude of firm extension staff.

3.2.3. Productivity and returns

Introduction of new technology and extension services through contract farming have led farmers obtaining higher yields and incomes (Awotide et al. 2005; Deshpande, 2005; Dev & Rao, 2005; Dileep, et al., 2002; Kumar, 2006; Miyata et al. 2009; Pandit, Pandey, Rana, & Lal, 2009; Rangi & Sidhu, 2000; Singh S. , 2000; Swain, 2010, 2011; Tripathi, Singh, & Singh, 2005; Warning & Key, 2002). Similarly, many studies using the production function or stochastic frontier analysis found that contract production was

more efficient compared to non-contracting mode of production (BIRTHAL et al., 2008; DELGADO, NARROD, & TIONGCO, 2008; DILEEP et al., 2002; KUMAR, 2006; PANDIT et al., 2009; SRIDHARA, 2010; SWAIN, 2010; TRIPATHY et al. 2005). This signifies the importance of contract farming in boosting growth in the agriculture sector.

Contracting firms through their input control measures such as the scheduling of planting and the selection of crop varieties and field inspections help enhance the yields and quality of crops (Goodhue, 1999). Several studies have reported that contracting has helped in reducing price and yields risk for crops viz. oil palm (Dev & Rao, Food processing and contract farming in Andhra Pradesh: A small farmer perspective, 2005), potatoes (Pandit et al., 2009; Tripathy et al., 2005; Yashaskara, Suryaprakash, & Mandanna, 2010), fresh fruits and vegetables (Maertens & Swinnen, 2009). Similarly, Ramaswami et al. (2006) and Kalamkar (2011) observed lower mortality risks in case of broiler contract producers. Hog contracts in US, lowered growers' risks accompanied by lower growers' efforts as most of the inputs were provided by the firm (Key & McBride, 2003).

Contracting also reduces farmers marketing and transportation costs. In the case of gherkin and oil palm in AP, companies set up the collections centres in the village. Moreover, the company also bore the cost of transporting the produce from collection centre to the factory (Dev & Rao, 2005). Many of the firms provide direct transportation facility to lift the produce from the farms, which saves the farmers' transportation costs (Vijaykumar & Sonnad, 2010).

Many of the studies on contract farming in India determine the income benefits of contract farming, by comparing the net returns of contract producers from growing contract crop compared with that of the producers growing contract crop or competing for traditional crops of a given region without a contract. However, Barrett et al. (2012) question the above methodology for determining the impact of contract farming on income. They argue that as a selection of farmers into CFAs is not random. Suppose an entrepreneurial farmer decide to enter a CFA. His profits would be higher than his counterparts, owing to unobservable characteristics (entrepreneurial and technical ability, knowledge, social networks, risk behaviour, etc.) and his resource base (quality of soil and inputs). Therefore, a direct comparison of profits of CF and NCF could lead one to conclude, that contracting helps earn higher profits, without acknowledging the

possibility that it might be the higher ability farmers who participate (Narayanan, 2011, p. 202).

Barrett et al. (2012) mention that when we regress returns on observational characteristics and an indicator (dummy) variable whether the farmer is contracted farmer or NCF, then error term of the regression will almost never be uncorrelated with the observables or with the CFA participation variable. Thus, any estimate of the dummy variable parameter, the benefits impact of CFA participation will be biased and inconsistent. Which can lead to a mistaken conclusion that CFA participation benefits smallholders when it, in fact, it hurts them, or vice versa. For e.g., an entrepreneurial farmer may decide not to enter a CFA, as he believes he can do better for himself on his own. In this case, the unobserved entrepreneurial ability is inversely correlated with D_i (dummy variable CFA participation) but positively related to returns. In this context, our estimate of dummy variable parameter would, therefore, be negatively biased. Barrett et al. (2012) mention that to identify the causal impacts of smallholder CFA participation on welfare, one needs a research design that makes the D_i variable as credibly exogenous as possible or can at least bound how much unobservables could affect inferences.

Narayanan (2002, pp. 202-203) notes that an important challenge is, therefore, to account for factors that might implicitly influence both participation and the welfare outcomes. If these factors remain neglected, then higher profits might be wrongly attributed to participation. One empirical approach is to account for selection based on observables by using Heckman's selection model or Propensity score matching (PSM) to control for selection bias and then compute average treatment effect (ATE) where the treatment is participation in CFAs. Several studies viz. BIRTHAL et al. (2008), Hernández (2009); Miyata et al. (2009), have used Heckman's selection model, while Awotide et al. (2015), Bachke (2013), Bolwig, Gibbon, and Jones (2009), Cai et al. (2008), Fischer and Qaim (2011), Leung et al. (2008), Maertens and Swinnen (2009), Minten et al. (2009), and Minten, Reardon, and Sutradhar (2010) use PSM to compute ATE. In general, these approaches rest on the assumption that selection into treatment, i.e., participation in CFAs, can be reliably based on observable characteristics (Dehejia and Wahba, 2002; Angrist and Pischke, 2009 as cited in Narayanan, 2011, p. 203).

Another approach to finding causal impact of contract farming on incomes as suggested in Barrett et al. (2012), is the use of Instrumental Variable (IV), in which participation is instrumented for by a variable that is correlated with participation but not

with the welfare outcome of interest. However, it is challenging to find an exogenous instrumental variable that is strongly correlated with participation in contract farming and not with an outcome (net returns) variable. There are some that have used IV to estimate causal impact of participation of CFAs on returns of contract crop cultivation. Bellemare (2012) using an experiment, derived farmers' willingness to pay to participate in contract farming instead of fixed return based on a game of dice as IV. Similarly, Warning and Key (2002) had used the trustworthiness of farmer, Simmons et al. (2005) used the number of organizations (including agricultural organizations) a farmer belongs to, Miyata et al. (2009) used distance between a farmer's farm and the farm of the village head, and Rao and Qaim (2010) used farmers' membership in a farmer group as IV. Bellemare (2012), Warning and Key (2002), Miyata et al. (2009), and Rao and Qaim (2010) found that participation in CFAs increases income by 10%, 39%, and 48% respectively. Many of the studies mentioned above, after correcting for selection, use endogenous switching regression to find out the impact of contract farming. Bellemare even found contract farming participation decreased the volatility of total household income and the duration of the hungry season experienced by the household by about two months. Minten et al. (2009) notes farmers that participating in CFAs have higher welfare, more income stability and shorter lean periods. Arumugam et al. (2010) farmers are perceived contract farming protected them against incurring losses.

Narayanan (2011) found that on an average CF for broilers, papaya, cotton and gherkin had higher net returns. Narayanan using treatment effect model concluded that contracted farmers were better of growing contracted crop. Similarly, NCF would have earned higher returns if they would have grown under contract. Similarly, Cai et al. (2008) found that had the never-CF contracted; their returns would have increased, but this is not the same for former-CF. Awotide et al. (2015) found ATE on the treated had a positive and significant increase in yield due to participation in contract farming. The increase of 58% in rice productivity and 64% in rice income was found. Swain (2011) found rice seed and gherkin CF earning double returns compared to NCF

3.2.4. Impact on markets

Contracting has been found to have a positive impact on the input and output agricultural markets for the contracted crops. This was reported in cases of milk, poplar, tomatoes, potatoes, safflower, etc. In the case of Marico's experience of contract

production of safflower in Maharashtra and Madhya Pradesh, it was observed that exporters and traders raised their prices due to competition from with the entry of the company for procurement for safflower (Singh & Asokan, 2005). BIRTHAL et al. (2008) observed that procurement by contracting agency led to the competition in milk markets which was otherwise dominated by vendors who often exploited the producers by paying them the less than the market price. Similarly, contractual innovations like providing inputs, credit and extension services in case of sugar beet in Slovakia led even other firms to imitate such arrangements to compete for the farmers. This induced direct positive effects for the farmers (Gow et al., 2000). Arumugam et al. (2010) and Chin (2015) mention about farmers in Malaysia, had little market information on prices, product quality and standards. But with participation in CFAs they were more aware of these aspects, which resulted in a reduction of post-harvest losses. Many studies state that effects of scaling up of contract farming will go beyond production and is likely to have several direct and indirect consequences for various stakeholders in the whole economy, as in multiplier effects in terms of income and employment will be significant in tertiary sectors directly or indirectly related to agribusiness supply chains (BIRTHAL et al. 2008).

3.2.5. Indirect benefits

3.2.5.1. Facilitating credit process

Bellemare (2012) found contract farming participation increased the likelihood that a farm household receives a loan from a bank or a microfinance institution by about 31%. Similarly, several studies have observed contracting firms has facilitated the process of availing bank loan to farmers. For e.g., Wimco-poplar programme (Deshpande, 2005); Appache cotton in Tamil Nadu (Paty, 2005); Hybrid rice seed in AP (Swain, 2011), PepsiCo¹⁷ for potato across many states in India, and Glover and Kusterer (1990) across Africa.

3.2.5.2. Improving managerial skills of farmer

Kumar (2006) founded that CF in Punjab used inputs judiciously and economically due to better guidance from the qualified research staff of firms which resulted in rise in overall land productivity of their farm. Similarly, Sharma, Pannu, and Phougat (2006) in

¹⁷ Source: <http://pepsicoindia.co.in/purpose/environmental-sustainability/partnership-with-farmers.html>

their study of contract farming in Harayana observed that contract farming helps in improving the managerial skills of the farmer and inculcates the concept of commercial cultivation. With improved technology adoption and better resource management learnt through contract farming, farmers in Madagascar were able to increase the productivity of other crops as well (Minten et al., 2009).

3.2.5.3. Improving socio-economic condition

Korovkin (1992) study observed that tobacco contract farming in Rinconada region of Chile, improved the economic positions of all sections of farmers. As landless labourers got employment in the region and small farmers were able to benefit with the rise in income through which they increased their landholdings or augment the animals. Tobacco sharecroppers were able to become independent producers. This was seen as the positive social transformation due to rise in agribusiness.

3.2.5.4. Generation of high employment in farm area

Many authors have reported that due to the adoption of the particular crop through contracting has helped generate higher employment for family labour and other labourers (Dev & Rao, 2005; Eaton & Shepherd, 2001; Erappa, 2008; Nagaraj et al., 2008; Swain, 2011). However, the impact of contract farming on employment is crop specific. For e.g., crops like tobacco, potato, gherkin, baby corn are highly labour intensive, hence the net effect on employment was positive. Whereas when farmers shifted their cultivation from cotton to asparagus in Chinchá zone of Peru due to contract farming, the net effect on employment was negative in the region (Escobal et al., 2000).

3.2.6. Environmental considerations

Some of the proponents have argued that contract farming facilitates adoption of new technologies and hence shall help in saving or sustaining the natural resources. One of the studies cited in Paty (2005) reported that that due to extension services and other price incentives provided by the McCain (I) Ltd. to its potato contract producers for adopting sprinklers and drip irrigation systems helped saving 40% of water, 20% of fertilizers and also increase the yield by 20%. However, some of the studies have reported that contract farming of certain crops has led to exploitation of natural resources. Dev & Rao (2005) reported that in the case of oil palm gardens, depletion of groundwater level is faster compared to other crops. Similarly, Swain (2011) reported

that irrigation intensity and usage of fertilisers and pesticides was higher for contract crops than for non-contract crops. Pomareda (2006) observed that contracting in Kenya for specific vegetables in a continuous manner led to the intensive use of land and water exhaustion.

Some researchers have also raised that CFAs may lead to mono-cropping, which would adversely affect the soil fertility and thus, the livelihood of smallholders (Da Silva & Shepherd, 2013). Repeated cultivation of tomato contract cultivation in Latin America without adequate rotation and/or chemical controls lead to a variety of soil infestations (Glover & Kusterer, 1990, p. 115). Some producers and agronomists in Mexico raised concerns about the soil depletion and forest degradation due to avocado contract farming, as the mono-cropping pattern was setting in (Romero, 2006, p. 81). Opondo (2000) observed that contract farming in Kenya has led to degradation of soil and exploitation of natural resources by following the same cropping pattern system. A point to note is that the even Punjab and Haryana are facing the similar problem due to the double mono-cropping pattern of rice-wheat (Chand, 1999; Rangi & Sidhu, 2000). Thus, it may not be appropriate to say that contract farming leads to land degradation. Instead the point is how the farmers utilise their land, i.e., following crop rotation may prevent land degradation.

Many companies do understand the importance of sustainable farming and focus their research and development towards developing seed varieties, agricultural practices that save water. Similarly, as mentioned in Section 3, PepsiCo introduction of the direct seedling plantation of rice resulted in 30% reduction in water consumption and cutting down on greenhouse gas emissions by 75%, while keeping the yields and quality at par (PepsiCo India, 2012). They also through their policy took necessary steps, such as incentivise farmers to go in for drip-sprinkler irrigation to save water.

There have also been instances where companies have ignored the environmental consideration. Morvaridi (1995) observed that firm encouraged farmers to expand citrus cultivation even though the problems of water shortage and salinity were surfacing. Such environment costs are borne by the farmers, as when productivity had fallen company tries to expand or shift the cultivation in the new regions. Similarly, Swain (2011) reported that in the case of gherkin in Andhra Pradesh when the productivity of particular region declined, the company shifted the production to other farmers and

regions. Thus, the farmer may earn short-term profits, but in the long run there are environmental costs which are detrimental.

3.3. Problems faced in contract farming

In addition to benefits in CFAs, farmers do face certain problems or constraints in contract farming. Chin (2015) cites that farmers felt application process to be complicated for growing fresh fruit and vegetables under contract farming in Malaysia which is mediated by State's Federal Agricultural Marketing Authority. This hinders the participation in CFAs. Moreover, Suryandari and Buang (2010) as cited in Chin (2015) commenting on contract farming in Malaysia, noted about the prices at times in contract being lower compared to market price, which was the major cause of dissatisfaction among farmers. Similarly, farmers in Tumkur district were dissatisfied by the lower price paid by contracting firms (Kumar & Kumar, 2008, p. 249)

Another problem faced in asparagus contract farming is of low yields than expected. For e.g., asparagus contracted farmers in Peru reported of having lower yields due to pest attack. The reason cited was these farmers have been slow to accept the new recommendations for several reasons. Farmers did not trust the advice of agronomists that using lesser quantities of cheaper fertilizer earlier in the plant cycle will produce better yields at harvest time. Moreover, farmers did not appreciate the attitude of agronomists regarding communication. The reduction in yields led to losses which caused debts and dissatisfaction among farmers (Glover & Kusterer, 1990, p. 59). However, such problem are crop and location specific. It would be inappropriate to generalise with it for the contract farming as an institution.

Disputes in contracts have mostly aroused over quantity, quality, and payments (Deshpande, 2005, p. 56; Glover & Kusterer, 1990). Given the heterogeneity in agriculture, there have been problems of moral hazards and adverse selection as yields, market demand and prices and quantities in market undergo tremendous changes in each season, which may lead to an opportunistic behaviour by each of the party in CF (Satish, 2003; Singh S. , 2007)

Glover and Kusterer (1990) mentions, that potato grower seeing the good income in initial years had invested in potato equipments. Thus, the problems of debt, specialised investment and monopsony led them being locked in CFAs.

One of the major problems faced by companies is the selling of the produce by farmer outside the contract (Deshpande, 2005; Dev & Rao, 2005; Dileep et al., 2002; Kumar & Kumar, 2008; Narayanan, 2012; Roy, 1963; Singh S. , 2000; Singh & Asokan, 2005). As Glover and Kusterer (1990) mentions that as market prices rise above the contract price, there is a great temptation for farmers to sell on the market. Even Roy (1963) in his review of contract farming in the USA reported that farmer shall break the contract when the market price is higher and bring back all the produce when the market price is lower. The default rate is observed to be high for the contracted crop only if the gap between contract and market price is large. Minten et al., 2009 observed that farmers in Madagascar grew the contracted crop on additional plots in addition to the contracted area. When the prices were higher in contracts compared to spot markets, they used the produce of the other plots and sold it to the firm. While when the market prices of the goods were higher, the company faced a significant decrease in the quantity supplied. The owner of Nijjer Agro Ltd. had also reported that tomato CF mixed 10-12 quintals of water/mud in each truck for which the company had to bear the financial loss (Rangi & Sidhu, 2000). Will (2013) also mentions of the moral hazard problems like such as diversion of inputs or side-selling.

The opportunistic behaviour has also been observed from the company's side. For instance, HLL (India) in Punjab was reported to have not procured from farmers many times, especially when they over-contracted acreage and yields are good (Singh S. , 2002, p. 1630). In Andhra Pradesh, for 63% of CF, there was a partial breach of contracts in gherkins as the firm did not procure as per contract terms (Swain, 2011). Many studies have observed that farmers faced delay in payments, manipulation of norms and problem of rejection of their produce (Arunkumar (2002) cited in Sridhara (2010); Dileep et al., 2002; Keshavmurthy, 2005; Kumar & Kumar, 2008; Kumar & Singh, 2009; Vijaykumar & Sonnad, 2010, Swain, 2011; Will, 2013). Daddieh, Kwame, & Little (1995, p. 5) in their study of pineapple producer in Ghana mention about occasional incidences of delays in being payments, non-payments, or reduced payments based on false claims of product quality. Due to delays in payment, most of the gherkin farmers were forced to sell their assets and take non-institutional credit to pay wages to the labour employed for the contracted crop (Swain, 2011). Daddieh et al. reports of incidences, where contracting firms did not turn up to procure output; or wanted to buy when fruits were immature; and only purchased the best fruits rather than the agreed upon quotas (p. 44).

Another kind of problem reported by Glover and Kusterer (1990, p. 114) and Singh S. (2002) in Panama and Punjab (India) respectively was the poor coordination of the delivery of tomatoes at the factory gate, whereby farmers have to wait at the factory gate for more than a day. A similar problem was reported in the case of mint (Singh S. , 2009) and potatoes (Kumar, Pandey, Rana, & Pandit, 2009) in Punjab. In the case of tomatoes, this results in longer delays result in spoilage, weight loss of the produce and higher rejection rate for the farmers (Singh S. , 2002). Glover and Kusterer (1990) also reported that McCain Ltd. for potatoes in Cannada, while banana industry in Ecuador resorted to manipulation of inspection standards to control deliveries when production was more than demand. Tomato contract growers in Honduras (Latin America) during 1980-81 also reported about long waits to rent company-owned harvesters, highly variable reject rates, and low prices (Glover & Kusterer, 1990, p. 113). Similarly, cauliflower contract seed growers complained about the absence of written legal agreement, lack of prior price information, near monopoly of big firms, deductions made on account of the moisture content and foreign material in the seed (Kumar & Singh, 2005). Kumar and Kumar (2008) also mentions about the problems faced by CF to meet the firms' quality requirements (p. 249).

Companies do not pursue legal action against defaulters as it is neither feasible nor politically wise (Glover & Kusterer, 1990). Moreover taking legal action would create a negative image among farmers (Roy, 1963; Singh S. , 2002, p. 1630). In the case of seed contracts, although there was a clause of penalty in case of default by the farmer but it was rarely implemented (Singh S. , 2004). The poorly developed legal institutions, the small amount involved and potential souring relationships between agribusiness and farming communities makes that the only threat at the disposal of the firm is to discontinue the contract with the farmers (Minten et al., 2009). In the absence of effective enforcement mechanisms, there is little that a farmer or firm can do against the opportunistic behaviour of opposite (Swain, 2011). Hence, for effective enforcement of the contract, the firm tries to build a relationship based on trust. Provision of inputs and services and visits of honest field staff of company does have a positive influence on contract relationship (Naidu, 2012).

3.4. Gaps in literature

Several studies in India, reviewed so far examined mostly the cost-benefits of the CF in specific crops and in some cases also the technical efficiency, compared with that of the NCF for a particular transaction/season only. There were also some studies examining participation issues. The success of contract farming scheme cannot be judged by just one transaction at a time. Moreover, much of the literature on contract farming have tried to estimate the welfare gains made due to the intervention of contract farming. However, the empirical literature on contract farming is limited in scope. This is partly due to the relative paucity of high-quality survey data on contract farming (Barrett et al. 2012). Williamson (1985) suggests full assessment of contract requires that both contract execution and ex-post competition at the contract renewal comes under scrutiny.

Naidu (2012) notes literature especially in India has not adequately focussed on the issue of continuity of relationship or breakups in contracts. The motive behind the decisions of firm relating to vertical coordination (whether to contract or not) is purely “economic” i.e. in a sense to get the job done in the cheaper or better way (Mighell & Jones, 1963). Thus, changing attributes, circumstances and learning from imperfect contract performance by both parties may lead to change in contracting status on both sides. However, this phenomenon has not been adequately dealt. Moreover, little is known about the performance of contract farming scheme in the sense how the firms are building and managing the long-term relationships with farmers. The general problems of contract theory i.e. hold-ups and moral hazard have also not been adequately looked in the contract farming studies in India.

3.5. Concluding Remarks

In this chapter, discussion about the previous work in the light of the research questions to be addressed in the thesis was presented. Studies so far have suggested, that in many cases it is the farmer who voluntarily decides whether to grow the crop in contract or not. It has been seen that all kinds of farmers participate in contract farming, whether small or large, educated or uneducated, young or old, experienced and inexperienced. Determinants of participation depend on the crop characteristics, agro-climatic factors, and local infrastructures such as roads, market access, alternative

earning opportunities, family conditions, farmers risk and entrepreneurial abilities. However, the impact of these variables has been found heterogeneous.

Overall, review notes that contracting helps in resolving market failures by providing access to credit and reliable inputs, provision of extension services, etc. which may be inaccessible without contracting. Thus, contracting helps reduce yield, input and price risks. The risk reducing the aspect of the contract facilitates technology adoption (Glover & Kusterer, 1990). Risk reduction provides incentives to farmers invest in yield stabilizing technologies such as irrigation facilities or yield-increasing inputs such as fertilizer or improved varieties. It is these factors that motivate farmers to participate in CF. Most of the studies have found that contract farming has helped increasing productivities and returns from cultivation. Till date research indicates that the major sources of farmer gains from contracting arise from the resolution of market failures, economies of scale or economies of scope gained mainly through dis-intermediation in the wider context of marketing system and reduced exposure to market risk (Barrett et al., 2012, p. 719; Singh K. , 2004).

Some of the problems faced in contract farming are due to uncertainties of market faced by firms' final products, and other is due inefficient management by the firm staff. As demand for crops is derived demand, therefore sometimes firm instead of the adverse market condition had to discontinue contract farming. Some of the problems related to how firms staff can manage the contract farming operations. It is important that firm staff are diligent and able to communicate well with the farmers for the success of contract farming scheme. Singh K. (2004) notes that contracting firms' assistance in technology transfer for contract crop cultivation and flexibility of incorporating market uncertainties through adjustments in contracted price from time to time is vital in continuity of CF relationships.

There were also environmental issues being raised about impact on land fertility due to mono-cropping pattern induced by contract crop production. Given the heterogeneity of crop characteristics and contract-farming relations, it is not possible to have a general theory of contract farming. Rather, the emphasis should be on understanding this phenomenon in relation to local conditions (Little, 1994).

In the next chapter, methodology adopted to fulfil the objectives of the thesis has been elaborated.

Chapter 4 - Research Design and Methodology

In the previous chapter, the review of literature based on our research questions was presented. In this chapter, research design and methodology adopted to fulfil the objectives of the thesis (see section 1.6) is presented.

4.1. Research Methods

Both qualitative and quantitative research strategy have been adopted to fulfil the research objectives. To fulfil the objective of understanding the history of CFAs of CGP and white onion in Maharashtra; motivations and problems of participation in CFAs, qualitative data was obtained using the focus-group discussion, structured and semi-structured interviews with various stakeholders such as farmers, company staff, input dealers, banking staff, and key informants like progressive farmers and village headman. The schedules had a combination of open ended and close ended questions (section 4.3.3).

Due to time and cost constraints, longitudinal study design could not be adopted for examination of the economics of contract crop cultivation vis-a-vis non-contract cultivation. The thesis adopts cross sectional research design. Under Cross-sectional design, case studies for selected crops in the selected region was built. Case study method is used for exploratory kind of research and to explain some phenomena in an extensive way over a period (Yin, 2014). Using case study method, the functioning of CFAs, farmers' motivation to join and grow under contract and also the problems faced within the same is explained. One of the limitations of cross sectional design is that data about returns and cultivation aspects is for one reference season only. Thus, based on analysis for one season, it cannot be concluded, whether contract cultivation is better off. However, cross-sectional design in combination with case study provides us a good idea of understanding contract farming in reality and fulfilling our objectives.

4.2. Selection of region and crop for thesis

For building the case study, first the state (region) was selected, followed by crop and company for the thesis. Maharashtra state was selected for the survey due to couple of reasons. Firstly, Maharashtra is one of the leading state in horticulture production and agro-industrial in general (GoI, 2011; GoM, 2010). Given the favourable agro-climatic

conditions for agriculture and flourishing CFAs in Maharashtra, thesis on contract farming shall help provide new insights on research questions. Second reason for selecting Maharashtra state, is that, owing to lack of resources, author of the thesis decided to conduct the entire survey by himself. As the author has the domicile of Maharashtra and with the familiarity of the local language, this makes him able enough to conduct the field survey in Maharashtra.

Thesis was confined for vegetable crops, as the contracts for short duration, i.e. for one cropping season. Therefore, and perennial crops like sugarcane and fruit crops were Moreover, thesis is confined to case study of contract farming Maharashtra. In order to address the research questions companies that were conducting contract farming operations, and having substantial amount of farmers i.e., at least 300 As there does not exist any database for list of contract to rely on primary and secondary sources to create a list of farming is carried out in India and in particular Maharashtra

(See Appendix A: List of firms undertaking contract farming). Secondary sources refer to web, print and electronic media, academic and Government publications. Primary sources confined to key informants in the area of agriculture and agribusinesses in academic, corporates, and Government. Also discussions were held with progressive farmers within selected talukas of Pune district. The list created is given in Appendix A. Based on the criteria of being vegetable crops and for which contract farming is being carried out substantially for more than five years in Maharashtra, white onion contract farming carried out by JISL, and CGP contract farming carried out by Pepsico (I) were selected for the thesis. Moreover, both the commodities viz. onion and CGP, chosen for the survey are the short duration vegetable crops, i.e., can be harvested in 100-120 days and 70-85 days respectively.

In light of the research questions, the thesis builds the case study of the CGP contract farming carried out by Pepsico (I) and white onion contract farming carried out by JISL.

4.3. Data Sources

The thesis fulfils the to address the selected the research questions and objectives through the secondary and primary data

4.3.1. Secondary Data

Since the thesis is based on Maharashtra, it is necessary to understand the socio-economic profile of the study area. Thus, data on agro-climatic conditions, socio-economic indicators of the study area have been collected from the Agricultural Census, 2001 and 2011; Economic Survey of Maharashtra of various years and other sources.

To develop case studies of companies carrying out contract farming the information about the history of the CFAs and other necessary information was obtained from Company's Annual Reports, print, and electronic media, and also from firm staff directly.

4.3.2. Primary Data

Primary data comprises of semi-structured interviews of Company's management, Commission agents in APMCs, banking officials, Government officials, hundekari (traders in case of CGP) and input companies involved in the contract farming. In this study, the farmer is the basic unit of analysis. Farmers' were interviewed using structured schedule through field survey (See Appendix B for schedule). Data about socio-economic characteristics, history of contract farming participation and motivation behind it was obtained. Information on contract cultivation aspects and problems faced by them was also elicited. Details of the sample are mentioned in section 4.4. Moreover, the data collected was supplemented by the information collected by interacting with various stakeholders' viz. farmers, contracting firm officials, input making companies and hundekari (trader) of the selected villages as in other nearby villages of the survey.

4.3.3. Data Collection Tools

Initially, an exploratory (pilot) survey was conducted for both white onion and CGP crop in the districts where its CFAs are being carried out. For study design purpose, vital information about the selected contracted crops was extracted through discussions with farmers, traders, banking and contracted firm officials involved. The companies carrying out contract farming were contacted and information was sought on history of

firms' CFAs. Insight was gained about how the companies carried out the CFAs of particular crops and what were the problems encountered. For sampling design, information was extracted from the internal records of the company on a number of farmers under contract, district wise, taluka wise, and village wise.

A pilot survey was conducted to know the ground realities. Whereby, to check the prevalence of contract farmers (CF) and non-contract farmers (NCF) within the villages. During the pilot survey, to seek new insights on the research questions, the semi-structured interviews were held with CF and NCF. NCF farmers comprised of Attritioned Contract Farmers (ACF) and Never Contracted Farmers (NNCF). ACF are also known as formerly contract farmers (i.e., farmers previously in the contract but had grown reference crop without a contract in reference season). NNCF are those farmers who have never grown reference crop in contract with the reference contracting firm. Also, one focus group discussion comprising of farmer participants was held in a village in Khed Taluka of Pune district. Focus group discussion revolved around the questions about contract features, history, participation, non-participation, disadoption, benefits, and problems of contract farming within the villages. The exploratory survey helped to know about the village size; current cropping pattern in the area as well as before advent of contract farming in the region, history of CFAs in the village and necessary details about the same.

Through consultation with the stakeholders, concepts and variables were identified that influence the farmers' behavior regarding participation of contracting. Different concepts generated using literature review, focus group discussion and semi-structured interviews with stakeholders which addressed the research objectives were transformed in to relevant variables of information. Then each variable was translated to clear questions to obtain answers. The schedule had a combination of open and close ended questions. For e.g., open ended questions were asked related to reasons for participation in CFAs, benefits, and problems, etc. faced in CFAs. Whereas as for examining profitability aspects of contract cultivation and non-contract crop cultivation, close ended questions were used. Finally, all the questions were organized in a coherent manner to elicit data from the respondents. These structured schedules were pre-tested from five CF and NCF respondents each per crop. Based on the feedback and experience, structured schedules were finalized for the final interviews. Final schedules are presented in Appendix B. Final interviews were conducted primarily with any adult person within the

household who is the chief decision maker regarding farming activities as well as actively involved in agricultural production. Participation of respondents for the survey was voluntary, with no direct benefits. They were informed that the conversation would be totally confidential and shall be used exclusively for study purpose.

The survey was carried out in two phases. The survey for onion crop was carried out in 2012 with the reference season of Rabi, 2011-12. CGP survey was carried out in early 2013 with the reference season of Kharif, 2012-13. Data on acreage and contracting status were cross verified with the actual database of companies. Similarly on prices in the open market as mentioned by the farmer was cross verified from nearest wholesale APMC market for the particular produce. Record checks were done wherever possible w.r.t inputs usage and costs, output sold and at what rate. This was done by checking the bills, receipts and other records with the farmer, hundekari, and companies.

4.4. Sample Design

For primary data collection, multi-stage sampling was adopted. Where, stratified simple random sample at the farm stage level of selection was used. As the district and village size concentration of contract, farmers are different. The sampling design of both the crops onion and CGP is presented in the sub-sections below:

4.4.1. Onion

It started contract farming on trial basis since 1997-98, but it was mainly started on a large scale from the year 2001-02 with 473 farmers in *Rabi* season, which reached 1926 farmers in 2011-12 (Table 4.1). It also started for contracting for *kharif* onion since 2007-08 onwards. However, a number of farmers and acreage under contract is very less in *kharif* compared to *Rabi* season. Therefore, *Rabi* season was selected, as the reference season for the survey. The number of farmers contracted for *Rabi* season from 2001-02 to 2011-12 is presented in Table 4.1.

It was observed that in the case of white onion, CF was geographically more spread out. As per the JISL officials, CFAs was spread over eight districts viz. Jalgaon, Dhule, Nandurbar, Nashik, Buldhana, Akola and two districts of Madhya Pradesh. All the villages where CFAs is going on lies between 200 km radius of its processing plant located in Jalgaon.

Table 4.1: Number of JISL's onion CF for Rabi season 2001-02 to 2011-12

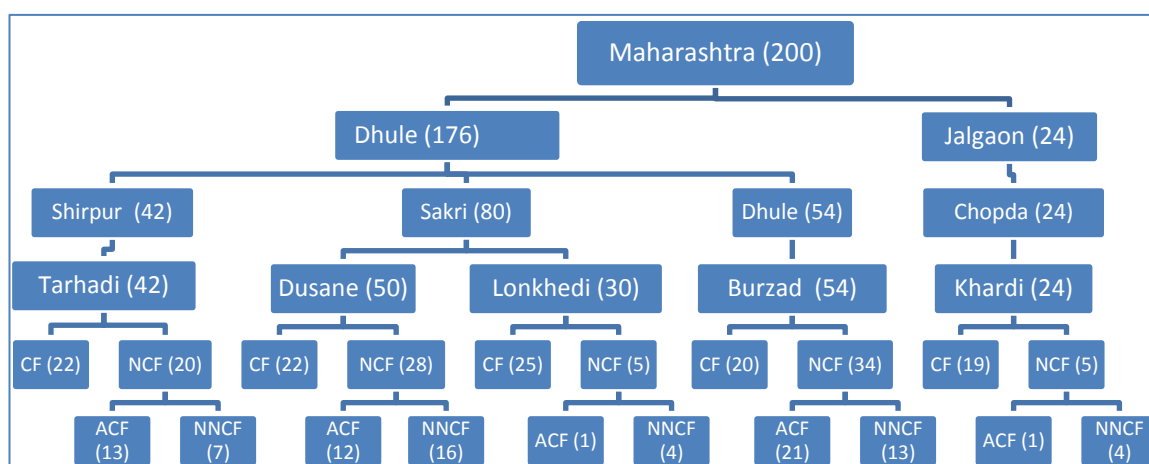
Particular	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
No. of District	4	3	3	6	7	8	8	8	8	8	8
No. of Taluka	10	20	19	22	24	25	26	28	28	25	25
No. of Village	105	105 (0.0)	128 (21.9)	166 (29.7)	198 (19.3)	198 (0.0)	287 (45.0)	340 (18.4)	404 (18.8)	400 (-1.0)	384 (-4.0)
No. of Farmers	473	315 (-33.4)	1028 (226.4)	1288 (25.3)	1267 (-1.6)	1780 (40.5)	1616 (-9.2)	2051 (26.9)	2360 (15.1)	2379 (0.8)	1926 (-19.0)
Total Area (Acres)	437	507 (16.0)	1519 (199.6)	2771 (82.4)	2941 (6.1)	2639 (-10.3)	3470 (31.5)	3562 (2.7)	2613 (-26.6)	2897 (10.8)	3311 (14.3)

Source: Company records

Note: Figures in parenthesis are percentage change over previous year

Initially, owing to the time and labour constraint it was proposed to have a sample of 200 (100 CF and NCF each) for onion and CGP. In the first stage, two districts having a major concentration of CF were selected. As per discussion with JISL, Jalgaon and Dhule combined accounted for around 70% of total CF during Rabi, 2011-12. Thus, these two districts were selected for the survey. It was observed that onion contract crop was well spread out within these two districts, as only seven villages had more than 30 farmers. As survey involved village enumeration for listing of CF and NCF households, to prepare complete sampling frame to facilitate random selection of households for the survey. As some villages consist of more than 500 households and village enumeration takes a considerable amount of time. Thus only those seven villages in these two districts having more than 30 CF were considering for sampling. Of which, two villages belonged to Raver taluka and one in Chopda taluka of Jalgaon district. Within Dhule district, Sakri Taluka had two villages and rest belonged to Shirpur and Dhule Taluka each. It was observed during the pilot survey, the two villages from Raver taluka (Jalgaon district) and also within its neighbouring villages, only JISL 'V12' onion crop variety was grown in Rabi season, and there were hardly any farmers growing table variety onion. One of the objectives of the thesis was to compare the profitability of CF and NCF which, needed a control group. Thus, due to lack of availability of control group, those two villages were dropped, and the rest five villages were selected. Survey focused on the main production zones where the contracting firms procured. The list of villages along with the sample is mentioned in Figure 4.1.

Figure 4.1: Sampling design for onion



Note: Units in parenthesis refer to sample size

Table 4.2: Population and sample of onion households of selected villages

Villages	CF		NCF	
	Population	Sample	Population	Sample
Dusane	32	22	85	28
Lonkhedi	70	25	12	5
Burzad	50	20	62	34
Khardi	36	19	12	5
Tarhadi	61	22	53	20
Total	249	108	224	92

Source: Primary Survey

4.4.2. CGP

CGP cultivation is confined to Kharif season in Maharashtra. PepsiCo (I) had introduced CGP cultivation from 2001-02 in few villages of Ambegaon and Khed Taluka of Pune district as well as in Khatav taluka of Satara district. In the Kharif season (2012-13), PepsiCo (I) had contracted around 1904 farmers. Of which, Pune and Satara districts comprised 43% and 47% of the CF respectively, while the rest 10% belonged to Sangli district (Table 4.3). PepsiCo had started contract farming in 2011-12 in Sangli district. As the proportion of farmers were less in 2012-13 at Sangli district, thus, it was not selected for the survey. Hence, Pune and Satara districts were selected for the survey. In Pune, one village each from Ambegaon and Khed Tehsil, while two villages in Khatav taluka¹⁸ of Satara were selected using PPS (Population Probability to Size) Method. In Satara district, two villages selected (Vanzoli and Mhasurne) through PPS did not have adequate number of NCF growing chip-grade potatoes. Hence, two additional villages

¹⁸ In Satara, CGP cultivation is majorly done in Khatav taluka, hence two villages were selected (Table 4.3).

(Gadewadi and Visapur) nearby within the same taluka having similar agro-climatic conditions were selected. Diagrammatic representation of CGP sampling design is presented in

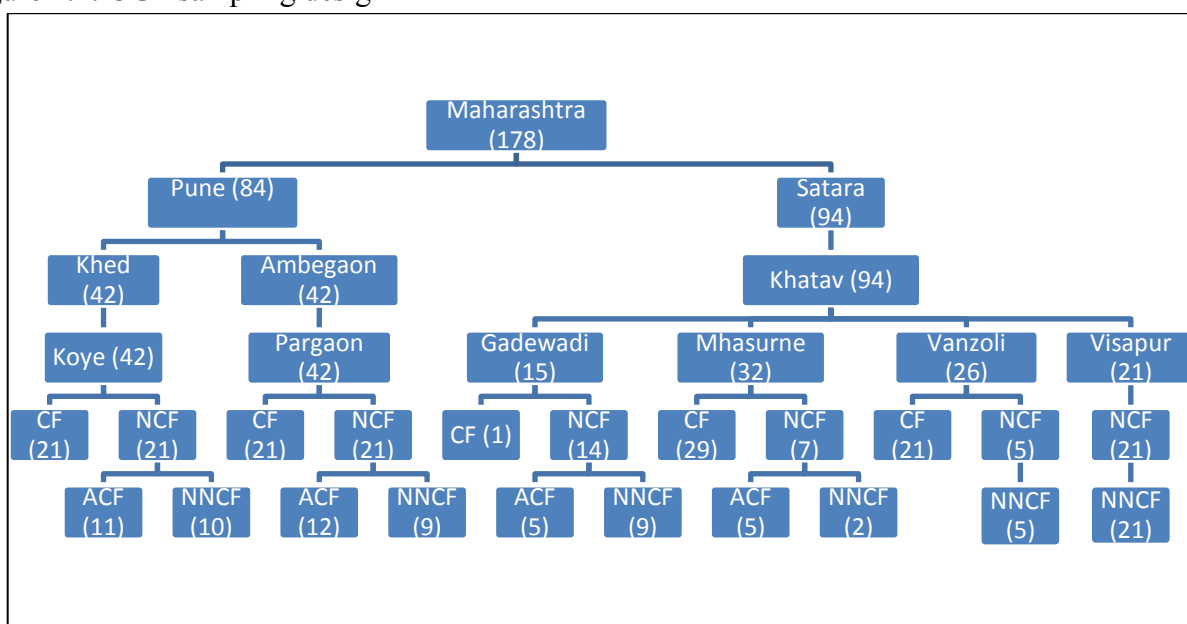
Figure 4.2.

Table 4.3: CGP CF Population district and taluka wise

District	Taluka	No: of CF	% of total
Pune	Ambegaon	412	21.6
	Khed	408	21.4
Satara	Khatav	900	47.3
	Karegaon	4	0.2
Sangli	Kadegaon	170	8.9
	Khanapur	10	0.5
Total		1904	100

Source: Primary survey

Figure 4.2: CGP sampling design



Note: Units in parenthesis refer to sample size

Table 4.4: Population and sample of CGP households of selected villages

District (Province)	Villages	CF		NCF	
		Population	Sample	Population	Sample
Satara	Gadewadi	1	1	28	14
	Visapur	0	0	98	21
	Mhasurme	130	25	14	7
	Vanzoli	98	21	8	5
Pune	Pargaon	114	21	156	21
	Koye	62	21	51	21

Total	405	89	355	89
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Source: Primary Survey

After the villages had been selected for onion and CGP crop survey, census household listing was done for the farming household in the selected villages. The village enumeration involved few basic questions such as the name of the farmer (chief decision maker for carrying out farming activities), whether they grow contract crop CGP/white onion respectively in respective reference season¹⁹. Census house listing would identify three types of farmers:

- a) Household growing contract crop within a contract in the reference season, i.e., CF
- b) Household growing contract crop but not under contract in reference season, i.e., NCF
- c) Household not growing the contracted crop in the reference season

For our study, only the (a) and (b) categories are of importance. Based on census house listing, a list of CF and NCF households for each selected village was prepared. Thus, the village was stratified into CF and NCF. Within each stratum of the village, using systematic, simple random sample method, households were selected for a final interview. For e.g., for CGP in Mhasurne, there were 130 CF (Table 4.3), there was a need to select 25 CF households for the survey. Therefore, a random number was generated from one to five. Suppose that number was 5. Then every fifth household (number 5, 10, 15, and so on as per the list) were selected for the survey.

As each household of respective CF and NCF were numbered. Overall, this selection design generated sample of total 387 farmers, i.e., 108 for CF and 95 for NCF for onion survey, 92 each for CF and NCF for CGP survey. However, after data cleaning²⁰, only 378 respondents were used for the final analysis, which makes a total sample size of 378, i.e., 108 CF and 92 NCF for onion survey and 89 each for CF and NCF for CGP survey. The list of population and sample for onion and CGP survey is presented in

¹⁹ For onion survey, contract crop is “V12” variety whereas, NCF grow any table variety of onion for the reference season, Rabi 2011-12. For CGP survey, contract crop refers to CGP, reference season is Kharif 2012-13.

²⁰ In some cases of CF within CGP survey, it came to know that after after cross-verification that they did not grew CGP under contract. Similarly, in NCF cases, it came to know later that some have mentioned some false responses in relation to production aspects.

Table 4.2 and

Table 4.4.

4.4.3. Limitations of sampling design

One of the limitations of the sample design is that those farmers, who had not grown contract crop in the reference season of that village, were left out of the survey. For e.g., Farmer in Mhasurne, who had grown CGP in 2011-12, but not grew in the Kharif season 2012-13, did not grow CGP. Similarly, the farmer may have grown the onion under contract in Kharif season, but did not grow onion in Rabi season. In onion survey, it was found that many farmers did not grow onion in Rabi season, due to lack of water availability in their fields. Although they did grow onion in Kharif season, but they were excluded from the survey. However, the reason for excluding the farmers who had not grown contract crop in the reference season was that as one of the objectives of the thesis was to examine economic aspects of contract crop vis-à-vis non-contract cultivation. However, through discussions with key informant and stakeholders, an attempt was made to understand their experiences.

Table 4.2 and

Table 4.4 show that disproportionate sampling fraction was used between strata's. The reason being, that one of the objective of the thesis was to examine and compare profitability and economics of contract cultivation vis-à-vis non-contract crop cultivation. Thus, an attempt was made to select the same number of CF and NCF within each village. According to Parten (1950), disproportionate stratified sampling could be used, if the objective of the study is comparing between sub-groups.

4.5. Data analysis method

Data collected from structured schedules was inputted in excel and then exported Statistical Package for Social Science (SPSS) software. For comparing the differences of socio-economics and farm related parameters between CF and NCF, mean and median as central measures of tendency was used. Also to validate statistical significance of differences, non-parametric test Mann-Whitney Test was used, as most of the variables like age, experience, schooling years, landholding, etc. did not follow normal

distribution. Also, profitability analysis was carried out on comparisons of average means of CF and NCF and the differences were tested using independent sample *t*-test.

For understanding the reasons behind farmers joining contract, or leaving or not joining contracts, multiple response analysis options in SPSS was used. To understand the determinants of contract farming participation, logit regression in SPSS was used.

4.6. Concluding remarks

In this chapter, the research and sampling design of the thesis was discussed. Adoption of mixed research method (both qualitative and quantitative research strategy) helped to build a case study of respective crops. Structured schedule at the farm household level was the major data collection instrument. However for building up the case study of both the crops, semi-structured interviews with other stakeholders and focus group discussion was used. In the next chapter, the profile of study area and details of the functioning of onion and CGP contract farming schemes is discussed.

Chapter 5 - Profile of study area, crops and contract farming schemes

In this chapter, the background information on State of Maharashtra and selected districts of study is presented. The history and functioning of JISL's onion contract farming and PepsiCo (I) CGP contract farming schemes are also discussed.

