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Farmers' participation in Contract Farming: A Case of White Onion and Chipgrade Potato Cultivation in Selected Provinces of Western India

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Abstract:

In India, there have been controversies surrounding inclusiveness of contract farming arrangements (CFAs). The present paper contributes to the literature on the adoption of CFAs based on the field evidence of white onion and chipgrade potato cultivation in the selected provinces of Western India. Using the cross-sectional research design, primary data was collected from 378 randomly selected farm households using structured schedules along with the discussions with key informants. Descriptive statistics and logit regression results indicate that CFAs were inclusive, as less experienced farmers and farmers with low agricultural asset resource base preferred to cultivate under contract. However, it was found that the wealthier and more experienced farmers were the first ones to join CFAs. Survey results showed that it is generally the farmers who self-select themselves in CFAs. The participation and non-participation in CFAs is not a permanent feature. Farmers' decision to contract in the forthcoming season is based on a number of factors viz. agro-climatic conditions, financial position, farmers' expectation of returns in the contract and alternatives, theirs and co-farmers' past experience. Imperfections in the input and output agricultural markets are the other reasons why farmers feel the need for the CFAs to grow the contract crop.

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JEL Codes: Q13, C25

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Farmers' Participation in Contract Farming: A Case of White Onion and Chipgrade Potato Cultivation in Selected Provinces of Western India

1. Introduction

Contract Farming is defined 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” (Narayanan, 2011). 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).

There is growing evidence that contract farming arrangements (CFAs) are expanding across India (Planning Commission, 2011c). Government of India (GoI) policy documents¹ emphasize the need to encourage contract farming as it shall boost crop diversification by providing assured and remunerative market opportunities for farmers. 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 farming². Also some studies have been critical of the inclusiveness aspects of CFAs. Farmer inclusiveness refers to integration of farmers in the whole value chain or a part of the value chain whereby there is exchange of information between processors and farmers (Vis,

¹ 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.

² Some of farmer groups across India have opposed contract farming, as they find it to be exploitative towards farmers. For e.g. 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)

2012). Literature so far has seemed to provide mixed results for the inclusion or exclusion of small farmers in the value chain?

Narayanan (2011) and Miglani (2016) provide a comprehensive review on participation of small and large farmers in CFAs. The literature review indicates that there could not be any general theory of contract farming due to the heterogeneity of crop characteristics, firms' conduct, and contract farming relations. Moreover, literature on inclusiveness aspects of CFAs is limited in scope mainly looking at whether small farmers are part of this value chain. This paper attempts to contribute to literature on the adoption process of CFAs whereby we attempt to examine (a) sources of information on participation in CFAs; (b) profile of early adopters of CFAs; (c) motivation behind farmers growing crops in CFAs and leaving CFAs (d) determinants of participation in CFAs. Overall this paper would be useful for academics and agribusinesses. The paper also suggests the areas where agribusiness firms should focus in order to carry out CFAs successfully.

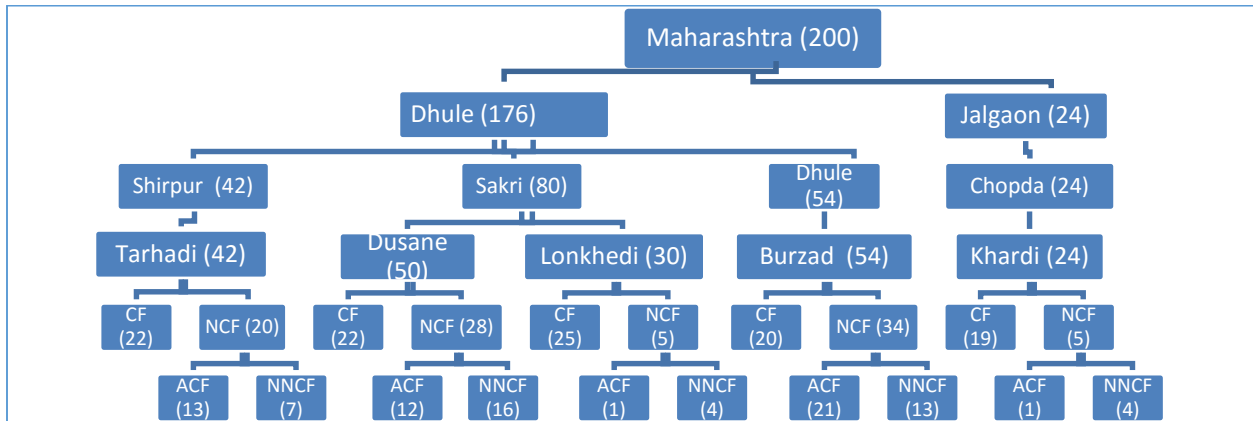
The paper is organised in six sections. Data and methodology adopted to fulfil the objectives of the paper are discussed in Section 2. The contract crop cultivation and brief background of contract farming firms is discussed in section 3. Section 4 discusses the different aspects of adoptions of contract crop cultivation in CFAs. This includes the source of awareness of contract crop cultivation, motivation of farmers to grow under CFAs, the profile of early adopters and followers of the farmers participating in CFAs. Section 5 deals with the aspects of not growing crops under contract. Section 6 presents the determinants of participation in CFAs using the logit regression and Section 7 concludes; points out the suggestions for the contracting firms and future areas of research work

2. Data and Methodology

The present paper adopted the cross-sectional research design to address the above objectives. The case study was prepared for two high value crops viz. white onion and chipgrade potato (CGP) crop in the selected provinces of Maharashtra (India) through secondary and primary data. Primary data included structured schedules through farmers' onion and CGP survey comprising 378 farmers as well as the field discussions with key informants. The survey was carried out in two phases, i.e. for onion in late 2012 and for CGP in early 2013.