5.1. Maharashtra

The State of Maharashtra is located in the western part of India. It is spread over a total area of 3,07,713 sq.km, and area wise, it is the third largest state in India. With a population of 11.24 crore (Census, 2011), i.e., 9.3% of the total population of India and is the second largest state, regarding population (Table 5.1).

Maharashtra is the industrially leading state in the country, highly urbanised with 45.2% people residing in urban areas. The rural and urban poverty, as well as male and female literacy, along with overall HDI score of 2007-08 of the state is higher compared to national average (Table 5.1). Thus, Maharashtra is economically better off compared to many other states in the country. The proportion of Scheduled Castes (SC) at 11.8% was lower by 4.8 percentage points from the all-India average in 2011 whereas the proportion of Scheduled Tribes (ST) at 9.4% was greater than the all-India average by 0.8 percentage points.

The State has 36 districts which are divided into six revenue divisions' viz. Konkan, Pune, Nashik, Aurangabad, Amravati and Nagpur for administrative purposes. Mumbai, the State capital, is considered the financial and commercial capital of the country (GoM, 2015).

5.1.1. Geographic Profile and Physical Divisions

The state is located between 16° N and 22° N latitudes and 72° E and 80° E longitudes and falls in the western part of India, along with the Arabian Sea. Physical divisions of the State comprise of three parts based on its physical features, viz., Maharashtra Plateau, the Sahyadri range and the Konkan Coastal Strip (GoM, n.d.-c).

Table 5.1: Maharashtra - Socio-economic characteristics

Particulars	unit	Maharashtra	India	Comparison with India
Population (2011)¹				
Total Population	'000	1,12,374	12,10,855	9.3
Proportion of rural population	%	54.8	68.9	
Proportion of urban population	%	45.2	31.1	
Proportion of SC population	%	11.8	16.6	
Percentage of ST population	%	9.4	8.6	
Density	persons/sq.km	365	382	
Sex ratio	Females per 1000 thousand males	929	943	
Decadal growth rate population	%	16	17.7	
Literacy Rate (Total)	%	82.3	73.0	
Literacy Rate, Male	%	88.4	82.1	
Literacy Rate, Female	%	75.9	65.5	
Geographical area (2011)	Lakh sq. km	3.08	32.9	9.4
Agriculture (2011-12)¹				
Net area sown	In '000 ha	17,386	140,801	12.3
Gross cropped area	In '000 ha	23,106	195,246	11.8
All foodgrains (cereals and-pulses) area - Triennium Average (2009-10 to 2011-12)	In '000 ha	11,998	124,253	9.7
Total livestock (2012)	In '000	32,489	5,12,057	6.3
Wheel Tractors (2003)	In '000	106	2,361	4.5
Diesel engines & Electric pumps	In '000	1,174	15,684	7.5
Total forest area (2013)	Sq.km.	61,734	7,71,821	8
State / National Income (2012-13)²				
Per capita income (current prices)	Rs.	1,03,991	67,839	
(GSDP) / (GDP) at factor cost	Rs. Crore	13,23,768	93,88,876	14.1
Share of Agriculture & allied sector in Total GSDP/GDP (current prices)	%	10.9	17.5	
HDI ³		0.572	0.467	
Poverty (2009-10) (Tendulkar Committee Approach)³				
Rural Poverty	%	29.5	33.8	
Urban Poverty	%	18.3	20.9	
Combined Poverty	%	24.5	29.8	

Source:

1: Maharashtra Economic Survey 2014-15

2: Maharashtra Economic Survey 2013-14

3: Maharashtra Human Development Report, 2012

A major portion of the state is semi-arid with three distinct seasons of which the rainy season comprises July to September. There are huge variations in the quantity of rainfall within different parts of the state. Ghat and coastal districts receive an annual rainfall of 2000 mm, but most of the state lies in the rain shadow belt of the ghat with an average of 600 to 700 mm. The rainfall variations from 500 to 5000 mm have been recorded with an average of 1000 mm distributed over 60-70 days.

As per National Agricultural Research Project of Indian Council for Agricultural Research, the state has been divided into nine agro-climatic zones based on rainfall, soil type and the vegetation as mentioned below and in Figure 5.1. More details on these can be accessed from GoM (n.d.-c)

- a) South Konkan Coastal Zone: Very high rainfall zone with laterite soils
- b) North Konkan Coastal Zone: Very high rainfall zone with non lateritic soils
- c) Western Ghat Zone
- d) Transition Zone – 1
- e) Transition Zone – 2: Western Maharashtra Plain Zone
- f) Scarcity Zone
- g) Assured Rainfall Zone
- h) Moderate Rainfall Zone
- i) Eastern Vidarbha Zone - High Rainfall Zone with soils derived from parent material of different crops.

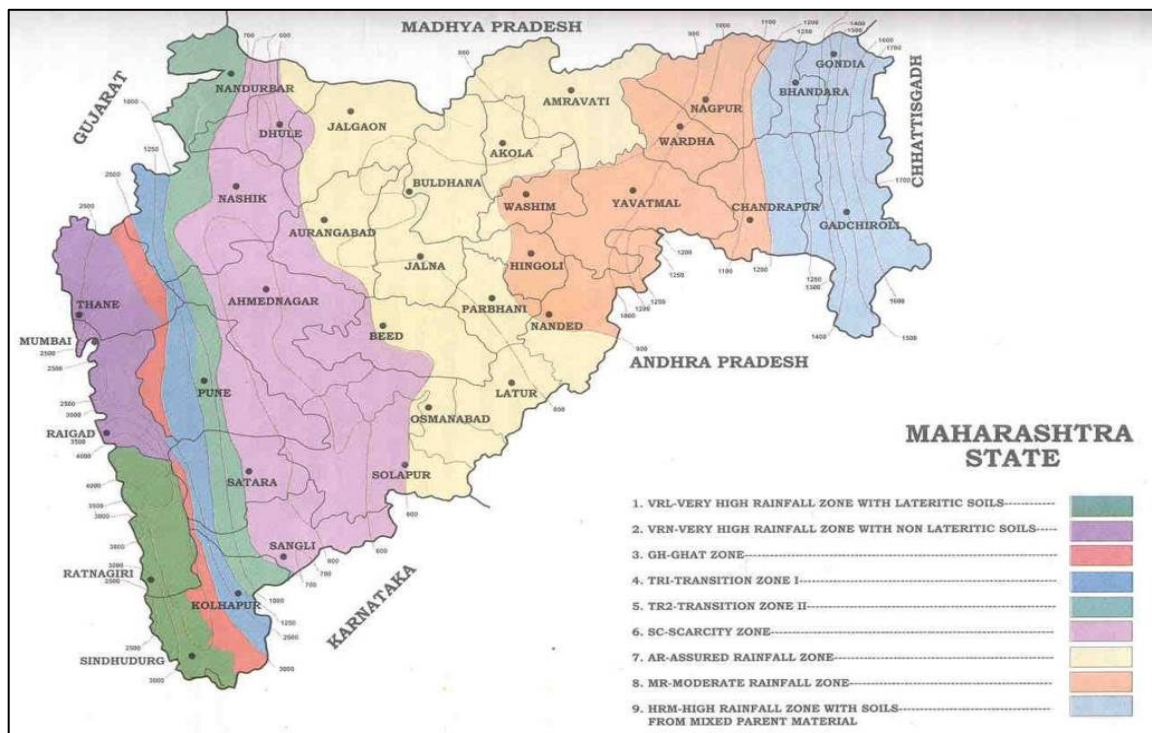
5.1.2. Agricultural Economy

Although Maharashtra is largely an industrial state, agriculture sector remains the mainstay of the state. The share of Agriculture and allied sector in employment was 52.7% as per Census 2011. However, its share in total Gross State Domestic Product (GSDP) at current prices for 2013-14 was 11.3% (GoM, 2015b). The state of Maharashtra accounted for 12.3% of India's net sown area (NSA) and 11.8% of gross cropped area respectively in 2011-12. Total foodgrains (cereals and pulses) area for T. E. 2011-12 was 9.7% of India. Of which, Jowar and Bajra acreage accounted for 53.5% and 10.7% respectively of the national acreage (GoM, 2015b). The principal crops grown in Maharashtra include jowar, bajra, wheat and pulses, and several oilseeds, including groundnut, sunflower, and soybean. The cash crops cultivated in the state include

groundnut, cotton, sugarcane, turmeric, and tobacco (Shah, 2013). Within Maharashtra, cash crops, cotton, and sugarcane accounted for 34.3% and 21.5% respectively of the National acreage. The horticulture sector has made fast progress in the state, and the major horticultural crops cultivated in the state are, grapes, banana, mango, oranges, onion and a host of other aromatic and medicinal plants (Shah, pp. 3-4). The state also accounted for 6.3% of total livestock and 11% of total poultry population in 2012 (Table 5.1). Maharashtra ranked second and third in fruit and flower (cut) production respectively in the country during 2012-13 (GoI, 2014). Thus, overall, coarse cereals, pulses, horticulture, and animal husbandry are major pillars of Maharashtra agriculture. However, the productivity of major cereals and cash crop such as cotton is below the national average (Table 5.3). One of the reasons for low productivity is due to the low and unstable irrigation base in the state (Shah, p. 4). Moreover, about 75% of the cultivated land in the State is monsoon dependent (GoM, 2015b).

In 2010-11, the NSA of 17.4 million hectares (ha) in Maharashtra was distributed among nearly 13.6 million farm holdings with an average size of the holding of 1.44 ha (GoM, 2014). The number of holdings, operated area and the average size of holdings as per size groups is presented in Table 5.2. Agriculture in Maharashtra is dominated by small holders as 79% of holdings belonged to marginal and small farm category.

Figure 5.1: Map of Agro climatic zones of Maharashtra



Source: (GoM, n.d.-c)

Table 5.2: Number of holdings, operated area and average size of holdings as per size groups, 2010-11

Size category	% of no. of holdings as per size (total no. of holding = 13,698)	Operated area (in '000' ha)	Average size of holding (in ha)
Marginal (0-1.0 ha)	49.0	3186	0.47
Small (1.0-2.0 ha)	29.6	5739	1.42
Semi-Medium (2.0-4.0 ha)	15.8	5765	2.67
Medium (4.0 – 10.0 ha)	5.2	3993	5.62
Large (more than 10.0 ha)	0.5	1084	15.94
All Sizes	100.0	19767	1.44

Source: (GoM, 2014b)

Table 5.3: Average yields of major crops (Triennium Ending 2011-12)

Crops	Maharashtra	India
Total Cereals	1,298	2,249
Total Pulses	721	673
Total foodgrains	1,126	1,935
Cotton	316	465
Sugarcane	85	71

Source: GoM, 2015b

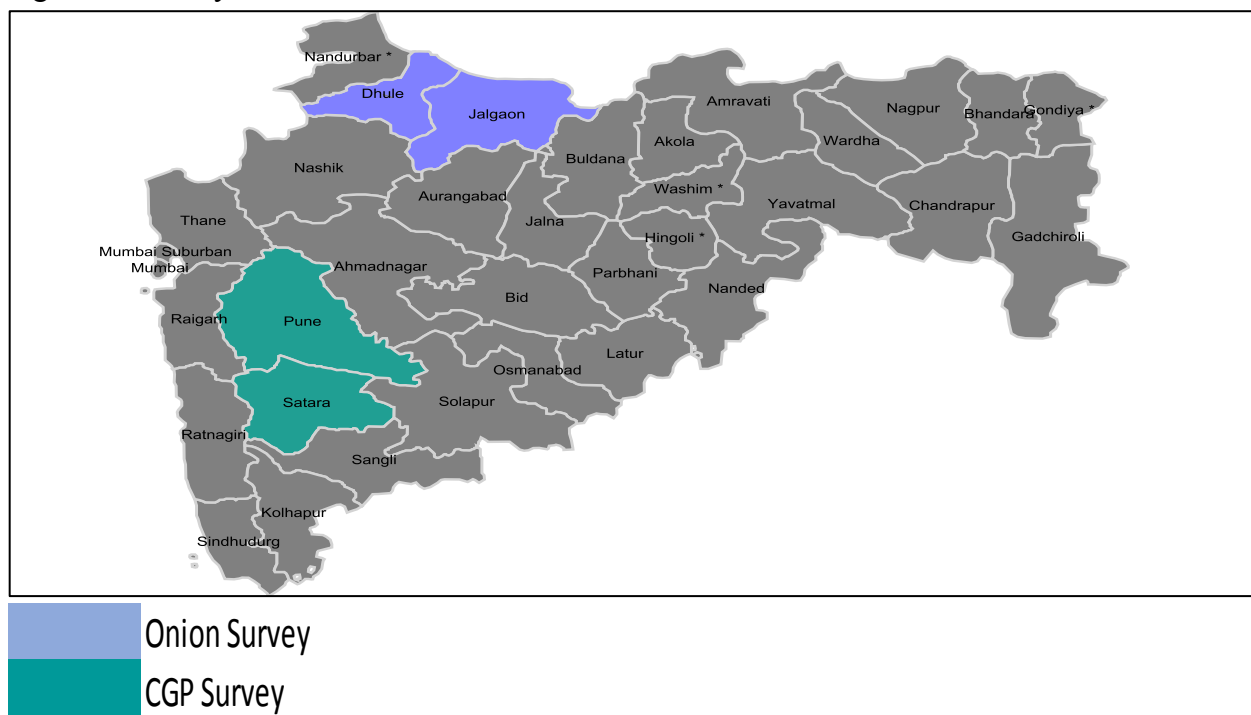
5.2. Profile of selected districts

The geographical area of this study includes four districts of Maharashtra viz. Pune, Satara for CGP survey and Jalgaon and Dhule for onion survey (Figure 5.2).

5.2.1. Jalgaon and Dhule District

Jalgaon and Dhule District are located in the north-west region of the state of Maharashtra. This region is bounded by Satpuda mountain ranges in the north, Ajanta mountain ranges in the south. Jalgaon is rich in volcanic soil which is well suited for cotton production. Jalgaon district is divided into 15 talukas with total 1,519 villages with a total population of 42.24 lakhs in 2011. Whereas Dhule district is divided into four talukas with total 678 villages, with a total population of 42.24 lakhs in 2011 (Table 5.4). Jalgaon has higher literacy rate and Percapita Net District Domestic Product (PCNDDP), higher HDI score compared to Dhule district in 2011 (Table 5.4). Also, the proportion of SC and ST of the total population in Jalgaon is 24.1% compared to 37.8% in Dhule. Agriculture is the basic profession of the population in the Jalgaon and Dhule District (Census of India, 2011).

Figure 5.2: Study area



Source: CensusInfo India 2011 Software

A major portion of Jalgaon and Dhule district fall under scarcity and assured rainfall zone. The major portion of both the district is situated in the Tapi basin. Both the districts have similar kinds of the soil profile, i.e., light to medium soils and fertile medium to heavy soils, respectively including black cotton soil. However, the percentage of the black cotton soil of the total cultivable area is higher in Jalgaon compared to Dhule (GoM, 2015a) (GoM, n.d.-d). As per the land utilization pattern of the district, Jalgaon district has 8.52 lakh ha of cultivable area and the surface & well irrigation area is up to 2.94 lakh ha. i.e. 17.8% of total cropped area (GoM, n.d.-d). Whereas, for Dhule district, out of the total cultivated area of 4.64 lakh ha, nine per cent area is under gross irrigation (GoM, 2015a). The low percent of gross irrigation in Dhule district is one of the reasons for low cropping intensity within the district (Table 5.5). As per Agriculture Census 2010-11, the landholding pattern was similar across both the districts with an average size of operational holding being 1.8 ha (Table 5.5).

Jalgaon is a major business centre for tea, gold, pulses, cotton and bananas. Whereas Dhule district is known for milk and milk products. Banana and cotton are Jalgaon's main crops, as 4 lakh ha area is under cotton and 46,074 ha area are under Banana crop (2007-08). Jalgaon district is known for its advances in horticulture. Its

production of bananas and cotton, especially by resorting to drip irrigation, has created a role model for cultivators in other parts of India. Cropping pattern of both Jalgaon and Dhule districts are similar. Major crops cultivated in Kharif season in both the districts are jowar, bajra, maize, green gram, black gram, tur, soyabean, sesame, groundnut and cash crops like cotton and sugarcane. In Rabi season major crops cultivated are wheat, gram, jowar, safflower in both the Districts. Brinjal and okra are main vegetable crops of Jalgaon district, whereas in Dhule district in addition to the onion and chilli are widely grown (GoM, n.d.-d; 2015a).

Table 5.4: Selected indicators of survey districts (2011)

Particulars	Onion survey		CGP Survey	
	Jalgaon	Dhule	Pune	Satara
Total talukas	15	4	14	11
Total villages	1,519	678	1,877	1,739
Total population	42,24,442	20,50,862	94,29,408	30,03,741
Area sq. km	11,765	7,195	15,643	10,480
Density(persons/sq. km)	359	285	603	287
Proportion of rural population (%)	68.3	72.2	39.0	81.0
Proportion of SC (%)	9.2	6.2	12.5	10.8
Proportion of ST (%)	14.9	31.6	3.7	1.0
Total Literacy Rate (%)	78.2	72.8	86.2	82.9
Cultivators (% of workforce)	20.6	25.5	21.9	43.2
Agricultural laborers (% of workforce)	50.2	45.9	10.2	21.9
Percapita Net District Domestic Product (Current Prices in Rs.)	75,956	66,140	1,40,570	80,671
HDI score	0.72	0.67	0.81	0.74
HDI Rank within Maharashtra	14	25	2	10

Source: GoI, 2011, YASHADA (2014), (GoM, 2013), District Census Handbook, 2011 of respective survey districts

5.2.2. Pune and Satara District

Pune and Satara are the adjoining districts and are located in the western part of Maharashtra (Figure 5.2). Pune is geographically the second largest district in the state with a geographical area of 15,683 sq. km. Pune district is divided into the 14 talukas with total 1,877 villages with a total population of 94.29 lakhs in 2011. Satara district has a geographical area of 10,480 sq. km. and is divided into 11 talukas with total 1,739 villages, with a total population of 30.04 lakhs in 2011 (Table 5.4). Pune has higher literacy rate and PCNDDP, higher HDI score compared to Satara district in 2011 (Table 5.4). Also, the proportion of SC and ST of the total population in Pune is 16.2% compared to 11.8% in Satara. Around 70% of the workforce in Satara district is engaged

in agriculture compared to 32% in Pune district. One of the reasons for this is that Pune is more urbanised compared to Satara (Table 5.4).

Table 5.5: Survey districts agricultural profile

Particulars	Onion survey		CGP Survey	
	Jalgaon	Dhule	Pune	Satara
Geographical location	Between 20° and 21° North latitudes and 74° 55' to 76° 28' East longitudes	Between 20° 38' to 21° 61' North Latitude and 73° 50' to 75° 11' East Longitude	Between 17°54' and 19°24' North latitude and 73°19' and 75°10' East longitude	Between 17° 5' to 18°11' North latitudes and 73°33' to 74°55' East longitudes
Agro Climatic Zone (NARP)	Western Maharashtra Scarcity Zone (MH-6)	Western Maharashtra Scarcity Zone (MH-6); part of Shirpur Taluka under assured rainfall zone; part of Sakri taluka under Western zone	Eastern part: Western Maharashtra Plain Zone; Some part: Western Ghat Zone; some part: Scarcity zone, some part: Sub-mountain zone	Southern & Eastern part: Scarcity zone; Central part: Plain Zone; Western Part: Sub-Mountain zone
Normal rainfall(mm),2012	756	612	915	1033
Cultivable area ('000 ha)	852.5	464.8	945.4	799.4
Forest area ('000 ha)	155.5	208.8	165.1	13.5
Net sown area ('000 ha)	844.2	431.0	945	580.4
Gross crop area ('000 ha)	1324.8	464.0	1148.0	799.4
Cropping intensity (%)	156.9	107.7	121.0	128.4
Avg. yield all food grains (ha/kg), 2012-13	1,498	1,352	945	976
Avg. size of operational holding (ha), 2010-11	1.8	1.8	1.4	0.7
Small & marginal (0-2 ha) (%)	71.8	69.9	80.6	93.0
Medium (2-4 ha) (%)	20.3	20.3	13.8	5.3
Large (>4 ha) (%)	7.8	9.8	5.6	1.7

Source: (GoI, 2011a) (GoI, 2011b) (GoI, 2011c) (GoI, 2011d); (GoM, 2013)

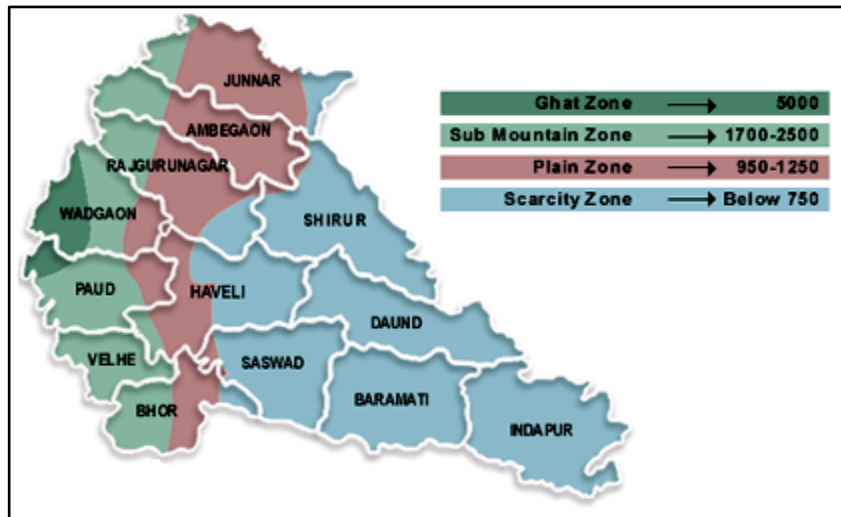
Note: Cultivable area, NSA, GCA are as per Land Utilisation Statistics 2005-2006; Percentage of holding category wise are from Agriculture Census Maharashtra, 2010-11

Pune district is divided into four agro-climatic zones as described in Table 5.5 and Figure 5.3. A major portion of Pune and Satara district fall under scarcity and assured rainfall zone. CGP contract farming is carried out in Ambegaon and Khed taluka. The areas where CGP farming is done lies mostly in assured rainfall zone. Whereas Khatav

taluka of Satara where CGP farming is mostly done is a drought prone taluka (GoM, n.d.-b, p. 35)

As per Agriculture Census 2010-11, the average size of operational holding was 1.4 ha and 0.7 ha for Pune and Satara respectively. The proportion of small and marginal farmers is 93% in Satara compared to 80% in Pune district (Table 5.5). Pune district has 26.4% of NSA irrigated (GoM, n.d.-a). Similarly, over 73% of cropped area is cultivated under rainfed condition in the Satara district. As stated in Comprehensive District Agricultural Plan (CDAP) of Pune district (2012-17), Ambegaon and Khed taluka have the cropping intensity of 123% and 108% respectively. Overall, the cropping intensity of Pune district is 118%. As stated in CDAP of Satara district (2012-17), Khatav taluka have the cropping intensity of 125%, and overall it is 128% for Satara district.

Figure 5.3: Agro-climatic zones of Pune district



Source: (GoM, n.d.-a)

The maximum area of Pune and Satara district is categorized as scarcity zone, and agriculture is dependent mainly on monsoons. In Pune, Rabi is the dominant season, while in Satara, it is the Kharif. In Pune and Satara, foodgrains were the dominantly grown which contributed 37.9% and 52.1% of total cropped area in 2012-13 (GoM, 2013). Jowar and bajra are the major food crops of both the district. Baring Jowar, bajra, and gram the yield of other cereals and pulses are lower compared to State average (GoM, n.d.-a, p. 54). Similarly, in Satara, baring sugarcane, yields of all other crops are lower compared to State average (GoM, n.d.-b, p. 66). One of the reasons for the yield gaps in both the districts cited by the respective CDAP, 2012-17, is the adoption gaps of

the technology. One of the major reason for this is the lack of awareness of the seed treatment and soil analysis (GoM, n.d.-b); (GoM, n.d.-a).

5.3. Onion contract farming

In this section, the profile of onion crops and in detail how the contract farming is carried out in the region is discussed.

5.3.1. Onion Crop profile

Onion (botanical name: *Allium cepa*) is one of the most important vegetable crop extensively grown throughout India (Supe, Marbhal, & Patil, 2008). Onion is the second largest vegetable (next to potato) grown (12 lakhs ha) and produced (194 lakhs Metric Tonnes [MT]) in India for the period 2013-14 (GoI, 2015). India ranks first area-wise and second- in onion production in the world (GoI, 2015, p. 255). Indian onions are famous for their pungency and are available round the year. Besides, being usage in a salad, it is a culinary ingredient which adds taste and flavour to food preparations. Indian onions have two crop cycles, first harvesting starts in November to January and the second harvesting from January to May (APEDA, n.d.). Onion is an extremely important vegetable crop not only for internal consumption but also as highest foreign exchange earner among the fruits and vegetables. The export of onion during 2013 -14 was 14.8 lakhs MT with a value of Rs. 3,169.6 crores (GoI, 2015, p. 217).

Maharashtra is the largest onion producing state, with the share of 33% in total onion cultivation area and 30% of total onion production for the T.E. 2013-14 (GoI, 2015). Onion is an important commercial cash crop of Maharashtra and is grown in most of the districts. Districts of Nashik, Pune, Satara, Ahmednagar, Dhule and Solapur are the major onion producing regions (Barakade & Lokhande, 2011).

The onion is cool season crop, tolerant to frost in the young stage but less sensitive to heat. It is well adapted to a temperature range of 13-25° C. Onion thrives well in places, which receive an average rainfall of 750-1000 mm during monsoon. Onions can be grown on all types of soil such as sandy loam, silt loam, and heavy clay soils. (National Horticulture Board, n.d.).

Predominantly, onion is a Rabi season crop in India (Supe et al. 2008). However in survey districts of Maharashtra, onion cultivation is undertaken in kharif, late kharif and Rabi season. For the kharif season, the transplanting of 6-7 weeks old seedlings is done

in between 20th July and 31st August for kharif crop, whereas 7-9 weeks old seedlings during October - November for late kharif (rangda) crop and December-January for rabi crop. The kharif crop is red onion while white onion and rangda onion²¹ are grown in late kharif-Rabi season. In Dhule district, white onion is also grown in kharif season. The white onions are grown on a commercial scale in few districts of Maharashtra and Gujarat. These white onions are suitable for dehydration compared to red onions due to high TSS in some hybrids, low moisture content, high pungency, and longer shelf life (Bajaj, Kaur, Singh, & Gill, 1980; (Jains, n.d.-b, p. 2).

5.3.2. Profile of Jain Irrigation and its contract farming operations

JISL is involved in contracting of white onion in Maharashtra. It is a multi-national company with activities extended into many hi-tech agro-related ventures. JISL derived its name from pioneering work it did for the micro-irrigation industry in India (Jains, n.d.-a, p. 4). JISL is the world's largest manufacturer of micro-irrigation systems (MIS) and plastic sheets and pipes. JISL also produces several other products including vegetable and fruit-based food products. The company is the world's largest producer of mango pulp, puree, and concentrate, and the second largest producer of dehydrated onions, which are used in dry soup mixes, pizza toppings, sauces, and other products. JISL's headquarters are located in Jalgaon in the western state of Maharashtra in India. Dehydrated onions are processed at JISL's Agri Food Park in Jain Valley, Jalgaon. (Larson, Richter, Birner, & Selvendiran, 2010, p. 3).

JISL sells its dehydrated onions under the brand name "Farm Fresh." They have set up two 100% export oriented units, one in Jalgaon with a capacity of 300 MT per day and the other one at Baroda with a capacity of 120 MT/day. JISL had set up its onion and vegetable dehydration plant in Jalgaon in 1997. JISL onion dehydration unit in Jalgaon is largest in Asia and second largest in the world (Jains, 2014). In 2006-07, 57,300 MT of white onions (both during Kharif and Rabi seasons) were dehydrated with a total dehydrated onion (DHO) production of 8,500 MT (Punjabi, 2008, p. 5).

Although JISL started contract farming on trial basis since 1997-98, it mainly started on a large scale from the year 2001-02 with 473 farmers (437 acres). This increased to 1926 farmers (3311 acres) for Rabi season in 2011-12. The number of

²¹ Rangda onion is light in color.

farmers contracted for Rabi season from 2001-02 to 2011-12 is presented in Table 4.1 (p. 57).

The white onion varieties grown by farmers in the state have low TSS (less than 13%). For onion dehydration, JISL needed onions which had higher TSS (greater than 17%). Therefore, JISL's Research and Development (R&D) team through its research and trials for seven years developed 'JV12' also known as "V12" among farmers, a high solid processing variety of onion (Kulkarni, 2011). JV-12 which comes from Spiti region of Himachal Pradesh and is not available in the market. It is short day variety; the white bulbs are small to medium, thick, flat, pungent, firm with long shelf. V12 white onion variety is used for cultivation in Rabi season. JISL also developed variety named JISL-5, conducive to be grown in Kharif season. JISL-5 is being cultivated for contract farming since 2007-08 Kharif season. However, a number of farmers and acreage under contract is less in kharif compared to Rabi season. One of the reasons for the higher number of farmers and acreage under Rabi season is that the price received for onion growers in the market during Rabi harvest is low compared to the prices received for kharif harvest.

There is no legal contract involved in this buyback arrangement. The company relies totally on their relationship, trust, and social peer pressure for contract compliance. JISL officials call their engagement with farmers as "contact farming" rather than contract farming. It is a concept where "there is a mutual understanding between the farmer and the company to grow onion." JISL has a strong history of working with farmers as irrigation and input suppliers. Thus, there seems to be trust among farmers on JISL (Punjabi, 2008, p. 13).

5.3.2.1. Selection of Villages and Farmers

It is important to understand how do some villages get selected while some do not participate in this value chain? Based on its demand, the crop profile, the transportation costs associated with the sale of output to factory's plant, Company fixed the area which is not more than 200 kms circumference from its factory plant for selection of villages. Based on the expertise of its supervisory staff, the villages having suitable agro-climatic regions²² and irrigation facilities were shortlisted. Due to the nature of the crop, protective irrigation is important so that there is no crop failure due to lack of availability of water. Initially, the company held meetings with farmers in the selected villages. Then

²² Water availability, soil, and temperature in that region must conducive to onion cultivation.

after the successful result of farmers, the nearby villages' farmers automatically joined, and thus it started spreading to other villages. The number of villages to be selected or developed depended on the raw material requirement for the contracting firm. Company's supervisors get the seeds sale & procurement targets. Based on which, supervisors decide to increase the villages or not. Thus, the acreage and contract farmers are depended on the demand for the final product.

It was observed that the company did not have any selection biases for farmers (whether small or large). Whichever farmer is having irrigation facilities and was prepared to grow onion was welcomed to take seeds for cultivation with an understanding of selling it back to the firm. The only exception is that the farmers who had not honoured the contract, by side-selling the contracted produce in the open market earlier. Other consideration was to have non-political farmers, which do not create a nuisance for others.

Apart from the relationship, firm tries to create the peer pressure for farmers not breaching the contract. For e.g. If any farmer defaults on giving the output to the company. Company backlists the farmer from next season for contracting. In case if most of the farmers have sold the contracted produce outside, then firm had even banned the village by not offering its seeds to any of its farmers. For e.g., Company had banned Adavat village (Chopda taluka, Jalgaon) because farmers had sold elsewhere when the price in the alternate market was trading high.

Company's presence is more dominated in the areas where red onion is grown and not where white onion is grown. It was observed that JISL contract farming was not much prevalent in the traditional white onion growing regions of Dhule district. The reason, being that there is a greater tendency of mixing of traditional white variety onion with firm's hybrid variety in case of a higher price in CF. Similarly, the village like Adavat, which are traditionally onion growing region in Chopda Taluka and has a sub-yard market, there farmers prefer to grow without a market.

5.3.2.2. Functioning of contract farming scheme

After the selection of the villages, company has stationed, its field staff named as "Jain Gram Sevak." Jain Gram Sevak is an agricultural graduate or holds a diploma in agronomy. They work as extension staff to monitor the production with the farmers in their contract area. One Jain Gram Sevak manages about 50-70 acres or 50-60 farmers.

At the start of the season, farmers have to report to the Jain Sevak in the respective village of how much quantity of seeds they need. Jain Sevak will register his requirement and give the seeds accordingly. Seeds are available as per the packing i.e. 4 kg or 5kg. For sowing onion seedlings in one acre, around three kg seeds are needed. It was observed that there were farmers who had taken one bag of five kg seeds and shared the half of it with another farmer. Therefore, small farmers who want to grow Jain onion in less than one acre can grow. Till 2011-12, farmers were delivered seeds by making part payment, and the rest was deducted after payment of final output. While in *Kharif* and *Rabi* season in 2012, the company delivered the seeds to the farmer on its full payment. However, the cost of V12 seeds was Rs. 700 per kg for the Rabi, 2012-13 season. Jain Sevak monitors the production process throughout the season and later makes arrangement for the procurement of the output. The pricing policy of the firm is discussed in detail in Section 1. After the produce reaches the firm's plant, within a week, the farmer is issued a cheque and receipt of sales details.

5.3.2.3. Inputs and services provided by contract farming:

Some of the services provided by the firms are mentioned as under:

a) Agronomical guidance:

Jain Sevaks reside within the village itself where they are stationed and are provided motorcycle, camera, and mobile for easy communication with higher authorities and receive timely feedback and assistance. The Jain Sevak is always available on a call and moreover visits the farm once or twice every 15 days and guides the farmer on good agriculture practices regarding techniques of sowing and harvesting, which kind of sprays to be used, when to use and in what proportion. It was observed during the field survey, that Jain Sevak personally supervises sowing and transplanting process. Almost all onion CF (98.3%) had mentioned that Jain sevak frequently visits the farms to oversee the crop production. Jain Sevak maintains a register in which all the details on sowing dates, acreage, quantities of various inputs (fertilizers, pesticides, etc.) applied to contract crop for each every farmer is noted. JISL also organises “Farmers’ meet” to discuss farm-level problems and suggest remedial measures. JISL has published booklets in the Marathi language for farmers on an improved method of onion cultivation. Around half of the sample, farmers had confirmed that they attended the training workshops organised by JISL. More than one-third of sample farmers had

mentioned that company had done soil testing on their farm and had suggested the necessary fertilizers required.

The intense monitoring by Jain Sevaks serves a dual purpose; first farmers get good yield and firm gets good quality produce and secondly continuous interaction of field official and farmer helps in building trust between farmer and firm. It was common to see farmer approaching the Jain Sevak for advice for other crops as well. Moreover, such kind of trust is needed to create that environment in which farmer does not “side-sells” the contracted crop.

b) Other inputs and transportation

Apart from the seeds, Company also provides bio-fertilizer on credit, which is optional. Farmers are provided free gunny bags for packing the output. As a farmer would find difficulty in finding a transporter to take the produce to company’s plant, as these truck may have to wait for a long time at JISL’s plant. Thus, company’s employee makes the transport arrangements. The transport charges are paid by the company but these charges are deducted later from the sale proceeds of the farmer.

c) Technology transfer

Firm’s policy is to get good yields and reduce farmers’ production risks. Hence it encourages the farmer to go in for modern technology (drip & sprinkler). The firm provides direct credit to farmers for buying MIS. It does all the paper-work formalities to get the subsidies for irrigation wherever applicable. The farmer needs to pay just 25-50% in advance while rest is recovered directly from the value of the produce. Jain Sevak facilitates the installation process at the field. In 2011-12, 28% of the onion CF had taken JISL assistance for adopting MIS.

With the shortage of labour faced by farmers during transplanting season JISL’s R&D team have developed a new equipment for the farmer, which can directly sow onion on the field through Bullock (See Figure 5.4). Direct plantation helps in tremendous reduction in farmers’ labour costs. The company initially started giving this equipment for free to farmers for usage. But currently, with the increasing demand among farmers, this equipment is being sold to every progressive farmer in the village who further lends it to other farmers in the village at the normal custom hiring charges.

Figure 5.4: Farmer using improvised farm equipment for sowing onion seeds



Source: (JISL, 2014)

d) Opening Bank Accounts/financial inclusion

JISL also has a Co-operative bank in which all the contract farmers' accounts are opened. Jain employee does all the necessary work to open the farmers' bank accounts. The payment of output procured is made by cheque within 15-30 days after the procurement. Thus with opening of bank accounts and being used by farmers, which aids the process of financial inclusion.

e) Jain GAP

The firm developed its 'JAIN GAP (Good Agricultural Practices)' standard based on diagnostics carried out in association with International Finance Corporation (IFC) team in July 2008. JAIN-GAP is a certification based on and recognized by GLOBAL GAP. Its objective is to ensure that the farmers utilize the prescribed good agricultural practices for sustainable productivity enhancement. JISL implemented JAINGAP to promote traceability, food safety, worker welfare, hygiene, sanitation, environmental conservation, biodiversity protection and natural resource preservation. Some 5,427 acres were brought under JAINGAP coverage, covering 1,000 onion farmers in FY2012-13 (JISL, 2014). Communication to the farmers regarding GAP is done through suitable channels like i) Village level campaigns- in order to access the farmers in interior places, firm carry out systematic village to village campaign by firm's agri-experts where farmers are given briefings on MIS and high-tech agriculture; ii) Video films; iii) One to

one communication by visiting field engineers and agronomists; iv) hoardings and exhibitions, etc. Company employee maintains the necessary database required to comply with the standards. JAINGAP farmers have reported that they were given the training, a separate box to give pesticides, uniform, and gloves while spraying of fungicides, pesticides, weedicides, etc.

5.3.2.4. Pricing Policy in onion contract farming

Pricing policy under CFAs plays an important role in the success of contract farming. The firm follows a flexible pricing method. Firm announces the minimum guaranteed price (MGP) at the start of the season. As price volatility in onion market is high, thus firm readjusts its offer price from day to day basis at the time of harvest. It takes the average of the average daily prices of white onion in Jalgaon and Dhule APMC market together (adjusting for all the additional marketing and transportation costs incurred if produce were taken to nearby APMC Market.) The daily offer prices are communicated to the farmer through its Jain sevak who receives the SMS from day-to-day basis during the harvest season. This reassures the farmer that firm would pay as per the market price whenever it is above MGP. Such policy has been effective in continuing of the relations between farmer and firm. Interactions with farmer did suggest that company offer price had been in tune with the prevailing market prices except in December 2010, when market price touched Rs. 4000 per quintal in Jalgaon APMC and firm's offer price was Rs. 2700, this had led to resentment among certain farmers (Miglani & Kalamkar, 2012).

Farmers are communicated well from beginning that firm will not procure onions which are of very small size. This makes farmer work hard to take good care of crop. Company tries its best through its extension services and pricing policy that farm produces onion of good size and quality. As onion crop is dependent highly on temperature and water availability and even one irrigation missed shall affect the growth of onion bulbs. As climatic conditions and power availability are out of control for farmers; the company does take those things into account and procures produce of marginally small size also. However, the company does cutting of 2.5% over the total quantity procured and pays the farmer for 97.5% of the total tonnage of produce at a constant rate. This is because there is an understanding out of the total produce around 2.5-5% or more of produce is of small size. Only in rarest of rare case, if the total

produce sent by the farmer is of very tiny size, then company refuse to purchase and send back the truck to the farmer. Farmer is free to sell that produce in the open market. Also, the presence of company employee at the field during filling onions in gunny bags prohibits the mixing of traditional white onion with firms' onion (Miglani & Kalamkar, 2012).

5.4. Chip-grade potato contract farming

In this section, the profile of CGP and in detail how the contract farming is carried out in the region is discussed.

5.4.1. CGP crop profile

Potato (*Solanum tuberosum* L.) is popularly known as 'The king of vegetables,' has emerged as a fourth most important food crop in India after rice, wheat and maize. Indian vegetable basket is incomplete without Potato. Generally, potato crop is raised in India when maximum temperatures are below 35°C and minimum temperatures below 20°C, with ideal tuberization temperature between 16-22°C. The potato crop is grown throughout India in varied soil types and under varying environmental conditions. Potatoes can be grown in alluvial, hill, black, red and laterite soils having pH in the range of 5.5-8.0. Well-drained coarse or sandy loam to loamy soils, rich in organic matter are also ideal for potato cultivation. Such soils ensure availability of sufficient oxygen for the growth of roots, stolons, and tubers, retain moisture and are helpful for drainage of excess water that allows production of beautiful tubers (Pandey, 2007).

Chip-grade potatoes are kind of potato varieties that contain low sugars (< 0.1% on a fresh weight basis) and high dry-matter content (>20%) for the preparation of specific value-added products like chips, french fries, cubes and other dehydrated products (Pandey, 2007). If the dry matter or solid content of the tuber is low, product recovery would be less; production cost would rise because of more consumption of energy, time and cooking oil, and the product will have shorter shelf life, inferior texture and poor taste (Pandey, Marwaha, Kumar, & Singh, 2009). Some of the potato processing varieties released by Central Potato Research Institute are Kufri Chipsona I, Kufri Chipsona II, Kufri Chipsona III, Kufri Surya and Kufri Himsona. However, these varieties are grown extensively in North-western plains of India (Minhas, et al., 2006; Pandey, 2007). There are few CGP heat and drought resistant varieties.

Potato processing is an important part of Indian agro-processing industry and has shown exceptional growth in recent years (Rana, 2011). The demand for processed potato products like chips, french fries, flakes, etc., is increasing continuously in the past decade mainly due to improved living standard, increased urbanization, preference for fast foods, rise in per capita income, increase in the number of working women preferring ready-cooked food and an expanding tourist trade (Pandey et al., 2009, p. 2). With this, there is an increased demand for processing variety potatoes among the potato processing firms.

Unlike potatoes, CGP crop is not freely available in APMC market throughout the year. As per the discussion with stakeholders, it is available in selected APMC markets of the country and that too for a short span during a particular season. Moreover, the quality available in APMC market is poor²³. However, potato chips manufacturers need the supply of CGP throughout the year. Also, CGP is semi-perishable in nature and cannot be stored in cold stores for a longer period. As, during cold-storage, reducing sugars accumulate in high amounts in potato making it unsuitable for processing because of the development of unwanted brown colouration in processed products. (Pandey et al. 2009). Thus, potato processors have to look for fresh CGP and cannot rely on cold storage output for too long.

5.4.2. Profile of FritoLay and its contract farming operations, Maharashtra

FritoLay, a PepsiCo group company²⁴, the market leader in potato chips industry (Rana, 2011), installed its first potato chips plant in Channo, District Sangrur, Punjab in 1987. Later two more plants were put up at Ranjangaon, Pune (Maharashtra) and Howrah in West Bengal. To run these plants, company requires more than 100,000 MT of processed grade potato per annum. PepsiCo (India) claims that it runs the country's largest CF operation in potato and works with nearly 15,000 farmers across seven states viz. Punjab, Uttar Pradesh, Karnataka, Bihar, West Bengal, Gujarat and Maharashtra in India (PepsiCo, 2010). PepsiCo through its research lab developed many processing variety potatoes depending on the regions. PepsiCo has collaborated with the Thapar Institute of Technology to develop quality potato mini-tubers. It has also invested in a world-class potato mini-tuber facility at Zahura in Punjab which helps to get robust and disease-free seeds to be distributed to its seed contact growers. For Maharashtra contract

²³ Interaction with potato commission agent in APMC, Pune.

²⁴ In this thesis FritoLay (I) and Pepsico (I) have been used interchangeably.

farming, it supplies seed potato variety of FL-1533 and Atlantic (ATL) to its farmers. These varieties suited the agro-climatic condition of the selected regions, showed greater than 20% dry matter, delivered good yields, and produced light colour chips of very good quality. FL1533 and ATL are both short duration crop with the maturity of 70-80 days and 85-95 days respectively. Farmers are free to choose whichever variety they would like to grow.

FritoLay (I) started its CFAs in Maharashtra in 2002 on trial basis in a couple of villages in Ambegaon and Khed Taluka of Pune district and few farmers in Khatav tehsil of Satara. Initially, they started with around 100 farmers (100 acres) in 2002-03 and increased over the years to around 2150 farmers (6306 acres approx.) in 2011-12. Table 5.6 gives more details about the coverage of CF in Maharashtra. The taluka and district wise details of CF for 2012-13 is presented in Table 4.3.

Table 5.6: Details of Frito-Lay (I) CGP contract farming in Maharashtra

Year	No. of Farmers	Area in acres	No. of Villages	No. of Tehsils	No. of Districts
2002-03	100	100	NA	3	2
2011-12	2,624	6,306	197	6	3
2012-13	2,150	NA	138	6	3

Source: Company records

NA: data not available

Initially, in 2002-03, the company held village meeting to encourage farmers to take up CGP cultivation. It provided the farmers with certified seeds (under the company trademark) on credit at subsidized rates and trained them regarding the agronomic practices to be followed w.r.t. new crop. They entered into legal written contract, to allay the fears of farmers that they would procure the produce at the guaranteed price mentioned in contract. The company has direct dealing with the farmer. After the promising results in 2002, as the company wanted to expand its reach to farmers, it tried involving an intermediary or a service provider on trial basis. The intermediary was the lead farmer or someone within the village willing to invest and can influence to farmers for CGP contract cultivation and, would take the responsibility to coordinate operations of contract farming. The intermediary was called 'hundekari' in the region. Hundekari is a service provider, having a performance link contract with the company whereby, he had a commission on seed distribution and output procurement. Hundekari has been given laptops based on their performance. The laptop helps them to maintain a database of farmers. Hundekari offered the following services:

- Developing the region for contract farming: Arranging meetings at the village level, influencing and bring together farmers for cultivation under contract.
- Dissemination of good agricultural practices: With the assistance and coordination of extension staff and field assistants of the company, guide farmers on CGP cultivation, problem solving, and making field visits for same. Dissemination of information, by arranging formal training to discuss the new technology like mechanised inputs like potato planter, harvester.
- A shop where all the queries of the farmer can be dealt. A meeting place of farmers with an agro-field team of the company.
- One stop shop for providing seeds, chemical kit, fertilizers, weighing of produce, procuring harvest with labor services for loading, arranging transport, Also help in documentation for contracting and availing loan for farmer

To finance for the working capital requirements, Company facilitated the farmers to get crop-loan from State Bank of India or the respective commercial banks in the region. Since 2006, PepsiCo has signed an annual MOU with the State Bank of India where the bank agrees to provide loans to PepsiCo contract farmers under terms and conditions negotiated with the company (Majerus, 2008). The idea of the agreement is that PepsiCo agrees to make a direct payment to the crop loan account following procurement of the potatoes if the bank gives a loan to the farmers. This allows the bank to automatically recover any loans made to PepsiCo contract farmers, so long as the contract farmers sell their potatoes to PepsiCo as agreed in their contract.

To provide the extension services and for providing plant-protection chemical kit, the PepsiCo have collaboration with Chemical Firm viz. Bayer Crop-science in Pune and DuPont in Satara and Sangli district. The objective of providing plant-protection kit is that farmer gets access to good quality inputs which protects the crop from pest attack and various diseases. Also, this partnership aims at providing the farmers with tools designed for farm management, integrated potato crop management, safe and proper use of crop protection products. The PepsiCo has a field team to oversee the production process at the farm level. This field team visits farmers' field and gives all the necessary and technical advice for free. The team comprises of staff of PepsiCo and also that of Bayer (I) and Dupont in Pune and Satara respectively. These chemical firm personnel or firm staff visit the contract farmer once or twice in the crop-cycle and also as and when

needed. Currently, the entire agricultural toolkit is prepared in coordination with agronomists of PepsiCo and respective chemical firm. This chemical kit is sold at the discounted price. Around half of the CF had mentioned that company had done soil testing on their farm and had prescribed composition of fertilizers needed for the soil.

CGP are grown in Kharif season in India within few districts in Maharashtra, Jharkhand and Karnataka and hilly states of North-East and Himachal Pradesh (Pandey et al. 2009). Thus, there is a tough competition among potato chips companies to procure processed variety from these regions to meet their raw materials requirement. After 2007, new companies entered the segment (viz. ITC Ltd., Balaji wafer Ltd., Parle Agro Ltd., Haldiram Ltd., etc.). Even they needed raw materials for their production. These companies started venturing into the FritoLay's contract farming regions for procurement of potatoes. Companies like Balaji wafer, Parle Agro started directly approaching an agent at the village level, offering them higher commission and higher rates to farmers for their processing potato variety. Thus, as the market for processing variety potatoes expanded and farmers became experienced, it was observed that farmers started exiting contract farming. Then 2007 onwards, FritoLay started developing new regions in Khatav taluka of Satara, where potato was hardly grown. Due to increasing requirement of raw materials, FritoLay started CF in 2011-12 in Sangli district, there also potato was hardly grown. With the advent of PepsiCo CGP contract farming, the Satara and Sangli farmer were able to adopt a new horticulture crop. Apart from PepsiCo (I), ITC Ltd. and Siddhivinayak Agro Pvt. Ltd. are also involved in CGP contract farming in Pune and Satara district of Maharashtra, but at a very limited scale. In the following subsection, some important details about PepsiCo CGP CFAs are discussed.

5.5.2.1 Selection of Villages and farmers

As CGP cultivation needs cool climate, thus in 2001-02, PepsiCo (I) staff selected those villages in Khed and Ambegaon taluka, whose agro-climatic conditions were suitable for CGP cultivation. It was observed that those farmers who are interested in growing CGP, can directly contact the hundekari. The farmers got interested in CGP cultivation in village meetings and also due to the success of co-farmers. There was no biasedness observed regarding whether small farmers or any particular social group were excluded. However, those farmers who had sold the complete contracted produce outside the contract earlier which led to straining of the relationship between farmer and

hundekari. Thus, hundekari does not give seeds again to such farmers. It was observed that it is hundekari who decides whom to give seeds or not. Also, a farmer can buy seeds from any hundekari from any village.

5.4.2.2. Functioning of CGP contract farming scheme

At the start of the season, farmers need to inform the hundekaris about the seeds requirement. For planting CGP, on one acre, it requires eight quintals of average size tubers. However, if the seed tubers are very tiny, requirement, six quintals per acre would also suffice. Based on the requirement, Hundekari will prepare documents for making a crop-loan application. Taking a crop loan is optional, a farmer can also buy seeds by drawing a Bank DD in favor of “PepsiCo.” After the loan is sanctioned, the payment for seeds, the chemical kit is credited to respective Company’s account through National Electronic Funds Transfer (NEFT) system. Thus, there is not a risk of money being falsely taken or misused. After the produce is sold to a company, the company shall reimburse the money to crop loan account. From which the loan amount get deducted, and rest of the money is transferred to farmers’ saving account.

There is a written agreement mentioning +quantity of seeds and its price, buy-back price, quality attributes of produce, etc. The agreement is written in Marathi (which is the local language) on the stamp paper of Rs. 20 or Rs. 100. However, the agreement seems to be biased in favour of the firm, as it does not protect the farmers from production risks.

For sowing one acre CGP, Rs. 25,000 crop loan is sanctioned by commercial banks. After the loan is sanctioned and as seeds and chemical kit get delivered to farmers, the cost of seeds and chemical kit are debited from this crop loan account. The field team visits farmers’ field to oversee the production process. Once the produce is ready for harvest. The farmer would inform hundekari to make procurement arrangement. Hundekari would make necessary arrangement to procure the harvest from the field. In case, the field is not accessible by road, where the truck cannot go, than farmer has to bring the produce through tractor to the road or the procurement collection center. Transport costs to the factory are borne by the company, however, if the produce is rejected and sent back, then the transport cost of that produce is borne by the farmer. Pricing policy is discussed in section 5.5.2.3.

Apart from seeds, chemical kit, extension services, transport arrangement, PepsiCo has encouraged farmers to adopt new technologies such as drip and sprinkler irrigation system and potato planters and harvesters. In 2011-12 at Satara, due to labour shortage at the planting as well as at the harvest time, PepsiCo has introduced potato planter and harvester, which shall save time and labour costs. Initially, it held village meeting, whereby along with farmers, bank officials were also present, whereby farmers were given a demonstration of potato planter and harvester. The bank officials were invited to showcase the potential of the machinery to facilitate providing loan for its purchase. It was observed that one of the progressive farmers from Mhasurne village bought potato harvester. So like tractor service which is available on custom hiring at the village level, the farmer was also providing this machinery on custom hiring basis. Similarly, farmers are adopting new machinery and equipment for spraying plant protection chemicals. Thus, even small and marginal have got access to the latest agriculture technology.

Like JISL, PepsiCo also regularly organises training meets for contract farmers to make them aware of new technological innovations. PepsiCo frequently organises a trip to JISL (Jalgaon) to show them the different innovations in irrigation systems as well. To adopt drip irrigation, it had come up with the incentive of Rs. 10,000 in the first year, while Rs. 7,000 on the second year to be given as bonus (linked to the sale of output). To farmers; this is apart from Government subsidy. This bonus is transferred along with the sale proceeds of the farmer. PepsiCo also holds workshops to share information on good agricultural practices. More than one-third of sample CF had mentioned of attending such training workshops. During the pilot survey, it was observed that as per CSR initiatives, the company carries out free medical health camps in villages and arranges programs on AIDS awareness.

5.5.2.3 Pricing Policy in CGP contract farming

PepsiCo fixes the guaranteed price at the start of the season (may-june), which is mentioned in the contract as well as on the banners put up at the hundekaris shops (see

Figure 5.5). Due to increasing competition especially, in Pune district, PepsiCo increase the prices, if they observe that the CF are selling the produce outside the contract. Moreover, to stop the produce being diverted elsewhere company has comes with other bonuses such as if farmers have taken the chemical kit, than 50 paise per kg

bonuses, if the farmer had taken drip irrigation this year, Rs. 2 per kg (with a cap of Rs. 10,000) and Rs. 1.5 for the second year (with a cap of Rs. 7,500) (Figure 5.5). Pricing directions comes from the main head office based on their requirements in three plants viz. Pune, Kolkatta, and Punjab.

Inorder to prevent side-selling of CF outside, companies has started MR scheme²⁵. Which is as per conversion of seed to crop (output). For e.g., if his conversion ratio was 1:4, i.e., if eight quintal seeds were bought and 32 quintals of output was delivered to the firm, then the farmer will get rebate of Rs. 7.5 per kg on seed price next year while purchasing the seeds next season. This rebate will only be available if the seeds would be purchased in next year. Higher the conversion ratio, higher the rebate farmer gets in next season. The MR scheme chart for Pune and Satara is presented in Figure 5.5 and Table 5.7 respectively.

Figure 5.5. PepsiCo banner of seed and output price 2012-13, Pune

PSICO शेतकरी बंधु आणि भगिनींनी, नमस्कार खरीप २०१२ मध्ये आपले सहर्ष स्वागत
२०११ मधील आपल्या उत्कृष्ट सहकार्याबद्दल मनःपूर्वक आभार!

बियाणे भाव:-

बियाणे भाव	अटलांटिक (प्रति किलो रु.)	एफएल १९३३ (प्रति किलो रु.)
(ए.बी.सी. ग्रेड)	२०	२३
डो ग्रेड व ग्रेड ग्रेड	१४	१४

खरेदी भाव

(१) मुळ खरेदी भाव रु. १०/- प्रति किलो
(२) औषधी बोनस रु. ०.५०/- प्रति किलो

पात्रता:- कंपनीने मुदविलेल्या औषधांचा संच घेणाऱ्या शेतकऱ्यांना औषधी बोनस मिळेल.

(३) ठिबक सिंचन योजना : रु. २ प्रति किलो (चिप ग्रेड बटाटे परत दिल्यास)
अ) प्रति एकर प्रथम वर्षासाठी १०,०००/- रु. जास्तीत जास्त
ब) प्रति एकर द्वितीय वर्षासाठी ७,०००/- रु. जास्तीत जास्त

(४) गुणवत्ता बोनस : कोलकत्ता व पंजाबला पाठविण्यात येणाऱ्या बटाट्यासाठी ०.५०/- रु. प्रति किलो वाढीव गुणवत्ता बोनस मिळेल.

पात्रता:- (१) चाळणीतून बाहेर निघालेला बटाटा ५% पेक्षा कमी असावा, जास्त लहान बटाटा (४५ मि. मि.) जास्त मोठा बटाटा (८५ मि. मि. पेक्षा मोठा) चिटा बटाटा, शिवा बटाटा, मेकॅनिकल डॅमेज व भात

(५) कालावधी बोनस : कंपनी नियमाप्रमाणे पुर्ण परिपक्व बटाटे खाली दिलेल्या वेळेमध्ये दिल्यास शेतकरी कालावधी बोनससाठी पात्र ठरेल. (ट्रान्सपोर्टच्या बिलावरील तारीख प्रामाण्ये बरली व

पात्रता:- (१) २५ सप्टेंबर २०१२ पर्यंत बटाटे दिल्यास प्रति किलोसाठी ०.७० पेसे
(२) २६ सप्टेंबर २०१२ ते १० ऑक्टो. २०१२ पर्यंत बटाटे दिल्यास प्रति किलोसाठी ०.५० पेसे

तपशिल

तपशिल	अटलांटिक (प्रति किलो रु.)	एफएल १९३३ (प्रति किलो रु.)
३ पटीपेक्षा जास्त	१५	१८
४ पटीपेक्षा जास्त	१२.५	१५.५
५ पटीपेक्षा जास्त	११	१४
६ पटीपेक्षा जास्त	९.५	१२.५
७ पटीपेक्षा जास्त	०८	११
८ पटीपेक्षा जास्त	६.५	९.५
९ पटीपेक्षा जास्त	०५	०८
१० पटीपेक्षा जास्त	३.५	६.५

सैको बटाटे कंत्राटी शेतीचा उपक्रम सर्व शेतकऱ्यांच्या सहकार्यानिच यशस्वीरीत्या वाढत चालला आहे. आपले उत्कृष्ट सहकार्य लाभार्थी धन्यवाद !!!

Source: Picture clicked at Koye village (Khed Taluka, Pune district) hundekari shop

²⁵ MR is a name given to scheme of rebate on the cost of seeds for the next season

Table 5.7: MR conversion seed rebate chart, 2011-12 kharif season

Conversion ratio	Seed Rebate (Rs./kg for 2012-13)
3	6
4	7.5
5	9
6	10.5
7	12
8	13.5
9	15
10>	16.5

Source: Company records

As can be seen from

Table 5.7, in 2011-12, PepsiCo had a cap on the rebate of Rs. 12,600 per acre i.e. Rs. 16.5 per kg for the purchase of seeds in 2012-13. While in 2012-13 season its MR policy has been revised with the cap of Rs. 7 per kg i.e., Rs. 5,600 per acre for the purchase of seeds in 2013-14. The purpose of the MR scheme is to incentivize farmers to grow their crops well, as higher productivity would give them higher seed rebate next year. Secondly, farmers would have a further incentive to contract for next year as well. Thus scheme seems to aim that farmers be bounded to grow CGP under contract.

During the field survey, it was observed that PepsiCo commands the price leadership. Whatever MGP PepsiCo offers, the non-contract hundekaris have to offer the higher price than MGP to procure CGP from farmers. Similarly, the non-contract hundekari's price of seeds follows as per the seed price of PepsiCo. The other players' viz. non-contract hundekaris, agent of other potato chips making companies, etc. are price follower, as they cannot speculate the prices.

5.6 Concluding remarks

In this chapter, the profile of crops, study area, contracting firms and operational aspects of their CFAs were discussed. The scale of CFAs of both JISL and PepsiCo scale is vast, i.e. having nearly 2,000 farmers cultivating the contract crops. Both JISL and PepsiCo supply inputs and services which facilitate good quality production, minimize the costs, empower farmer with good agriculture practices. Both the firms tries to build a relationship with farmers so that farmers continue to grow contracted crops and produce quality produce. In the next couple of chapters, the survey results based on the objectives of the thesis is presented.

Chapter 6 - Household characteristics and determinants of farmers participation in contract farming

One of the objectives of the thesis was to understand the inclusiveness aspects of contract farming. Here, inclusiveness refers to which kind of farmers participate in contract farming. As discussed in Sections 1.3 and 3.1.1., there are a group of people and studies which advocate that contract farming benefits mostly large farmers as small farmers are excluded from this value chain. This chapter discusses the question of whether CF tends to be better endowed than NCF. According to Shah (2013), socio-economic characteristics of farmers have a profound influence on the decision-making process and profitability of crop enterprise. In general, this chapter focuses on socio-demographic profile and farm related characteristics of sample farmers household as well as the characteristics of their operational holdings and the cropping pattern (Sections 6.1 and 0). The chapter also discusses the profile of farmers who participate in the contract (CF), who have left contracting (ACF) and who have never participated in the contract (NNCF). Using Logit regression analysis, the determinants of farmers' participation in contract farming is discussed (Section 6.3).

6.1 Socioeconomic and demographic profile

In this section, the comparison of the information relating to household size and dependency ratio, education status, and composition of the social group and agricultural assets, etc., for CGP and onion CF and NCF (including ACF and NNCF) is done.

6.1.1 Gender, Social Group and Occupation

Here, the comparison of the socio-demographic characteristics between CF and NCF is discussed. It was observed during the CGP and onion survey, that there was no caste and gender bias made by contracting firms while offering seeds on contract. The gender, social group and occupational profile of sample CGP and onion farmers' have been presented in Table 6.1 and 6.2. Most of the farmers in both the sample groups are male. During the village enumeration, it was observed that although, there were very few female-headed farming households, they were not averse in growing the chip-grade potato under contracting. The majority of the farmers in the CGP sample belonged to the general category of social group, i.e., 80% of CF and 89% of the NCF households, while

rest belonged to backward classes²⁶. While majority of the onion sample farmers belonged to OBC general category of social group, i.e., 77% of CF and 90% of the NCF households, while 17% of CF and 7% of NCF belonged to general category

There seems to be not much difference in the occupational profile of CF and NCF of both the onion and CGP farmers. Almost all CGP sample growers have to farm as their main occupation, and more than half have dairy/poultry as a subsidiary occupation. While 28% of CGP CF and NCF had no subsidiary occupation (Table 6.1). There were two ACF from Pune, who had left growing CGP in the contract and instead themselves became potato commission agents (non-contract hundekari). These agents go to Punjab and buy the seed tubers from farmers there and sell it to the growers in their village. In the case of onion, all growers have farming as their main occupation, and around one-third have dairy/poultry/sheep rearing as a subsidiary occupation. And around half did not have any subsidiary occupation. Here, it seems there are not major differences between CF and NCF in terms of occupational profile.

Table 6.1 Gender, Social Group, and Occupational Profile of CGP Farmers

Particulars	CF ($n_1=89$)	Non-Contract farmer (NCF)		
		ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+n_3=89$)
Gender				
Male	95.5	100.0	98.2	98.9
Female	4.5	0.0	1.8	1.1
Social Group				
General	79.8	84.8	91.1	88.8
OBC	16.9	12.1	3.6	6.7
SC/ST/NT	3.4	3.0	5.4	4.5
Main Occupation				
Farming	98.9	97.0	98.2	97.8
Poultry/Sheep rearing	0	0.0	1.8	1.1
Non-farm (non-agri labour/service/ shop)	1.1	3.0	0	1.1
Subsidiary occupation				
Dairy	53.9	54.5	58.9	57.3
None	28.1	30.3	26.8	28.1
Non-Farm (Non-agri labour/ transport/ shop)	15.7	6.1	12.5	10.1
Agri-labour/ Farming	2.2	3.0	1.8	2.2
Potato commission agent	0.0	6.1	0.0	2.2

Source: Computed from primary survey (2012-13)

Note. Units in percentage and have been calculated on column sums

²⁶The term “backward classes” comprises of four sections of Indian society viz. Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Communities (OBC) and Denotified communities (Revankar, 1971).

Table 6.2: Gender, Social Group and Occupational Profile of Onion Farmers

Particulars	CF ($n_1=108$)	NCF		
		ACF ($n_2=48$)	NNCF ($n_3=44$)	NCF ($n_2+n_3=92$)
Gender				
Male	99.1	97.9	97.7	97.8
Female	0.9	2.1	2.3	2.2
Social Group				
OBC	76.9	89.6	90.9	90.2
General	17.6	6.2	6.8	6.5
SC/ST/NT	5.6	4.0	2.3	3.3
Main Occupation				
Farming	99.1	100.0	97.7	98.9
Non-Farm (Non-agri labour/Service)	0.9	0.0	2.3	1.1
Subsidiary occupation				
Dairy/poultry/sheep	52.8	33.3	34.1	33.7
Non-Farm (Non-agri labor/Transport/Shop)	3.7	18.8	2.3	10.9
Agri-labour/ Farming	0.0	0.0	4.6	2.1
None	43.5	47.9	59.1	53.3

Source: Computed from primary survey (2012)

Note. Units in percentage and have been calculated on column sums

Overall, there was no major difference between the social group and occupational profile of CF and NCF categories for both the crops.

6.1.2 Household size and dependency

Arithmetic mean values of household size and dependency ratio are presented in Table 6.3. Weighted Average household size²⁷ of CGP CF is 5.3 ($SD = 1.5$) while, that of CGP NCF are 6.5 ($SD = 1.8$), while for the dependency ratio²⁸, it was around 0.33 for both the groups. Similarly, one-third of family member are dependents among sample CF-NCF households. In our survey, the average dependency ratio of 0.33 is not high. Moreover, the median values of household size and dependency ratio between both the CGP groups (CF and NCF) are not significantly different from each other²⁹ (Table 6.3).

²⁷ Household size is expressed as household's total number of adult equivalents (Deaton, 1997); it was obtained by treating each individual under 15 as 0.5 adult, each individual between the ages of 15 and 65 as one adult, and each individual over 65 as 0.75 adults.

²⁸ Household dependency ratio is obtained by dividing the number of individuals in the household under 15 or above 65 years of age by the total number of individuals in the household (Bellemare, 2012).

²⁹ Using Mann-Whitney test, it was found that household size of both the CF and NCF did not significantly differ from each other ($Mdn= 5.0$ for both the categories, $U = 3858$, $Z = -.3$, $p = .77$). Similarly, household dependency ratio did not significantly differ from each other of both the CF ($Mdn = 0.33$) and NCF ($Mdn = 0.4$), U statistic = 3748, $Z = -.6$, $p = 0.27$.

The weighted average household size of onion CF were 5.6 ($SD = 2.3$) while, that of NCF are 5.9 ($SD = 2.4$). The weighted average of dependency ratio was around 0.34 ($SD = 0.2$) for both onion CF and NCF respectively for both the groups, Therefore, there is not much difference in the quantity and quality of family labour force between CF and NCF for CGP and onion households.

Table 6.3: Mean values of Household Size and dependency ratio

Particulars	CF	NCF		
		ACF	NNCF	NCF
CGP				
Household size	5.3 (2.3)	6.2 (2.6)	5.5 (3.4)	5.7 (3.1)
Household dependency ratio	0.33 (0.23)	0.40 (0.17)	0.32 (0.22)	0.35 (0.21)
Onion				
Household size	5.3 (2.3)	6.2 (2.6)	5.5 (3.4)	5.7 (3.1)
Household dependency ratio	0.33 (0.23)	0.40 (0.17)	0.32 (0.22)	0.35 (0.21)

Source: Computed from primary survey (2012-13)

Note. Figures in bracket are standard deviation (SD), NCF is a sub-total of ACF and NNCF

6.1.3 Age and Education

Age and education profile of sample growers are presented in Table 6.4. Weighted mean age of both CGP CF and NCF respondents is nearly 47 years ($SD = 11.5$). Three-fourth of the sample respondents (CF and NCF including ACF and NNCF) are young and middle-aged (i.e. 21-55 years). Moreover, proportions of farmer belonging to CF and NCF within the different age groups and for the type of schooling attended are similar (Table 6.4).

Table 6.4: Age and Education Profile of Farmers

CGP				
Particulars	CF	NCF		
	($n_1=89$)	ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+n_3=89$)
Age (years)				
21-40	37.1	33.3	44.6	40.4
41-55	38.2	39.4	35.7	37.1
More than 55	24.7	27.3	19.6	22.5
Mean of age	46.9	48.9	44.9	46.2
(SD)	(11.2)	(11.2)	(10.9)	(11.0)
Median of age	45	47	45	45
Type of schooling attended				
Did not go to school	6.7	9.1	3.6	5.6
Primary (I- IV)	15.7	12.1	17.9	15.6
Upper primary –secondary (V-X)	50.6	57.6	51.8	53.9
Higher secondary (XI-XII)/diploma	16.9	15.2	19.6	18.0
Degree college/University	10.1	6.1	7.1	6.7
Mean years of schooling	8.4	8.0	8.5	8.3
(SD)	(4.5)	(4.3)	(4.0)	(4.1)
Median-	10	9	10	10
Onion				
Particulars	CF	NCF		
	($n_1=108$)	ACF ($n_2=48$)	NNCF ($n_3=44$)	NCF ($n_2+n_3=92$)
Age (years)				
21-40	44.4	45.8	36.4	41.3
41-55	41.7	39.6	40.9	40.2
More than 55	13.9	14.6	22.7	18.5
Mean of age	43.8	44.7	46.2	45.4
(SD)	(10.9)	(11.7)	(13.2)	(12.4)
Median of age	42.0	41.5	45.0	45
Type of schooling attended				
Did not go to school	8.3	6.1	23.3	14.1
Primary (I- IV)	22.2	26.5	11.6	19.6
Upper primary –secondary (V-X)	36.1	42.9	44.2	43.5
Higher secondary (XI-XII)/diploma	24.1	12.2	11.6	11.9
Degree college/University	9.3	12.3	9.3	10.9
Mean years of schooling	8.1	8.0	6.9	7.5
(SD)	(4.5)	(4.6)	(5.0)	(4.8)
Median	9.0	9.0	7.5	9

Source: Computed from primary survey

Note. Age and schooling distribution units are in percent and are calculated on column sums

In the case of onion, weighted mean age of CF and NCF respondents is nearly 43.6 years ($SD = 11.2$) and 45.9 years ($SD = 12.7$) respectively. Nearly 86% of CF and ACF

are young and middle-aged (i.e. 21-55 years) compared to 77% of NNCF. Thus NNCF were slightly more elderly compared to CF and ACF.

Literature suggests that education is positively associated with farmers' adoption of new technologies, market access, participation in the high value chain, and membership of farmers' organisation (Bachke, 2010; Feder, Just, & Zilberman, 1985; Foster & Rosenzweig, 1996; Narayanan, 2011; Onphanhdala, 2009). Feder et al., (1985, p. 276) mentions that formal schooling plays an important role in determining the allocative ability of farmer. Staal, Baltenweck, Waithaka, deWolff, and Njoroge (2002, p. 7) states that "more formal education is likely to increase farmer capacity for management and for utilizing information." Foster and Rosenzweig (1996) found out that primary education was an important predictor of adopting new farming technology and profitability during the time of the "Green Revolution" in India. Similarly, Onphanhdala (2009) in her study of Lao PDR, reported that education plays an important predictor for the adoption of new technologies and market access. Education of farmer is also a factor revealing its' social characteristics. For e.g., Sinha (1978, p. 39-42) observed the positive influence of education on the image of the farmer at the local level. Education adds social respectability as well as equips an educated person with greater capacity of leadership. Therefore, in the case of onion, where the company has introduced a new variety, CF was expected to be more educated compared to NCF. Which may not be the case of CGP, as both the farmer groups are using the same variety.

Years of schooling attended along with the type of schooling³⁰ attended have been taken as an indicator in the survey to gauge the farmers' education. According to CGP survey results, schooling profile was similar across CF, ACF, NNCF groups. Respondents without any formal schooling comprised of six and seven percent of CF and NCF respectively. Most of CF and NCF respondents (i.e. 78%) had formal schooling of upper primary and above (fifth standard and above). The sample farmers having higher secondary schooling³¹ and above were in a proportion of 27% of CF and 25% of NCF respondents (Table 6.4). Thus, most of them can read and write, hence can read the contract documents. This indicates that schooling does not play any role in farmers' decision to grow CGP in the contract and without a contract.

³⁰Type of schooling refers to whether farmer has attended primary or upper-primary or secondary, secondary, etc.

³¹Higher secondary schooling refers to that farmer had attended college after passing his tenth standard.

In the case of onion, median years of schooling of CF and ACF was nine years compared to 7.5 years of schooling. Similarly, 23.3% of NNCF did not go to school compared to 8% and 6% of CF and ACF sample respectively. Thus, overall NNCF were slightly more elderly and less educated. It seems more elderly farmers and less educated farmers were comfortable with growing traditional variety onion and reluctant to adopt a new variety of onion.

6.1.4 Agricultural Assets

Agricultural assets of the farmer are one of the good indicators of his financial position (Chauhan, Mundle, Mohanan, & Jadhav, 1973). Agricultural assets comprise of physical farm assets and livestock possessed³². Physical farm assets facilitate intensive cultivation of land. Almost all of the farmers (CGP and onion survey) owned some livestock and physical farm assets (Table 6.5). About physical farm assets, less than half of the CGP CF, ACF, and NNCF (43%, 49%, and 50% respectively) owned bullock carts. Around 87% of CGP CF, ACF, and NNCF owned electric motor or diesel pump for irrigation. More than half of CGP CF and ACF (58% and 55% respectively) owned either drip or sprinkler irrigation systems compared to 27% of NNCF. One of the reasons of higher availability of drip/sprinkler irrigation system in CGP CF is to the fact that 40% of them had received the financial assistance for the same from the contracting firm. Around 19% of CF and 24% of ACF owned tractor/heavy machinery compared to 9% of NNCF farmers.

The weighted average of the value of physical farm assets was around Rs. 141,400 ($SD= 209,500$) for CGP CF and Rs. 133,400 ($SD = 215,900$) for CGP NCF. As the data was positively skewed, Mann-Whitney test to check whether medians of farm assets between CF and NCF were different were used. Mann-Whitney test results indicated that CF ($Mdn = Rs. 66,700$) owned higher value of the physical farm assets compared to NCF ($Mdn = 46,200$), $U = 3451$, $Z = -1.48$, p (1 -tailed) = 0.07, $r = -.11$. The r value here denotes the effect size, which is low in this case.

³²Physical farm assets include ownership of bullock cart, electric/diesel motor, farm building, heavy agricultural machinery (plougher, rotavator, threshers, tillers, trolley, etc.), irrigation, and equipment. The valuation of open/tube wells have been excluded, as it very difficult to calculate their true value present value. Although, the author has the record of number of wells possessed by farmer, but not sure how many are functional and non-functional. Livestock include cow, bullocks, goat, sheep, horse, and poultry.

The weighted average value of livestock for CGP survey was Rs. 100,400 ($SD=75,500$) for CF and Rs. 108,400 ($SD=96,000$) NCF. A Mann-Whitney test results indicated that livestock values were not significantly different from each other between CF ($Mdn = 85,000$) and NCF ($Mdn = 80,000$), $U = 3699$, $Z = -.76$, $p = .45$, $r = -.11$. The fact that mean of farm assets and livestock was higher than the median is not surprising since some households in every village owned heavy agricultural machinery.

Table 6.5: Percentage of Farmers Owning Particular Type of Agricultural Assets

Types of assets	CF	NCF		
	($n_1=89$)	ACF ($n_2=33$)	NCF' ($n_3=56$)	NCF ($n_2+n_3=89$)
CGP				
Livestock	96	97	86	90
Physical farm assets	98	100	95	97
Electric motor/Diesel pump	88	88	86	87
Drip/sprinkler	58	55	27	37
Bullock cart	43	49	50	49
Tractors & related machinery	19	24	9	15
Onion				
Type of assets	CF	NCF		
	($n_1=108$)	ACF ($n_2=48$)	NNCF ($n_2=44$)	NCF ($n_2+n_3=92$)
Livestock	95	100	89	95
Physical farm assets	100	100	100	100
Electric motor/Diesel pump	97	100	95	97
Bullock cart	86	95	77	87
Drip/Sprinkler	30	12	5	9
Tractors & related machinery	12	19	9	14

Source: Computed from primary survey

Note. Units are in percentage and are calculated on column sums

In the case of onion, about physical farm assets, about 86% of CF, 96% of ACF, while only 77% of NNCF owned bullock carts. Almost all farmers owned electric motor or diesel pump for irrigation. Less than one-third (31%) of onion CF owned either drip or sprinkler irrigation systems compared to 12% of ACF and 5% of NNCF. One of the reasons for greater ownership of drip/sprinkler irrigation system is because JISL incentivises farmer to go in for micro-irrigation systems. Ownership of some tractor/heavy machinery was 19% within ACF compared to 12% of CF and 9% of NNCF farmers.

The weighted average value of physical farm assets was around Rs. 86,885 ($SD=157,830$, $Mdn = 29,375$) for onion CF and Rs. 95,213 ($SD = 178,810$, $Mdn = 27,215$) for onion NCF. Similarly, the weighted average value of livestock was around Rs. 115,437

(*SD* = 209,879) for CF and Rs. 118,747 (*SD* = 297,795) for NCF, whereas the median value for the same was Rs. 70,000 for both the groups. The median values of farm assets and livestock were similar among onion CF, ACF, and NNCF respectively (Table 6.6). Mann-Whitney test results confirmed that there were not significant differences in values of physical farm assets and livestock values between onion CF and NCF.

Table 6.6 shows that CF and ACF had higher agricultural assets compared to NNCF, indicating that financial position of CGP and onion CF and ACF were better off compared to NNCF.

Table 6.6: Value of Physical Farm Assets and Livestock of sample growers

Particulars		CF	NCF		
			ACF	NNCF	NCF
Physical farm assets (Rs. in thousand)					
CGP	Mean	150.2	167.2	104.7	127.9
	(<i>SD</i>)	(224.0)	(221.3)	(181.0)	(198.1)
	Median	66.7	60.2	31.4	46.2
Onion	Mean	86.9	124.4	52.8	93.0
	(<i>SD</i>)	(157.8)	(215.4)	(96.5)	(169.8)
	Median	29.4	29.1	25.8	28.5
Livestock Value (Rs. in thousand)					
CGP	Mean	102.9	118.2	86.8	98.4
	(<i>SD</i>)	(81.2)	(102.4)	(76.3)	(87.7)
	Median	85.0	90.0	72.5	80.0
Onion	Mean	126.7	150.1	71.1	120.1
	(<i>SD</i>)	(250.4)	(364.7)	(61.3)	(258.3)
	Median	70.0	70.0	61.0	70.0

Source: Computed from primary survey (2012-13)

6.1.5 Credit constraintness

The growing empirical literature suggests that in rural areas of developing countries credit constraintness have significant adverse effects on farm output (Feder, Lau, Lin, & Luo, 1990; Petrick, 2004; Sial & Carter, 1996, cited in Guirking & Boucher, 2008)], farm profit (Carter, 1989; Foltz, 2004; cited in Guirking & Boucher) and farm investment (Carter and Olinto, 2003, cited in Guirking & Boucher).

In most of the empirical literature, households are classified as credit constrained if they demonstrate an excess demand for credit (Guirking & Boucher, 2008). To identify farmers as credit constrained, the direct elicitation methodology used by Boucher, Guirking and Trivelli (2006) have been adopted. Farm households were classified as constrained if they demanded an excess demand for credit and did not get it. Farmers'

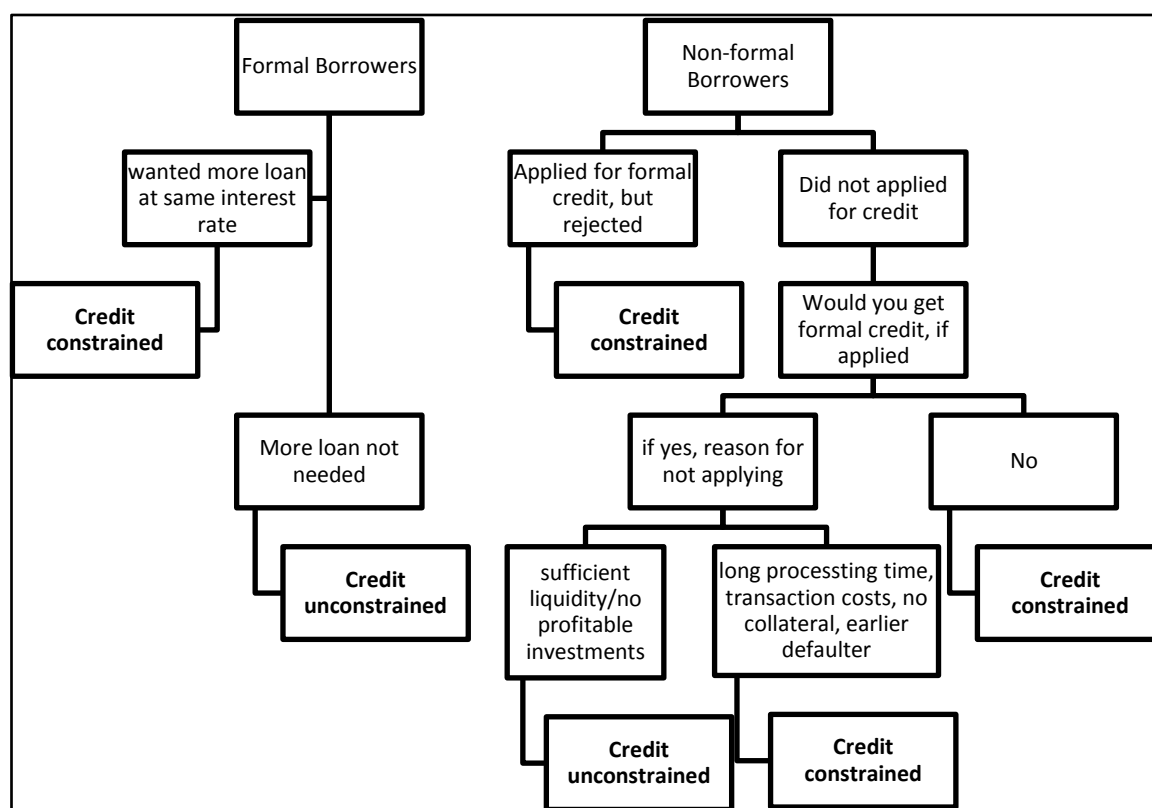
are also credit constrained if they got credit but wanted to have had more under the same terms and conditions (viz. interest rate). This kind of rationing is termed as quantity rationing. Quantity rationing is a supply side constraint and occurs when a borrower's effective demand exceeds supply (Boucher et al. 2006, p. 10). While apart from this there may be other means that may affect households' terms of access to the credit market for e.g., transaction costs associated with getting the bank loan. Banks may pass on to borrowers the transaction costs associated with screening applicants. These transaction costs may make it unprofitable for a farmer to take a loan (Guirkinger & Boucher, p. 296).

The questionnaire used to collect our data was designed to detect the quantity rationing (Appendix B). To identify whether the farmers are credit constraint or not, initially farming households were separated into formal borrowers and formal non-borrowers. Formal borrowers are referred to as those households which had taken a loan in last 12 months from either a commercial bank or cooperative credit society. There were series of questions that the farmers were asked. If the borrowing household wanted to have more amount of loan at the same interest rate, they were classified as credit constrained farming household (CCFH), if not then they were classified as credit unconstrained farming household (CUFH). Further questions that were asked to formal non-borrowers, they were asked if they had applied for credit, but application got rejected during the last five years were classified as CCFH. For non-borrowers, who had not applied for credit, were asked certain perception based questions like whether a bank/cooperative society lend to you if you applied? If the farmer says yes, then he was asked the reasons for not applying. Those that said they had sufficient liquidity or they had no profitable investments to make were classified as CCFH. If the reason for not applying is due to long processing time, paperwork, costly fees of application or he did not have collateral or had no chance of getting a loan may be due to the reason that he was a defaulter earlier, then the farmer is credit constrained. The identification process of CCFH and CUFH is also depicted in Figure 6.1, while its results are presented in Table 6.7.

In the case of CGP, it was observed that 78% of CF and ACF were CUFH compared to 68% of NCF. As CF receive crop loan of Rs. 25,000 and above hence most of them belong to CUFH. Prevalence of credit constraintness seems to be limited in the case of CGP. Boucher, Guirkinger, and Trivelli (2006) in the study on Peruvian farmers

had observed that credit constraintness become less prevalent over time. As CGP CFAs are going on for over a decade and also CF receive crop loan of Rs. 25, 000 per acre, these could be the reason for the limited prevalence of credit constraintness. In the case of onion, 66% of NCF were CCFH compared to 55% of CF households (Table 6.7). Overall CF and ACF have similar credit constraintness profile.

Figure 6.1: Farming household: Credit constrained or unconstrained



Source: primary survey

Table 6.7: Farming household: credit constrained or unconstrained

Types of assets	CGP			
	CF ($n_1=89$)	NCF		
		ACF ($n_2=33$)	NCF' ($n_3=56$)	NCF ($n_2+n_3=89$)
Credit constrained	21.3	21.2	37.5	31.5
Credit unconstrained	78.7	78.8	62.5	68.5
Particulars	Onion			
	CF ($n_1=108$)	NCF		
		ACF ($n_2=48$)	NNCF ($n_3=44$)	NCF ($n_2+n_3=92$)
Credit Constrained	55.6	57.1	76.7	66.3
Credit unconstrained	44.4	42.9	23.3	33.7

Source: Computed from primary survey

Note. Figure in percent and have been calculated on column sums

6.1.6 Proximity of the farm to paved road

For CGP survey, the weighted average distance of the CGP farms to the paved roads was in the range of 0.9 km for CF and 0.7 km for NCF. Whereas, the average distance of onions to the paved roads were around 1.4 km for both CF and NCF (Table 6.8). Thus, there is not much difference in the average distance of farm to paved roads. Also, minimum and maximum values of the distance are same. Thus in case of both the crops neither CF, who were far away, were averse to working with firm, nor did the firm had any biasedness towards them

Table 6.8: Distance of farm to paved road
(units in km)

Statistics	CGP		Onion	
	CF	NCF	CF	NCF
<i>Mean</i>	0.9	0.7	1.4	1.5
<i>SD</i>	1.1	0.9	1.6	1.7
<i>Mdn</i>	0.5	0.5	1.0	1.0
<i>Min.</i>	0.0	0.0	0.0	0.0
<i>Max.</i>	6.0	6.0	5.0	5.0

Source: Primary survey

6.2 Farm Related Characteristics

6.2.1 Type of Land Ownership

In the case of both the crops, sample farmers were mainly owner-cultivators. In the case of CGP, owner-cultivators constituted 95% of CF and NCF categories respectively, while rest were tenants and owner-cum-tenants (Table 6.9). Similarly, for onion, owner-cultivators represented 83% of CF and 88% of NCF, while rest were tenants and owner-cum-tenants. Thus, it seems that lease market was not very active in sample villages.

Table 6.9: Land ownership pattern

CGP				
Types of assets	CF	NCF		
	($n_1=89$)	ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+n_3=89$)
Owners	95.5	90.9	96.4	94.4
Owner-cum-tenant	4.5	9.1	3.6	5.6
Tenants	0.0	0.0	0.0	0.0
Onion				
Particulars	CF	NCF		
	($n_1=108$)	ACF ($n_2=48$)	NNCF ($n_3=44$)	NCF ($n_2+n_3=92$)
Owners	83.3	89.8	86.0	88.0
Owner-cum-tenant	15.7	10.2	14.0	12.0
Tenants	0.9	0.0	0.0	0.0

Source: Computed from primary survey

Note. Figure in per cent and have been calculated on column sums

6.2.2 Size Categories

Land is an important resource base of the farmer in the production process. The economic and social progress of farmers mostly depends on the size of their operational holdings (Shah, 2013). Keeping in view the significance of land resources, it was thought essential to show the land use pattern of sampled farmers. The distribution of the sample according to the size categories of the operational holding (marginal and small: < 5.0 acres, medium: 5.0 – 9.9 acres, and large: 10 acres and above) is given in Table 6.10 and Table 6.11 for CGP and onion farmers respectively. Distribution pattern of operational holding is similar within CF and ACF categories in both the crops. This can be seen from the fact that proportion of CF and ACF belonging to marginal and small (16%), medium (33%) and large farm categories (50%) for both crops are almost similar. Whereas proportion of NNCF belonging to marginal and small were 41%, medium were 46%, and large were 13% in case of CGP, while for onion it was 34%, 41% and 25% respectively. Thus, proportion of small farmers is higher in NNCF or overall in NCF, compared to CF. Overall for both the crops, NNCF have lower holdings within NCF compared to ACF.

Table 6.12 presents preference of contracts based on holding size categories. Two-thirds of the small CGP farmers had chosen to grow CGP without a contract, while almost two-third of the large category farmers had chosen to grow CGP with a contract

in 2012. Similarly, 43% and 60% of small and large category farmers within the sample had chosen to grow onion with a contract in 2011. For both the crops, descriptive statistics show that operational holding is higher in the case of CF compared to NCF, and this claim is supported by Mann-Whitney test results³³.

Table 6.10: Size of the operational holdings of CGP farmers

Size of the holding (acres)	CF ($n_1=89$)	NCF		
		ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+n_3=89$)
Marginal and small (0- 4.9)	15.7	15.2	41.1	31.5
Semi-medium (5.0- 9.9)	34.8	33.3	46.4	41.6
Large (10.0 and above)	49.5	51.5	12.5	26.9
<i>Mean of operational holding</i>	11.0	11.2	6.0	7.9
<i>(SD)</i>	(7.5)	(7.9)	(5.5)	(6.9)
<i>Median</i>	9.0	10.0	5.0	5.8

Source: Computed from primary survey

Note. Units in per cent and have been calculated on column sums.

Table 6.11: Size of the Operational Holdings of Onion Farmers

Size of the holding (acres)	CF ($n_1=108$)	NCF		
		ACF ($n_2=49$)	NNCF ($n_3=43$)	NCF ($n_2+n_3=92$)
Marginal and small (0- 4.9)	16.7	18.8	34.1	26.1
Semi-medium (5.0- 9.9)	32.4	27.1	40.9	33.7
Large (10.0 and above)	50.9	54.2	25.0	40.2
<i>Mean of Operational holding</i>	11.0	11.9	8.1	10.1
<i>(SD)</i>	(7.1)	(7.9)	(7.6)	(7.9)
<i>Median</i>	10.0	10.0	6.0	7.5

Source: Computed from primary survey

Note. Units in per cent and have been calculated on column sums

³³ Visualization of histogram and the results of K-S test were significant ($p < 0.05$) for operational holdings for both the crop, indicated that data was not normally distributed. Hence, non-parametric mann-whitney test was used to check whether median values are significantly different from each other. For CGP, Mann-Whitney test results indicated that holding size (acres) were significantly different for CF ($Mdn = 9$) and NCF ($Mdn = 5.8$), $U = 2262.5$, $Z = -3.32$, $p = 0.00$, $r = 0.25$. For onion, Mann-Whitney test results indicated that holding size (acres) were significantly different for CF ($Mdn = 10$) and NCF ($Mdn = 7.5$), $U = 4300$, $Z = -1.64$, p (1-tail) = 0.05. However, the effect size is small, as $r = -0.12$.

Table 6.12: Preference of contracts based on holding size

Farm size categories (acres)	CF	NCF	Total
CGP			
Marginal and small (0.0 - 4.9)	33.3	66.6	100.0 (<i>n</i> =42)
Medium (5.0 - 9.9)	45.6	54.4	100.0 (<i>n</i> =68)
Large (10.0 and above)	64.7	35.3	100.0 (<i>n</i> =68)
Onion			
Marginal and small (0.0 - 4.9)	42.9	57.1	100.0 (<i>n</i> =42)
Medium (5.0 - 9.9)	53.0	47.0	100.0 (<i>n</i> =66)
Large (10.0 and above)	59.8	40.2	100.0 (<i>n</i> =92)

Source: Computed from primary survey (2012-13)

Note. Figure in per cent and have been calculated on row sums.

6.2.2 Sources of irrigation

Most of the CGP, CF and NCF households (97% and 94% respectively) had some source of irrigation on their holding. Similarly, all the onion farm households had some source of irrigation on their holding. Open well was the source of irrigation for almost all the farmers (of both the crops) who had access to irrigation. In the case of CGP, apart from an open well as a source of irrigation, 14% of CF, 21% of ACF, and 18% of NNCF owned at least one tube-well. In the case of onion, 49% of CF, 39% of ACF, and 30% of NNCF owned at least one tube-well.

For CGP, the average percentage of irrigated land to operational landholding for the CF is 66%, which is 9% lower than NCF. For the onion, it was 89% for both CF and NCF (Table 6.13). For CGP, the percentage of irrigated land to operation landholding was higher for the sample in Satara compared to Pune.

Table 6.13: Average percentage of irrigated land to operation landholding

Crop	CF	NCF		Sub-total
		ACF	NNCF	
CGP	66	74	76	75
Onion	89	88	89	89

Source: primary survey

6.2.3 Characteristics of operational holding

For CGP and onion, the average of gross irrigated area (GIA), gross cropped area (GCA), net sown area (NSA), and cropping intensity was nearly same for CF and NCF

(Table 6.14 and Table 6.16). However, in the case of CGP, the average GIA of CF was 11.2 acres, for ACF was 13.7 acres, and NNCF was 8.7 acres. Similarly, the average GCA of CF was 11.7 acres, for ACF was 14.4 acres and NNCF was 8.7 acres. The average NSA of CF was 6.3 acres, for ACF was 7.6 acres, and NNCF was 4.9 acres. Cropping intensity of CF was 188%, for ACF was 201%, and NNCF was 182% (Table 6.14). Similarly, in the case of onion, average GIA, GCA, and NSA was highest in the case of ACF, followed by CF and then NNCF (Table 6.16). However, the cropping intensity of onion farmers CF was 174%, for ACF was 181%, and NCF was 182% (Table 6.16). Thus, for both crops, overall, the intensity of cultivation was highest in the case of ACF followed by CF and NNCF.

Table 6.14: Selected indicators of land-use pattern of holdings of CGP farmers

Particulars (acres)		CF	NCF		Subtotal
			ACF	NNCF	
Gross irrigated area	Mean	11.2	13.7	8.7	10.6
	(SD)	8.4	11.7	10.4	11.1
	Median	9.3	10.0	6.0	7.5
Gross cropped area	Mean	11.7	14.4	8.9	11.0
	(SD)	8.5	11.7	10.6	11.3
	Median	9.6	10.0	6.4	8.0
Net sown area	Mean	6.3	7.6	4.9	5.9
	(SD)	4.4	6.4	5.5	6.0
	Median	5.0	6.0	3.5	4.5
Cropping intensity (percent)	Mean	187.7	200.9	181.6	188.8
	(SD)	34.1	59.2	30.9	44.3
	Median	194.7	197.4	187.7	188.9

Source: Computed from primary survey (2012-13)

Table 6.15: Mann-Whitney Test statistics for selected indicators of land use pattern, CGP

Particular	Contracting Status	Mean Rank	<i>U</i>	<i>p</i> (1-tail)	<i>r</i>
Gross irrigated area	CF	95.77	3403	.05	.12
	NCF	83.23			
Gross Cropped Area	CF	96.62	3327	.03	.14
	NCF	82.38			
Net Sown Area	CF	96.57	3331	.03	.14
	NCF	82.43			
Cropping Intensity	CF	91.46	3787	.31	.04
	NCF	87.54			

Source: computed from primary survey (2012-13)

Note. *U*: Mann-Whitney test value; *p* (1-tail) value <.05 is statistically significant and <.01 is highly statistically significant; *r*: effect size

As these variables did not follow normal distribution, Mann-Whitney tests were used to verify whether they differ across CF-NCF groups.

Table 6.15 and 6.17 presents the Mann-Whitney Test statistics for GIA, GCA, NSA, and cropping intensity for CGP and onion crop respectively. The third column of Tables 6.15 and 6.17 provides us the mean ranks³⁴ of the variable group wise. Overall, medians of GIA, GCA, and NSA were significantly higher in the case of CGP CF compared to NCF. However, cropping intensity was not significantly different from each other. While for onion, Mann-Whitney test results indicated that except NSA, all other indicators (i.e., GIA, GCA, and cropping intensity) were significantly not different between CF and NCF.

Table 6.16: Descriptive statistics of selected indicators of land-use pattern, onion

Particulars (acres)			CF		NCF	
				ACF	NNCF	Subtotal
Gross irrigated area	Mean	17.3	19.6	13.2	17.0	
	(SD)	(12.2)	(14.4)	(12.8)	(13.0)	
	Median	14.3	15.0	9.1	12.9	
Gross cropped area	Mean	18.0	20.1	13.5	17.6	
	(SD)	12.0	14.1	13.2	13.0	
	Median	15.6	18.0	10.0	15.0	
Net sown area	Mean	10.4	11.1	7.6	10.0	
	(SD)	6.7	7.5	7.3	7.1	
	Median	9.0	9.0	5.8	8.0	
Cropping intensity (percent)	Mean	173.9	180.1	182.9	177.4	
	(SD)	31.2	24.0	42.8	32.6	
	Median	180.9	187.5	188.8	185.0	

Source: Computed from primary survey

Table 6.17: Mann-Whitney Test statistics of selected indicators of land use pattern, onion

³⁴ Mann-Whitney test relies on scores being ranked from lowest to highest; therefore, the group with the lowest mean rank is the group with the greatest number of lower scores in it and vice-versa. This is helpful in interpreting the results.

Particular	Contracting status	Mean Rank	<i>U</i>	<i>p</i> (1-tail)	<i>r</i>
Gross irrigated area	CF	104.72	4512	0.13	-0.08
	NCF	95.54			
Gross Cropped Area	CF	105.45	4434	0.10	-0.09
	NCF	94.69			
Net Sown Area	CF	106.92	4275	0.04	-0.12
	NCF	92.97			
Cropping Intensity	CF	105.53	4506	0.13	-0.08
	NCF	96.22			

Source: Computed from primary survey (2012-13)

Note. *p* (1-tail) value <.05 is statistically significant at 5% significance level; *r*: effect size

6.2.4 Farming and Crop experience

It is important to understand the role farming and crop experience plays in understanding participation aspects of contract farming. If younger farmers or farmers with limited farming or crop experience adopt new variety of crops that is a sign of inclusiveness aspect of contract farming, as it helps farmer's gain new skills and knowledge. Moreover, according to Staal et al. (2002), longer farming experience predisposes farmer to better farming techniques through learning by doing. Thus, whether only farmers with longer farming experience participate in onion and CGP contract farming is examined below.

Category-wise distribution of farming and crop experience of the CGP farmers as per the CF, ACF, and NNCF groups has been presented in Table 6.18. The average farming experience of the CGP CF, ACF, and NNCF was 23, 26, 21 years respectively. Around half of the farmers belonging to CF, ACF, and NNCF, had farming experience in the range of 11-25 years. While 23% of CF and NNCF had farm experience of less than ten years. Within ACF farmers, 6% had farm experience of less than 10 years and while 43% have been farming for more than 25 years. Therefore, it seems more experienced farmers are the ones who have left CF. This finding is also supported when the average years of experience of respondents of growing potato (inclusive of both table and CGP variety), presented in Table 6.18 is seen. Average potato crop experience of CF, ACF, and NNCF was 12, 19, 14 years respectively. Around 55% of the ACF had more than 16 years of experience of growing potato (inclusive of both table and CGP variety), while for CF it was only 19%. Around 44% of CF had experience of less than eight years of growing potato, compared to 24% in ACF and NNCF respectively. Therefore, the

farmers who are less experienced in growing potato are associated with growing CGP under contract.

Table 6.19 shows that 64% of less experienced potato growers (i.e., grew potato for eight years or less) grew CGP under contract in 2012. Similarly, more than two-third of experienced potato growers (i.e., grown potato for more than 16 years) within the total sample grew CGP without a contract. Years of experience of growing potato was significantly higher for NCF ($Mdn = 13$) compared to CF ($Mdn = 10$), $U = 2822$, $p < .001$, $r = -.25$.

Table 6.18: Farming and Crop Experience, CGP

Particulars	CF	NCF		
	($n_1=89$)	ACF ($n_2=33$)	NCF' ($n_3=56$)	NCF [($n_2 + n_3$)=89]
Farm experience (years)				
0 – 10	23.6	6.1	23.2	16.9
11 – 25	46.1	51.5	50.0	50.4
More than 25	30.3	42.4	26.8	32.6
Mean	3.0	26.2	20.5	22.6
(SD)	(12.5)	(11.5)	(11.1)	(11.6)
Median	20	22	17	20
Potato crop (including CGP) experience (years)				
0 – 8	43.8	24.2	25.0	24.7
9-16	37.1	21.2	42.9	34.8
More than 16	19.1	54.5	32.1	40.4
Mean	11.7	19.3	14.4	16.2
(SD)	(9.3)	(11.7)	(9.2)	(10.4)
Median	10	19	12	13

Source: Computed from primary survey (2012-13)

Note. Figures in per cent and have been calculated on column sums

Table 6.19: Farming and crop experience, CGP (Outflow Table)

Particulars	CF	NCF	Total
Farm experience (years)			
0 – 10	58.3	41.7	100.0 ($n=36$)
11-25	47.7	52.3	100.0 ($n=86$)
More than 25	48.2	51.8	100.0 ($n=56$)
Weighted Mean	23.2	24.3	
(SD)	(12.7)	(11.7)	

Potato crop experience (years)			
0 – 8	63.9	36.1	100.0 (<i>n</i> =61)
9-16	51.6	48.4	100.0 (<i>n</i> =64)
More than 16	32.1	67.1	100.0 (<i>n</i> =53)
Weighted mean	11.8	18.8	
(<i>SD</i>)	(7.6)	(10.1)	

Source: Primary survey (2012-13); *Note.* Units are in percent and have been calculated on row sums; '*n*' indicates sample belonging to the respective row attribute.

Percentage distribution of farming and crop experience of onion growers as per the CF, ACF, and NNCF groups has been presented in Table 6.20. The average farming experience of CF, ACF, and NNCF was 25, 24, 27 years respectively. Around half of the onion CF have farming experience in the range of 16-30 years. The percentage of farmers having farming experience of more than 30 years were lower in CF (i.e., 25%) compared to NNCF (i.e., 39%). About 37% of the NNCF have farming experience of more than 30 years compared to 25% of CF. Therefore, it seems more experienced farmers are reluctant to grow company's onion in the contract. This finding is also supported when the years of experience of respondents of growing onion, presented in Table 6.20 is seen. Average onion crop experience of CF and ACF was 14.9 years compared to 18.2 years of NNCF. While the weighted average of onion crop experience of CF and NCF was 14.9 and 16.4 years respectively. Similarly, median onion crop experience of NNCF was 16 years compared to 11.5 years of CF. One-third of the CF had experience of growing onion of less than eight years compared to 21% of NNCF. Similarly, 62% of less experienced growers (i.e., grown onion for less than eight years) grew onion without a contract.

Overall from the both crops survey, it seems less experienced farmers are more likely to be associated with the contract. As per the discussion with farmers, the reason being they have less crop and market knowledge, and the production and price risks are higher in the non-contract production of these crops. Hence growing crop under contract is associated to be less risky as firm assist in production, by enhancing farmers' capabilities like the adoption of irrigation systems and good agricultural practices. With MGP, farmers' price risks are covered.

Table 6.20: Farming and Crop Experience (years) of Onion Farmers

Particulars	CF	NCF		
	($n_1=108$)	ACF ($n_2=48$)	NNCF ($n_3=44$)	NCF ($n_2+n_3=92$)
Farm experience (years)				
0 – 15	25.0	35.4	25.0	30.4
16 - 30	49.1	37.5	36.4	37.0
More than 30	25.9	27.1	38.6	32.6
Mean	24.8	23.7	27.0	25.2
(SD)	12.2	11.8	14.2	13.0
Median	25.0	24.0	25.0	25.0
Onion crop experience (years)				
0 – 8	34.3	29.2	20.5	25.0
9-16	25.9	35.4	31.8	33.7
More than 16	39.8	35.4	47.7	41.3
Mean	14.9	14.8	18.2	16.4
(SD)	10.5	9.4	11.9	10.7
Median	11.5	12.0	16.0	14.0

Source: Computed from primary survey

Note. Figures in per cent and have been calculated on column sums

Table 6.21: Farming and crop experience, Onion (Outflow Table)

Particulars	CF	NCF	Total
Farm experience (years)			
0 – 10	49.1	50.9	100.0 ($n=55$)
11-25	60.9	39.1	100.0 ($n=87$)
More than 25	48.3	51.7	100.0 ($n=58$)
Onion crop experience (years)			
0 – 8	61.7	38.3	100.0 ($n=60$)
9-16	47.5	52.5	100.0 ($n=59$)
More than 16	53.1	46.9	100.0 ($n=87$)

Source: Computed from primary survey

Note. Units are in percent and have been calculated on row sums; 'n' indicates sample belonging to the respective row attribute.

Table 6.22: Mann-Whitney test statistics for farm and onion crop experience

Particulars	Mann-Whitney U	Z	p (1-tail)	r
Farming experience	4934	-0.08	0.47	-0.01
Onion crop experience	4512	-1.12	0.13	-0.08

Source: Computed from primary survey

Note. r : effect size

6.2.5 Cropping Pattern

The cropping pattern seems to be similar across the CGP and onion sample growers. Within the total CGP sample (CF, ACF, and NNCF), on an average almost half of the GCA was allotted to foodgrains (rice, wheat, coarse cereals, and pulses) while rest half to cash crops (Table 6.23). It is observed that CGP is the dominant crop for sample farmers in Kharif season, which was followed by jowar in Rabi season. About 61% of the sample were growing cash crop other than CGP.

The weighted average percentage of CGP area of the total Kharif area was 66.9% and 69.4% for CF and NCF respectively. In Pune, on an average, more than three-fourth of the total Kharif area of CF, ACF, and NNCF consisted of CGP. Whereas in Satara, 50%, 71% and 56% of the total Kharif area of CF, ACF and NNCF respectively, was allotted to CGP (Table 6.25).

The weighted average area under CGP was 3.9 acres for CF and 3.6 acres for NCF. In the case of Pune, the average CGP acreage was 5.4 acres for CF, 6 acres for ACF' and 2 acres for NNCF. Similarly, in Satara, the average CGP acreage was 2.5 acres for CF, 2.6 acres for ACF and 1.7 acres for NNCF

Table 6.24). One of the important reasons for higher CGP acreage is that CGP cultivation in Pune started extensively from 2002-03 compared to 2006-07 in Satara. Also, the environmental climate and market conditions for CGP cultivation are more favorable in Pune CGP cultivating areas compared to Satara. In Pune, there are many players apart from Pepsico which purchase CGP through many agents. Another important point to be noted is that CGP acreage is higher for CF and ACF, while it is very low for NNCF. Thus, those farmers who have larger acreage under CGP are either CF or ACF. Larger CGP acreage means larger investment and risks. Thus these farmers grow CGP under contract to address the production and market risks.

Table 6.23: Percentage distribution of overall acreage of GCA, CGP farmers

Particulars	CF	NCF		Sub-total
		ACF	NNCF	
CGP				
Food crops	49	49	54	52
Cash crops	51	51	46	48
Onion				
Food crops	20	24	21	23
Cash crops	80	76	79	77

Source: Computed from primary survey

Table 6.24: Average CGP acreage (acres) district wise

District	CF	NCF		
		ACF	NNCF	Sub-total
Pune	5.4	6.0	2.0	4.2
Satara	2.5	2.6	1.7	1.9
Total	3.8	5.0	1.8	3.0

Source: Computed from primary survey (2012-13)

Table 6.25: Percentage share of CGP acreage out of kharif area and GCA, CGP

Particulars	District	CF	NCF		
			ACF	NNCF	Sub-total
CGP area of kharif area	Pune	78	76	76	76
	Satara	56	71	50	54
	Total	66	75	59	65
CGP area out of GCA	Pune	40	39	39	39
	Satara	28	33	23	25
	Total	34	37	29	32

Source: Computed from primary survey (2012-13)

Table 6.26: Percentage share of jowar acreage out of Rabi area and GCA, CGP

Particulars	District	CF	NCF		
			ACF	NNCF	Sub-total
Jowar area out of total rabi area	Pune	87	77	90	83
	Satara	76	63	66	66
	Total	81	73	75	74
Jowar area out of GCA	Pune	42	37	45	41
	Satara	34	37	35	35
	Total	37	37	38	38

Source: Computed from primary survey (2012-13)

The other crops grown by CGP growers during the kharif season are rice, corn, bajra, groundnut, vegetables, and pulses. There were only four farmers from the sample within Pune and none from Satara district who were also growing table variety potato. The share of Jowar in Rabi season was 81% for CF, 73% for ACF and 75% for NNCF. The share of jowar in GCA was around 38% for both CF and NCF (

Table 6.26). The other crops grown in Rabi are wheat, red onion, corn, and vegetables. There were no perennial crops grown by Pune sample growers. However there were quite a few growers in Satara district growing sugarcane and ginger.

In the case of onion, cotton is a dominant crop grown, comprising of 41% of GCA followed by onion with 22% of GCA. Cropping pattern seems to be similar across sample growers (Table 6.27). Within the total sample, on an average 21% of the GCA

was allotted to food crops (rice, wheat, corn, coarse cereals, and pulses) while rest to cash crops. The average percentage of onion area of total Rabi area was 37% in case of CF and NNCF and 26% for ACF. The average Kharif and Rabi acreage for onion farmers is presented in Table 6.28. The Rabi onion acreage is higher compared to Kharif onion acreage. The average Rabi onion acreage was 1.9 acres, 1.5 acres, and 1.1 acres for CF, ACF, and NNCF respectively Table 6.28.

Table 6.27: Percentage distribution of overall acreage, Onion farmers

Particulars	CF	NCF		Sub-total
		ACF	NNCF	
Food crops out of GCA	19.6	24.1	21.4	22.8
Cash crops out of GCA	80.4	75.9	78.6	77.2
Cotton out of GCA	40.7	42.9	38.7	40.9
Onion out of GCA	22.2	18.4	25.7	21.9
Onion out of Rabi	37.0	26.0	36.5	31.0

Source: Computed from primary survey

Note: percentage is for the whole reference year

Table 6.28: Average onion acreage (acres) season-wise, 2011-12

Season	CF	NCF		Sub-total
		ACF	NNCF	
Kharif	1.4	1.5	1.1	1.3
Rabi	1.9	1.6	1.5	1.6

Source: Computed from primary survey

The other crops grown by sample growers during Kharif season are bajra, groundnut, mung (bean), corn, and vegetables. The other crops grown in Rabi are wheat, groundnut, corn, and vegetables. There were few famers who had orchard or sugarcane Overall, there were no major differences in cropping pattern across sample. However, intensity of Rabi onion cultivation was higher among CF compared to NCF³⁵.

6.3 Determinants of contract farming participation – Logit regression

6.3.1 Analysis Plan

The determinants of participation in the contract farming (compared to the non-contract which is also referred as without contract) using the logit regression model for both the crops are modelled separately. The strategy was adopted whereby initially, variables were identified with a careful thought (literature review and field observations) that would influence the probability of farmers' participation in contract farming. This

³⁵ Mann-Whitney test results indicated that onion Rabi acreage (acres) were significantly different for CF ($Mdn = 1.50$) and NCF ($Mdn = 1.12$), $U = 4141$, $Z = -2.04$, $p = 0.04$.

involved running a preliminary logit model whereby all the intuitively relevant variables regardless of their statistical significance were included. However, the problem with this strategy is that the resulting model may be over fit producing unstable results, i.e., large estimated co-efficient and standard errors (Hosmer & Lemeshow, 2000). As suggested by Hosmer and Lemeshow, it is important to review all variables added to model critically before a decision is reached regarding the final model. The strategies suggested in Hosmer and Lemeshow for the variable selection for the participation model were adopted. The univariable analysis was conducted, whereby contracting status was dependent variable and each independent variable in the preliminary model was explanatory variable of the logit model. Any variable whose univariable test has a p -value < 0.25 was included in the final model. This strategy allows the suspected variables to become candidates for inclusion in the model (p. 95). Thus, after identifying the significant variables and also those variables which are important from a theoretical perspective, the final logit model was run. The general Logit model takes the form

$$A_i = F(B_i, H_i, R_i) + \varepsilon_i \dots \dots \dots (1)$$

In the above equation (1), A_i is a binary variable that shows the farmers' choice of contract farming = 1, and without contract or non-contract = 0. Where B_i, H_i, R_i are the vector of the regressors viz. farmer characteristics, household characteristics, and farm-related characteristics, respectively. The regressors of the participation model and the empirical results have been explained in the section 6.3.2.

The parameters estimated in this equation have been estimated by the maximum likelihood method using the IBM SPSS 20.0. As suggested in Field (2009), after the final model selection, the assumption of linearity of continuous predictors and no multicollinearity among all predictors were checked. For testing the assumption of no multicollinearity, statistics such as the tolerance and variance inflation factor (VIF) were obtained by simply running a linear regression analysis using the same outcome and predictors. Linearity assumption was checked by running the final logit regression, whereby also including predictors that are the interaction between each continuous predictor and the log of itself.

6.3.2 Description of variables

The dependant variable a binary variable that shows the farmers' contracting status (contract farming =1, non-contract = 0) and the regressors in participation equation are

chosen through the literature review and field observations. The concepts of farmers', households and farm characteristics as explanatory variables, which are discussed in the following subsections. The participation model developed explains the relationship between contract farming participation and farmers', household's and farm characteristics. Overall, the description of variable and their anticipated relationship with contract farming participation is presented in Table 6.29

6.3.2.1 Farmer characteristics

- a) Farmers age, farming and crop experience: These variables have ambiguous expectations, on the one hand, it is expected that as the farmer ages or experienced, he/she is more reluctant to change his/her choice of market channel. Therefore if the farmer has been growing the traditional variety of crop and selling to the traditional market channel for a long period, he/she is reluctant to take up a new variety cultivation under a new marketing channel. On the other hand, as the farmer ages, he/she has more experience thus, being able to adapt to more demanding market conditions (Hernández, 2009).
- b) Years of schooling: This variable is expected to positively associate contract farming participation. As education increases, farmers can learn and shall be willing to adopt new technologies (Feder et al., 1985; Hernández, 2009).

6.3.2.2 Household characteristics

- c) Household size: According to Hernández, the more available household labor will increase the probability of participating in presumably more labor demanding market channels. As contract farming demands good quality produce which in turn requires greater attention of farmers. Thus, household size has positive association with the probability of participation in CFAs.
- d) Access to non-farm income/own livestock: According to Feder et al. (1985, p. 278), non-farm income helps to overcome working capital constraint or funding any fixed investment. Thus, this variable is likely to have positive influence on contract farming participation, as contract farming may encourage farmers to adopt modern technologies, which may require some investment.

Similarly, livestock ownership is related to access to subsidiary income which is likely to overcome working capital constraints of farming.

- e) House type: House owned by farmer could be kucha i.e., mud or cow dung etc. or that which is made of stones, bricks and with cement, Pucca house indicate that the household is affluent. With higher wealth, there is a reduction of degree of risk aversion. As CGP cultivation, involves higher investments, thus, it is expected to have positive association with contract farming participation.
- f) Credit constraint: Credit constraintness is likely to restrict the farm investments as well as ability to grow cash crop as they entail high working capital. As CGP CF receive crop loan of Rs. 25, 000 and above hence CUFH are likely to be under contract. Also, cost of cultivation is lower in growing table variety onion compared to JISL onion. Therefore, CUFH are likely to be under contract

6.3.2.3 Farm related characteristics

- g) Operational holding: Operational holding denotes production resource endowment of the farmer. Farmers with large landholding would be willing to grow cash crops in higher intensity. Therefore, this variable to have the positive influence on the probability of participation in contract farming. The categorical variable for operational landholding, i.e., distribution of the sample is done in three size categories (marginal and small: < 5.0 acres, medium: 5.0 – 9.9 acres, and large: 10 acres and above) have been included.
- h) GCA and reference crop area: GCA and reference crop acreage denotes intensity of overall and reference crop cultivation respectively. These variable to have positive influence in probability of participation in contract farming. As higher the CGP and onion cultivation, higher are the investments, thus farmers shall like to reduce their risk coverage by participating in contact.
- i) Agriculture assets: Greater agriculture assets would mean greater agriculture capacities to grow cash crops and for intensive cultivation, which would positively influence probability of participation in contract farming. As this variable was not normally distributed, the variables were sub-divided into three

categories for CGP viz. less than Rs. 30000; Rs. 30,001 - 1,00,000; and above Rs. 1,00,000; for onion viz. less than or equal to Rs. 25000; Rs. 25,001 - 50,000; and above Rs. 50,000

- j) Farm to road distance: This variable has ambiguous expectations, with the farm being further from the road, leads to higher costs of the farmer on getting inputs and selling the output. Thus, the further farm is away from the road, more likely he is to join contract farming, as firm provides inputs and make procurement arrangements from the farm. Another argument is that further, the farm is away from the road, the contracting firm may not be keen to initiate a contract due to additional transaction cost expenditure.

Table 6.29: Description of explanatory variables of participation model

Variables	Variable Description	Anticipated sign	
Farmer characteristics			
Age (years)	21-40 = 0RC 41-55 = 1 >55 = 2	+/-	
Years of schooling	No formal schooling/primary = 0 RC Secondary schooling = 1 Higher secondary schooling =2	+/-	
Farm experience (years)	CGP 0-10 = 0RC 11-25 = 1 >25 = 2	Onion 0-15 = 0RC 16-30 = 1 >30 = 2	-
Crop experience	0-8 = 0RC 9-16 = 1 >16 = 2	-	
Household characteristics			
Household size	Continuous		
Access to non-farmer income	No = 0 RC 1 = yes	-	
Owens Livestock	No = 0 RC 1 = yes	+/-	
House type	Kucha= 0 RC Pucca = 1	+/-	
Credit constrained	No = 0 RC 1 = yes	+	
Farm related characteristics			

Operational holding*	Marginal & small = 0 RC Medium = 1 Large = 2	+/-	
GCA (acres)	Continuous	+	
Reference crop (acres)	Continuous	+	
Farm to road distance(km)	Continuous	+	
Agricultural assets (Rs.)	CGP <=30,000 = 0 RC 30001–100000=1 >100000 =2	Onion <=25000 = 0 RC 25001– 50000=1 >50000=2	+

Note: * Marginal & small = <5acres; medium 5.0 = 9.9 acres; large = >=10 acres.

RC = reference category

6.3.3 Results

The Preliminary results of the estimated logit model for CGP and onion are presented in Table 6.30 and Table 6.32. As noted in Swain (2012, p. 178), that though signs and significance of the coefficient are simplest way to interpret Logit model, inferring odd ratio (along with its confidence interval) are important. Hosmer and Lemeshow (2000) point out:

“Estimated coefficients for the independent variables represent the slope (i.e., the rate of change) of a function of the dependent variable per unit of change in the independent variable. Thus, interpretation involves two issues: determining the functional relationship between the dependent and independent variable, and appropriately defining unit of change in the independent variable (p. 47). While odd ratio is a measure of association, as it approximates how much more likely (or unlikely) is the outcome to be present among those with $x = 1$ than those among $x = 0$ ” (p. 50).

A positive co-efficient means that odds of observing a higher participation in contract farming increase with a higher value of the independent variable. While a negative co-efficient has exponentiated value between 0 and 1 which decreased the odds (Swain, 2012).

Of the 14 explanatory variables in preliminary CGP participation model (Logit), five variables viz. crop experience, livestock ownership, operational holding, GCA, and

CGP acreage were found to be statistically significant³⁶. Model chi-square test³⁷ was found to be significant and Hosmer and Lemeshow (H-L) test³⁸ not significant which indicates that model has adequate fit. Also overall model had predictive accuracy of 73%, which is considered to be good.

Table 6.30: Preliminary CGP participation model (Logit)

Variables in the Equation			B	S.E.	Wald	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Farmer Characteristics	Age (years)	41_55	.50	.47	1.12	.29	1.65	.65	4.17
		>55	.54	.58	.87	.35	1.71	.55	5.33
	Schooling	secondary	-.64	.52	1.54	.21	0.53	.19	1.45
		higher secondary	-.56	.63	.80	.37	0.57	.17	1.96
	Crop experience (years)	9-16***	-.82	.46	3.19	.07	0.44	.18	1.08
		>16*	-2.51	.64	15.24	.00	0.08	.02	.29
	Farm experience (years)	11-25	-.11	.52	.05	.82	0.89	.32	2.45
		>25	.03	.71	.00	.97	1.03	.25	4.13
Household characteristics	HH Size (units)		-.11	.08	1.76	.18	0.90	.76	1.05
	Access to non-farm income		-.53	.44	1.43	.23	.59	.25	1.40
	Owns livestock***		1.25	.77	2.65	.10	3.51	.77	15.90
	Credit constraint		.14	.44	.09	.76	1.15	.48	2.72
	House type (Pucca)		.34	.46	.54	.46	1.40	.57	3.43
Farm related Characteristics	Operational holding	Medium**	1.11	.56	3.97	.05	3.03	1.02	8.99
		Large*	1.85	.64	8.36	.00	6.39	1.82	22.45
	GCA (acres)**		-.08	.04	4.51	.03	.93	.87	.99

³⁶ Statistical significance is based on Wald statistic. In logit regression, Wald statistic has a special distribution known as the chi-square distribution. Like the *t*-test in linear regression, the Wald statistic tells us whether the β coefficient for that predictor is significantly different from zero. Wald statistic = $\beta / S.E.$ β . If the p-value of Wald statistic is less than 0.05, then that coefficient is significantly different from zero (Field, 2009, p. 287).

³⁷ It is statistical test of the null hypothesis that all the predictor coefficients are zero. It is equivalent to the overall *F* test in linear regression.

³⁸ Hosmer and Lemeshow³⁸ (H-L) test of goodness of fit is similar to a Chi Square test, and indicates the extent to which the model provides better fit than a null model with no predictors, or, in a different interpretation, how well the model fits the data.

istics	CGP acreage (acres)*		.30	.10	8.67	.00	1.34	1.10	1.64
	Farm to road distance(km)		.18	.18	.98	.32	1.19	.84	1.70
	Agricultural assets	30,001 -10,000	.09	.45	.04	.84	1.10	.45	2.68
>1,00,000		-.01	.55	.00	.99	.99	.34	2.90	
Constant			-.63	1.11	.32	.57	.53		
Hosmer and Lemeshow test : 4.0 (.86)					Chi-square value: 49.0 (.00)				
-2 Log likelihood : 197.8					Total percent correct classification: 73%				

Note: *,**, and *** indicate variables are significant at 1, 5, and 10% respectively; N = 178, CF =89, NCF = 89

After initially running the preliminary model, the final modal was ran with only ten predictors excluding the variables in the Table 6.30 that have high p-values and also on the basis of univariable analysis. The final CGP participation model is presented in Table 6.31.

Table 6.31: Final CGP participation model (Logit)

Variables in the Equation			B	S.E.	Wald	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Farmer Characteristics	Age (years)	41_55	.52	.44	1.41	.23	1.68	.71	3.94
		>55	.59	.51	1.38	.24	1.81	.67	4.88
	Schooling	secondary	-.68	.49	1.88	.17	.51	.19	1.34
		higher secondary	-.64	.57	1.28	.26	.53	.17	1.60
	Crop experience (years)	9-16***	-.91	.43	4.48	.03	.40	.17	.93
>16*		-2.58	.58	19.77	.00	.08	.02	.24	
Household characteristics	HH Size (units)		-.11	.08	1.75	.19	.90	.77	1.05
	Access to non-farm income		-.50	.42	1.38	.24	.61	.26	1.39
	Owns livestock***		1.29	.74	3.04	.08	3.64	.85	15.58
Farm related Characteristics	Operational holding	Medium**	1.02	.51	4.00	.05	2.79	1.02	7.61
		Large*	1.79	.61	8.62	.00	5.96	1.81	19.66
	GCA (acres)**		-.08	.03	4.85	.03	.93	.87	.99
	CGP acreage (acres)*		.29	.10	9.14	.00	1.34	1.11	1.61
	Farm to road distance(km)		.17	.18	.96	.33	1.19	.84	1.68
Constant			-.34	.94	.13	.72	.71		
Hosmer and Lemeshow test : 10.6 (.22)					Chi-square value: 48.1 (.00)				
-2 Log likelihood : 198.6					Total percent correct classification: 73.6%				

Note: *,**, and *** indicate variables are significant at 1, 5, and 10% respectively; N = 178, CF =89, NCF = 89

There is not much difference in the preliminary and final model as the predictive accuracy percentage and the significant variables are the same. Except that final model has lesser variables and lower standard errors. Of the 10 explanatory variables in CGP participation model (Logit), five variables viz. crop experience, livestock ownership, operational holding, GCA, and CGP acreage were found to be statistically significant. As in preliminary model, model chi-square test was found to be significant and H-L test not significant which indicates that model has adequate fit. The final CGP participation model also satisfied the assumption of linearity of continuous predictors and no multicollinearity among all predictors.

In case of onion, of the 14 explanatory variables in preliminary CGP participation model (Logit), three variables viz. farm and crop experience, and Rabi onion acreage were found to be statistically significant. Both Model chi-square and H-L test were insignificant. The overall model had a predictive accuracy of 61.5%.

Table 6.32: Preliminary onion participation model (Logit)

Variables in the Equation			B	S.E.	Wald	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Farmer Characteristics	Age (years)	41_55	.18	.41	.20	.65	1.20	.54	2.67
		>55	.51	.60	.74	.39	1.67	.52	5.37
	Schooling	secondary	.11	.38	.08	.77	1.12	.53	2.37
		higher secondary	.55	.43	1.61	.20	1.73	.74	4.03
	Crop experience (years)	9-16**	-.86	.44	3.85	.05	.42	.18	1.00
		>16***	-.82	.46	3.25	.07	.44	.18	1.07
Farm experience (years)	16-30**	.92	.47	3.83	.05	2.52	1.00	6.33	
	>30	.81	.64	1.60	.21	2.26	.64	7.97	
Household characteristics	HH Size (units)		-.06	.08	.63	.43	.94	.81	1.09
	Access to subsidiary income		.41	.33	1.51	.22	1.50	.79	2.86
	Owns livestock		-.11	.75	.02	.89	.90	.21	3.89
	Credit constraint		.20	.35	.33	.56	1.22	.62	2.43
	House type (Pucca)		-.18	.37	.23	.63	.84	.40	1.74
Farm related Characteristics	Operational holding	Medium	.32	.44	.53	.47	1.38	.58	3.29
		Large	.86	.58	2.17	.14	2.36	.75	7.40
	GCA (acres)		-.03	.02	2.57	.11	.97	.93	1.01
	Onion Rabi area (acre)***		.35	.18	3.63	.06	1.42	.99	2.03
	Farm to road distance(km)		.00	.10	.00	.97	1.00	.82	1.21

	Agricultural assets	25001 -50000	-.57	.40	2.05	.15	.56	.26	1.24
		>50000	.26	.49	.28	.60	1.29	.49	3.39
	Constant		-.88	1.12	.62	.43	.42		
Hosmer and Lemeshow test : 4.6 (.8)					Chi-square value: 25.4 (.19)				
-2 Log likelihood : 250.7					Total percent correct classification: 61.5%				

Note: *, **, and *** indicate variables are significant at 1, 5, and 10% respectively; N = 200, CF =108, NCF = 92

After initially running the preliminary onion participation model, the final modal was ran with only eight predictors. The final onion participation model is presented in Table 6.33. As shown in the Table 6.32, the estimated coefficients and odd ratios of the crop experience categories (9-16 and 16> years) were similar. With the thought of parsimony, crop experience with a dichotomous covariate coded “0 for 0-8 years and 1 for more than 8 years” have been modelled in the final model. With lesser variables and lower standard errors in the final model of eight explanatory variables, six variables viz. farm and crop experience, operational holding, GCA, Rabi onion acreage, and agricultural assets were found to be statistically significant. Overall, predictive accuracy percentage had increased marginally to 63%. Model chi-square test was found to be significant and H-L test insignificant suggesting that model has adequate fit. The final onion participation model also satisfied the assumption of linearity of continuous predictors and no multi-collinearity among all predictors.

Table 6.33: Final onion participation model (Logit)

Variables in the Equation			B	S.E.	Wald	Sig.	Exp(B)	95% C.I. for EXP(B)		
								Lower	Upper	
Farmer Characteristics	Farm experience (years)	16-30**	.86	.41	4.41	.04	2.36	1.06	5.25	
		>30	.49	.45	1.18	.28	1.63	.68	3.95	
	Crop experience	>8 years **	-.85	.38	5.02	.03	.43	.20	.90	
		Schooling	secondary	.01	.37	.00	.97	1.01	.49	2.08
			higher secondary	.45	.42	1.14	.29	1.56	.69	3.55
Household characteristics	Access to subsidiary income		.39	.33	1.46	.23	1.48	.78	2.81	
Farm related Characteristics	Operational holding	Medium	.37	.43	.72	.40	1.44	.62	3.37	
		Large***	.94	.56	2.78	.10	2.55	.85	7.67	
	GCA (acres)***		-.04	.02	3.37	.07	.96	.93	1.00	
	Onion Rabi area (acre)***		.32	.17	3.44	.06	1.38	.98	1.94	
	Agricultural assets (Rs.)	25001-50000***	-.67	.38	3.11	.08	.51	.24	1.08	

	>50000	.18	.48	.14	.70	1.20	.47	3.09
Constant		-.38	.53	.51	.47	.68		
Hosmer and Lemeshow test : 4.0 (.86)				Chi-square value: 23.2 (.03)				
-2 Log likelihood : 252.73				Total percent correct classification: 63%				

Note: *, **, and *** indicate variables are significant at 1, 5, and 10% respectively; N = 200, CF =108, NCF = 92

Within farmer characteristics, age and schooling did not seem to influence onion and CGP farmers' participation in the contract; however inexperienced farmers are more likely to grow crop under contract. In case of both the crops CGP and onion, the odds of contract farming participation was lower as crop experience increase. For e.g., odds of a farmer being under contract in 2012 season is with contract crop experience between 9 and 16 years and 16 years and more is 0.4 times and 0.08 times likely compared to crop experience of eight years and less (Table 6.31). Similarly, odds of a farmer being under onion contract in 2011-12 Rabi season, with contract crop experience more than eight years is 0.4 times likely compared to farmers with crop experience of eight years and less (Table 6.33). In the case of CGP, farming experience variables were insignificant, whereas in onion farmers having experience of 16-30 years were 2.3 times more likely to be under contract compared to farmers having experience with 15 years and less. Whereas variable 'farmers with more than 30 years' experience were insignificant, indicating that younger and middle-aged onion farmers were more likely to grow under contract compared to elderly. The reasoning for this would be that as more experienced growers understand the crop's technical and market dynamics and thus, they are more likely to grow the crop on its own. Also for onion, more experienced and elderly farmers were hesitant to grow new crop variety. Similar, results were observed in Deshpande (2005), Ramaswami et al. (2006), Simmons et al. (2005).

In case of household characteristics, household size, access to subsidiary source of income within the household were not found to be playing a key role in farmers' contract participation for both the crops. However, for CGP, farmers having livestock were thrice likely to participate compared to those who did not have access to contract farming. Although, this variable was significant at 10% level of significance.

For farm related characteristics, operational holding and contract crop acreage were found as positive determinants for contract farming participation in both the crops. In case of CGP, odds of a farmer being under contract for medium and large category farmers were is 2.8 times and six times more likely compared to the small category.

Similarly, large onion farmers were more than twice likely to be under contract compared to small farmers, however, this variable was significant at 10% level of significance, while medium category variable was insignificant indicating that small and marginal onion farmers were equally likely to participate in contract farming. Also, with a one-acre increase in contract crop acreage for the reference season, the probability of contract farming participation increases by 30% for both CGP and onion farmers. In contrast, with a one-acre increase in GCA, the probability of CF participation decreases by 8% and 4% for CGP and onion farmers respectively.

Agricultural assets variable was insignificant in case of CGP, but for onion, as farmers asset increased, its odds of contract farming participation decreased. As farmers within the category of agricultural assets less than Rs. 25,000 were twice more likely to be under contract than farmers within the category of agricultural assets of Rs. 25,001-50,000. Thus onion farmers with lower agriculture assets were more likely to be under contract. This again reflects that contract farming helps less endowed farmers to cultivate cash crop.

6.4 Concluding remarks

Based on descriptive results of section 6.1, it was found there was no significant difference between the social group and occupational profile of CF and NCF categories for both the crops. Overall, except for agricultural assets, there were no significant differences in socio-economic and demographic indicators between CF and NCF. Thus, asset wise CF and ACF were better endowed compared to NNCF. One of the reason, for better endowment of agricultural assets among CF and ACF, is that after they had started contract cultivation, they had also started investing in assets such as MIS and sprayers.

For both the crops, descriptive statistics show that operational holding is higher in the case of CF compared to NCF. Overall for both the crops, NNCF have lower holdings within NCF compared to ACF. The distribution pattern of operational holding is similar within CF and ACF categories in both the crops. For both crops, average GIA, GCA, and NSA was highest in the case of ACF, followed by CF and then NNCF. Thus, ACF follow more intensive cultivation, compared to CF and NNCF.

CGP acreage is higher for CF and ACF, while it is very low for NNCF. Thus, those farmers who have larger acreage under CGP are either CF or ACF. Larger CGP acreage means larger investment and risks. Thus these farmers grow CGP under contract

to address the production and market risks. While the intensity of adoption of onion is highest among CF, followed by CF and NNCF.

CGP ACF has higher farming and crop experience compared to CF and NNCF. In the case of onion, it is NNCF which had higher farming and crop experience. Overall from the both crops survey, it seems less experienced farmers are more likely to be associated with the contract.

NCF comprises of ACF and NNCF. While ACF is endowed better with agricultural assets and operational holdings. Thus, it seems as these farmers adopt the new crop and technologies, then later they no longer felt the need to be in the contract. The financial position of CF and ACF is better compared to NNCF as they have lower agricultural assets.

The Logit results confirmed that large category farmers and those having high contract crop acreage, and those with less crop experience have preference for contracts. One of the reasons for this is it that large CGP farmer considered contracting as a hedging mechanism, whereby they would have a guaranteed buyer, as in case price goes down large CGP growers can sell their produce to Pepsico. In the case of onion, farmers with lower agriculture assets were more likely to be under contract. Thus, contract farming seems to facilitate cash crop adoption and crop diversification even among small and farmer with lesser resource base. Results also suggest that contracting is a strategy of the farmers to reduce the risks.

The farmers' experience under contract and reasons for their participation, ACF disadoption from contracting, and why NNCF never participated in contract would be discussed in the next chapter.

Chapter 7 - Participation aspects of contract farming

In this chapter, the various aspects of contracting from farmers' perspective are discussed. This chapter is divided into two subsections. The first sub-section focuses on various aspects of contracting such as why farmers participate in contract farming and what is the profile of early adopters and followers of the farmers participating in CFAs. Benefits, problems, and overall experience of contract farmers of both the crops are also discussed. In the second sub-section, the functioning of the non-contact mode of production and risks involved in it is discussed. The reasons for disadoption and non-participation in contracting is also discussed. Overall, this chapter highlights the key points which help determine success and failures of the contract farming schemes.

7.1. Different aspects of contract farming schemes

In this Section, different aspects of contracting from farmers' perspective are discussed. Firstly, the discussion on that, contracting induces new crop adoption, which is followed by a discussion on what kind of farmers are early adopters in contract farming. Awareness of terms of the contract and how does first contact of the farmer happen with the firm. Motivating factors of farmers that induce it to join contracting, benefits, problems, and overall experience of contract farmers of both the crops are also discussed.

7.1.1. Induces new crop adoption

It was observed during the field survey, that CF induces farmers to grow cash crops. In the case of CGP cultivation, all farmers started growing CGP after it was introduced by Pepsico (I) through CF. Moreover, 36% of CF and 16% of ACF had never grown any variety of potato ever before; they directly started growing CGP under contract. It was observed that Pepsico started CF in Pune and Satara districts, within few villages in 2001-02. In Satara, CFAs started expanding 2006 onwards. According to key stakeholders³⁹ in Satara district before 2007-2008, farmers did not have any other source or alternate cash crop in the villages nearby Mhasurane region of Khatav taluka, Satara district. Farmers used to grow mostly foodgrains due to the scarcity of water. But after Pepsico (I) introduced CGP cultivation in the region, the farmer had the option to grow a short duration cash crop of 70-89 days of potato. CGP cultivation did not require much

³⁹ viz. Banking staff, traders, and elderly farmers

water, and land here (sandy brown) was conducive to grow potato. Farmers shifted from growing bajri, corn to potato in Kharif. Now they grow CGP in Kharif and grow one more crop, mostly jowar in Rabi. Earlier, farmers had low crop due to the practise of cultivating food crops. Farmers did not have finance options to grow a cash crop. As orchards or cash crop may require irrigation. When company came, it initiated the loan process by entering into the tripartite agreement. Farmers got the loan; they started getting good returns in short duration i.e. within 3-4 months. Slowly their purchasing power started increasing; inducing agricultural investments such as digging wells, MIS, and farm equipment.

For onion survey, it was observed that most of the farmers used to grow table variety onion prior to JISL CFAs. However, 19% of CF and 16% of ACF had started growing onion with JISL contract farming.

CGP CF admitted that with the advent of CFAs they have been able to shift from growing traditional cereals to the cash crop. Many of the farmers in Khatav taluka (Satara district) started growing potato for the first time. As they were getting inputs on credit, with technical guidance and MGP, they had confidence. Similar observations were reported in the case of white onion growing regions in Jalgaon and Dhule districts. Thus, overall it seems contact farming has facilitated new crop adoption.

To know the importance of contracting in crop cultivation, farmers were asked about “if they were not contracting for CGP/onion crop with the firm this season, what would be the next best option?”. In reply, 71% of CGP CF they would have been grown CGP without contract while rest 29% mentioned that they would have grown some another crop. While 48% of CF would have grown table variety onion without a contract. Rest 52% would have taken another crop viz. wheat or groundnut and not onion. Thus, the many of the CF are growing onion in Rabi season primarily due to contract farming. Thus, it can be said that contracting facilitates crop adoption and helps diversify the farm portfolio.

7.1.2. Socio-economic profile of early adopters and followers of contract farming

From the firm’s and academic perspective this section discusses, what the profile of early adopters of contract farming is. Thus, firms who want to start CFAs in new areas

can focus on early adopters that would help them expand their contract farming operations.

It was observed that overall nearly one-third of sample farmers (CF and ACF both) had grown contract crops (both onion and CGP) under contract within the three years of the beginning of the contract farming within the respective villages. These farmers were termed as early adopters, while rest were termed as followers. It would be interesting to understand who were the earlier adopters and followers of contract farming.

Age and schooling profile of CGP and onion farmers based on CF adoption categories is presented in Tables 7.1 and 7.2. Tables 7.1 and 7.2 show there are not much differences in age, schooling profile of early adopters and followers for both crops. This fact is also supported by summary statistics presented in

Table 7.6. Similarly, farm experience of early adopters and followers was found to be similar for both the crops (Tables 7.3 and 7.4).

Table 7.1: Age and schooling profile of early adopters and followers, CGP CFAs

Particulars	Early adopters (n=41)	Followers (n=81)	Total (n=122)
Age (years)			
21-40	36.6	35.8	36.1
41-55	43.9	35.8	38.5
More than 55	19.5	28.4	25.4
Type of schooling attended			
No formal schooling	2.4	9.9	7.4
Primary (I- IV)	12.2	16.0	14.8
Upper primary - secondary (V-X)	56.1	50.6	52.5
Higher secondary (XI –XII) & above	29.3	23.5	25.4

Source: Computed from primary survey (2012-13)

Note. Units in percentage and have been calculated on column sums

Table 7.2: Age and schooling profile of early adopters and followers, onion CFAs

Particulars	Early adopters (n=56)	Followers (n=100)	Total (n=156)
Age (years)			
21-40	42.9	46.0	44.9
41-55	37.5	43.0	41.0
More than 55	19.6	11.0	14.1
Type of schooling attended			
No formal schooling	8.9	7.0	7.7
Primary (I- IV)	19.6	25.0	23.1
Upper primary - secondary (V-X)	42.9	36.0	38.5
Higher secondary (XI –XII) & above	28.6	32.0	30.8

Source: Computed from primary survey

Note. units in percentage and have been calculated on column sums

Table 7.3: Farm and crop experience profile of early adopters and followers, CGP CFAs

Particulars	Early Adopters (n=41)	Followers (n=81)	Total (n=122)
Farm experience (years)			
0 – 10	22.0	25.9	24.6
11 - 25	51.2	50.6	50.8
More than 25	26.8	23.5	24.6
Potato crop (including CGP) experience (years)			
0 – 8	19.5	48.1	38.5
9-16	31.7	33.3	32.8
More than 16	48.8	18.5	28.7

Source: Computed from primary survey (2012-13)

Note. Units in percentage and have been calculated on column sums

Table 7.4: Farm and crop experience profile of early adopters and followers, onion CFAs

Particulars	Early Adopters (n=56)	Followers (n=100)	Total (n=156)
Farm experience (years)			
0 – 10	30.4	27.0	28.2
11 – 25	39.3	49.0	45.5
More than 25	30.4	24.0	26.3
Onion crop experience (years)			
0 – 8	25.0	37.0	32.7
9-16	33.9	26.0	28.8
More than 16	41.1	37.0	38.5

Source: Computed from primary survey

Note. Units in percentage and have been calculated on column sums

Early adopters of both CGP and onion contract farming had been growing respective contract crop for greater number of years compared to followers. On an average, at the time of the survey, early CGP adopters had experience of nearly 18 years

compared to 12 years of followers (Table 7.6). Less than half (49%) of the CGP early adopters had been growing potato for more than 16 years compared to 19% of the followers. Whereas, less than half (48%) of the followers had been growing potato for less than eight years compared to 20% of the early adopters (Table 7.3). . In case of onion, early adopters had experience of 17.7 years compared to 13.3 years of followers (Table 7.4)

Average holdings of CGP early adopters (14 acres) was greater than that of followers (9 acres). Moreover, 63% of early adopters were large farmers (holding of 10 acres and more) compared to 43% of followers. While for onion, average holdings of early adopters (14.2 acres) were greater than that of followers (9.7 acres). Large farmers comprised 73% of early adopters and 40% of followers (Table 7.5).

Mann-Whitney test results showed that household size, crop experience, operational holdings, livestock and physical farm assets were higher in the case of early adopters compared to followers for both the crops (Tables 7.6 and 7.7). Summary statistics and Mann-Whitney test results indicate that farmers who are wealthier and are more experienced in growing respective contract crop were the first ones to join contract farming. This is in line with the literature on technology adoption (see Feder et al., 1985).

Table 7.5: Operational holding pattern of early adopters and followers of CFAs

CGP			
Holding categories (acres)	Early Adopters (n=41)	Followers (n=81)	Total (n=122)
Marginal and small (0.0 - 4.9)	7.3	19.8	15.6
Medium (5.0 - 9.9)	29.3	37.0	34.4
Large (10.0 and above)	63.4	43.2	50.0
Onion			
Holding categories (acres)	Early Adopters (n=56)	Followers (n=100)	Total (n=156)
Marginal and small (0.0 - 4.9)	8.9	22.0	17.3
Medium (5.0 - 9.9)	17.9	38.0	30.8
Large (10.0 and above)	73.2	40.2	51.9

Source: Primary survey (2012-13);

Note. Units in percentage and have been calculated on column sums

Table 7.6: Summary statistics of household characteristics of early adopters and followers of CGP CFAs

Particulars		Early Adopters	Followers	Total
Age (years)	Mean	47.7	47.1	47.3
	<i>SD</i>	11.1	12.0	11.6
	<i>U</i> = 1615; <i>p</i> = 0.80; <i>r</i> = -.02	Median	45.5	45.0
Schooling (years)	Mean	9.0	7.8	8.3
	<i>SD</i>	4.2	4.5	4.4
	<i>U</i> = 1433; <i>p</i> = .10; <i>r</i> = -.11	Median	10.0	9.0
Household size	Mean	6.1	5.3	5.6
	<i>SD</i>	2.5	2.3	2.4
	<i>U</i> = 1331; <i>p</i> = .07	Median	5.8	5.0
Farming experience (years)	Mean	24.4	23.6	23.9
	<i>SD</i>	12.8	12.1	12.3
	<i>U</i> = 1433; <i>p</i> = .49 <i>r</i> = -.00	Median	20.0	20.0
Contract crop experience (years)	Mean	17.6	11.9	13.8
	<i>SD</i>	10.7	10.0	10.6
	<i>U</i> = 1016; <i>p</i> = .00 <i>r</i> = -.31	Median	15.0	10.0
Farm to road distance (km)	Mean	0.8	0.8	0.8
	<i>SD</i>	.9	1.1	1.0
	<i>U</i> = 1642; <i>p</i> = .46 <i>r</i> = -.00	Median	0.5	0.5
Operational landholding (acres)	Mean	13.3	9.9	11.0
	<i>SD</i>	7.6	7.4	7.6
	<i>U</i> = 1122; <i>p</i> = .00 <i>r</i> = -.26	Median	13.0	8.0
Livestock (Rs.)	Mean	125,988	97,397	107,005
	<i>SD</i>	94,581	82,319	87,300
	<i>U</i> = 1242; <i>p</i> = .01 <i>r</i> = -.20	Median	108,300	80,000
Physical farm assets (Rs.)	Mean	249506	106972	154,873
	<i>SD</i>	298270	153,297	222,526
	<i>U</i> = 1086; <i>p</i> = .00 <i>r</i> = -.28	Median	104108	50,300

Source: Computed from primary survey (2012-13)

Note. *U*: Mann-Whitney test value; *p* values reported are (1-tail); *p* value <.05 is statistically significant and <.01 is highly statistically significant; *r*: effect size

Table 7.7: Summary statistics of household characteristics of early adopters and followers of onion CFAs

Particulars		Early Adopters	Followers	Total
Age (years)	Mean	44.9	43.7	44.1
	SD	12.5	10.4	11.2
	Median	44.0	41.0	42.0
<i>U</i> = 2630; <i>p</i> = 0.27; <i>r</i> = -.05				
Schooling (years)	Mean	8.3	8.0	8.1
	SD	4.6	4.5	4.5
	Median	10.0	9.0	9.0
<i>U</i> = 2725; <i>p</i> = .39; <i>r</i> = -.11				
Farming experience (years)	Mean	25.2	23.9	24.4
	SD	12.6	11.7	12.0
	Median	25.0	24.0	24.0
<i>U</i> = 2635; <i>p</i> = .27; <i>r</i> = -.05				
Contract crop experience (years)	Mean	17.7	13.3	14.9
	SD	11.1	9.3	10.2
	Median	15.0	10.0	12.0
<i>U</i> = 2144; <i>p</i> = .00; <i>r</i> = -.19				
Farm to road distance (km)	Mean	1.6	1.5	1.6
	SD	1.6	2.9	2.5
	Median	1.0	.0	1.0
<i>U</i> = 2483; <i>p</i> = .10; <i>r</i> = -.10				
Operational landholding (acres)	Mean	14.2	9.7	11.3
	SD	7.8	6.6	7.4
	Median	12.5	8.0	10.0
<i>U</i> = 1733; <i>p</i> = .00; <i>r</i> = -.32				
Livestock (Rs.)	Mean	171271	113018	133930
	SD	343365	253718	289373
	Median	75000	62000	70000
<i>U</i> = 2258; <i>p</i> = .02; <i>r</i> = -.20				
Physical farm assets (Rs.)	Mean	156420	75130	104311
	SD	236758	139359	183916
	Median	43350	26475	29113
<i>U</i> = 1086; <i>p</i> = .00; <i>r</i> = -.16				
Household size	Mean	6.6	5.3	5.7
	SD	2.4	2.2	2.3
	Median	6.0	5.0	5.4
<i>U</i> = 2049; <i>p</i> = .00; <i>r</i> = -.27				

Source: Computed from primary survey (2012-13)

Note. *U*: Mann-Whitney test value; *p* values reported are (1-tail); *p* value <.05 is statistically significant and <.01 is highly statistically significant; *r*: effect size

7.1.3. Awareness of terms of contract

In the case of CGP, the contract is written in Marathi (which is the local language) on the stamp paper of Rs. 20 or Rs. 100. It was found that most (53%) of the CF have read or were explained about the terms and conditions of contract in detail. While rest were neither aware of the detailed terms and conditions and nor were they bothered. They just knew that they were buying this much amount of seeds and would have to sell the harvested output to firm. The copy of the contract signed by the farmer is only with CF firm and not the farmer. The farmers felt that contract is just a mere formality and for records, which shall facilitate to get a crop loan through which they can pay for the material inputs. Most of CF were felt PepsiCo would not do anything even if they sell

outside the contract. For the PepsiCo, contract helps in protecting its interests in contingencies, i.e., if farmers go to legal authorities during disputes.

In the case of onion, there was no written agreement between farmer and JISL. The relationship was based on trust, where if the farmer has taken the seeds from the firm, he will let Jain sevak monitor the crop production and sell the harvest to the firm at the MGP or a higher price (in case, the price of onion is higher in APMC after adjusting the transportation and marketing costs, Section 1).

7.1.4. First contact with the contracting firm

During the survey, farmers were asked about how did the farmers' first contact happen with the contracting firms. The results of which are presented in Table 7.8. Around 45% of CGP CF and 36% of onion CF replied that their first contact with the contract firm official happened when the firms were canvassing in the village about their CF scheme. Around 30% of CGP sample farmers (CF and ACF both), reported that they directly contacted the firm official, while around 12% each mentioned that firm/hundekari approached them directly and friend/relative introduced farmer to the contracting firm.

In the case of onion, a quarter of the sample (CF and ACF both), reported that JISL staff had approached them, and while 20% mentioned that friend introduced them to JISL staff. Around 17% mentioned that firm staff approached them to cultivate contract crop. Overall, canvassing within the village by organising the meeting of farmers through village leaders is an effective way of influencing farmers to join CF.

Table 7.8: First contact with the firm
(response in %)

Particulars	CGP (n=116)	Onion (n=151)
Firm canvassing in village	44.8	36.4
Farmer contacted firm/hundekari	30.2	17.9
Firm approached farmer	12.9	25.2
Friend introduced	12.1	19.9
Agriculture exhibition	0.0	0.7

Source: Primary survey; Note. For CGP and onion, six responses each were missing for this question

7.1.5 Motivation to start growing under contract

To understand the factors that motivate farmers to join contract farming, farmers (ACF and CF both) were asked the open ended question on the reasons that led them to join contract farming. The tabulation of multiple responses was done using SPSS.

In case of CGP, overall 371 responses were generated by 122 respondents (both CF and ACF), results of which are presented in Table 7.9. The majority (64%) of the respondents cited credit availability as one of the reasons for joining contract farming. The access to crop loan in CGP contract farming helped them cover the working capital requirement for the growing CGP. Thus, those farmers who did not have funds to undertake CGP cultivation were able to do so with crop loan. While 62% and 56% of CGP CF cited the success of co-farmers and MGP respectively as the reasons for joining CF. Less than one-third of CGP respondents mentioned access to quality inputs and high returns as one of the reasons for growing under contract farming. The other reasons mentioned were experiencing new crop/variety, good yields, no alternate cash crop, no marketing costs, relationship with hundekari, extension service, friends' suggestion, and trustworthiness of firm assured market and influence of firm staff. CGP, a new crop in the region required high working capital, therefore, availability of credit, the success of co-farmers and reduction of price and production risks in CFAs led them farmers to grow CGP under contract.

Table 7.9: Reasons for joining CGP Contract Farming

Particulars	% of responses (n = 371)	% of cases (n=122)
Credit availability	20.8	63.6
Success of co-farmer	20.2	62.0
Minimum guaranteed price	18.3	56.2
Quality seeds/inputs	10.0	30.6
High income/returns	7.8	24.0
Experience new crop/variety	5.9	18.2
Good yields	4.0	12.4
No alternate cash crop	3.5	10.7
No marketing costs	2.7	8.3
Relationship with Hundekari	2.4	7.4
Extension service	2.2	6.6
Others ^a	2.2	6.6
Total	100.0	

Source: Primary survey; *Note.* Cases includes both CF and ACF; multiple responses question

^a Friends suggestion, trustworthiness of firm, assured market, firm staff influence

In case of onion, overall 381 responses were generated by 156 respondents (both CF and ACF), results of which are presented in Table 7.10. Most of the respondents (90.5%) cited MGP as one of the reasons for joining onion contract farming. This is so because farmers face huge price volatility in table variety onion. While 50% and 30% of respondents cited the success of co-farmers and high returns respectively as the reasons for joining CF. The other reasons mentioned were good yields, higher price in contract, trustworthiness of firm, extension service, wanting to experience new crop/variety, friend suggestion, no marketing costs, assured market, quality seeds/inputs, no alternate cash crop, losses in competitive crop, and drip subsidy

Table 7.10: Reasons for joining onion contract farming

Particulars	% of responses (n = 381)	% of cases (n=157)
Minimum guaranteed price	37.4	90.5
success of co-farmer	20.4	49.4
High returns	12.3	29.7
good yields	5.8	13.9
High price	5.2	12.7
trustworthiness of firm	4.2	10.1
extension service	3.4	8.2
experience new crop/variety	2.6	6.3
friend suggestion	2.4	5.7
no marketing costs	2.4	5.7
Others ^a	3.9	9.5
Total	100.0	

Source: Computed from primary survey

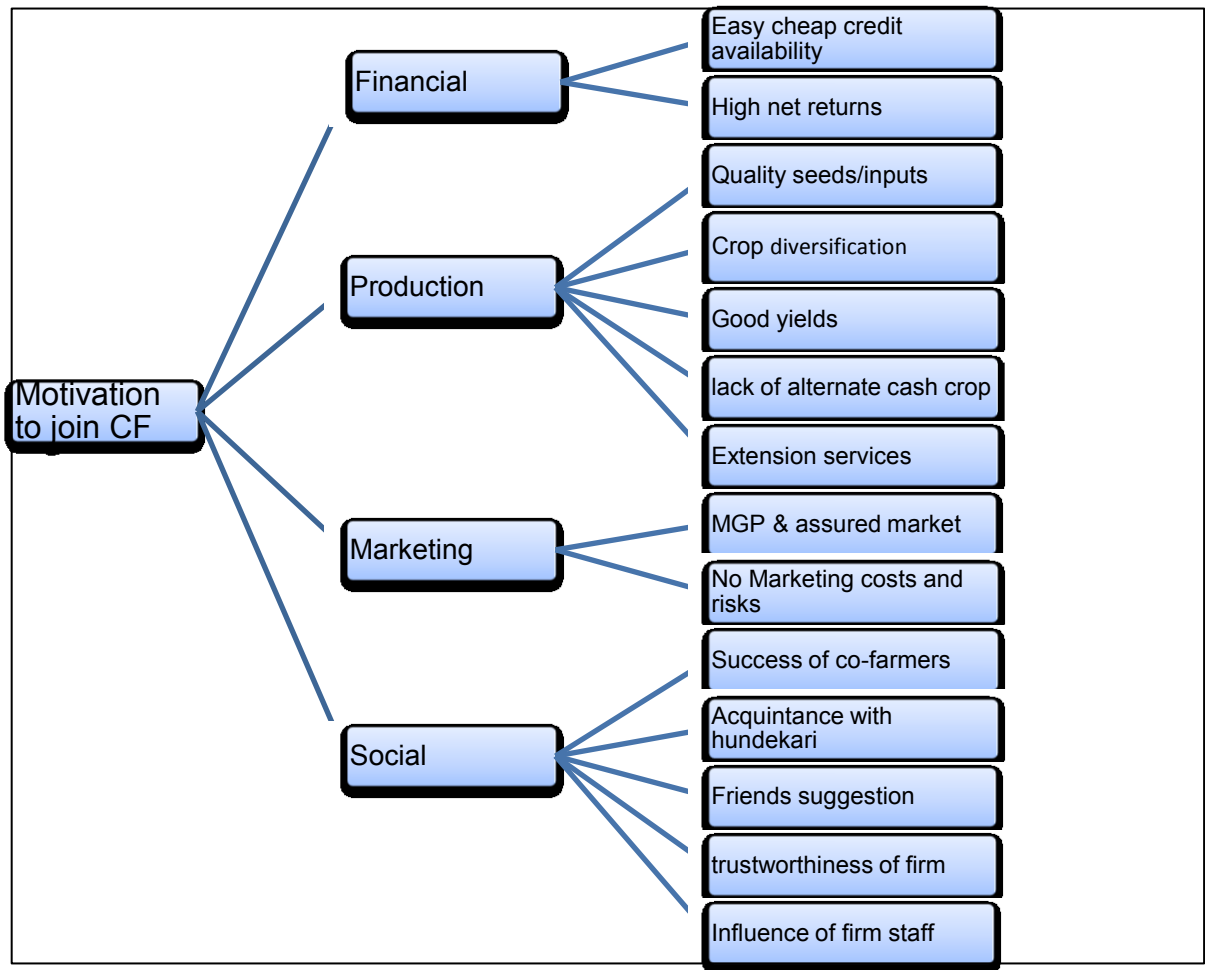
Note. Cases include both CF and ACF and it is a multiple response question

^a assured market, quality seeds/inputs, no alternate cash crop, loss in competitive crop, and drip subsidy

Based on results of Table 7.9 and 7.10 and discussions with farmers, the motivations to join CF are summarized in Figure 7.1. These motivations are broadly classified into financial, production, marketing, and social. On financial grounds, farmers were attracted to easy, cheap credit availability from banks and high expected income after seeing the success of co-farmers in contract crop cultivation. On the production aspect, contract crop cultivation was seen as an opportunity for crop diversification, access to quality seeds/inputs, and extension services. As farmers had mentioned from the Satara being drought prone region, farmers wanted to be sure that seeds are of good quality. On the marketing side, there were no marketing costs and price risks due to MGP and assured procurement by the firm. Also, the firm would make arrangements for

procurement. Moreover, farmers being risk averse and with the higher costs involved in CGP cultivation; farmers wanted an assured market for their produce at MGP. Within the social settings of the village, farmers were influenced by the feedback of their co-farmers and encouragement from firm staff and Hundekaris. Overall, farmers viewed contract crop cultivation, as means to overcome uncertainties and imperfections of input and output markets.

Figure 7.1: Motivation to join contract farming



Source: Primary survey

7.1.6. Benefits of contract farming

Multiple response analysis of the open ended question of benefits perceived by CGP and onion CF in contract farming is presented in Table 7.11 and Table 7.12 respectively. For the open ended question, regarding benefits perceived by sample CGP CF farmers, overall 284 responses were generated. MGP and easy credit availability were the major benefits of CGP contracting mentioned by 72% and 63% of CF

respectively. Less than half of CF mentioned that high yields/income and quality seeds/inputs respectively as benefits of growing under CFAs. Around 20% of CF perceived extension services, no marketing costs and risks and transport arrangements as other benefits of CF. Over 9% of farmers also felt the discounted price of chemical kit as beneficial. For e.g., during 2012-13 in Pune, the plant protection kit was available at 33% discount of the market price. Other benefits perceived by CGP CF include irrigation assistance, remunerative price, proper payment, and improvement in soil fertility (Table 7.11).

Table 7.11: Benefits perceived of PepsiCo CGP contract farming

Particulars	% of responses (n=284)	% of cases (n=89)
Minimum guaranteed price	22.2	71.6
Easy credit availability	19.4	62.5
High yields/income	14.8	47.7
Quality seeds/inputs	14.1	45.5
Technology transfer/extension service	6.7	21.6
No marketing costs	6.3	20.5
Transport arrangements	5.6	18.2
No market risk	5.3	17.0
Discount on inputs	2.8	9.1
Others*	2.8	9.1
Total	100.0	322.7

Source: Computed from primary survey (2012-13)

Note. Multiple responses question; *Irrigation assistance, remunerative price, improvement in soil fertility, and proper payment

In case of onion, for the open ended question, regarding benefits perceived by sample CF, overall 248 responses were generated, of which MGP received largest responses, i.e. 83% of CF, followed by high yields/returns mentioned by 50% of CF (Table 7.12). While one third of CF mentioned technology transfer and extension services as one of the benefit of onion CF. Improvement in soil fertility, quality inputs and no marketing costs were mentioned by nearly 15% of onion CF. CF also mentioned that they do not have tension to take the produce to APMC market and at what rate the produce would sell. As generally, for taking produce to market, they have to spend one or two days apart from transport and marketing costs. Other benefits perceived by onion CF were no market risk, high price, irrigation assistance, and easy credit availability.

Overall, in both the crop surveys, it was found that MGP, high yields/returns, quality inputs and technology transfer were the major benefits. These attributes point that contract farming help in overcoming input and output markets imperfections.

Table 7.12: Benefits perceived of JISL onion contract farming

Particulars	% of responses (n=248)	% of cases (n=108)
Minimum guaranteed price	35.9	82.4
High yields/returns	21.8	50.0
Technology transfer/extension service	14.1	32.4
Improvement in soil fertility	6.5	14.8
Quality seeds/inputs	5.6	13.0
No marketing costs	5.6	13.0
Transport arrangements	3.2	7.4
Others*	7.3	6.5
Total	100.0	

Source: Computed from primary survey (2012-13)

Note. Multiple responses question;

* no market risk, high price, irrigation assistance, and easy credit availability

7.1.7. Problems in CF

When asked to CF about any problems faced in growing contract crop under contract, only about 49.4% of CGP CF and 31.5% of onion CF mentioned they did face some problem on contract crop cultivation. This shows a majority of the CF were satisfied with contract farming. Multiple response analysis for the open-ended question on problems faced by CGP and onion CF is presented in Tables 7.13 and 7.14 respectively. One-fourth of CGP CF and eight per cent of onion CF stated delay in procurement by the firm as one of the problems. It was observed that with around hundreds of farmers growing contract crop in the region, mostly, the harvest period of contract crop is near about same for all the farmers. Therefore, many times, the firm staff is unable to find the transporters to procure the produce for all the farmers at the same time. Moreover, there were huge ques at its factory plant in Pune (for CGP) and Jalgaon (for onion), where truck have to wait for several hours to offload the produce. Therefore, some farmers have to wait for few (3-5) days for the produce to be procured due to unavailability of trucks. Many times due to delay, there are risks that CGP output may

get internal and external defects⁴⁰. As after the produce is transported, the sample of the produce from the truck is checked at PepsiCo factory plant. The firm accepts 5% of the produce which is extra small (less than 45 mm) or extra-large (greater than 85%) or damaged or green CGP, or soil. If the sample exceeds 5% of the permissible limits, the farmer is paid at the rate of Rs. 1.75 per kg for that proportion of produce. About 23% of CF said that strict quality norms followed by PepsiCo as another difficulty in CGP as this directly affects their net returns. Similarly, 17% of CGP CF mentioned about lack of transparency in final weighing, as a farmer comes to know about the final weight and price of the produce, after the output is weighed at the firm's plant, i.e., after 1-3 days of the produce is transported from the farm. Similar concerns were also raised by onion growers. Moreover, there were few CGP farmers even doubting the ethics of contracting firm about whether they report the true weight of seed tubers and output. As some farmers felt that on seeds tubers bag, weight is not mentioned. Thus, farmers feel contracting firm's quality norms is biased towards them. Some CGP farmers (12%) complained about the poor quality of seeds being given. Some of the other problems mentioned by few CGP farmers were low output price, delay in delivery of seeds, late payments, higher cost of inputs and not enough support from the firm.

Table 7.13: Problems faced by CGP CF

Particulars	% of CF (n=89)
None	49.4
Delay in procurement	24.7
Strict quality norms	22.5
Lack of transparency	16.9
Poor quality seeds	12.4
Low price	7.9
Others*	

Source: Computed from primary survey (2012-13)

Note. Multiple responses question; * Delay in delivery of seeds, late payments, higher cost of inputs, and not enough assistance from firm

Table 7.14: Problems faced by onion CF

Particulars	% of CF (n=108)
None	69.5

⁴⁰ External Defects include mechanical damage, greening, bruising, wet rot, dry rot, infestation (PTM), other external defects. Internal defects, hollow heart brown fleck, Black Heart, Black spot, other internal defects.

Delay in procurement	8.3
Pest attack	8.3
Fertility loss	8.3
Low price	5.6
Others*	

Source: Computed from primary survey

Note. Multiple responses question; *poor quality seeds, higher costs of inputs, late payments, inflexibility, strict quality norms, and water scarcity

As per the survey data, CGP CF have been growing CGP continuously since the year they started CGP cultivation. To understand whether farmers are facing declining yields or deterioration of land due to the regular growing of CGP, farmers were asked about it. Sixteen percent of CGP CF growers felt that yields have been declining. Of which more than two-thirds stated mono-cropping as the reason for the decline, while rest felt a decline in yields was mainly due to adverse climatic conditions.

In the case of onion, only 43 responses were generated from 34 onion CF respondents. Apart from delay in procurement, pest attack, and fertility loss were the other major problems faced by onion growers (Table 7.14). Fertility loss is a perception, and there is no scientific basis of it. One of the reasons for the loss of fertility is a mono-cropping pattern followed by farmers. It was observed in the survey, that contracting firms encourage the farmer to grow on different parcels of land every year and not follow mono-cropping. Some onion CF also complained about the lower price in the contract. Few farmers raised other concerns such as poor quality seeds, higher costs of inputs, late payments, inflexibility, strict quality norms, and water scarcity.

7.1.8. Overall Experience

To understand the overall experience of contracting, CF were asked about whether they were satisfied, dissatisfied, or neither satisfied nor dissatisfied (i.e. average). More than three-fourth of the CGP CF (i.e., 79%) stated that they were satisfied, while 18% were neither satisfied nor dissatisfied and only 3% were dissatisfied with growing CGP under contract. Similarly, in case of onion, 70% of CF stated they were satisfied, while 28% stated they were neither satisfied nor dissatisfied, and only 2% were dissatisfied in onion contract crop cultivation. Thus, majority of the CGP and onion CF were satisfied to grow under contract. This is also reflected in the fact that only 5.6% of CGP CF have so far had taken a break from CF, i.e., there was a year or more, where they did not grow CGP within the contract. Thus farmers are consistently growing CGP under CF. While

23% of onion CF have so far had taken a break from CF for at least a year, where they did not grow onion within the contract.

Overall, farmers of both the crops have said that the experience of contract farming have been good. They are more informed about the technical know-how of farming, i.e., good agricultural practices regarding planting and maintaining fields to get a good harvest. Before, the company, there was no one who would visit the farms and guide farmers. The extension services by the Government agency is virtually absent in the region. Also, through mobile phones, they are easily connected to other APMC markets. Farmers incomes have increased from contract crop cultivation, and they feel more empowered.

7.1.9. Suggestions by CF

On asking about any suggestions and improvements in contract farming, nearly half of CGP CF responded, which generated 73 responses (Table 7.15). The percentage of non-response was high because many farmers were unable to give concrete suggestions. About 24% of CF suggested timely procurement by CF firm. The Higher price of output and good quality CGP seed tuber was suggested by 12% and 10% of CF respectively. Nine percent of CF suggested that there should be direct dealing with firm staff, with no intermediary, i.e., hundekaris in this case. As currently, in the CGP CF by PepsiCo, the major operations like distribution of seed tubers, chemical kit, and procurement of output are carried mainly by hundekaris. As many did not have faith in them, some are also alleging that they may be corrupt. Seven percent of CF suggested relaxing strict quality norms of output while procuring.

Both the crops survey results (Table 7.15Table 7.16) show that timely procurement and higher price were the major suggestions of the CF farmers. It seems many of the suggestions like timely procurement, good quality seeds, quicker payment are linked to efficiency and diligent behavior of firm staff.

Table 7.15: Suggestions of CGP CF

Particulars	% of responses (n=73)	% of CF responded (n=48)
Timely procurement	28.8	23.6
Higher price of output	15.1	12.4
Good quality seeds/tuber	12.3	10.1
Direct dealing with firm	11.0	9.0
Relaxing quality norms	6.8	5.6
Crop insurance	4.1	3.4
Farmer association	4.1	3.4
Weighting of output at farm	4.1	3.4
Others*	13.6	
Total	73	100.0

Source: Computed from primary survey (2012-13)

Note. Multiple responses question; * Lower seed price, immediate receipt of output, seed bags be properly weighed and packaged, seeds on time, quicker payment, availability of cold storage facility

Table 7.16: Suggestions for onion CF

Particulars	responses (n=20)
Higher price of output	11
Quicker payment	3
Timely procurement	3
Crop insurance	1
Weighting of output at farm	1
Bank loan assistance	1
Total	20

Source: primary survey

Note. Multiple responses question

7.2. Non-participation aspects of contract farming

In this section, non-participation aspects of contracting of CGP and onion crops is discussed. Firstly, some aspects of contract crop cultivation without a contract is discussed. Factors influencing ACF to disadopt from contracting and NNCF not to grow in the contract is discussed in a later subsection.

7.2.1. Functioning of non-contract mode of production

In case of CGP, the NCF grow CGP either with the seed tubers bought in credit or on payment from non-contract hundekaris or they go to Punjab. It was observed that in many villages in Pune, there were a group of people (farmer or fertilizer dealers) go together to Punjab in the month of February-March. There they buy the CGP seeds tubers (FL-1533 and ATL) from an agent or a large farmer in Punjab. After the purchase,

the seed tubers are kept in cold-storage in Indore or Punjab. The delivery of which is received in June in their respective village. These farmers groups also called as non-contract hundekaris sell these seeds to farmers either on partial or full credit. For some, there is an oral understanding, where they buy the seed on 50% credit. This credit is paid back after the harvest is sold. In most of the cases, it is this non-contract hundekari which provides a chemical kit, fertilizers, etc. on credit or provide advances for labour payments also arranges the sale of the output. There seems to be interlocking of factor markets in Pune districts. Since the non-contract hundekari has provided the seeds to them, the farmer is bound to sell the produce to him. This non-contract hundekaris is linked to many potato chips firms' staff and agents.

In case of onion, NCF grow table variety onion viz. white onion and rangda onion in Rabi season. The crop duration is not very different between V12 and white onion or rangda onion. However, some farmers claim that white onion or rangda onion reaches maturity in 105-110 days compared to 120 days of V12 onion. Rest crop attributes and water requirements are similar. However, V12 may need one or two additional irrigation due to greater maturity duration. Unlike CGP seed tubers which are not easily available in market, the seeds of table variety onion are easily available in market. The harvested produce can be easily sold in APMC markets or there are many traders visiting farms, who directly procure from the field.

7.2.2. Risks in non-contract production

In case of CGP, NCF revealed that they face input and market risk. Firstly, the NCF are not sure about the quality of the seed tubers supplied by non-contract hundekaris. Similarly, few farmers also felt a risk whether output would sold and at what price. However, most of the farmer are not worried about the market risk. As they had seen the rising demand for CGP tubers. As each year they are wooed by many traders to sell the produce to them as one of the Pepsico hundekari from Satara district says,

“Nearby villagers of Pusegaon (Khatav taluka), know traders in Pusegaon as they have been producing potato for many years. Hence, they can trust them. In case, they get bad seeds. They can contact them and do not pay back the money. Moreover the business also works on full or partly credit. However, those farmers who are new to potato cultivation, do not have contacts with potato traders and are not keen to try cultivation without contract. As in contract, most of their risks are taken care of. Those regions which are farther from traditional potato market of Pusegaon, shall look to stick to contract.”

In case of onion, the price risk is the important concern for NNCF, as many times they are not sure about the price what they would get. The price volatility is very high. As sometimes prices goes down to Rs. 2 per kg and sometimes to Rs. 6 per kg. Thus, onion cultivation is risky, but returns could be very high as well.

7.2.3. Disadoption from contracting

In this section, why do the farmer leaving contracting is discussed. To understand, why ACF disadopted from contracting, they were asked the open-ended question about the reasons for exiting contracting. The results for the above multiple-response question for CGP and onion are presented in Table 7.17 and 7.18.

Table 7.17: Reasons for exiting CF, CGP

Reasons for exiting CF	% of responses (n=66)	% of ACF (n=33)
Inflexibility	25.8	51.5
Lower Price	22.7	45.5
No need for loan	10.6	21.2
Loss in contracting	7.6	15.2
Higher cost of cultivation	6.1	12.1
Corruption by firm's agent	6.1	12.1
CGP seeds available outside	6.1	12.1
Got late in seed booking	4.5	9.1
Delay in procurement	4.5	9.1
Others*	5.9	12.1
Total	100.0	-

Source: Field survey (2012-13)

Note. Multiple-response question

*Strict quality norms, Late Payment, agent lost the firms' agency

In case of CGP, 66 responses were generated from 33 ACF respondents. The majority of ACF (51.5%) said the inflexibility in contracting as the reason for exiting CF. By inflexibility they meant single buyer, i.e. they cannot sell to any other buyer and they have to agree to the price offered by the contracting firm. Similarly, about 45.5% mentioned lower price in the contract while more than one-fifth (21.2%) of them did not felt the need of credit or to take crop loan for growing CGP as the reasons for exiting CF. About 15% of CF farmers also mentioned that after having faced loss in CGP cultivation under contract, hence they left growing under contract. What farmers mean, is that the other traders were offering higher prices. Thus they had forgone profits by selling to

PepsiCo. Nearly 12.1% of ACF mentioned that higher cost of cultivation under contract, easy availability of CGP seed tubers outside, and corruption by the firm agent as the reasons for exiting CF. thus, it seems that if a farmer is uncomfortable with hundekari and if the seed tubers are available outside, then he would grow CGP without a contract. This emphasizes that conduct of hundekari and the firm staff is crucial in the continuance of farmer growing CGP under contract.

In case of onion, 130 responses were generated from 56 ACF respondents. More than one-third of ACF had exited CF, due to higher costs and losses in contract cultivation. The next important reason is the water scarcity and longer duration of maturity of V12 Crop, mentioned by more than quarter of ACF (Table 7.18). The table variety onion has the maturity of around 100-110 days, whereas V12 crop requires on an average 120 days for maturity (primary survey). Another reason for its greater number of days of maturity is that V12 takes bigger size compared to table variety onion. Greater duration of maturity leads to an additional couple of irrigation, i.e. increased water requirement. Therefore, those farmers, who have less water on their field due to poor rainfall in that agriculture may opt out of contracting for that season. The other reasons mentioned were a lower price, soil deterioration, strict quality norms, lack of transparency, low yields, and delay in procurement. Another point mentioned by few of the farmers is that if the Jain Sevak is not in the same village, their access to him may be limited. Thus, as in case of CGP, the efficient functioning of the JISL staff in onion CFAs also plays an important role in arresting the attrition from CFAs. If the firm staff are not diligent and are not able to provide efficient service to farmers, then farmers may leave to grow the crop with the contracting firm.

Table 7.18: Reasons for exiting CF, Onion

Reasons for exiting CF	% of responses (n=130)	% of ACF (n=48)
Higher cost of cultivation	13.8	36.7
Loss in contracting	13.1	34.7
Long duration crop	12.3	32.7
Water scarcity	9.2	24.5
Lower price	6.9	18.4
Soil deterioration	5.4	14.3
Strict quality norms	4.6	12.2
Lack of transparency	4.6	12.2
Firm staff not in village	4.6	12.2

Low yield	3.8	10.2
Others*	21.5	
Total	100.0	-

Source: Field survey

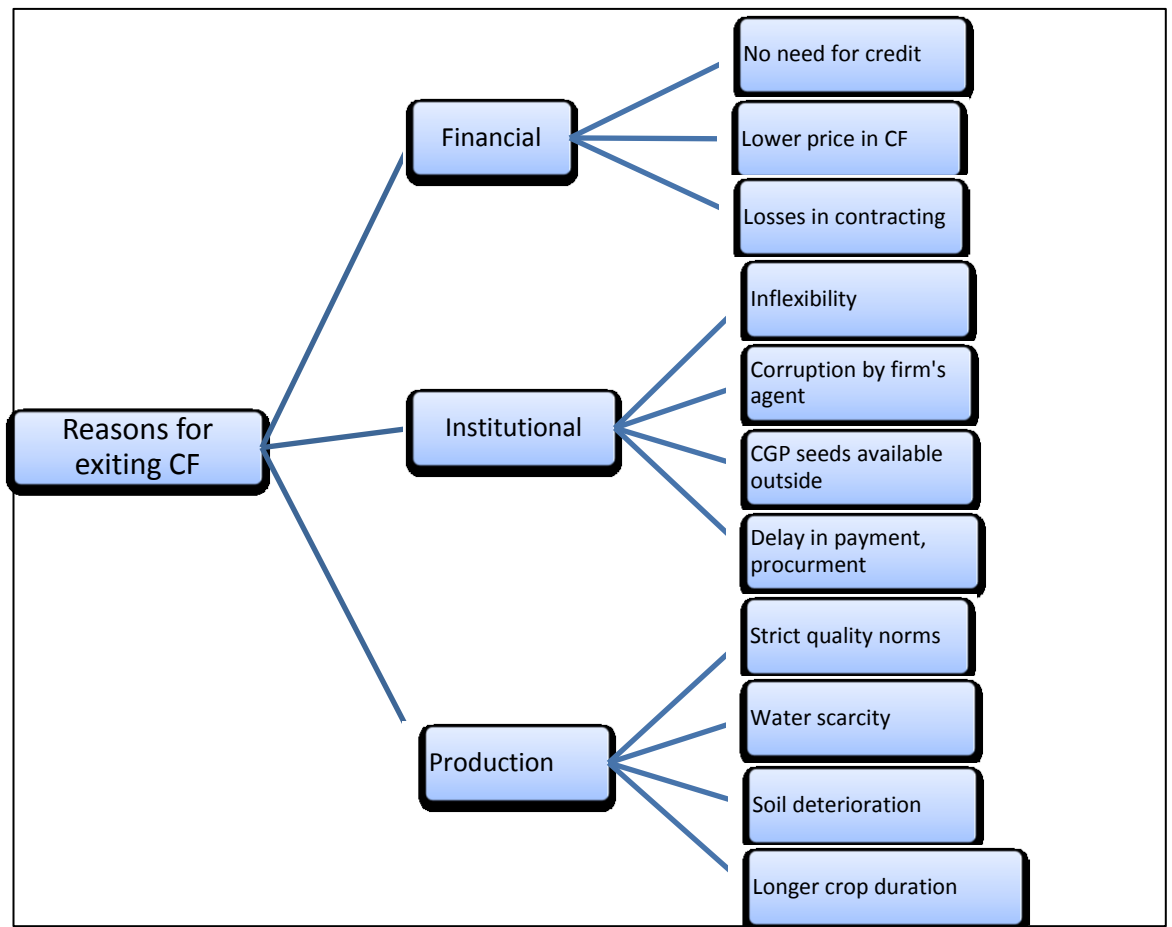
Note. Multiple-response question

*nursery failure, firm did not offer contract, late and improper payment, compulsory MIS, poor seed quality, personal reason, delayed procurement, crop rotation, pest issue, lot of attention needed for company's crop.

Based on results of Table 7.17 and 7.18 and discussions with ACF, the reasons of exiting CF are summarized in Figure 7.2. The reasons are broadly classified into three categories, viz., financial, institutional, and production. On financial grounds, no need for credit and lower price in contract cultivation led ACF to grow CGP without a contract. Similarly, loss in contract crop cultivation led onion ACF to exit CF, as they thought they were better off without it. Most of the ACF (both CGP and onion) are financially well-off (Sections 6.1.4 and 6.2.2).

In case of CGP, after few years of joining CF, when demand for CGP crop started rising and competition increased. The other traders started offering higher prices compared to CF price. ACF did not want to have a single buyer, whereby they are dependent on its terms and conditions. They would like to be open to selling to whom so ever, i.e., wherever they find it more profitable. Moreover, CGP seeds were easily available with other traders. Then there were other institutional factors which are about the contracting firm, which led to the dissatisfaction among ACF. ACF was unhappy about the strict quality norms, delay in procurement, and conduct of the hundekari. Overall in the case of CGP, financial aspect collectively gathered 48% responses, followed by 45% about institutional aspects. Similarly, in the case of onion, financial, production and institutional aspects plays an important role in decision making of farmers. Therefore, the contracting firm needs to focus on these aspects, to reduce the attrition from contracting.

Figure 7.2: Reasons for exiting contract farming



Source: Field survey (2012-13)

During the survey, it was observed that farmers take a break from contracting, i.e. there would be a season, when they do not contract. For e.g., 23% of onion CF had taken a break for a season or more from contracting. The majority of farmers, who had taken a break from CF in one of the season, had mentioned losses in the previous season as one of the reasons for taking a break. i.e., if the farmer faces losses in CF, it is likely to shift to growing table variety onion, similarly, if it NCF faces losses in one of the season than it is likely to contract in next season. Overall, if farmers feel that they would be better off without being in a contract, then they would not grow under contract. Similarly, if they perceive that being in the contract they would have a better pay off. Then, they would not hesitate to join back CF. For e.g., 82% of CGP ACF and 91% of onion ACF reported they might join contract crop cultivation with the present firm again in future again. Such churning in and out of CF was also reported by Narayanan (2011).

Another reason for the break in contracting was of side-selling the contracted produce. As those farmers who had sold the produce outside contract had not approached firm for the next season. Few farmers also cited the reason of water scarcity for not taking up onion contract cultivation in one of the seasons. Thus, farmers decision making whether to contract or not is also dependent on its resource conditions. Also, availability of alternative crop production opportunities also plays an important role in farmers' decision-making process, whether to grow in the contract and without a contract. For e.g., farmers in Satara do not have alternative cash crop opportunities on their land, moreover growing CGP without a contract is highly risky (See section 7.2.2). Therefore, attrition of CGP is lower in Satara compared to Pune. Cai et al. (2008) also observed in their study that attrition in remote areas is low.

7.2.4. Non-participation in contract farming of never contracted farmers

To understand, why NNCF never grew contract crop under contract, they were asked the open ended question about the reasons for non-participation. The results for the above multiple-response question for CGP and onion are presented in Table 7.19 and 7.20. In case of CGP, 144 responses were generated from 56 NNCF. Similar to the reasons for ACF exiting CF, the top three responses generated were inflexibility (31.6%), lower price in CF (17.4%), and do not want to take a loan (11.4%). Some of the farmers also cited they had trust and support of the other non-contract hundekari. Many of NNCF were acquainted with these non-contract hundekari, who was from the village itself. He provided seeds and other inputs on credit. Thus, these NNCF no longer felt the need to align with Pepsico. Also, there were few farmers who did not trust the PepsiCo hundekari. Thus, the relationship between the farmer and the hundekari or first staff, do play a role in farmers choice whether to contract or not. This point was also emphasized in Section 7.2. Hundekari and firm staff have to work on working efficiently to minimise the constraints faced by the farmer. Hundekari and the firm staff needs to focus on minimising delay in payments and procurement and also explain them the need for quality norms. They need to work on so as to avoid any grapevine (negative rumour) spreading among farmers.

Table 7.19: Why did CGP NNCF never grew under contract

Particulars	% of responses (n=144)	% of NNCF (n=56)
-------------	---------------------------	---------------------

Inflexibility	31.6	64.3
Lower price in CF	17.5	35.7
Did not want to take loan	11.4	23.2
Trust/support of agent	8.8	17.9
Less land and resources	7.9	16.1
Lack of information on CF	6.1	12.5
Personal reasons	4.4	8.9
Earlier booking	4.4	8.9
Strict quality norms	2.6	5.4
Lack of trust	2.6	5.4
Others*	2.6	5.4
Total	100.0	203.6

Source: Primary survey

Note. Multiple response question; * High costs, delay in procurement and payment

In the case of onion, 66 responses were generated from 44 NNCF. The majority of the NNCF (46%) cited water scarcity as one of the reasons for not growing V12 onion. This was followed by the higher cost of cultivation. Another reason which deterred NNCF from growing company V12 onion was the rumour that it leads to loss of fertility of the soil. Long duration crop, inflexibility, and not wanting to try new onion variety were the other reason mention by more than 10% of ACF (**Error! Not a valid bookmark self-reference.**)

Table 7.20: Why did onion NNCF never grew under contract

Particulars	% of responses (n=63)	% of NNCF (n=44)
Water scarcity	30.2	46.3
Higher cost of cultivation	14.3	22.0
Fertility loss rumour	12.7	19.5
Long duration crop	9.5	14.6
Inflexibility	7.9	12.2
Not wanting to try new variety	6.3	9.8
Lack of information on CF	4.8	7.3
Less land	3.2	4.9
Low yield	3.2	4.9
Others*	7.9	
Total	100.0	

Source: Primary survey

Note. Multiple response question;

* Personal reasons lack of trust, high-quality standards, lack of trust, earlier booking, and nursery risks

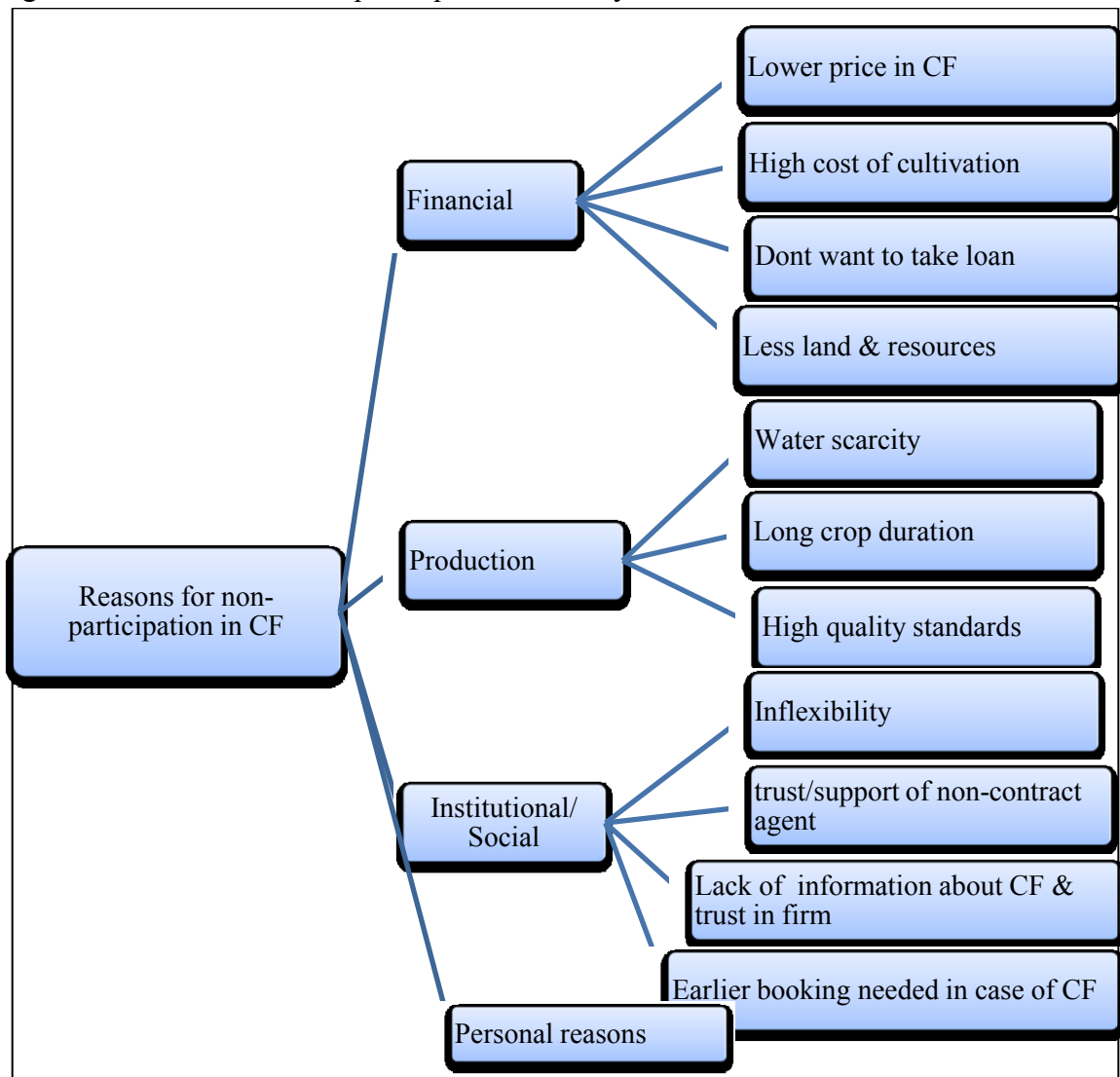
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Table 7.20, and discussions with NNCF of CGP and onion, the reasons for non-participation in contracting are summarized in Figure 7.3. From the financial front, lower price in CF, the high cost of cultivation, no need for credit and limited land and resources were reasons not to participate in CF. There is a mentality among some CGP farmers that they do not want to show they have taken some bank loan, as it would affect their status within the village. Also, some of the farmers wanted to avoid the documentation related to taking crop loan and going to banks. Moreover, by taking a crop loan, it would reflect on the Government's land revenue records. Farmers felt that in the case due to some reason if they are not able to pay back the loan, they would be termed a defaulter in the banking records, which they do not want. Presently, the trader is giving them seed tubers, fertilizers, and chemicals on credit (either half of the amount or the whole). Thus, they no longer felt the need to take crop loan from the bank. About 16% of CGP NNCF and 5% of onion NNCF also mentioned that they have less land and resources; As discussed in previous chapter average holding as well as acreage under contract crop cultivation (both CGP and onion) is lower among NNCF compared to CF (See section 6.2.6).

About production aspects, whether to grow CGP/onion or not depends on climatic factors like rain, as some of them do not have access to irrigation sources. There were few farmers, who felt their land was not suitable to get a good quality crop. As contract crop production, it is important that they get good quality crops. Thus, these farmers shy away from contracting. Similarly, water scarcity issue is another constraint which discourages to undertake contract crop cultivation. Field observations also revealed there were many farmers who due to climatic and resource constraints could not cultivate

contract crop. Also, some farmers decide to grow CGP/onion and how much to grow at the last instance. As in CGP/onion contracting. Usually, farmers have to inform hundekari/Jain Sevak one-two weeks in advance, which is not the case in NNCF. However, here NNCF CGP also run the risk of not getting CGP seed tubers. While this is not the case for onion, as onion seeds and even nurseries are available.

Figure 7.3: Reasons for non-participation in CF by NNCF



Source: Field survey (2012-13)

Institutional reasons refer to the problems related to contracting firm and contracting system. Less-than two-third of the NNCF felt inflexibility as the reason by non-participation. Inflexibility refers to a single buyer and adhering to its terms and conditions, i.e. when will it procure and at what rate and farmers do not have much say in it. About 12.5% of CGP NNCF and 7.3% of onion CF were not aware of in details about the contract farming scheme of the company. Therefore, firm staff and hundekari

need to make efforts to create awareness of the contract farming to all the farmers. Also as mentioned in section 7.2.3, firm staff needs to avoid delays in procurement, as it leads to the risk of quality deterioration of the crops, which in turn affects their returns.

Overall, CGP firms should have a more participatory approach with stakeholders regarding fixing terms and conditions of the contract. As of now the system seems to be more biased towards PepsiCo which create distrust among farmers towards firm. Which could be detrimental for the continuance of the contracting system in that area.

As in case of ACF, NNCF were open to joining contracting, as and when they would feel so. In the case of onion. More than two-third were non-committal but told they might join CF in future, while 28% were likely to join onion under contract in future. Similarly, 93% of NNCF reported they might grow CGP in the contract in future, and they are not averse to it. The discussions with farmers revealed that decision to participate in contract farming depends on their financial condition, market expectations and environment prevailing during that time. If they had a bad experience in growing CGP without contract or problems in seed tuber or marketing issues, then they may switch to CFA.

7.3. Concluding remarks

In this chapter, it was found that those farmers were experienced and better resource endowments were the early adopters. Operational holdings, livestock and physical farm assets were higher in case of early adopters compared to followers. MGP and success of co-farmers were the major influencing factors to join contract farming. Also, credit availability in case of CGP was very important, as CGP cultivation required high working capital. Therefore, contracting firms needs to keep up trust in a relationship through its actions. Positive feedback and image of CFAs attract farmers to CFAs, while negative feedback discourages farmer to join CFAs. Also, contract crop acreage is low in NNCF compared to CF. Therefore, those having higher acreage, want to reduce risks by growing crop under contract. Thus, overall, it seems, contracting is a kind of risk mitigation strategy of farmers.

Delay in procurement was the major problem faced by CF. Such problem was also reported by Singh, S. (2002) in their study of tomatoes in Punjab. Overall, farmers of

both the crops have said that the experience of contract farming have been good and satisfactory.

The discussions with farmers revealed that their decision to participate in CFAs depends on their experience, financial condition, and environment also their future expectations prevailing during that time. If they had a bad experience in growing the respective crop without a contract, then they may switch to CFA. Thus, participation and non-participation in CFAs is not a permanent feature; farmer can grow under contract as and when they feel.

Churning in and out of the contracts was observed in both the crops. Whenever, the market price of output is higher than that of the price offered by the contracting firm, farmers feel they are losing on the gain. Also after growing contract crops for some years, they understand the technicalities of it and get financially better off. Thus they no longer felt the need for contract and thus, inflexibility, i.e. single buyer a constraint, which led them not to participate in contract farming. Market dimensions also play an important role in decision making of farmer. Villages, which have inputs and output markets close by, there farmers may prefer to grow CGP/onion without contract. Also, the villages in which CGP hundekaris are more, there also. However, those villages which are far away from input and output markets, their farmers prefer to grow in the contract. Thus, where there are imperfections in input and output markets, there farmer feel the need for support and are more likely to stay in contract.

Firms need to keep the focus on how could they retain their farmers and be their preferred buyers. For this, it is essential that their staff functions in an efficient and diligent way. As any inappropriate action leads to negative reputation, which may have an adverse impact on the functioning of CFAs. In next chapter, the economics of contract crop cultivation vis-à-vis non-contract crop cultivation is discussed.

Chapter 8 - Cost of cultivation and profitability of CF and NCF

8.1.Introduction

Contract farming would be sustainable from farmers' perspective if it enhances its profits and reduces its risks and uncertainty. Thus, the farmer would continue to remain in the contract provided that contracting would provide him better returns than alternative markets (Barrett et al., 2012). It is important to know whether growing the CGP or onion under contract is profitable compared to without contract. This chapter helps us in understanding the cultivation and profitability aspects of CF and NCF for CGP and onion. Productivity, input-use pattern, costing analysis, gross and net returns, benefit-cost ratios per unit of land for CF and NCF of CGP and onion in sample regions is presented. Section 8.2 presents the methodology and data limitations. Section 8.3 examines the costs, input-use pattern, and returns from CGP and onion cultivation respectively. Section 8.4 synthesises the results.

8.2.Methodology

Economic analysis measuring the productivity, input-use pattern, costing analysis, gross and net returns, benefit-cost ratios per unit of land for CF and NCF of CGP and onion in sample regions was done. There were direct and indirect costs borne by farmers during production as well as the time of marketing the crop. In the thesis, both production and marketing costs have been accounted.

8.2.1. Production costs

Total production costs comprise of fixed and operational costs. Although the cash expenses such as buying of inputs like seeds, fertilizers, plant protection material, etc., are directly observed, but utilization of his fixed assets (like land, machinery, implements, etc.) and owned inputs like family labour (FL) in production are also accounted to give a realistic picture of the total costs incurred. In addition to fixed and operational costs, the cost concepts (Costs A, B, C) used by Commission for Agricultural Costs and Prices (CACP) is presented in this section. Based on the present Comprehensive scheme of CACP cited in Sen and Bhatia (2004), CACP (2012), and

Manual on Cost of Cultivation Surveys (CSO, 2008) various cost concepts calculated are explained in Figure 8.1

Figure 8.1: CACP Cost Concepts

<p>Cost A1 = Value of hired human labour (HL), value of hired bullock labour (BL), value of owned bullock labour, value of owned machine labour (ML), hired machinery charges, value of seed (both farm produced and purchased), value of insecticides and pesticides, value of manure (owned and purchase) value of fertilizers, irrigation charges, depreciation on implements and farm building, land revenue, cesses and other taxes, and interest on working capital</p> <p>Cost A2 = Cost A1+ Rent paid for leased-in land,</p> <p>Cost B1 = Cost A1 + interest value of owned fixed capital assets (excluding land)</p> <p>Cost B2 = Cost B1 + Rental value of owned land (net of land revenue) and rent paid for leased-in land</p> <p>Cost C1 = Cost B1 + imputed value of family labour</p> <p>Cost C2 = Cost B2 + Imputed value of family labour</p> <p>Modified Cost (C2M) = Cost C2 + marketing costs and transportation report</p>
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Source: Compiled from Sen and Bhatia (2004, p.96) and CACP (2012)

COST A2 are paid out costs. Operational costs are nothing but deducting depreciation from COST A2. While fixed cost comprises of depreciation, rental value of land, and interest on fixed capital. Apart from productions costs, marketing costs have been included which include expenses such as assembling, grading, packing, local transportation, loading-unloading, transport, and commission and market fees. In addition to costs, corresponding gross returns and net returns were worked out. Gross return is the total value of the output. While net returns per acre of a crop, defined as gross returns per acre minus the total costs per acre, is one of the indicators of profitability.

The details of the computation of specific cost items mentioned in Figure 8.1 are:

- k) HL, BL, ML – valued at the actual rates paid by the farmer.
- l) FL – valued at the rate of wages paid for hired labour for similar work.
- m) BL and ML (owned) – valued at rates paid to hire the same.
- n) Exchange labour & exchange Bullock has been treated as HL & BL respectively.

- o) Seeds (purchased), and irrigation charges – valued at rates paid by the farmers. Irrigation charges include maintenance on irrigations systems and electricity charges, whether paid or unpaid and also fuel. For e.g., drip irrigation systems require flushing of a chemical after each season.
- p) Seeds (farm produced), manure (owned) – valued at the prevailing market prices
- q) Chemical Fertilizer – Fertilizers are evaluated at the purchase price including the transport charges.
- r) Cost of insecticides and pesticides (plant protection kit) – It is evaluated at the purchase price. Physical input such as fuel used for application for plant protection kit has been included under the plant protection kit category.
- s) Expenses incurred on getting Farm yard manure (FYM) to field, for e.g., HL, FL, ML, and BL has been included under the respective labour categories of land preparation category.
- t) Miscellaneous and overhead charges – expenses incurred on bringing seeds from collection centre to farm/home. Expenses on maintenance and repair of implements if any is included in this category
- u) Rental value of own land – Farmers were asked a hypothetical question that if they had given the plot of land where the reference crop was sown, and for the crop duration, and how much rent you would have received? In some cases farmer was unaware about lease rates, then the rental value of owned land has been set at a rate similar to what other people in the area are charging for the type of land owned by the farmer.
- v) Depreciation - is calculated for assets which were utilized for reference crop cultivation. Depreciation was calculated by the straight-line method $[(\text{Purchased value} - \text{Scrap value}) / \text{Life span}]$. Details regarding how the depreciation has been apportioned for particular asset is explained below:
 - i. Bullock cart: Assets such as bullock cart were excluded from the calculation of depreciation and repair. The reason being as it was observed during the field survey and also mentioned in Panse (1954) that bullock

carts are used mainly for transportation and not directly for crop production.

- ii. Agricultural machinery - It was observed that only handful of farmers owned tractors and its associated machinery, and STP sprayer within the village. These farmers used it for custom hiring purpose and was a source of revenue for them. Moreover, in our survey, the prevailing custom hiring rates have been imputed, for those who owned these machinery and thus no further estimations like depreciation, repairs, and interest on fixed capital were apportioned⁴¹. While the assets such as hand sprayer or petrol sprayer used for spraying plant protection chemicals have an average life of 10 years and are used on other crops as well. Moreover, they are borrowed and used by other fellow farmers. Thus, it is cumbersome to calculate the exact share of depreciation for the reference crop. Also, this depreciation amount was very small. Hence, depreciation and interest on fixed costs have not been calculated for hand sprayer or petrol sprayers.
- iii. Electric motor/ diesel pump - It was observed that mostly more than one crop is grown on a farm and moreover, the farmer may have more than one electric motor. Thus, depreciation for the electric motor is charged to the reference crop acreage in proportion to the GCA.
- iv. Drip/Sprinkler Irrigation system: While depreciation for the irrigation system is carried as per the proportion of irrigation system applied to reference crop in the proportion of irrigation system to GCA. The estimated life of drip and sprinkler irrigation system for onion growers is estimated to be seven years and ten years, with the salvage value of 12.5% and 10% respectively of the purchase price. Whereas estimated life of drip and sprinkler irrigation system for CGP growers is estimated to be ten years with the salvage value of 10% respectively of the purchase price⁴².

⁴¹ According to Agrawal (1961), if the item is just a negligible percentage of total cost, but involves too much calculation in arriving at its actual cost, then it is desirable to follow a simpler procedure although less perfect in evaluating such an item. As the amount were so small compared to total cost of production, custom hiring rates in case of valuation of bullock and machine labour are accounted.

⁴² The number of irrigations and water consumption is high among cotton and onion compared to potato (INCID, 1994; Narayanamoorthy, 2004). Based on the discussion with irrigation suppliers and farmers as

- w) Interest on working capital is charged at 12% per annum for half the crop duration (applicable for both the crops).
- x) Interest on Fixed Capital on electric/diesel pump and drip and sprinkler irrigation systems is charged @10% per annum to the reference crop in proportion to the acreage for which irrigation system was used in the agricultural year. While interest on electric/diesel pump was calculated in proportion of the reference crop to the GIA.

8.2.2. Marketing Costs

Marketing Costs include expenses incurred on physical inputs (gunny bags for packing or other inputs used while storage); FL, HL related to packing, loading and also in case of onion NCF has gone to APMC market for sale, as that requires a day commitment; APMC charges (commission and market fees) and transportation costs. Transportation costs incurred during storage (if any), farm to firm's collection centre (in case of some CGP CF) or firm's plant (in case of onion), from farm to APMC Market have been accounted.

8.2.3. Gross Value of Output

The actual price at which the farm produce is sold has been used for calculating gross receipts. The unsold stock used for family or bullock consumption has been evaluated at the prevailing farm price during the harvest period. In case if there are marketing costs involved in selling this stock, it has been accounted (Agrawal, 1961). Similarly, Gross output (kgs) for the farm is defined as total sales plus the output of farm produce which was unsold to the company and used for domestic use such as home or cattle consumption or gifted to relatives.

8.2.4 Data Limitations

The cost of cultivation data analysed in this section refers to the data collected by primary survey from the sample CGP farmers for Kharif season 2012-13 and onion for Rabi season 2011-12. The survey was carried out after three-four months of the output harvested and sold. Farmers were encouraged to show or refer to any written records such as bills or receipts of purchases of inputs and sale of selected crops respectively or

well as review of literature, for e.g. (Singh A. , 2008) the life span and salvage value of irrigation system was estimated.

any statement about income and expenditure accounts they had. However, in many cases, farmers relied on recall. The detailed account of costs and returns was obtained using the interview schedule in Appendix B. Data related to prices of inputs were cross-checked wherever possible with respective input dealers. Similarly, output sale data i.e. price and quantity sold was cross-verified by hundekari in case of CGP, and by company staff for onion. In case of onion NCF, the name of APMC market was recorded along with the month of sale. This helped in verifying the price of the crop from the respective APMC, which gives the modal, minimum, and maximum price. Similarly, w.r.t. CGP NCF, to whom they had sold the output was noted, and wherever possible it was cross-checked. This approach enabled wherever possible crosschecks, ensuring that such recall data on costing and sale of output was reliable.

Given that the primary survey was specific to a farmers of particular crop and contracting firm, hence, results of it could not be generalised. Moreover, the analysis of data is from a single season. Therefore, results need to be viewed with caution. However, results do give us the broad understanding and helps to fulfil the objectives of the thesis.

8.3. Results and Discussion

Before presenting the results of production, costs and returns of reference crops, the type of irrigation and seed variety used by CGP and onion growers are discussed. Usage of drip and sprinkler was higher in case of CF and ACF compared to NNCF. Overall, nearly 65% of ACF and 61% of CF had used either drip or sprinkler irrigation for CGP cultivation compared to 31% of NNCF. But in case of onion, only one NCF used drip for onion cultivation, while rest all used flood irrigation. While 85% of CF used flood irrigation, while rest used drip/sprinkler irrigation for onion cultivation (Table 8.1).

Table 8.1: Type of irrigation used for contract crop cultivation (%)

CGP				
Particulars	CF	NCF		
		ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+n_3=89$)
No irrigation	25.8	30.3	32.1	31.5
Flood	13.5	6.1	35.7	24.7
Drip	28.1	24.2	14.3	18.0
Sprinkler	32.6	39.4	17.9	25.8
Total	100.0	100.0	100.0	100.0
Onion				
Particulars	CF	NCF		
		ACF ($n_2=48$)	NNCF ($n_2=44$)	NCF ($n_2=92$)
flood	85.2	100.0	97.7	98.9
drip	4.6	0.0	2.3	1.1
sprinkler	7.4	0.0	0.0	0.0
drip/sprinkler & flood	2.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0

Source: computed from primary survey

Note: Units in percentage and have been calculated on column sums

Table 8.2 shows the seed variety grown by farmers. In case of CGP, 53% and 30% of CF had grown FI-1533 and ATL variety of CGP respectively. While rest 17% of CF had grown both ATL and FL-1533. On some part of the land, farmers prefer to grow ATL. In the case of onion all the CF had had grown V12 variety, while 60% and 40% of NCF had grown Rangda onion and table variety white onion respectively.

Table 8.2: Seed Variety grown by farmer

CGP				
Crop variety	CF	NCF		
		ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+n_3=89$)
1533	89.9	46.9	57.1	53.4
ATL	4.5	18.8	35.7	29.5
1533 and ATL	5.6	34.4	7.1	17.0
Total	100.0	100.0	100.0	100.0
Onion				
Crop variety	CF	NCF		
		ACF ($n_2=48$)	NNCF ($n_2=44$)	NCF ($n_2=92$)
V12	100.0	0.0	0.0	0.0
White onion	0.0	45.8	34.1	40.2
Rangda	0.0	54.2	65.9	59.8
Total	100.0	100.0	100.0	100.0

Source: computed from primary survey

Note: Units in percentage and have been calculated on column sums

8.3.1. Production costs

In this section, the details about various aspects of cost of production and marketing of CGP and onion is explained. Weighted average production and marketing costs and net returns for CGP and onion growers is presented in Tables 8.5 and 8.6. Total production costs of an acre of CGP is 6% higher in CF, Rs.50,411 compared to Rs.47,571 for NCF. Total production costs comprise of fixed and operational costs. Similarly, operational and fixed costs were 1% and 6% higher in CGP CF compared to NCF. While marketing cost were very less incase of CGP compared to onion. This is mainly because both contracting firm and the non-contracting firm were procuring harvests mostly from farmers' field. Also, transportation costs were borne by respective firms. In the case of onion, NCF had to take the produce to the APMC. Which involved marketing and APMC charges w.r.t. sale of output. In the following sub-sections, different production aspects are discussed.

8.3.1.1. Material inputs

CGP CF farmers used to buy most of the input materials such as seed tubers, plant protection material except fertilizers from Company's hundekari. The majority (58%) of the NCF had bought seeds also from other than company hundekari, while one-third bought from Company hundekari itself. Within NCF, 55% of ACF and 22% of NNCF had bought from company hundekari, whereas 30% of ACF and 75% of NNCF had bought from other hundekaris (Table 8.3). Whereas three-fourth of NNCF farmers had bought seeds from other hundekari. This shows that although ACF grew CGP without a contract, they were still associated with company hundekari with regard to purchasing seeds and sale of output, while NNCF were associated with other hundekaris for the same.

About 93% of CF had taken a bank loan to pay for material inputs (seeds, fertilizers, plant protection kit) for CGP cultivation while rest had paid through Bank Demand draft. Three-fourth of ACF and half of NNCF had bought material inputs either on partly or fully credit from the hundekaris. While 15% of ACF and 38% of NNCF had bought material inputs on cash. Thus, the majority of the NCF grew CGP based on the purchase of materials inputs on credit.

Table 8.3: From where did NCF CGP growers purchased seeds from?

Particulars	NCF		
	ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+ n_3=83$)
Company hundekari	55	22	34
Other hundekari	30	75	58
Both company and other hundekari	6	0	2
Self	9	4	7
Total	100.0	100.0	100.0

Source: Primary survey

Units in percentage and have been calculated on column sums

Table 8.4: Purchase terms for buying seeds, CGP NCF

Particulars	CF ($n_1=89$)	NCF		
		ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+ n_3=83$)
Bank crop loan	93	6	2	3
Cash/bank DD	7	15	38	30
Partly credit	0	55	36	43
Full credit	0	18	21	21
Self-produced	0	1	4	3
Total	100.0	100.0	100.0	100.0

Source: Primary survey

Note: Units in percentage and have been calculated on column sums

The PepsiCo hundekaris from Pune also sell CGP seed tubers other than that of contract. About 39% of CF grew CGP in addition to contract acreage of which 80% were from Pune. The major reason for the CF growing CGP in addition to contract is that often, the price offered by other traders is higher compared to the contract price. The incidence of growing CGP in addition to contract is high in Pune because CF is going around in sample villages of the district for around 10 years. Moreover, the presence of outside traders and firms are high in Pune compared to Satara district. The PepsiCo hundekaris as well as other non-company hundekaris, source the seed tubers from Punjab. Those growing CGP without a contract or even CF if they bought seed tubers on cash payment they would get it as per the contract seed tuber price. Those who bought on half and full credit had to pay Re. 1 and Rs. 2 per kg respectively in addition to contract seed tuber price.

Material input costs were high among both CGP and onion CF compared to NCF. Seed cost contributes over 35% of total cost in case of CGP, which is substantial. Material input costs were higher in CGP CF as they spent a larger amount on seeds, plant-protection measures, and manures (Table 8.5). While Onion CF spent a higher amount on fertilizers and plant-protection measures (Table 8.6).

The weighted average seed cost per acre of CGP CF was Rs. 18,369 was slightly higher compared to that of NCF, which was 17,682. This is mainly because, 90% of CF and 53% of NCF used FL-1533 variety exclusively, which is priced Rs. 23/kg in contract and Rs. 24-25/kg without a contract. While rest used ATL variety which is priced Rs. 20 in the contract and around Rs. 20-22 in without a contract. ATL was preferred by farmers in Visapur village, Khatav taluka, as it was yielding good results. The unweighted average seed costs per acre of CF and ACF were similar, while that of NCF were lower (Table 8.7).

In the case of onion, V12 seed cost is Rs. 700. Of which CF has to pay Rs. 600 and Rs. 100 is deducted from final payment. For one acre, 3-4 kg seeds are required. Thus, the cost of seeds for an acre cultivation is not very high. While NCF buys seed which is available on any agriculture store. Within NCF, seed costs were similar for both ACF and NCF (Table 8.7)

8.3.1.2. Labour costs

Human labour (both FL and HL), were similar for CGP. Most of the CGP farm households (96%) used exchange labour. Overall, for both crops, it was found total production labour costs do not significantly differ from each other. However, in the case of onion, hired labour for cultivation was significantly higher in CF compared to NCF at 10% level of significance. This was mainly because as due to higher yields, more farm labour is needed. Also, average weeding hired labour costs was higher for CF was Rs. 1,689 compared to Rs. 1,434 for onion NCF and it was significantly different from each other at 5% level of significance. Overall, onion contract farming seems to have a positive impact on rural employment in the region.

The average bullock labour costs for CGP were higher in case of NCF compared to CF, while for machine labour it was vice-versa. This shows that CGP CF farmers were inclined to use modern technology. Some of CF in Satara had used potato harvesters for harvesting CGP output, while NCF had mostly relied on bullock labour for the same. As per Table 8.7, unweighted average bullock labour was similar for CF and ACF, while it was higher in case of NNCF. This shows that it is NNCF which relies on traditional practices of cultivation.

On an average total operational costs of CF was significantly higher ($p < .01$) than that of NCF for both the crops. On average, total operational costs of CGP CF were Rs.

44,486 compared to Rs. 41,709 of NCF. While average total operational costs of onion CF were Rs. 29,468 compared to Rs. 26,881 of NCF. Total operational costs constituted around 85% of both CGP CF and NCF. While in case of onion, operational production costs constituted around 75% and 66% of total costs CF and NCF respectively.

8.3.1.3. Fixed costs and other costs

Overall fixed production costs accounted for around 12% of the total costs. The fixed costs were significantly not different for CF and NCF among both the crops. Of the fixed costs, the rental value of owned land was the major constituent. In case of onion, the rental value of owned land costs was significantly not different for CF and NCF. However, in case of CGP, NCF had a significantly higher rental value of owned land compared to CF, suggesting that NCF had a better quality of land or due to a locational aspect. In fixed costs for CGP, depreciation and interest on fixed costs were higher for CF, but these constituted a marginal percentage of the total costs.

8.3.2 Marketing Costs

The marketing costs did not make a difference in case of CGP, as the marketing channel was similar, i.e., both for CF and NCF it was sold via an intermediary and mostly truck used to come on the farm for procuring the produce. However, for onion, marketing channels were different, as CF used to sell it directly to JISL, with the Jain Sevak making arrangements to procure from the farm directly. While most of the NCF had to take produce to APMC, incurring substantial marketing costs. As marketing costs of onion, NCF constituted 21% of total costs compared to 12% of onion CF. Onion NCF had to incur extra marketing costs with respect to labour, material inputs, and APMC charges. NCF had to spend on gunny bags as well as on storage material. While for CF, gunny bags was provided by the company and they had to sell produce immediately after harvest, thus no storage costs were involved.

8.3.3. Total Costs

Overall, total costs per acre was not significantly different for both the crops. For CGP weighted average total costs per acre was Rs. 52,331 for CF and Rs.49,680 for NCF. While for onion, weighted average total costs per acre was Rs. 39,623 for CF and Rs.40,497 for NCF.

Different cost concepts discussed in Figure 8.1, its results for CGP and onion are presented in Table 8.8: Weighted average cost of cultivation and returns (cost concepts) Table 8.8. Costs A2, B1, B2, C1, C2, and C2M were significantly higher in CF compared to NCF, with percentage change being in the range of 5-8%. Although costs of CF were higher, but the net returns over Costs A2, B1, B2, C1, C2, and C2M were significantly not different between CF and NCF. This suggests that either yield and/or price was higher in the contract.

8.3.4. Yields

Yields were significantly higher in CF compared to NCF for both the crops (Tables 8.5 and 8.6). The weighted average physical yield obtained by CGP CF was 44.6 quintals per acre, which was 18% higher of yield of 37.7 quintals per acre in NCF. Similarly, for onion, weighted average yield in CF was 91.4 quintals, which was 16% higher of yield of 78.8 quintals per acre in NCF. This, shows that contract production has resulted in higher yields. The results are in line with the literature viz. Awotide et al. (2015); Cai et al. (2008); Narayanan (2011); and Swain (2011). Due to higher yields in CGP and onion CF resulted in per quintal total costs are lower over NCF, though the per acre costs are higher. Also cost average cost per kg of CGP was Rs. 16.8 compared to Rs. 13.8 that of both CF and ACF. As stated in Dev and Rao (2007, p. 42), “*economic theory states that the average costs matter in decision-making and deciding the profitability rather than absolute costs*”.

One of the reasons for higher yields is that the CF had spent higher money on material inputs (seeds, fertilizers, plant protection kit) so that they get good yields. Also, CF had access to extension services.

One of the point to note is that in case of CGP, many of the farmers had stored part of produce and by the time they had sold, some part had got spoiled, therefore not all harvested output was sold. Similar was the case of NCF onion. Thus, the marketable surplus was less than marketed surplus. While for CF, JISL used to pay only for 97.5% of produce. This is perhaps the reason that when total yield is multiplied by average selling price, the value is greater than that of gross returns.

8.3.5. Net returns

Net returns matter in deciding which crop to grow and under which governance mode (CF or NCF). Net returns over different cost concepts for CGP and onion are presented in Table 8.8. Average selling price of CGP CF for the reference season was Rs. 11.8 per kg, which was 19% lower compared to NCF. This is mainly because Pepsico commanded a price leadership position. Thus, the non-contracting firms had to pay more than the PesiCo price, in order to entice farmers to sell to them. Thus, NCF fetched a higher price. This resulted in average NCF net returns (i.e., deducting production and marketing costs from gross returns) of Rs. 1,047 per acre, while that for CF was a loss of Rs. 2,443. However, this return was significantly not different from each other. The average selling price per kg in case of CGP CF could easily cover the Cost C1 and fall short of Cost C2 with a small margin of Rs. 523. But NCF were able to cover all the imputed costs along with paid-up costs (production and marketing) at their average selling price per kg.

Average selling price of onion CF for the reference season was Rs. 4.8, which was 21% higher compared to NCF. Thus, CF fetched both the higher price and yields. This resulted in average CF net returns (i.e., deducting production and marketing costs from gross returns) of Rs. 3,230 per acre, while that for NCF was a loss of Rs. 8,737 per acre. This result was significantly higher at 1% level of significance. The average price per kg in case of onion, NCF could easily cover the Cost C1 and fall short of Cost C2. But onion CF were able to cover all the imputed costs along with paid-up costs (production and marketing) at their average selling price per kg (Table 8.8).

Table 8.5: Weighted average production, marketing costs and net returns, CGP (Rs./acre)

Cost Items	CF		NCF		<i>t</i> -test
	CF	% of total cost	NCF	% of total cost	<i>p</i> value (2-tailed)
Production Cost					
Human Labour Cost					
Hired labour	2,465	4.7	2,664	5.4	.30
Family labour	1,887	3.6	1,921	3.9	.94
Sub-total Human labour	4,352	8.3	4,584	9.2	.11
Bullock labour**	2,426	4.6	2,863	5.8	.05
Machine labour**	2,351	4.5	1,909	3.8	.01
Material Input					
Seed**	18,369	35.1	17,682	35.6	.05
Manure	4,883	9.3	3,688	7.4	.26
Fertilizer	5,780	11.0	5,736	11.5	.42
Plant protection*	5,379	10.3	4,363	8.8	.00
Sub-total material inputs*	34,410	65.8	31,468	63.3	.00
Irrigation charges**	240	0.5	140	0.3	.01
Miscellaneous expenses	149	0.3	196	0.4	.95
Interest on working capital	559	1.1	547	1.1	.92
Total Operational Costs*	44,486	85.0	41,709	84.0	.00
Depreciation*	555	1.1	243	0.5	.00
Rental value (own land)*	4,716	9.0	5,316	10.7	.00
Interest on fixed capital*	654	1.2	304	0.6	.00
Fixed Cost	5,925	11.3	5,862	11.8	.66
Total Production Costs (a)	50,411	96.3	47,571	95.8	.00
	Marketing and Storage				
Material Inputs	690	1.3	640	1.3	.15
Human Labour	896	1.7	853	1.7	.25
Transport and APMC	334	0.7	415	1.2	.11
Sub-total marketing cost (b)	1,920	3.7	2,109	4.2	.36
Total Cost (a+b)*	52,331	100.0	49,680	100.0	.00
Yield (quintals/acre)*	44.6		37.7		.00
Total cost per kg	11.7		13.2		.44
Average price*	11.8		14.6		.00
Gross Return (c)	49,888		50,727		.92
Net Return (a+b-c)	-2,443		1,047		.17

Note: For each row, the last column presents the results of a *t*-test of the null hypothesis that the means are equal in both samples. **p* < .01, ** *p* < .05, *** *p* < .1

Table 8.6: Weighted average production, marketing costs and net returns, onion (Rs./acre)

Cost Items	CF		NCF		<i>t</i> -test <i>p</i> value (2-tailed)
	CF	% of total cost	NCF	% of total cost	
Production Cost					
Human labour cost					
Family labour	3,785	9.6	3,742	9.2	.90
Hired labour***	7,772	19.6	7,134	17.6	.10
Sub-total Human labour	11,557	29.2	10,875	26.9	.12
Bullock labour	783	2.0	776	1.9	.93
Machine labour	1,822	4.6	1,664	4.1	.65
Material Input					
Seed	2,623	6.6	2,459	6.1	
Manure	4,983	12.6	5,131	12.7	.81
Fertilizer*	4,301	10.9	3,093	7.6	.00
Plant protection*	2,463	6.2	2,047	5.1	.00
Sub-total material inputs**	14,370	36.3	12,729	31.4	.03
Irrigation charges	435	1.1	426	1.1	.63
Interest on working capital*	502	1.3	410	1.0	.00
Total Operational Costs**	29,468	74.4	26,881	66.4	.02
Depreciation	94	0.2	35	0.1	.13
Interest on fixed capital	125	0.3	106	0.3	.49
Rental value (own land/lease-in)	4,894	12.4	4,955	12.2	.27
Fixed Cost	5,113	12.9	5,096	12.6	.85
Total Production Costs (a)**	34,581	87.3	31,977	79.0	.02
Marketing and Storage					
Material Inputs*	0	0.0	2,489	6.1	.00
Human Labour***	1,364	3.4	1,526	3.8	.06
Transport**	3,674	9.3	3,033	7.5	.05
APMC & other charges*	3.5	0.0	1,472.2	3.6	.00
Sub-total marketing cost (b)	5,042	12.7	8,520	21.0	.00
Total cost (a+b)	39,623	100.0	40,497	100.0	.52
Yield (quintals/acre)*	91.4		78.8		.00
Total cost per kg	4.3		5.1		
Average price*	4.8		4.0		.00
Gross Return*	42,853		31,760		.00
Net Return *	3,230		-8,737		.00

Note: For each row, the last column presents the results of a t-test of the null hypothesis that the means are equal in both samples. * $p < .01$, ** $p < .05$, *** $p < .1$

Table 8.7: Unweighted average costs and net returns for CF, ACF, and NCF
(Rs./acre)

Particulars	CGP			Onion		
	CF	ACF	NNCF	CF	ACF	NNCF
Production Cost						
Human Labour Cost						
Family labour	1,894	1,771	2,245	3,687	3,452	4,353
Hired labour	2,460	2,522	2,450	7,660	8,112	6,150
Sub-total Human labour	4,354	4,293	4,695	11,347	11,564	10,503
Bullock labour	2,476	2,582	2,995	759	893	755
Machine labour	2,326	1,971	2,038	1,838	1,686	1,538
Material Input						
Seed	18,411	18,238	17,274	2,632	2,438	2,433
Manure	5,011	2,270	4,712	4,962	5,941	4,548
Fertilizer	5,773	5,472	5,964	4,250	3,345	2,879
Plant protection kit	5,390	4,788	4,166	2,445	2,169	1,939
Sub-total material inputs	34,362	31,375	32,118	14,289	13,893	11,799
Irrigation charges	241	202	141	442	411	428
Miscellaneous expenses	147	184	126	--	--	--
Interest on working capital	559	547	564	498	447	370
Total Operational Costs	43,905	40,607	42,113	29,174	28,894	25,394
Depreciation	557	364	254	102	16	43
Interest on fixed capital	669	359	374	132	65	136
Rental value (own land/lease-in)	4,726	5,277	5,046	4,938	4,926	4,951
Fixed Cost	5,953	6,000	5,675	5,171	5,007	5,131
Total Production Costs (a)	49,858	46,607	47,788	34,345	33,901	30,524
Marketing and Storage						
Material Inputs	693	685	610	0	2,762	2,342
Human Labour	900	877	768	1,360	1,674	1,539
Transport	17	13	161	3,680	3,571	2,873
APMC & other charges	321	368	334	3	1,851	1,391
Sub-total marketing cost (b)	1,924	1,886	1,804	5,043	9,857	8,145
Total cost (a+b)	51,782	48,493	49,592	39,388	43,758	38,669
Yield (quintals/acre)	45.0	37.8	34.6	92.0	82.0	74.5
Total cost per kg	13.7	13.8	16.8	4.3	5.3	5.2
Average price	11.8	13.7	14.3	4.8	4.3	3.8
Gross Return	50,453	48,970	46,519	43,094	35,573	29,013
Net Return	-1,328	477	-3,073	3,705	-8,185	-9,656

Source: Computed from primary survey

Table 8.8: Weighted average cost of cultivation and returns (cost concepts)

Particulars	CF	NCF	% change over NCF	Independent sample <i>t</i> -test
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				<i>p</i> value
CGP Cost of cultivation (Rs/acre)				
Cost A1/A2*	43,155	40,031	7.9	.00
Cost A2+FL*	45,041	41,951	7.4	.00
Cost B1*	43,809	40,335	8.7	.00
Cost B2*	48,524	45,650	6.3	.00
Cost C1*	45,695	42,255	8.1	.00
Cost C2*	50,411	47,566	6.0	.00
Cost C2M*	52,331	49,680	5.3	.00
CGP, Net returns over cost (Rs/acre)				
Cost A1/A2	6,734	10,696	-37.0	.13
Cost A2+FL	4,847	8775	-44.8	.14
Cost B1	6,080	10,392	-41.5	.11
Cost B2	1,364	5,076	-73.1	.16
Cost C1	4,193	8,472	-50.5	.11
Cost C2	-523	3,161	-116.5	.16
Cost C2M	-2,443	1,047	-333.3	.17
BC ratio (A2+FL)	1.11	1.21	-8.3	.12
BC ratio (C2M)	0.95	1.02	-6.9	.18
Onion Cost of cultivation (Rs/acre)				
Cost A1*	25,777	23,174	11.2	.01
Cost A2	25,806	23,174	11.4	.01
Cost A2+FL**	29,592	26,916	9.9	.02
Cost B1*	25,931	23,280	11.4	.01
Cost B2**	30,796	28,235	9.1	.02
Cost C1**	29,716	27,022	10.0	.02
Cost C2**	34,581	31,977	8.1	.02
Cost C2M	39,623	40,497	-2.2	.53
Onion, Net returns over cost (Rs/acre)				
Cost A1*	17,075	8,586	98.9	.00
Cost A2*	17,046	8,586	98.5	.00
Cost A2+FL*	13,261	4,844	173.8	.00
Cost B1*	16,922	8,480	99.6	.00
Cost B2*	12,057	3,525	242.1	.00
Cost C1*	13,136	4,738	177.2	.00
Cost C2*	8,272	-217		.00
Cost C2M*	3,230	-8,737		.00
BC ratio (A2+FL)*	1.5	1.2	-8.3	.01
BC ratio (C2M)*	1.1	.78	-6.9	.00

Note: For each row, the last column presents the results of a *t*-test of the null hypothesis that the means are equal in both samples. **p* < .01, ** *p* < .05, *** *p* < .1

8.4. Concluding Remarks

The results of both the crops confirmed that CF had better yields than the NCF. This is mainly due to extension services and access to quality material inputs in contracting. The onion CF had outperformed NCF in all respects (production and

marketing). Although overall costs were higher in CF for both the crops, but they gain in terms of increase in yields, this overall reduces the per quintal costs. The average per quintal costs was higher in onion NNCF compared to CF and ACF. In case of CGP, although net returns over the total cost of CF were negative, while those of NCF were positive, but they were not significantly different from each other. CGP CF could easily cover the Cost C1 and fall short of Cost C2 with a small margin of Rs. 523.

CF also save on marketing costs, which improves their overall profitability. Thus, contracting seems to increase yields, and help farmers reduce their marketing costs. Given the imperfections in input markets in India, contract farming seems to facilitate positive change in the overall agricultural sector.

Chapter 9 - Conclusion

Contract farming is an institutional form of procurement of raw material (agricultural commodities) for agro-processing/marketing firms. As noted by Roy (1963), contract farming unblocks the flow of resources to agriculture. In light of the controversy surrounding the functioning of contract farming about the inclusiveness and exploitation of farmers, this thesis is an effort to contribute towards understanding the various socio-economic aspects of the CFAs. Overall, there is a dearth of micro-level studies focussing on the inclusiveness and economic aspects of the contract farming. The thesis sought to examine the profile of farmers prefer to grow under contract and the motivation behind it. The thesis also sought to examine the benefits and problems experienced by CF. The thesis also examined the cultivation and profitability aspects of contract farming vis-à-vis without it.

Due to time and resource constraints thesis adopted the cross-sectional research design to address the research questions. The case study was prepared for onion and CGP crop in the selected regions of Maharashtra through the secondary and primary data. Primary data comprised of structured schedule through farmers' onion and CGP survey comprising of 378 farmers. It also included semi-structured interviews of contracting firm staff, commission agents in APMCs, banking officials, Government officials, hundekari (traders in case of CGP) and input companies related to CFAs.

In this chapter, the summary of the findings of the thesis is presented; followed by suggestions for contracting firms and policy recommendations for the Government. In the end, the recommendations for future research areas pertaining to CFAs have been presented.

9.1 Summary of the findings

This section will synthesize the findings to answer the thesis research questions. It was found that both the contract farming firms' (JISL and PepsiCo) facilitated new crop adoption and helps diversify the farm portfolio. In addition to dominant contract crop growing regions, the contracting firm also tries to develop new regions. The reason being the farmers in these regions would remain a reliable source of supply of raw materials to the firm. It was found that both the contract farming firms' tries to supply inputs and services which shall help facilitate good quality production, minimize the costs,

empower farmer with good agriculture practices. Both the firms tries to build the relationship with farmers so that farmers continue to grow under contract and produce quality produce.

Both the firms have not shown any biases towards selecting the farmers in the contract except for those farmers who are most likely to sell the produce outside the contract. It is actually the farmers who decide whether to grow crop under contract. Farmers were drawn into onion and CGP contract farming mainly due to MGP, credit availability and by the success of co-farmers. It was found that all sections (across social groups, small or large holding, educated or uneducated, experienced or inexperienced) farmers participate in contracting. However, it is the wealthier and more experienced farmers in growing respective contract crop that were the first ones to join contract farming.

Although farmers with greater agricultural assets were more likely to be under CGP contract, it was vice-versa for onion. Thus, it cannot be concluded that only well-off farmers can grow contract crops. The schooling, age, farms distance from the road, and distance of farm to the road were not the significant determinants of CF participation. This is line with the results of Narayanan (2011) for papaya, marigold, gherkin and broilers in TN, Swain (2012) for rice seed, Miyata et al. (2009) for green onion and apple in China, and Warning and Key (2002) for peanuts in Senegal. The proportion of farmers with greater agricultural assets and experience mostly belonged to ACF. This phenomenon was also observed in Deshpande (2005). Less crop experienced farmers were found to be more likely to be under contract, as they needed company's support for production and marketing of the crop. This pattern is consistent with that presented by Narayanan (2011) for cotton in TN, Simmons et al. (2005) for broilers in Indonesia and by Ruben and Saenz (2008) for choyate in Costa but contradicts that of Birthal et al. (2008) and Awotide et al. (2015).

Field observations and overall descriptive and logit results seem to indicate that contract farming schemes were inclusive, as less experienced farmers and even farmers with low agricultural asset resource base grew contract crop. Farmers with high contract crop acreage had a higher likelihood of being under contract for both the crops. This signifies farmers seem to perceive contract farming as risk mitigation strategy, as in contract they have assured buyer and MGP, which reduces the risk coverage. Farmers' decision to contract in the forthcoming season is based on a number of factors. Agro-

climatic conditions (water availability), financial position, farmers' expectation of returns in the contract and other alternatives, theirs and co-farmers past experience of the same influences farmers' decision whether to grow contract crop in the forthcoming season.

Market dimensions also play an important role in decision making of the farmer. Villages, which have inputs and output markets close by, there farmers may prefer to grow CGP/onion without a contract. Also, the villages in which CGP hundekaris are more, there also. However, those villages which are far away from input and output markets, there farmers prefer to grow CGP/onion in the contract. This phenomenon was also observed by Kliebenstein and Lawrence (1995) and Miyata et al. (2009). However, this result of the thesis is contrary to (Singh, 2007) which notes that large spread of CFA has been found in regions better endowed with infrastructural facilities. But our thesis observes that, where there are imperfections in input and output markets, there farmer feel the need for support and are more likely to remain in the contract. The agriculturally backward region (i.e. regions which are less endowed in terms of soil and climate for farming) from a market perspective, are favorable for contract farming. For instance prevalence of PepsiCo CFAs in Satara which is a drought prone region

Another inclusiveness aspect of contract farming observed in the both the crops was that CFAs has facilitated new technology adoption. Farmers mentioned that in addition to seed variety and plant protection kit, both the contracting firms incentivises farmers to adopt MIS, which saves water and enables farmer with less water availability to grow the contracted crop. JISL introduced direct sowing method through its agricultural equipment, which saved the labour costs. While PepsiCo introduced STP sprayers for application of plant protection kit as well as potato planters and harvesters to its farmers. Farmers have felt benefited with the extension services of CFAs, as it made them more aware of good agricultural practices, which they would adopt in growing other crops. As prior to the advent of contract farming in the region, farmers did not receive any extension services from Government agencies. Even the NCF benefit from their fellow CF, as they share the information about cultivation practices and inputs (plant protection chemicals, micro-nutrients, etc.). It was common to see that both CF and NCF used to consult Jain sevak for any advice with respect to the cultivation of other crops as well. Overall, farmers felt empowered with the access to new technologies,

skills and an increase in capacities and income due to contract crop cultivation. All this have contributed to CF farmers getting good yields.

Production results confirmed that CF were better off compared to NCF. Although CF had higher absolute costs, but they had lower per kg total costs owing to higher yields. Higher yields in CF is mainly due to extension services and access to quality material inputs in contracting. This result is in line with the literature (Awotide et al. 2005; Deshpande, 2005; Dev & Rao, 2005; Dileep et al., 2002; Kumar, 2006; Miyata et al. 2009; Pandit, Pandey, Rana, & Lal, 2009; Rangi & Sidhu, 2000; Singh S. , 2000; Swain, 2010, 2011; Tripathi, Singh, & Singh, 2005; Warning & Key, 2002). Thus contracting seems to have a positive impact on cultivation practices in the village, which shall boost growth in the agriculture sector.

CF of both the crops faced relatively less marketing costs. This phenomenon was also observed by Dev and Rao (2005) and Vijaykumar and Sonnad (2010). Reduction in marketing costs helps improve farmers' profitability. For the reference season, net returns over total costs were significantly higher for onion CF compared to NCF. However, for CGP, net returns over total costs were significantly not different from each other. Costing, yield and profitability results have to be seen in caution as they are for one particular season. Hence, results cannot be generalised whether CF gets better yields and returns compared to NCF.

Overall, the farmers in the villages admit that contract farming in the region has raised the incomes of farmers in the village, which have boosted the overall village economy. As with rising in income, their consumption expenditure has increased and they have started investing in agriculture assets, which improve their capacities to grow cash crops and reduce production risks.

Churning in and out of the contracts was observed in both the crops. Having single buyer and higher price outside the contract, were the major reason for non-participation in CF. Farmers felt having a single buyer is a constraint as they have to agree to terms and conditions of the contracting firm. However, if NCF has a bad experience in growing crop without a contract in the previous season, then they may switch to contract farming in the forthcoming season. The contracting firm welcomes the return of farmer in contracting. Overall, participation in contracting and disadoption is not a permanent feature, a farmer can grow CGP under contract as and when it wants.

9.2 Suggestions for contracting firms.

Although, majority of the CF were satisfied with contract farming. But there were few who faced the problem of delayed in procurement and complained of strict quality norms. Contracting firm should try to understand the farmers' perspective about the problems faced by them due to strict quality norms followed by it. Also, farmers should be explained the reasons behind the strict quality norms.

Onion farmers mentioned that there were rumors that V12 cultivation affects soil fertility. Thus, the JISL should conduct the scientific study of the same and publish its results. Positive feedback from peers and image of contracting firms attract farmers participation in CFAs, while negative feedback discourages farmer to join CFAs. Thus, company staff should try their best to build trust in a relationship through its actions. Contracting firms needs to keep the focus on how could they retain their farmers and be their preferred buyers. For this, it is essential that their staff functions in an efficient and diligent way. As any inappropriate action leads to negative reputation, which may have an adverse impact on the functioning of CFAs.

9.3 Policy suggestions

Evidence from several studies, including this thesis state that CFAs helps boost agriculture sector and the rural economy overall. Agriculture gets boosted with an increase in yields, farm investments and incomes. In-turn rural economy gets boosted with increasing farm incomes which in turn give rise to consumption expenditure. Therefore, all the State Governments in India should permit and facilitate CFAs. As mentioned in section 2.3.1 , some kind of arbitration machinery is needed that shall help protect the interests of stakeholders viz. farmer and firm

Maharashtra Government amended its APMC act in 2005 to permit and facilitate contract farming. The Maharashtra model APMC act provides institutional support to contract farming through (i) Registration of sponsoring company; (ii) Recording of Contract Farming agreement; (iii) Time bound dispute resolution mechanism; and (iv) Indemnity to farmers land. The basic objective behind model APMC act is to protect the rights of both the parties (farmer and contracting firm). Generally, farmers are considered weak compared to firms and the redressal mechanism shall help farmers in protecting rights of farmers. Although the States have been amending the act and rules

for making provisions of contract farming, but the response from contracting firms is not that encouraging for example based on the media reports . Interaction with agricultural marketing board officials of the state of Gujarat and Maharashtra, that there are a handful of companies that have come forward and registered themselves. For e.g., Maharashtra State Agricultural Marketing Board (MSAMB) list of contracting firms consisted of some firms which comprised mostly for crops like cotton, banana, and grapes. The JISL and PepsiCo, involved in large-scale CFAs of white onions and CGP in Maharashtra had not registered themselves with the prescribed district authorities. Therefore, there are no complete data available at State level or national level pertaining to a number of companies and farmers involved in contract farming. Moreover, the data on the crops and acreage under contract farming at State and National level is unavailable in the public domain.

Most of the commodities grown under contract farming would be used for processing purposes and not for table consumption. Most of the commodities grown under contract farming are those which are not available in the APMC market at the required quantity and at right time for the agro-processors. Therefore, in light of the issue of food security, as a policy maker, it is important to know how much area is being diverted to which crops under contract farming. For example; JISL had contracted for 3331 acres in 2011-12 Rabi season for white onion (processing variety) cultivation which was used for dehydration to be exported. It is likely, that the farmer which would have grown table variety onion has diverted his acreage for growing this processing variety onion. Similarly, contract farming is carried out extensively for commodities which are processed. For e.g., Palm fruit, chip-grade potato, sugarcane, gherkin, cotton, winery grapes, marigold, etc. (See Appendix for the list of crops and contract farming firms). Therefore it is important to monitor the crop acreage diversion for processing variety crops. Such monitoring would help us in planning for issues related to food price inflation and food security. If thought from the academic perspective, such a database helps researchers, who are planning to work in the area of agribusiness and high-value chains.

The primary survey in selected districts of Maharashtra found that the farmers, unaware of the existence of a dispute-settling mechanism, felt helpless whenever a dispute would arise. While the interaction with the firm staff revealed that firms are not interested in registering, as they perceive that dispute resolution mechanism would be

biased against them. As any dispute lodged by farmers shall create a negative reputation of the firm. Instead, both the firms attempt that disputes do not arise. In case there is any they would like to settle it, without involving any third party. As mentioned in Chapter 5, both the firms try to build a relationship of trust with the farmers. As JISL officials call it “contact farming” rather than contract farming.

As mentioned by Mighell and Jones (1963) contract production is an institutional machinery for getting things done. One cannot say that machine is good or bad. A machine may yield good or bad result depending on how and where it is used. In such a scenario, State Government can keep a watchful eye to protect the rights of stakeholders. Some of the policy suggestions that can help in effective functioning of contract farming:

- a) State Governments should hold a discussion with the food processing firms/ associations to find out the suggestion for incentivising contracting firms to register with respective State/District agencies.
- b) State Government should publicise its contract farming policy and rules in order to create awareness for the same with special highlights on benefits of contract farming, the availability of dispute resolution mechanism and indemnity of land, which protects the rights of the farmer. State Governments can use mass media viz. electronic media (Television, radio, etc.), print media (newspapers, periodicals, etc.), as well as through agri-exhibitions to publicise and promote contract farming rules. This shall help in making farmers aware about their rights in CFAs and clear the fears from farmers mind about working with agro-processing/marketing firms.
- c) State Government extension services agencies, should examine and keep a watch, whether contract crop cultivation has any negative impact on soil fertility and ground water.

9.4 Future areas of research

Similar studies on different crops shall contribute to a better understanding of inclusiveness aspects of CFAs. During the course of the thesis, certain limitations (Section 1.8) were found in the research design. Also due to time and resource constraints, certain issues of contract farming could not be dealt, which have been

highlighted in this section. Also, there are certain areas which need to be studied and examined, that would help us in a better understanding of contract farming. Following are the future areas of research in the subject of contract farming, which can be worked on:

- a) How much time does it take to adopt or give up the contract crop cultivation? Is the churning in and out of contract farming temporary and permanent? A duration analysis of contract farming shall help us to know how much time it takes to adopt farmers to take up contracting.
- b) Need more studies that document the broad implications of contract farming. There is a need for studies that highlight the implications of CFAs on input and output market structure and the cropping pattern in the region. There is a need to document that how contracting can help develop new markets and how it affects different stakeholders such as farmers, businessmen, and consumers overall. As mentioned in section 7.3, that most of the commodities grown under contract farming would be used for processing purposes and not for table consumption. Thus, whether the growth of CFAs affects the prices of foodgrains, fruits, and vegetables and contributes towards food inflation of the country.
- c) There are a handful of Indian studies viz. Narayanan (2011) and (Singh, 2007) that have conducted village-level analysis, to find out what kind of villages get selected into CFAs, and which do not. It may be essential to know from a policy point of view, to know whether only villages with good infrastructure are where CFAs are practiced or even in backward regions. This shall help us understand the inclusiveness of CFAs as institutional machinery.
- d) One of the important parameters of success of CFAs is when both the parties (firm and farmer) mutually adhere to terms and conditions. However, if one of the parties reneges the terms, then that relationship would break. Thus, study multiple crops to see, under which kinds of contracts, compliance rates are high; i.e., How the design of contracts helps in higher compliance and success of CFAs.

- e) As per our survey, farmers used to grow contract crops (onion and CGP) both in a contract and without a contract. There is a need for studies to validate whether CFAs are a hedging mechanism for farmers to cover the price risks.

9.5 Concluding remarks

As have mentioned in the first chapter of the thesis, it is not possible to have a general theory of contract farming, due to the heterogeneity of crop characteristics, firms' conduct, and contract-farming relations. This thesis contributes to the literature in a way of understanding the phenomenon contract farming of two short duration of processing variety crop in Maharashtra (India). In this thesis, it was found that gains from CFAs are not just restricted to yields and returns but it has benefited farmers in the long run, by educating them on good agricultural practices, improving their farm capacities, and helping them being more empowered in taking their farming decisions. Overall, it was found CFAs are inclusive as all sections of farmers participate in it. Imperfections in input and output markets and lack of profitable alternatives led farmers to join contract farming. CF had higher yields for both crops, signifying its positive influence in boosting agriculture production. Although, there were few constraints faced by CF, but overall benefits out powered constraints as majority of CF were satisfied growing under contract with the present firm. Current regulatory framework for contracting seems inadequate, as the majority of contracting firms are not registering themselves. Thus State Government should make the regulatory (arbitration) mechanism more participatory which is easily accessible and not costly along with timely redressal of disputes.

References

- Agrawal, G. D. (1961). Principles of evaluation and apportion of items of cost. *Seminar on Cost Studies in Agriculture* (pp. 120-135). Mumbai: The Indian Society of Agricultural Economics.
- Allen, G. R. (1972). An appraisal of contract farming. *Journal of Agricultural Economics*, 23(2), 89-98.
- Angrist, J., & P. J. (2009). *Mostly harmless econometrics : An empiricist's companion*. Princeton: Princeton University Press.
- APEDA. (n.d.). *Fresh Onions*. Retrieved from Agriculture and Processed Food Products Export Development Authority:
http://apeda.gov.in/apedawebsite/SubHead_Products/Onions.htm
- Arumugam, N., Fatimah, M. A., Eddie, F. C., & Zainalabidin, M. (2010). Supply chain analysis of fresh fruits and vegetables (FFV): Prospects of contract farming. *Agricultural Economics*, 56, 435-452.
- Arunkumar, S. (2002). *Economics of contract farming in vegetables - A case of Belgaum district*. M. Sc. (Agri.) Thesis, Univ. of Agric. Sci., Dharwad.
- Arya, A., & Asokan, S. R. (2011, July-Dec). Contract farming: A tool to manage risk in agriculture. *Anvesak*, 41(2), 63-71.
- Asokan, S. R., & Singh, G. (2003). Role and Constraints of Contract Farming in Agro-Processing Industry. *Indian Journal of Agricultural Economics*, 58(3).
- Asokan, S. R., & Singh, G. (2005, September 10). Discussion: Food Processing and contract farming in AP. *Economic and Political Weekly*, 4082-4083.
- Awotide, B. A., Fashogbon, A., & Awoyemi, T. T. (2015). Impact of Agro-Industrial Development Strategies on Smallholder Rice Farmers' Productivity, Income and Poverty: The Case of Contract Farming in Nigeria. *Paper Prepared for Presented at the International Conference of the Centre for the Studies of African Economies*. Oxford, UK.
- Bachke, M. E. (2013). *Do Farmers' Organizations Enhance The Welfare of Small-Scale Farmers?* Paper presented in the European Economic Association & Econometric Society. Retrieved November 3, 2015, from <http://www.eea-esem.com/files/papers/eea-esem/2013/2551/FarmersorgMozcomplete.pdf>
- Bajaj, K. L., Kaur, G., Singh, J., & Gill, S. P. (1980). Chemical evaluation of some important varieties of onion (*Allium cepa* L.). *Plant Foods for Human Nutrition*, 30(2), 117-122. Retrieved November 28, 2015, from <http://link.springer.com/article/10.1007/BF01099049#page-2>
- Baker, G., Gibbons, R., & Murphy, K. J. (2002). Relational Contracts and the Theory of the Firm. *The Quarterly Journal of Economics*, 117(1), 39-84.
- Banerji, A., & Meenakshi, J. V. (2004). *Millers, Commission Agents and Collusion in Grain Auction Markets: Evidence from Basmati Auctions in North India*. Working Paper No. 129: Delhi School of Economics.

- Barakade, A., & Lokhande, T. (2011). Trends in Area, Production and Productivity of Onion in Maharashtra. *Shodhsamiksha Aur Mulyankan*, 2(26), 7-9. Retrieved from http://scholar.googleusercontent.com/scholar?q=cache:jbG1ljsz1YJ:scholar.google.com/&hl=en&as_sdt=0,5
- Barrett, C. B., Bachke, M. E., Bellemare, M. F., Michelson, H. C., Narayanan, S., & Walker, T. F. (2012, April). Smallholder participation in contract farming: Comparative evidence from five countries. *World Development*, 40(4), 715-730.
- Bellemare, M. F. (2012). As you sow, so shall you reap: The welfare impacts of contract farming. *World Development*, 40(7), 1418-1434.
- Bijman, J. (2008). *Contract farming in developing countries: an overview*. Working Paper, Wageningen University, Department of Business Administration.
- Birthal, P. S., Jha, A. K., Tiongco, M. M., & Narrod, C. (2008). *Improving farm-to-market linkages through contract farming: a case study of smallholder dairying in India*. Discussion Paper 00814, IFPRI, Markets, Trade and Institutions Division.
- Birthal, P. S., Joshi, P. K., & Gulati, A. (2005). *Vertical coordination in high value food commodities – assessing implications for the smallholders*. Markets, Trade and Institutions Division (MTID), Discussion Paper No. 85, IFPRI, Washington DC.
- Bolwig, S., Gibbon, P., & Jones, S. (2009). The Economics of Smallholder Organic Contract Farming in Tropical Africa. *World Development*, 37(6), 1094-1109.
- Boucher, S., Guirking, C., & Trivelli, C. (2006). *Direct elicitation of credit constraints: conceptual and practical issues with an empirical application to Peruvian agriculture*. Working Paper No. 07-004, University of California, Davis, Department of Agricultural and Resource Economics.
- BS Reporters. (2012, June 08). Mamata to open up state's backend retail to private sector. *Business Standard*. Retrieved August 27, 2012, from <http://www.business-standard.com/india/news/mamata-to-openstates-backend-retail-to-private-sector-/476634/>
- CACP. (2012). *Price policy for kharif crops the marketing season 2012-13*. New Delhi: Ministry of Agriculture, GoI.
- Cai, J., Ung, L., Setboonsarng, S., & Leung, P. (2008). *Rice contract farming in Cambodia: Empowering farmers to move beyond the contract toward independence*. ADBI Discussion Paper 109. Tokyo: Asian Development Bank Institute.
- Carter, M. (1989). The Impact of Credit on Peasant Productivity and Differentiation in Nicaragua. *Journal of Development Economics*, 31(1), 13-36.
- Carter, M., & Olinto, P. (2003). Getting Institutions Right for Whom? Credit Constraints and the Impact of Property Rights on the Quantity and Composition of Investment. *American Journal of Agricultural Economics*, 85(1), 173-186.
- Census of India. (2011). *District census handbook - Dhule*. Directorate of Census Operations, Maharashtra.

- Chand, R. (1999). Emerging Crisis in Punjab Agriculture: Severity and Options for Future. *Economic and Political Weekly*, 34(13), A2-A10.
- Chaturvedi, R. (2007). Contract farming and Fritolay's Model of Contract farming for potato. *Potato Journal*, 34(1-2), 16-19.
- Chauhan, K. K., Mundle, S., Mohanan, N., & Jadhav, D. (1973). *Small farmers, problems and possibilities of development*. Ahmedabad: Centre for Management in Agriculture, Indian Institute of Management .
- Chin, D. (2015). *Supermarkets in Malaysia's Food Supply Chain: Influence on Traditional Supply Chain and Implications for Contract Farmers*. Paper presented at 29th International Conference of Agricultural Economists "Agriculture in an Interconnected World", Milan, Italy.
- Clapp, R. A. (1994). The moral economy of contract. In P. D. Little, & M. J. Watts (Eds.), *Living under contract: Contract farming and agrarian transformation in Sub-Saharan Africa*. (pp. 78-94). Madison, WI: University of Wisconsin Press.
- Coase, R. (1937). Nature of the firm. *Economica*, 4, 386-405.
- Collins, N. R., Mueller, W. F., & Birch, E. M. (1959). *Grower-Processor Integration: A study of Vertical integration between growers*. Berkeley: California Agricultural Experiment Station, Bulletin 768.
- Corporate Catalyst India. (2012). *Retail Sector in India*. Industry Report. Retrieved October 07, 2012, from http://www.cci.in/pdf/surveys_reports/indias_retail_sector.pdf
- Cramer, G., & Jensen, C. W. (1988). *Agricultural Economics and Agribusiness*. John Wiley and sons, Inc.
- CSO. (2008, July 23). *Manual on cost of cultivation surveys*. Retrieved June 21, 2012, from Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, GOI: http://mospi.nic.in/Mospi_New/upload/manual_cost_cultivation_surveys_23july08.pdf
- Da Silva, C. A., & Shepherd, A. W. (2013). Editorial: The multi-faceted dimensions of contract farming. *Food Chain*, 3(3), 127-130.
- Daddieh, C., Kwame, A., & Little, P. (1995). *Pineapple Production and Labor Relations in the Peri-Urban Area of Accra, Ghana*. Institute for Development Anthropology, Binghamton, NY.
- De Treville, D. (1986). *Contract farming, the private sector and the state: An annotated and comprehensive bibliography with special reference to Afric*. Working Paper No. 2, Institute for Development Anthropology, Binghamton, New York.
- Deaton, A. (1997). *The analysis of household surveys: a microeconomic approach to development policy*. World Bank Publications.

- Dedehouanou, S., Swinnen, J., & Maertens, M. (2013). Does contracting make farmers happy? Evidence from Senegal. *Review of Income and Wealth, Series 59*, S138-S160.
- Deepak Fertilisers And Petrochemicals Corporation Ltd. (2014). *Annual Report 2013-14*. Pune.
- Dehejia, R., & Wahba, S. (2002). Propensity score-matching methods for nonexperimental causal studies. *The Review of Economics and Statistics, 84*, 151-161.
- Delgado, C. (1999). Sources of growth in smallholder agriculture in Sub-Saharan Africa: The role of vertical integration of smallholders with processors and marketers of high-value items. *Agrekon, 38*, 165-189.
- Delgado, C., Narrod, C., & Tiongco, M. (2008). *Determinants and implications of the growing scale of livestock farms in four fast-growing developing countries*. IFPRI, Washington, D.C.
- Deshpande, C. S. (2005). *Contract farming as means of value added agriculture*. Occasional Paper - 42, National Bank for Agriculture and Rural Development, Department of Economic Analysis and Research, Mumbai. Retrieved from <http://www.nabard.org/fileupload/DataBank/OccasionalPapers/OC%2042.pdf>
- Deshpande, C. S. (2005). *Contract farming as means of value added agriculture*. Occasional Paper - 42, National Bank for Agriculture and Rural Development, Department of Economic Analysis and Research, Mumbai. Retrieved from <http://www.nabard.org/fileupload/DataBank/OccasionalPapers/OC%2042.pdf>
- Dev, M., & Rao, C. (2005, June 25). Food processing and contract farming in Andhra Pradesh: A small farmer perspective. *Economic and Political Weekly, 40*(26), 2705-2713.
- Dev, M., & Rao, C. (2007). *Socioeconomic impact of Bt cotton*. Hyderabad: Centre for Economic and Social Studies.
- Dileep, B. K., Grover, R. K., & Rai, K. N. (2002). Contract farming in tomato: An economic analysis. *Indian Journal of Agricultural Economics, 57*(2), 197-210.
- Dorward, A. (2001). The effects of transaction costs, power and risk on contractual arrangements: A concept framework for quantitative analysis. *Journal of Agricultural Economics, 59*-73.
- Eaton, C., & Shepherd, A. W. (2001). *Contract farming: Partnership for growth*. Rome: Food and Agricultural Organization. Retrieved June 21, 2012, from <http://www.fao.org/docrep/014/y0937e/y0937e00.pdf>
- Eaton, D., Meijerink, G., & Bijman, J. (2008). *Understanding institutional arrangements: Fresh Fruit and Vegetable value chains in East Africa*. Wageningen UR. Retrieved October 9, 2015, from http://www.researchgate.net/profile/Gerdien_Meijerink/publication/40094344_Understanding_institutional_arrangements_Fresh_Fruit_and_Vegetable_value_chains_in_East_Africa/links/004635230985ab8777000000.pdf

- Erappa, S. (2008). Contract farming in Karnataka: A boon or bane. In R. S. Deshpande (Ed.), *Contract Farming and Tenancy reforms-Entangled without Tether*. Concept Publishing Co.
- Escobal, J., Agreda, V., & Reardon, T. (2000). Endogenous institutional innovation and agroindustrialisation on the Peruvian coast. *Agricultural Economics*, 23, 267-277.
- ET Bureau. (2012, June 12). West Bengal government may amend APMC Act. *Economic Times*. Retrieved August 26, 2012, from http://articles.economictimes.indiatimes.com/2012-06-12/news/32195018_1_apmc-act-contract-farming-west-bengal
- Feder, G., Just, R., & Zilberman, D. (1985). Adoption of agricultural innovations in developing countries: A survey. *Economic Development and Cultural Change*, 33(2), 255-298.
- Feder, G., Lau, L., Lin, J., & Luo, X. (1990). The Relation between Credit and Productivity in Chinese Agriculture: A Model of Disequilibrium. *American Journal of Agricultural Economics*, 72(5), 1151-57.
- Ferroni, M., & Zhou, Y. (2012). Achievements and challenges in agricultural extension in India. *Global Journal of Emerging Market Economies*, 4(3), 319-346.
- Field, A. (2009). *Discovering statistics using SPSS*.
- Fischer, E., & Qaim, M. (2011). Linking Smallholders to Markets: Determinants and Impacts of Farmer Collective Action in Kenya. *World Development*, 40(6), 1255-1268.
- Foltz, J. (2004). Credit Market Access and Profitability in Tunisian Agriculture. *Agricultural Economics*, 30(3), 229-240.
- Foster, A. D., & Rosenzweig, M. R. (1996). Technical change and human-capital returns and investments: Evidence from the green revolution. *The American economic review*, 86(4), 931-953.
- Foster, A. D., & Rosenzweig, M. R. (2010). Microeconomics of technology adoption. *Annual Review of Economics*, 2, 395-424.
- Gandhi, V. P., & Jain, D. (2011). *Institutional innovations and models in the development of agro-food industries in India: Strengths, weakness, and lessons*. Indian Institute of Management, Ahmedabad.
- Ghadyalpatil, A. (2008, January 04). Corporates continue to take direct route to contract farming. *Economic Times*.
- Ghosh, N. (2013). *India's agricultural marketing: market reforms and emergence of new channels*. New Delhi: Springer.
- Glover, D., & Kusterer, K. (1990). *Small farmers, big business: Contract farming and rural development*. New York: St. Martin's Press.
- GoI. (2002). *Report of Inter-Ministerial Task Force on Agricultural Marketing Reforms*. Ministry of Agriculture, GoI.

- GoI. (2005). *Report of the expert committee to examine methodological issues in fixing MSP*. New Delhi: Government of India.
- GoI. (2007). *National Policy for Farmers*. New Delhi: Department of Agriculture & Cooperation, Ministry of Agriculture, GoI.
- GoI. (2010). *Annual Report 2009-10*. Ministry of Agriculture, Department of Agriculture and Cooperation. New Delhi: GoI. Retrieved August 27, 2012, from <http://agricoop.nic.in/AnnualRepor2009-10/AR.pdf>
- GoI. (2010-11). *State tables*. Retrieved from Agrciultural Census Database: <http://agcensus.dacnet.nic.in/statesummarytype.aspx>
- GoI. (2011a). *Agriculture Contingency Plan for District: Dhule*. Department of Agriculture and Cooperation, GoI.
- GoI. (2011b). *Agriculture Contingency Plan for District: Jalgaon*. Department of Agriculture and Cooperation, GoI.
- GoI. (2011c). *Agriculture Contingency Plan for District: Pune*. Department of Agriculture and Cooperation, GoI.
- GoI. (2011d). *Agriculture Contingency Plan for District: Satara*. Department of Agriculture and Cooperation, GoI.
- GoI. (2011e). *Indian Horticulture Database-2011*. National Horticulture Board, Ministry of Agriculture, GOI.
- GoI. (2011f). *Primary Census Abstract - Maharashtra*. Retrieved from CensusIndia: http://www.censusindia.gov.in/2011census/hlo/pca/PCA_Data_Maharashtra.html
- GoI. (2012a). *Report of the Working Group on Food Processing Industries for the 12th Five Year Plan*. Ministry of Food Processing Industries. Government of India.
- GoI. (2012b). *State of Indian Agriculture 2011-12*. Ministry of Agriculture , Department of Agriculture & Cooperation. Government of India. Retrieved October 09, 2012, from <http://agricoop.nic.in/SIA111213312.pdf>
- GoI. (2014). *Hand Book of Horticulture Statistics 2014*. Government of India, Ministry of Agriculture, Department of Agriculture and Cooperation, New Delhi.
- GoI. (2015). *Indian Horticulture Database 2014*. National Horticulture Board, Ministry of Agriculture, GoI.
- GoI. (n.d.). Retrieved from Agriculture Census Database, 2011: <http://agcensus.dacnet.nic.in/>
- GoM. (2008). Consolidated report Comprehensive District Agriculture Plan (CDAP) - Dhule. Retrieved November 22, 2015, from http://dhule.nic.in/pdf_file/agriculture/success/DAP.pdf
- GoM. (2010). *Agro Industrial Policy 2010-draft for comments and suggestions*. GoM.

- GoM. (2013). *Selected indicators for districts in Maharashtra and States in India, 2012-13*. Directorate of Economics & Statistics, GoM, Mumbai. Retrieved from https://mahades.maharashtra.gov.in/files/publication/indicators_2012-13.pdf
- GoM. (2014a). *Economic Survey of Maharashtra, 2013-14*. Mumbai: GoM.
- GoM. (2014b). *Maharashtra State Report on Number and Area of Operational Holdings*. Pune: Commissionerate of Agriculture, Maharashtra.
- GoM. (2015a). *C-DAP 2012-17, Dhule District*. Dept. of Agriculture, GoM. Retrieved November 22, 2015, from <http://www.mahaagri.gov.in/level3detaildisp.aspx?id=5&subid=15&sub2id=7>
- GoM. (2015b). *Economic Survey of Maharashtra, 2014-15*. Mumbai: Director of Economics and Statistics, GoM.
- GoM. (n.d.-a). *CDAP 2012-17, Pune District*. Dept. of Agriculture, GoM. Retrieved from <http://www.mahaagri.gov.in/level3detaildisp.aspx?id=5&subid=15&sub2id=11>
- GoM. (n.d.-b). *Comprehensive District Agriculture Plan, 2012-13 to 2016-17 Satara District*. Satara: Dept. of Agriculture, GoM.
- GoM. (n.d.-c). *Agro Climatic zones of Maharashtra*. Retrieved from Dept. of Agriculture, GoM: <http://www.mahaagri.gov.in/CropWeather/AgroClimaticZone.html>
- GoM. (n.d.-d). *C-DAP Jalgaon district, 2014-15 to 2019-20*. Dept. of Agriculture, GoM. Retrieved from <http://www.mahaagri.gov.in/level3detaildisp.aspx?id=5&subid=15&sub2id=9>
- Goodhue, R. E. (1999). Input Control in Agricultural Production Contracts. *American Journal of Agricultural Economics*, 81(3), 616-620.
- Gow, H. R., Streeter, D. H., & Swinnen, J. F. (2000). How private contract enforcement mechanisms can succeed where public institutions fail: the case of Juhocukor a.s. *Agricultural Economics*, 23, 253-265.
- Guirkinger, C., & Boucher, S. R. (2008). Credit constraints and productivity in Peruvian agriculture. *Agricultural Economics*, 39, 295-308.
- Gulati, A., Joshi, P. K., & Landes, M. (2008). Contract Farming in India: An Introduction. In A. Gulati, P. K. Joshi, & M. Landes, *Contract Farming in India: a Resource Book*. National Centre for Agricultural Economics and Policy Research.
- Gulati, A., Minot, N., Delgado, C., & Bora, S. (2005). Growth in high-value agriculture in Asia and the emergence of vertical links with farmers. *Paper presented at the workshop "Linking Small-Scale Producers to Markets: Old and New Challenges"*, 1. World Bank.
- Guo, J. (2008). *An empirical study of farmers cooperative behavior in agricultural marketing – based on farmers in Jiangxi province*. PhD thesis, Huazhong Agricultural University, Wuhan.

- Harou, A., & Walker, T. (2010). *The pineapple market and the role of cooperatives*. Working Paper, Cornell University.
- Hart, O. (1995). *Firms, Contracts, and Financial Structure*. Oxford: Clarendon Press.
- Hernández, R. (2009). *Supermarkets, wholesalers and tomato growers in Guatemala*. Unpublished M. Sc. Thesis, Michigan State University. Retrieved August 22, 2012, from http://aec.msu.edu/theses/fulltext/hernandez_ms.pdf
- Hobbs, J. E., & Young, L. M. (2001). *Vertical linkages in agri-food supply chains in Canada and the United States*. Canada: Strategic Policy Branch for Agriculture and Agri-food.
- Hosmer, D., & Lemeshow, S. (2000). *Applied logistic regression* (2nd ed.). John Wiley & Sons, Inc.
- INCID. (1994). *Drip Irrigation in India*. New Delhi: National Committee on Irrigation and Drainage.
- Jain, R. C. (2008). Regulation and dispute settlement in contract farming in India. In *Contract Farming in India : A Resource Book*. New Delhi: ICAR,IFPRI, USDA.
- Jains. (2014). *Jain Irrigation's Onion and Vegetable Dehydration Division Bags 2014 CII National Award for Food Safety*. Mumbai. Retrieved November 28, 2015, from <http://www.jains.com/Company/news/Jain%20Irrigations%20Onion%20and%20Vegetable%20Dehydration%20Division.htm>
- Jains. (n.d.-a). *Corporate Product Profile*. Retrieved 06 16, 2012, from Jain Irrigations Systems Pvt. Ltd.: <http://jainpipe.com/PDF/CORPORATE%20PROFILE.pdf>
- Jains. (n.d.-b). *Improved cultivation of white dehydrator onion*. Jalgaon: JISL. Retrieved June 06, 2012, from Improved cultivation of white dehydrator onion: <http://jisl.co.in/PDF/crop/cultivation%20of%20white%20onion.pdf>
- JISL. (2014). *Sustainability Report 2013*. Jalgaon: JISL.
- Ka, C. (1991). Agrarian development, family farms and sugar capital in colonial Taiwan. *Journal of Peasant Studies*, 18(2), 206-240.
- Kalamkar, S. S. (2011a). *Economics of contract broiler farming in Maharashtra*. Pune: Gokhale Institute of Politics and Economics.
- Kalamkar, S. S. (2011b). Patterns and determinants of agricultural growth in Maharashtra. *Artha Vijnana*, 53(2), 156-181.
- Kearney, A. T. . (2012). *Global Retail Expansion: Keeps On Moving*. Global Retail Development Index Report, Vienna.
- Keshavmurthy, N. N. (2005). *A study on contract farming in gherkin production*. Unpublished M. Sc. Thesis, University of Agricultural Sciences, Department of Agricultural Extension Education, Dharwad.

- Key, N., & McBride, W. (2003). Production Contracts and Productivity in the U.S. Hog Sector. *American Journal of Agricultural Economics*, 85(1), 121-133.
- Key, N., & Runsten, D. (1999). Contract farming of agro-processing firms and the scale of outgrower production. *World Development*, 27(2), 381-401.
- King, R. P. (1992). Management and financing of vertical coordination in agriculture: an overview. *American Journal of Agricultural Economics*, 74(5), 1217-1218.
- Kliebenstein, J., & Lawrence, J. (1995). Contracting and Vertical Coordination in the United States Pork Industry. *American Journal of Agricultural Economics*, 77(5), 1213-1218.
- Knoeber, C. R., & Thurman, W. N. (1995). "Don't Count Your Chickens...": Risk and Risk Shifting in the Broiler Industry. *American Journal of Agricultural Economics*, 77(3), 486-496.
- Korovkin, T. (1992). Peasants, grapes and corporations: the growth of contract farming in a Chilean community. *The Journal of Peasant Studies*, 19(2), 228-254.
- Kulkarni, D. N. (2011). Sustainable agriculture for the growth of food processing industry. *Agriculture and food processing industry - Policy initiatives, opportunities and prospects*. Mumbai: Maharashtra Economic Development Council.
- Kumar, A. S., & Singh, P. (2009). Perceived constraints of contract farmers and apprehensions of non-contract farmers in Tamil Nadu. *Pusa AgriScience*, 32, 75-78. Retrieved August 23, 2012, from <http://eprints.iari.res.in/48/1/14-Aru.pdf>
- Kumar, H., & Singh, R. (2005). Success and failure of contract farming in Himachal Pradesh: A case study of Cauliflower seed production. *Indian Journal for Agricultural Marketing*, 19(2), 170.
- Kumar, J., & Kumar, P. (2008). Contract farming: problems, prospects and its on Income and employment. *Agricultural Economics Research Review*, 21(2), 243-250.
- Kumar, N. R., Pandey, N. K., Rana, R. K., & Pandit, A. (2009). Production and marketing of potato in Bathinda district of Punjab - a comparison of processing and non-processing varieties. *Indian Journal of Agricultural Marketing*, 23(2), 43-56.
- Kumar, P. (2006). *Contract farming in India: options and implications for small and large farmers*. Working Paper Series No. E/267/2006, Institute of Economic Growth, Delhi.
- Larson, W. M., Richter, B., Birner, S., & Selvendiran, P. (2010). *Water Footprint Assessments: Dehydrated Onion Products, Micro-irrigation Systems*. Washington, DC: Prepared in collaboration with The Nature Conservancy for Jain Irrigation Systems Ltd. and International Finance Corporation. Retrieved 06 16, 2012, from <http://www.jainpipe.com/PDF/food/IFC%20Water%20Foot%20print%20Assessments-JainIrrigationSystems.pdf>

- Leung, P., Sethboonsarng, S., & Stefan, A. (2008). *Rice contract farming in Lao PDR: moving from subsistence to commercial agriculture*. ADB Institute Discussion Paper No. 90.
- Little, P. D. (1994). Contract farming and the development question. In P. D. Little, & M. J. Watts (Eds.), *Living under contract: Contract farming and agrarian transformation in Sub-Saharan Africa* (pp. 216-247). The University of Wisconsin Press.
- Lundy, M. (2012). Video Interview Mark Lundy, CIAT. Seas of Change international workshop. Retrieved May 30, 2013, from <http://seasofchange.net/2012/04/interview-mark-lundy-ciat/>
- MacDonald, J. M., & Korb, P. (2006). *The Growing Use of Contracts to Govern US Farm Production*. Paper presented at Annual Conference of the International Society for New Institutional Economics.
- MacDonald, J., Perry, J., Ahearn, M., Banker, D., Chambers, W., Dimitri, C., . . . Southard, L. (2004). *Contracts, markets, and prices: organising the production and use of agriculture commodities*. Agricultural Economics Report Numbern 837, United States Department of Agriculture, Economic Research Service.
- MacLeod, W. B. (2007). Reputations, relationships, and contract enforcement. *Journal of Economic Literature*, 45(3), 595-628.
- Macneil, I. R. (1978). Contracts: Adjustment of Long-Term Economic Relations under Classical, Neoclassical, and Relational Contract Law. *Northwestern University Law*, 72, 854-906.
- Maertens, M., & Swinnen, J. (2009). Trade, standards, and poverty: Evidence from Senegal. *World Development*, 37(1), 161-178.
- Majerus, J. (2008). *A case study on the PepsiCo Frito-Lay Potato Outgrower Program India*. United States Agency for International Development. Retrieved from https://www.microlinks.org/sites/microlinks/files/resource/files/Case_Study_India_PepsiCo.pdf
- Malone, T. W., Yates, J., & Benjamin, R. I. (1987). Electronic markets and electronic hierarchies. *Communications of the ACM*, 30(6), 484-497.
- MANAGE. (2003). Contract farming ventures in India: a few successful cases. *Spice*, 1(4).
- Masakure, O., & Henson, S. (2005). Why do small-scale producers choose to produce under contract? Lessons from nontraditional vegetable exports from Zimbabwe. *World Development*, 33(10), 1721-1733.
- Meyers, L. S., Gamst, G. C., & Guarino, A. J. (2013). *PERFORMING DATA ANALYSIS USING IBM SPSS*. New Jersey: John Wiley & Sons.
- Michelson, H. (2010). *Welfare effects of supermarkets on developing world farmer suppliers: Evidence from Nicaragua*. Working Paper, Cornell University.

- Mighell, R. L., & Jones, L. A. (1963). *Vertical coordination in agriculture*. Washington 25, D.C.: U.S. Department of Agriculture, Economic Research Service, Farm Economics Division.
- Miglani, V., & Kalamkar, S. (2012). Pricing policy in contract farming: A case of onion in Maharashtra. *Indian Society of Agricultural Marketing*, 26(3).
- Minhas, J. S., Kumar, D., Joseph, T. A., Raj, B. T., Khurana, P. S., Pandey, S. K., . . . Naik, P. S. (2006). Kufri surya: A new heat-tolerant potato variety suitable for early planting in north-western plains, peninsular India and processing into french fries and chips. *Potato Journal*, 33(1-2), 35-43. Retrieved from <http://epubs.icar.org.in/ejournal/index.php/PotatoJ/article/viewFile/33270/14752>
- Minot, N. (1986). *Contract Farming and its Effect on Small Farmers in Less Developed Countries*. Working Paper No. 31, Michigan State University, Department of Agricultural Economics.
- Minot, N. (2007). *Contract Farming in Developing Countries: Patterns, Impact, and Policy Implications*. Case Study #6-3 of the Program: " Food Policy for Developing Countries: The role of Government in the Global Food System". New York: Ithaca, Cornell University.
- Minten, B., Randrianarison, L., & Swinnen, J. F. (2009). Global Retail Chains and Poor Farmers: Evidence from Madagascar. *World Development*, 37(11), 1728-1741.
- Minten, B., Reardon, T., & Sutradhar, R. (2010). Food Prices and Modern Retail: The Case of Delhi. *World Development*, 38(12), 1775-1787.
- Miyata, S., Minot, N., & Hu, D. (2009). Impact of contract farming on income: Linking small farmers, packets, and supermarkets in China. *World Development*, 37(11), 1728-1741.
- MOFPI. (n.d.). *Retail in Food Processing*. Retrieved March 05, 2012, from Ministry of Food Processing Industries, Government of India: <http://www.mofpi.nic.in/ContentPage.aspx?CategoryId=142>
- Morvaridi, B. (1995). Contract farming and the environmental risk: the case of Cyprus. *Journal of Peasant Studies*, 23(1), 30-45.
- Mueller, W. F., & Collins, N. R. (1957, December). Grower-processor integration in fruit and vegetable marketing. *Journal of Farm Economics*, 39(5), 1471-1483.
- Nagaraj, N., Chandrakanth, M., Chengappa, P., Roopa, H., & Chandakavate, P. M. (2008). Contract Farming and its implications for input supply, linkages between markets and farmers in Karnataka. *Agricultural Economics Research Review*, 21(Conference Number), 307-316. Retrieved from <http://ageconsearch.umn.edu/bitstream/47880/2/1-N-Nagaraj.pdf>
- Naidu, N. T. (2012). *Managing Buyer-Seller Relationships in Contract Farming*. paper presented at 22nd Annual IFAMA World Forum and Symposium, Shanghai. Retrieved August 26, 2012, from https://www.ifama.org/events/conferences/2012/cmsdocs/Symposium/PDF%20Symposium%20Papers/658_Paper.pdf

- Narayanamoorthy, A. (2004). Drip irrigation in India: can it solve water scarcity? *Water Policy*, 6(2), 117-130.
- Narayanan, S. (2011). *Contract farming as frictional equilibria: a theoretical perspective with empirical excursions in India*. Unpublished Phd Thesis, Cornell University.
- Narayanan, S. (2012). *Notional Contracts: The Moral Economy of Contract Farming Arrangements in India*. Working paper-2012-20, IGIDR, Mumbai. Retrieved September 14, 2012, from <http://www.igidr.ac.in/pdf/publication/WP-2012-020.pdf>
- Narayanan, S., & Gulati, A. (2002). *Globalization and the smallholders : A Review of Issues, Approaches and Implications*. Discussion Paper 50, Markets and Structural Studies Division. IFPRI, Washington, D.C.
- National Horticulture Board. (n.d.). *Onion soil and climate*. Retrieved from National Horticulture Board: <http://nhb.gov.in/PDFViwer.aspx?enc=3ZOO8K5CzcdC/Yq6HcdIxMfvLt8gOzIYTCIRQLD+jKU=>
- Onphanhdala, P. (2009). *Farmer education and agricultural efficiency: Evidence from Lao PDR*. GSICS Working Paper Series, 20.
- Pandey, M., Sudhir, K., Ahuja, R., & Tewari, D. (2010). *Fieldfresh foods: linking Indian fields to the world*.
- Pandey, S. K. (2007). *Potato and Tuber Crops*. Central Potato Research Institute, Shimla.
- Pandey, S. K., Marwaha, R. S., Kumar, D., & Singh, S. V. (2009). Indian potato processing story: Industrial limitations, challenges ahead and vision for the future. *Potato Journal*, 36((1-2)), 1-13.
- Pandit, A., Lal, B., & Rana, R. K. (2014). An Assessment of Potato Contract Farming in West Bengal State, India. *Potato Research*, 58(1), 1-14.
- Pandit, A., Pandey, N. K., Rana, R. K., & Lal, B. (2009). An Empirical Study of Gains from Potato Contract Farming. *Indian Journal of Agricultural Economics*, 64(3), 497-508.
- Panse, V. G. (1954). *Estimation of cost of production of crops*. Bombay: Indian Central Cotton Committee.
- Panse, V. G., & Rao, V. R. (n.d.). *System of Agricultural statistics in India. Reprinted from Bulletin of the International Statistical Institute, Vol. XXXIII, Part V*. International Statistical Institute.
- Parker, D., & Hartley, K. (2003). Transaction costs, relational contracting and public private partnerships: a case study of UK defence. *Journal of Purchasing & Supply Management*, 9, 97-108.
- Parten, M. (1950). *Surveys, polls, and samples: Practical procedures*. New York: Harper & Brothers.

- Paty, B. K. (2005, April-June). Contract farming in India: progress and potential. *Agricultural Marketing*, 48(1), 13-20.
- PepsiCo. (2010, March 23). *Press Releases-PepsiCo India achieves splendid success in contract farming in West Bengal*. Retrieved July 30, 2012, from http://pepsicoindia.co.in/media/Press-Releases/release_03_23_10.aspx
- PepsiCo India. (2012, July 17). *PepsiCo India's efforts result in 20 fold increase in land under Direct Seeding of Rice in Punjab*. Retrieved July 31, 2012, from PepsiCo India: http://pepsicoindia.co.in/media/Press-Releases/release_07_17_12.aspx
- PepsiCo. (n.d.). *Partnership with farmers*. Retrieved June 02, 2012, from PepsiCo India: <http://pepsicoindia.co.in/purpose/environmental-sustainability/partnership-with-farmers.html>
- Peterson, H. C., Wysocki, A., & Harsh, S. B. (2001). Strategic choice along the vertical coordination continuum. 4(2), 149-166.
- Petrick, M. (2004). A Microeconomic Analysis of Credit Rationing in the Polish Farm Sector. *European Review of Agricultural Economics*, 31(1), 23-47.
- Planning Commission. (2002). *Tenth Five Year Plan (2002-2007)*. New Delhi: Government of India. Retrieved August 26, 2012, from http://planningcommission.nic.in/plans/planrel/fiveyr/10th/volume2/10th_vol2.pdf
- Planning Commission. (2011). *Faster, sustainable and more inclusive growth: an approach to twelfth five year plan*. New Delhi: GoI.
- Planning Commission. (2011). *Mid-Term Appraisal Eleventh Five Year Plan (2007-12)*. New Delhi: GoI.
- Planning Commission. (2011c). *Report of the working group on agricultural marketing infrastructure, secondary agriculture and policy required for internal and external trade for the XII Five Year Plan 2012-17*. Planning Commission, Agriculture Division. GoI.
- Planning Commission. (2008). *Eleventh Five Year Plan (2007-12)*. New Delhi: GoI.
- Pomareda. (2006). *Contract Agriculture: Lessons from experiences in Costa Rica*. Paper prepared as part of a series of contributions by RIMSIP-Latin American Center for Rural Development to the preparation of the World Development Report 2008 "Agriculture for Development".
- Punjabi, M. (2008). *Supply chain for exports of Dehydrated onions: Case study of Jain Irrigation Systems in India*. New Delhi: FAO.
- Raja, A. (2011, December 1). Contract farming not helping in farmers. *India Today*. Retrieved August 26, 2012, from <http://indiatoday.intoday.in/story/contract-farming-helping-farmers-maharashtra/1/162338.html>
- Ramaswami, B., BIRTHAL, P. S., & JOSHI, P. K. (2006). *Efficiency and distribution in contract farming: The case of Indian poultry growers*. MTID Discussion Papers 91, IFPRI, Washington DC.

- Rana, R. K. (2011). Status of Punjab State in Indian potato processing industry. *Indian Journal of Agricultural Marketing*, 25(2), 1-17.
- Randel, R. (2005). *Integration of emerging cotton farmers into the commercial agricultural economy*. Unpublished Ph. D. Thesis, University of the Free State, Bloemfontein, South Africa.
- Rangi, P. S., & Sidhu, M. S. (2000). A study on contract farming of Tomato in Punjab. *Agricultural Marketing*, 42(4), 15-23.
- Rao, E. J., & Qaim, M. (2010). *Supermarkets, farm household income and poverty: Insights from Kenya*. Cape Town: Paper presented at the Joint 3rd African Association of Agricultural Economists and 48th Agricultural Economists Association of South Africa Conference.
- Rao, P. P., BIRTHAL, P. S., & JOSHI, P. K. (2006, June 30). Diversification towards High Value Agriculture: Role of Urbanisation and Infrastructure. *Economic and Political Weekly*, 41(26), 2747-2753.
- Reardon, T., & Minten, B. (2011). *The Quiet Revolution in India's Food Supply Chains*. IFPRI Discussion Paper 01115, IFPRI, New Delhi.
- Reardon, T., Timmer, C. P., & Minten, B. (2010). *Supermarket revolution in Asia and emerging development strategies to include small farmers*. Proceedings of the National Academy of Science (PNAS). Retrieved October 08, 2012, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3412023/pdf/pnas.201003160.pdf>
- Regional Centre for Development Cooperation . (2011). *Contract Farming in Odisha: Prospects and Constraints*. Bhubaneshwar.
- Rehber, E. (1998). *Vertical integration in agriculture and contract farming*. Food Marketing Policy Center, University of Connecticut.
- Revankar, R. G. (1971). *The Indian Constitution: A case study of backward classes*. New Jersey: Associated University Presses, Inc.
- Rohini, A., Selvanayaki, S., & Selvi, M. P. (2015). Contract farming-an efficient marketing method of *Ailanthus excelsa*. *Indian Journal of Economics and Development*, 11(4), 939-944.
- Romero, J. (2006). *Contract farming and producer participation in the avocado industry in Michoacan* . Master thesis, Simon Fraser University.
- Rosernberg, D. (2012, April). Seas of Change international workshop. *Video Interview David Rosenberg, Ecom*. Vimeo. Retrieved May 30, 2013, from <http://seasofchange.net/2012/04/interview-david-rosenberg-ecom/>
- Roy, E. (1963). *Contract Farming, U.S.A.* Danville, Illinois: Interstate Printers and Publishers, Inc.
- Ruben, R., & Saenz, F. (2008). Farmers, Markets and Contracts: Chain Integration of Smallholder Producers in Costa Rica. *European Review of Latin American and Caribbean Studies*, 85, 61-80.

- Sarkar, A. N. (2003). *Techno-economic feasibility study on contract farming in Maharashtra*. Research Project Series: 15, VAMNICOM, Pune.
- Sartorius, K., & Kirsten, J. (2007). A framework to facilitate institutional arrangements for smallholder supply in developing countries: An agribusiness perspective. *Food Policy*, 32, 640-655.
- Satish, P. (2003). Contract Farming as a backward Linkage for Agro-Processing - Experience from Punjab. *Sixty-Third Annual conference of the Indian Society of Agricultural Economics*. 58 (3), pp. 603-604. Indian Journal of Agricultural Economics.
- Sen, A., & Bhatia, M. S. (2004). Cost of cultivation and farm income. In *State of Indian Farmer: A Millenium Study* (Vol. 14). New Delhi: Ministry of Agriculture, GoI and Academic Foundation.
- Shah, D. (2013). *Assessment of Pre and Post Harvest Losses in Tur and Soyabean Crops in Maharashtra*. Gokhale Institute of Politics and Economics, Pune.
- Sharma, R., Pannu, R. S., & Phougat, S. (2006, December 1,15). Contract farming in Haryana: Issues for adoption. *Southern Economist*, 15,16, 38-40.
- Shinde, T. (2015). Spatial Distribution of Drip Irrigation in Satara District (Maharashtra, India): A Geographical Analysis. *European Academic Review*, 2(10), 13687-13697.
- Sial, M., & Carter, M. (1996). Is Targeted Small Farm Credit Necessary? A Microeconomic Analysis of Capital Market Efficiency in the Punjab. *Journal of Development Studies*, 32(5), 771-798.
- Simmons, P., Winters, P., & Patrick, I. (2005). An analysis of contract farming in East Java, Bali, and Lombok, Indonesia. *Agricultural Economics*, 33(s3), 513-525.
- Simon, H. (1961). *Administrative behavior*. 2nd ed. New York: Macmillan.
- Singh, A. (2008). Economic feasibility of growing capsicum crop under drip irrigation in West Bengal, India. *Irrigation Drainage System*, 22, 179-188.
- Singh, G., & Asokan, S. R. (2005). *Contract farming in India: text and cases*. New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd.
- Singh, K. (2003). Rapporteur's Report on Emerging Trends in Agro-Processing Sector. *Sixty-Third Annual conference of the Indian Society of Agricultural Economics*. 58(3), pp. 655-668. Indian Journal of Agricultural Economics,.
- Singh, K. (2004). Summaries of Group Discussion - Emerging Trends in Agro-processing Sector. *Sixty-third Annual Conference of Indian Society of Agricultural Economics*. 59 (1), pp. 51-54. Indian Journal of Agricultural Economics,.
- Singh, M. P. (2007). *Contract Farming and Emerging Agrarian Structure: The Case of Punjab*. PhD. thesis, Centre for the Study of Regional Development, JNU, New Delhi.

- Singh, S. (2000, July-Sept). Contract Farming for agricultural diversification in the Indian Punjab: A study of performances and problems. *Indian Journal of Agricultural Economics*, 55(3), 283-294.
- Singh, S. (2002). Contracting out solutions: political economy of contract farming in the Indian Punjab. *World Development*, 30(9), 1621-1638.
- Singh, S. (2004). Contract farming of seed in India: A study of private and public sector performance. *Indian Journal of Agricultural Marketing*, 18(1), 89-103.
- Singh, S. (2007). *Leveraging contract farming for improving supply chain efficiency in India: Some innovative and successful models*. In II International Symposium on Improving the Performance of Supply Chains in the Transitional Economies 794 (pp. 317-324). Retrieved November 05, 2015, from <http://ejournal.narotama.ac.id/files/Leveraging%20Contract%20Farming%20for%20Improving%20Supply%20Chain%20Efficiency%20in%20India.pdf>
- Singh, S. (2009). Supply chain for high value crops: a case study of mint in Punjab. *Indian Journal of Agricultural Marketing, (Conf. Spl.)* 23(1), 93-103.
- Singh, S. (2009). Understanding Practice of Contract Farming in India: A Small Producer Perspective. 'Contract Farming in India: A Resource Book'. IFPRI, ICAR and USDA. Retrieved from http://www.ncap.res.in/contract_%20farming/Resources/4.1%20SukhpalSingh.pdf
- Sinha, S. P. (1978). *Marginal and small farmers: Perspectives, problems and prospects: A study with reference to North Bihar*. Muzaffarpur: Manisha.
- Sridhara, J. (2010). *Economics of contract farming—a case study of chilli in Bagalkot district of Karnataka*. M. Sc.(Agri.) Thesis, University of Agricultural Sciences, Dharwad.
- Srivastava, U. K., & Seetaraman, S. P. (1989). Summaries of the group discussion: Agro-processing industries. *Indian Journal of Agricultural Economics*, XLIV(4), 407-412.
- Staal, S., Delgado, C., & Nicholson, C. (1997). Smallholder dairying under transactions costs in East Africa. *World development*, 25(5), 779-794.
- Stigler, G. J. (1951). The Division of Labor is Limited by the Extent of the Market. *The journal of political economy*, 185-193.
- Stonier, & Haque. (1980). *Text book of economic theory*.
- Stringer, R., Sang, N., & Croppenstedt, A. (2009). Producers, processors, and procurement decisions: The case of vegetable supply chains in China. *World Development*, 37(11), 1773-1782.
- Supe, V., Marbhal, S., & Patil, S. (2008). Performance of onion genotypes in rangda (Late kharif) season under Nashik district. *International Journal of Agriculture Science*, 81-82.

- Suryandari, R. Y., & Buang, A. (2010). *Contract Farming as a Mechanism for Agricultural Development in Malaysia: Perceptions from Participants and Non-Participants*. Paper presented at 4th Asian Rural Sociology Association International Conference .
- Swain, B. (2010). *Does technological linkage in contract farming increase the farm productivity and efficiency? A study of rice seed cultivation in Southern India*. Paper presented at Gobelics 8th International Conference "Making Innovation work for society: Linking, Leveraging, and Learning". 1-3 December 2010, University of Malaya, Kuala Lumpur, Malaysia.
- Swain, B. (2011). Contract Farming in Andhra Pradesh: A Case of Rice Seed and Gherkin Cultivation. *Economic & Political Weekly*, 46(42), 60-68.
- Swain, B. (2012). Determinants of farmers' participation in contract farming: the cases of gherkin and paddy seed in Andhra Pradesh, India. *Millennial Asia*, 3(2), 169-185.
- ToI. (2012, August 4). *Contract farming government order sows seeds of fear among royts*. Retrieved August 5, 2012, from Times of India: <http://timesofindia.indiatimes.com/city/hyderabad/Contract-farming-government-order-sows-seeds-of-fear-among-royts/articleshow/15346582.cms>
- Tripathi, R., Singh, R., & Singh, S. (2005). Contract farming in potato production: An alternative for managing risk and uncertainty. *Agricultural Economics Research Review*, 18, 47-60.
- USDA. (1963). *Contract farming and vertical integration, 1953-1962 : List of selected reference*. Washington, D.C.: United States Department of Agriculture.
- Vermeulen, H., Kirsten, J., & Sartorius, K. (2008). Contracting arrangements in agribusiness procurement practices in South Africa. *Agrekon*, 47(2), 198-221.
- Vijaykumar, H. S., & Sonnad, J. S. (2010). Contract farming: A boon or bane for farming community. In M. Devraj, & A. Bhatnagar (Eds.), *Contract farming in India: present scenario and future aspects* (pp. 71-92). New Delhi: Excel India Publishers.
- Vis, J. K. (2012, April). Video Interview Jan Kees Vis, Unilever. Seas of Change international workshop. Retrieved May 30, 2013, from <http://seasofchange.net/2012/04/interview-jan-kees-vis-unilever/>
- Wang, H., Dong, X., Rozelle, S., Huang, J., & Reardon, T. (2009). Producing and Procuring Horticultural Crops with Chinese Characteristics: The Case of Northern China. *World Development*, 37(11), 1791-1801.
- Wang, H., Wang, Y., & Delgado, M. (2014). The Transition to Modern Agriculture: Contract Farming in Developing Economies. *American Journal of Agricultural Economics*, 96(5), 1257-1271.
- Wang, H., Zhang, Y., & Wu, L. (2011). Is contract farming a risk management instrument for Chinese farmers? Evidence from a survey of vegetable farmers in Shandong. *China Agricultural Economic Review*, 3(4), 489-504.

- Warning, M., & Key, N. (2002). The Social Performance and Distributional Consequences of Contract Farming: An Equilibrium Analysis of the Arachide de Bouche Program in Senegal. *World Development*, 30(2), 255-263.
- Warning, M., Key, N., & Soo Hoo, W. (2002). Small Farmer Participation in Contract Farming. *presented at Western Economics Association International Annual Meetings*. Seattle, Washington.
- Watts, M. J. (1994). Life under contract: contract farming, agrarian restructuring and flexible accumulation. In P. D. Little, & M. J. Watts, *Life under contract: contract farming and agrarian transformation in Sub-Saharan Africa* (pp. 21-77). Madison, Wisconsin: The University of Wisconsin Press.
- Will, M. (2013). *Contract farming handbook: A practical guide for linking small-scale producers and buyers through business model innovation*. GIZ.
- Williams, T. T. (1961, October). Contract Vegetable Marketing. *Southern University Bulletin No: 4*, pp. 18-19.
- Williamson, O. E. (1975). *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: Free Press.
- Williamson, O. E. (1983). Credible Commitments: Using Hostages to Support Exchange. *American Economic Review*, 73(4), 519-538.
- Williamson, O. E. (1985). *The economic institutions of capitalism*. New York: Free Press.
- Woodhill, J., Guijt, J., Wegner, L., & Sopov, M. (2012). *From islands of success to seas of change: a report on scaling inclusive agri-food markets*. Centre for Development Innovation, Wageningen University & Research Centre.
- YASHADA. (2014). *Maharashtra Human Development Report 2012: Towards Inclusive Human Development*. Pune: YASHADA.
- Yashaskara, M. K., Suryaprakash, S., & Mandanna, P. K. (2010). Contract farming vis-à-vis conventional agriculture: An analysis of contract farming in Potato in Karnataka. in M. Devraj and Anurag Bhatnagar (Eds) *'Contract Farming in India: Present Scenario and Future Prospects'*. Excel India Publisher, New Delhi.
- Yin, R. K. (2014). *Case Study Research: Design and Methods*. Sage Publications.

Appendix A: List of firms undertaking contract farming

There does not exist a database about the companies procuring through contract. However, I have tried to prepare a list of companies which are carrying out contract farming. This list (Table A.1) has been compiled through different sources of literature such as through website of Ministry of Agriculture, GoI, Ministry of Food Processing, GoI, NABARD, MSAMB, and other print and electronic sources. The list is incomplete and was during the course of Ph.D. Hence, currently not sure which among them is non-functional. As can be seen from the Table A.1, that contract farming is carried out in various crops right from special kind of wheat or basmati paddy, medicinal herbs, poultry, fruits and vegetables.

Table A.1: Partial List of Companies which have adopted contract farming

S No	State	Crops	Company
1	Mahaarashtra (Ratnagiri and Sindhudurg districts)	Patchouli (Aromatic oil plant)	S. H. Kelkar Group of companies
2	Maharashtra	White Onion	Jain Irrigation
3	Maharashtra	Many Crops	Mahindra Shublabh
4	Maharashtra	Winery grapes	Champagne (I) Ltd & many other wineries
5	Maharashtra	Table variety grapes	Tata Chemicals
6	Maharashtra (Ambegaon taluka, Pune district)	Fodder for 3500 cows	Gowardhan Dairy
7	Maharashtra (Junnar taluka, Pune district)	red onion	Panchganga
8	Maharashtra (Junnar; 150 Farmers)	Banana	Gargi Agribiotech
9	Maharashtra (Wardha, Yavatmal)	Cotton	12 companies
10	Maharashtra, MP, Gujarat, Karnataka, Chattisgarh, Rajasthan	Safflower	Marico
11	Maharashtra (650 farmers, 1200 acres Nashik district)	Tomato	Varun Foods
12	Maharashtra, Andhra Pradesh (AP), TN;	Broiler	Sri. Venkateshwara Hatcheries; Swathi Hatcheries; Pioneer; Suguna Poultry
13	Maharashtra, Gujarat, Punjab, West Bengal, Karnataka	Potatoes,	Pepsi Co (I)
14	Maharashtra, TN, MP, Gujarat, Haryana,	Organic products of banana, potato, wheat, papaya, basmati, cotton	Ion Exchange Enviro Farms Ltd.
15	Maharashtra, Punjab, UP, MP, , Karnataka	Basmati, Wheat, Fruits and Vegetables	Rallis

S No	State	Crops	Company
16	Karnataka	Marigold, Caprica Chilly	AVT Natural Products Ltd
17	Andhra Pradesh	guar	Agrilogix
18	Gujarat; Punjab; Lahaul Spiti (HP)	Sesame seeds; Potato; Seed potato	McCain (I) Ltd
19	Karnataka and other adjoining area in other states	herbs	Rosun Naturals Products Pvt. Ltd.
20	Karnataka, AP	Gherkin, baby corn, paprika	Global Greens, Sterling Agro Products, Ken Agritech, Green Agri Pack, Unicorn AgroTech
21	Karnataka, Tamil Nadu	Organic Cotton	Appachi Cotton Company
22	Madhya Pradesh	Wheat, Maize and Soybean	Cargill India Pvt Ltd
23	Madhya Pradesh	Wheat	HLL
24	Madhya Pradesh	Soyabean	ITC - IBD
25	Madhya Pradesh	Pomegranate	Sanjeevani Orchards
26	Punjab	Chilies, Basmati, Groundnut	PepsiCo
27	Punjab	Tomato and chilies	Nijjer Agro Foods
28	Punjab	Basmati	Satnam Overseas, Escorts
29	Punjab	Milk	Nestle
30	Punjab, Rajasthan, UP and Maharashtra (200 farmers)	Baby corn, sweet corn	Bharti Del Monte
31	Rajasthan	Barely	SAB-Miller (I)
32	Rajasthan	Guar	Vikas WSP Ltd
33	Rajasthan (1300 farmers)	Barley	UB Group through PepsiCo
34	TN	Paddy (Branded rice Ponni)	EID Parry

Source: adapted from electronic and print media sources

Appendix B: Farmer Schedule

My name is Varun Miglani. I am the PhD student at Gokhale Institute of Politics and Economics (GIPE), Pune. This study is being carried out for my PhD thesis. Study attempts to understand economics of contract farming vis-à-vis non-contract farming. The study also attempts to identify factors influencing farmers' decision to participate or leave contract farming. I would like to learn about your experience of contract farming and therefore would ask you certain questions. In case, during the interview, if you have doubt in any question, please ask me for explanation. I am a student and have no links with any company or government. Our conversation will be totally confidential and will be used exclusively for research purpose. I will ensure that whatever I write down will not be viewed by anyone else. There are no direct benefits and risks to you for sharing the experience. Your cooperation will be very useful for the study and my overall learning. Results of the study will help us in better understanding of contract farming.

Farmer ID No:	Crop	Season	year	Current Contracting status	landholding class	Type of Irrigation used for crop	Date
Contract farming household grew chip-grade potato in Kharif, 2012-13/white onion in Rabi, 2011-12							1
Non-contract farming household previously in contract for chip-grade potato/white onion							2
Non-contract farming household never grew for chip-grade potato/white onion in contract							3

1. Identification & Demographic Characteristics

1.1	Name of farmer		1.6	Proportion of non-farm income in total income	
1.2	Village		1.7	Age of head HH (years)	
1.3	Taluka		1.8	Education of head of HH	
1.4	District		1.9	Social Group (SC/ST/NT/OBC/Gen)	
1.5	Family members within household	Below 15 years		1.10	Main occupation
		Between 15-65 years non-studying	M	1.11	Subsidiary occupation
			F	1.12	Experience of farming (years)
		Above 15 yrs studying full-time		1.13	Crop experience
		those above 65 years		1.14	Distance of farm to metaled road (km)
	Employed in non-farm		1.15	Contact no:	

2. Resource Endowments:

2.1 Particulars of land (Acres)

Sr	Particulars	Owned	Leased in	Leased out	Total Land
1	Rain fed Land				
2	Irrigated Land				
3	Fallow Land	Temporary			
		Permanent			
4	Method of irrigation	Flood			
		Drip			
		Sprinkler			
5	Availability of irrigation*				
6	Total Land				
7	Terms of lease@				
8	Rental value				

+ 1: Kharif season only; 2: Rabi season only; 3: All seasons available; 4: Kharif & Rabi only (not summer);

@ 1. Fixed cash rent; 2. Output sharing; 3. Output and input sharing both

2.2 Compared to other farmers' lands in your village, would you say that the agricultural land you own is:
1) More fertile; 2) Equally (or just as) fertile; 3) Less fertile

2.3 Livestock

Livestock	Bullocks	Cows	Buffaloes	Sheep	Goat	Poultry	Others_____
Number							
Market value							

2.4 Machinery and Equipment

Sr.	Particulars	Number	Year of Purchase	Purchase price	Market Value
1	Bullock Cart				
2	Open Well				
3	Tube well				
4	electric motor				
5	Tractor				
6	Plougher				
7	Rotravator				
8	Trolley				
9	Tiller (Cultivator) (Panja				
10	Paas (Vakhar) of tractor				
11	Drip set				
12	Sprinkler set				
13	Sprayer				
14	Bullock Plough				
15	Bullock vakhar				
16	Other bullock equipments				
17	Farm Building				
18	Cattle shed				
19	Diesel Pump				
20					

3.1 Cropping Pattern in the past year (Area in acres)

Kharif				Rabi		
No:	Crop	Dry/Irrigated	Acreage	No:	Crop	Acreage
1		Dry		1		
		Irrigated		2		
2		Dry		3		
		Irrigated		4		
3		Dry		5		
		Irrigated		6		
4		Dry		Total		
		Irrigated		Summer		
5		Dry		1		
		Irrigated		2		
6		Dry		3		
		Irrigated		4		
7		Dry		Total		
		Irrigated		Perennial		
8		Dry		1		
		Irrigated		2		
Total		Dry		3		
		Irrigated		Total		

4. History of contracted crop cultivation & contracting details

4.1 In which year, you first time grew chip-grade potato /white onion under contract?

Year	Season	Company Name			
PAST HISTORY					
Year	Whether grew contract crop	Contracting Status and Company Name	Year	Whether grew contract crop	Contracting Status and Company Name
2001	1. Yes 2. No	1. Contract (_____) 2. Open	2007	1. Yes 2. No	1. Contract (_____) 2. Open
2002	1. Yes 2. No	1. Contract (_____) 2. Open	2008	1. Yes 2. No	1. Contract (_____) 2. Open
2003	1. Yes 2. No	1. Contract (_____) 2. Open	2009	1. Yes 2. No	1. Contract (_____) 2. Open
2004	1. Yes 2. No	1. Contract (_____) 2. Open	2010	1. Yes 2. No	1. Contract (_____) 2. Open
2005	1. Yes 2. No	1. Contract (_____) 2. Open	2011	1. Yes 2. No	1. Contract (_____) 2. Open
2006	1. Yes 2. No	1. Contract (_____) 2. Open	2012	1. Yes 2. No	1. Contract (_____) 2. Open

4.2 Do you grow chip grade potato/white onion on same piece of plot every year? 1. Yes; 2. No

4.3 How did the first contact happen with the company? (Show card)

- 1) A friend/neighbour/fellow-farmer/relative introduced me / put in a word for me
- 2) I contacted the company official /agent on my own
- 3) The company official/ agent approached me personally
- 4) The company official/agent was canvassing in the village and asked for volunteers
- 5) Others (please specify) _____

4.4 Were there any eligibility criteria that you know of in order to get selected by the firm? Yes/No/ Unaware?

If YES, please list any eligibility criteria. Why do you think you were selected? [show card]

1	trustworthiness	6	Crop experience
2	Hard work and ability	7	Through reference
3	Reputation	8	Availability of irrigation
4	Those who will comply & obey	9	Others
5	Land (good soil)	10	

4.5 What were the reasons that led you to join Contract farming?(show card)_____

1	Good remunerative price	8	Minimum guaranteed price
2	Assured market for produce	9	Friend/neighbor suggestion
3	Seeing the success of co-farmers.	10	Procurement at farm gate
4	Quality seeds	11	Free gunny bags
5	Extension service & technical advice	12	Availability of credit
6	Trustworthiness of company	13	Expecting higher return
7	Good/higher production		

4.6 Is it a written contract?

1. Yes (continue); 2. No (Skip to 4.7)

4.7 Do you have a copy?

1. Yes; 2. No

4.8 What is the language of contract?

1. English; 2. Marathi

4.9 Have you read it or had it read to you?

1. Yes; 2. No

4.10 What inputs /services you received directly or indirectly through company? (show card)

Code	Items	free	Credit	Payment		Discount	Hired basis
				Advance	Deferred payment		
1	Seeds						
2	Organic Fertilizer						
3	Equipment, Machinery, Planter						
4	Assistance for Bank Loan						
5	Extension service						
6	Irrigation systems assistance						
7	Gunny bags						
8	Arranging transport						
9	Soil & water testing						
10	Training programmes/workshops						

4.11 Which of the decisions of farming are controlled by company? (show card)

1	Sowing dates	5	Which pesticide
2	Which seeds	6	When to harvest
3	Which fertilizer	7	Others
4	Which weedicide		

4.12 How often did company's fieldmen/officials visit you in the past crop growing season to discuss production related matters? (Show card)

1	Once a week	4	Once or twice during the crop cycle
2	Once in 15 days	5	Never
3	Once in a month		

4.13 What are the benefits of contract farming with the present firm, you could realize? (show card)

1	Good remunerative price	6	Minimum guaranteed price
2	Good yields	7	Extension and technical advice
3	Easy credit availability	8	Flexible price
4	Availability of quality seeds/inputs		Others (_____)
5	Assured Market for produce		

5. Cost of Cultivation of white onion for Rabi season/chip grade potato for Kharif season?

5.1 Method of Plantation

1	Direct sowing in field through bullock/planter	Ask Q. 5.2 & then go directly to 5.3
2	Hand dibbling	
3	Transplanting (only for white onion)	Continue

5.2 Seeds Costs

Seeds Variety	Quantity	Price	Total
Seed treatment chemical cost	Rs.	FL	HL

Section 5.3 for onion growers only, Skip to Section 5.4 for CGP

5.3 Nursery preparation costing

5.3.1 Acreage under nursery preparation? _____

Land preparation	Days/hrs		Wages (Rs)		Total Cost	
(A) Ploughing;	M	F	M	F	M	F

harrowing						
Machine Labor						
Family labor						
Hired labour						
Bullock labor						
(B) FYM/Fertilizers/Weedicide/fungicide/tonic	trolley/qty	Price	Total Cost	Labour cost		
				FL	HL	ML
Farm Yard Manure						
(C) Manual weeding	Days/hrs		Wages (Rs)		Total Cost	
	M	F	M	F	M	F
Family labor						
Hired labour						

5.2.4 Irrigation

No. of times irrigation	FL			HL			Diesel/Power cost (months: _____ acreage: _____)
	Days	Wage rate	total	Days	Wage rate	total	

5.4 Costs on Main Land cultivation

5.4.1	trolley/qty	Price	Total Cost	Labour cost		
				FL	HL	ML
1) Farm Yard Manure						
2) Fertilizers						
Urea						
DAP						
Labour	Days/hrs		Wages (Rs)		Total Cost	
	M	F	M	F	M	F
A) Land preparation (ploughing & harrowing)						
Machine Labor						
Family labor						
Hired labour						
Bullock labor						
B) Sowing for chip-grade potato/Transplantation for white onion)						
Family labor						
Hired labour						
Bullock labour						
C) Weeding (No. of times _____)						
Machine Labor						
Family labor						
Hired labour						
D) Harvesting, Storage & Grading						
Family labor						
Hired labour						
Bullock labor						
Weedicide/Pesticides	Qty	Price	Total Cost	FL	HL	ML
Weedicide						
Pesticide						
Fungicides						

5.5 Irrigation

No. of times irrigation	FL			HL			Diesel/Power cost (months: _____ acreage: _____)
	Days	Wage rate	total	Days	Wage rate	total	

6. Packaging costs

No. of bags	Rate	Total	Transport wage	Hired labour						Family labour					
				Days		Wage rate		total		Days		Wage rate		total	
				M	F	M	F	M	F	M	F	M	F	M	F
			Packing labour												
			Transport labour												

7. Storage costs

7.1 Did u stored up the farm produce? 1. Yes; Period: _____ 2. No

Place of storage	Mode of storage	Quantity	Total Cost

9. Production and marketing details

Seed Variety	Production	Whom did you sold*	quantity	Selling price	Total payment	Transport	tractor	Market (APMC) charges / Arthiya

*1: company; 2: other trader; 3: other company; 4: APMC Market

9.1) How many days after the sale of output, did you receive the full payment? _____ days

9.2) Volume of product that you did not sold to company as it did not met company standards? ___kgs

9.3) What did you do with that crop?

1	Left at the farm itself for fodder for sheep/goats	2	Sold in the market
---	--	---	--------------------

9.4) What is the volume of product that was lost due to spoilage /wastage? _____ kgs

9.5) Has it ever happened that your produce have been ever rejected by company? 1. Yes; 2. No

Ask Q. 10 only for contract farmers

10. In the last season, had any company/trader approached you regarding the sale of contract crop?

1. Yes; 2. No;

11. What was the prevailing price in the local market or price offered by another company when you sold your price?

	Contract price	Price offered by competing firm/market	Difference
previous			
back to back season			

Q. 12 to 17 only for contract farmers

12. As you would know some of the farmers sell the part of their contract crop to other buyers, have you ever in the past sold your contract crop to other buyer?

1. Yes (continue); 2. No (Skip to 14)

13. In the last season, have you sold the contract crop to any other buyer (local market or another company)?

1. Yes (proportion of contract crop: _____ %); 2. No (Continue)

(Reasons: _____) (Skip to 14)

14. Do you sell the part of contract crop to the other buyer/market, every year? 1. Yes;
2. No

15. According to you, what proportion of contract farmers in your village sell their contract crop to other buyers? ___%

16. In general, how important do you think it is for you to honour the contract? (Show card)
1. Very important; 2. Important; 3. Not important;

17. If you were to violate the contract, what do you feel would be the consequences? [Allow farmer to articulate his/her thoughts, & if appropriate ask questions below to get specific answers as a follow-up]

1	Nothing	6	Fight with us
2	Stop contracting	7	Complaint to village leader
3	Warn us	8	They will lose faith in us
4	They will approach police	9	Will inform other companies
5	Will go to court	10	Others

18. Expectations on Uncertainty

I would like to learn about your expectations regarding yield & price of chip-grade potatoes/White onion. Based on your experience if and you were to contract with same firm for the similar season and follow same procedures and assuming general conditions, weather remain unchanged, what is the ...

Variable	Most likely expected?	Minimum value you expect?	Maximum value you expect?
Yield (kg/acre)			
Price (Rs./kg)			

19. What are the risks present for growing contract crop under contract/non-contract farming? (let the respondent speak & then probe for each attribute) (s)

1	Risk of poor quality seeds	4	Risk of firm not coming back to pick up the produce at harvest time
2	Yield risk	5	Risk of rejection of output
3	Price risks	6	Risk of delay in payment

Q. 20 to 22 only for contract growers

20. So far, did you have disputes with company in the past? 1. Yes (Show card); 2. No

	Attributes	Reason	Was it successfully resolved or not
1	Poor quality of seeds		
2	Poor quality of other inputs		
3	Late delivery of inputs		
4	Rejection of output		
5	Higher prices charged for inputs		
6	Payments		
7	Others		

21. In general, if the firm does not honour the contract, what would you do?

1	Nothing, powerless	5	Will lose faith in company
2	Demand Compensation	6	Stop contracting with this firm, contract with other firms
3	Complain to the local authorities /police	7	Give up growing contract crop
4	Will go court	8	others

22. What are the problems do you face in growing the contract crop & was it resolved? (Show card)

1	Lower price of output	7	Lack of flexibility
2	Poor quality of seeds	8	Unfavorable terms of transactions

3	Rejection of output	9	Fixed rate
4	Higher cost of inputs	10	Not enough assistance from firm
5	Late delivery of inputs	11	Land degradation
6	Late Payments	12	Others (Specify _____)

Ask Q. 23, only if there was break in contracting otherwise skip

23. There was a break in between year, what was the reason for the break?

1	Company did not offer the contract	4	Water issue
2	Losses with the contract	5	Personal reasons
3	Pest issue	6	

24. Based on your experience of contract farming, are you:

Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very Satisfied
1	2	3	4	5

25. Any suggestions for improving the contract farming scheme?

26. If you were not contracting for potato/white onion with the firm this season, what would be your next best option?

a. Grow contract crop for another company or open market (specify name of company)

b. _____ Another crop instead of contract crop _____

27. Would you grow the contract crop in the next season? 1. Yes ; (Continue) 2. No; 3. Not decided

28. Would you grow: 1) With the same firm; 2) with another firm or open market

Ask Q29, 30 for ACF only:

29. What were the reasons which led you to exit from the contract farming? (Category 2 farmers; show card)

1	Lower price in contract	9	change in mindset
2	Lower yield	10	Higher cost of seeds
3	Company did not offered the contract	11	Soil quality deteriorated
4	Rejection for output/strict quality norms	12	Not procurement of whole produce
5	Higher cost of cultivation	13	Personal reasons (like death in the family)
6	Improper payment	14	Lack of transparency
7	Late payment	15	Losses in contract
8	Longer duration crop	16	

30. Would you like to join contract farming again? 1. Yes; 2. No; 3. Not decided

Ask Q31, 32 for never participated contract farmer

31. Have you ever tried growing V12 onion? 1. Yes; (What happened: _____) 2. No;

32. Why you did never participated in contract farming? (show card)

1	Lower price in contract	7	Late payment
2	Lower yield	8	Inflexibility
3	Unfavorable terms of transactions	9	Higher price of inputs
4	Rejection for output/strict quality norms	10	Heard about impact on fertility of soil
5	Lack of trust in the company	11	Longer duration crop
6	Lack of transparency in contract	13	Others (_____)

33. Credit Constraint Section (Applicable to all categories)

33.1 Did you or household receive any loan in the past 12 months?

a. Yes (Continue) (No: of Loans: _____); b. No (Go to Section 9.2)

33.2 Borrowers Section

1	List of loans	1	2	3																																				
2	Name of the lender																																							
3	Type of the lender																																							
	<table border="1"> <tr> <td colspan="2">Formal</td> <td colspan="2">Semiformal</td> <td colspan="2">Informal</td> </tr> <tr> <td>1</td> <td>Commercial Bank</td> <td>3</td> <td>Cooperative</td> <td>6</td> <td>Money lender</td> </tr> <tr> <td>2</td> <td>RRB</td> <td>4</td> <td>MFI/SHG</td> <td>7</td> <td>Input supplier</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>8</td> <td>Arthiya</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>9</td> <td>Relative/friend</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>10</td> <td>Grocery store</td> </tr> </table>	Formal		Semiformal		Informal		1	Commercial Bank	3	Cooperative	6	Money lender	2	RRB	4	MFI/SHG	7	Input supplier					8	Arthiya					9	Relative/friend					10	Grocery store			
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				9	Relative/friend																																			
				10	Grocery store																																			
4	What was the loan used for?																																							
	<table border="1"> <tr> <td>1</td> <td>To buy inputs >>5</td> <td>5</td> <td>Education >>6</td> </tr> <tr> <td>2</td> <td>To install perennial crops >>5</td> <td>6</td> <td>Consumption >>6</td> </tr> <tr> <td>3</td> <td>To buy agricultural equipment/machinery>>6</td> <td>7</td> <td>Other _____</td> </tr> <tr> <td>4</td> <td>Spending related to side business >>6</td> <td></td> <td></td> </tr> </table>	1	To buy inputs >>5	5	Education >>6	2	To install perennial crops >>5	6	Consumption >>6	3	To buy agricultural equipment/machinery>>6	7	Other _____	4	Spending related to side business >>6																									
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2	To install perennial crops >>5	6	Consumption >>6																																					
3	To buy agricultural equipment/machinery>>6	7	Other _____																																					
4	Spending related to side business >>6																																							
5	For what crop did you request the loan?																																							
6	Would you have wanted a larger loan at the same interest rate? 1. Yes >> (constrained); 2. No >> (unconstrained)																																							

33.3 Non-Borrowers Section

- In the last 5 years, have you applied for a loan from bank/cooperative society and been rejected?
 - Yes (Constrained) (Continue);
 - No >> Go to 3
- Why the loan application got rejected? _____
- Currently, would a bank/cooperative society lend to you if you applied?
 - Yes (Continue);
 - No >> Go to 4
- Why did you not apply? _____

Unconstrained		Constrained	
1	Sufficient liquidity	4	long processing time, paper work
2	interest rate was too high,	5	Illiterate
3	no profitable investments	6	Demanding collateral
		7	Demanding bribery

- If you were certain that a bank/cooperative society would approve your application, would you apply?
 - Yes (Constrained);
 - No >> Continue;
- Why Not? _____

Unconstrained		Constrained	
1	Sufficient liquidity	4	long processing time, paper work
2	interest rate was too high,	5	illiterate
3	no profitable investments	7	Demanding bribery
		8	Demanding collateral

34 Locational Attributes

- Distance of the farmer's field from the nearest market for contract crop _____ metres
- Distance of the farmer's field from the nearest market for the alternate crop _____ metres
- House: 1.Kacha; 2. Pakka