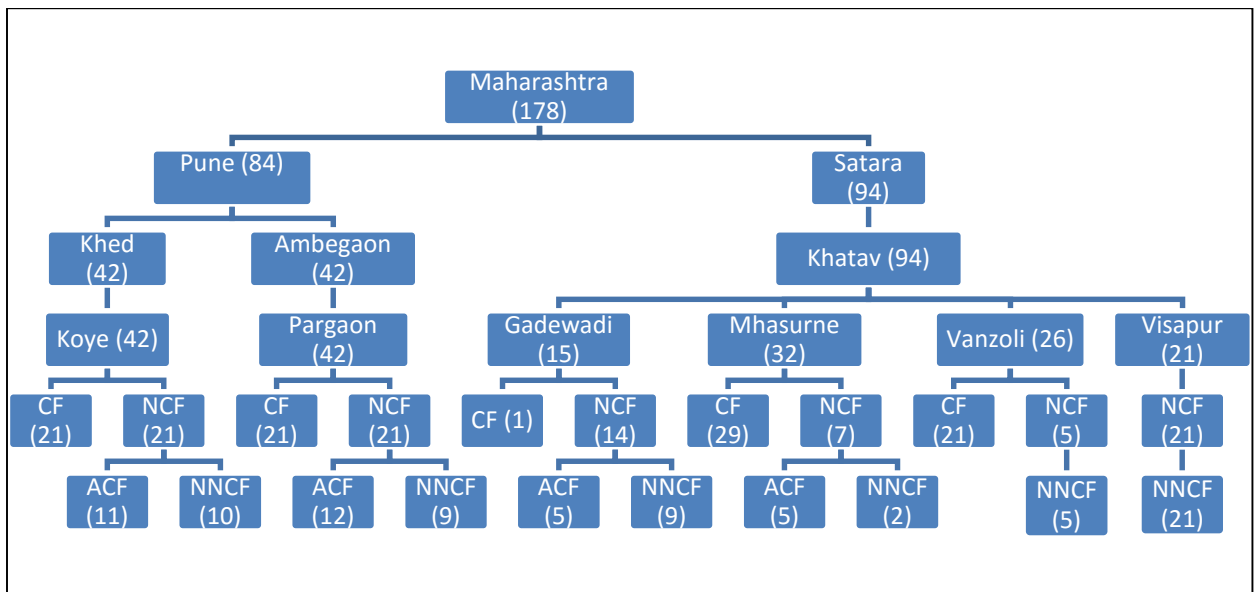
Multi-stage sampling was adopted with systematic stratified sampling at the ultimate sampling unit. In the first stage of sample selection, two provinces having a major concentration of CFAs were selected. In case of onion, number of farmers per village were few, hence all the villages having at least 25 contract farmers were selected within the selected province. In case of CGP, villages were selected using population probability to size method. The list of villages along with the respective sample size for onion and CGP is mentioned in the Figures 1 and 2 respectively.

Figure 1: Sample design for white onion



Note: Units in parenthesis refer to sample size; CF: Contract farmer; NCF: Non-contract farmer; ACF: Attritoned Contract farmer (previously in contract); NNCF: Never contracted Farmer

Figure 2: Chip-grade potato sampling design



Note: Units in parenthesis refer to sample size; CF: Contract farmer; NCF: Non-contract farmer; ACF: Attritoned Contract farmer (previously in contract); NNCF: Never contracted Farmer

3. Contract Cultivation of Selected Crops in Maharashtra

3.1 Chip-grade Potato CFAs:

Chip-grade potato (CGP) CFAs in Maharashtra region is being carried out since 2002 by PepsiCo's Frito-Lay (I), market leader in potato chips snack segment as well as for potato CFAs in Maharashtra and India (PepsiCo, n.d.). Frito-Lay (I) started its CFAs in Maharashtra from 2002 onwards on trial basis in couple of villages of Pune and Satara provinces. Initially, they started with around 100 farmers in 2002-03 and increased over the years to around 2150 farmers in 2011-12. Table 1 gives more details about the coverage of CGP CFAs.

Table 1: Details of Frito-Lay (I) Chip-grade Potato Contract Farming in Maharashtra

Year	No. of Farmers	Area (hectares)	No. of Villages	No. of Provinces
2002-03	100	41	NA	2
2011-12	2624	2552	197	3
2012-13	2150	NA	138	3

Source: Company records.

NA: Not available

With few farmers involved in 2002-03, PepsiCo's field staff had direct contact with farmers providing all the necessary support. However, with more farmers joining CF, company appointed hundekaris³ for managing CFAs. There is a legal contract between farmer and firm and also between firm and hundekari, whereby all the duties of each stakeholder are mentioned in detail.

3.2 White Onion CFAs:

Jain Irrigations Pvt. Ltd. (JISL), is a multi-national company (MNC) with activities extended into many hi-tech agro-related ventures. JISL is involved in CFAs of white onion in Maharashtra since 1998 and procures the white onion for producing dehydrated powder for export purpose. JISL has developed its own seed variety named "V12" for winter crop, which it distributes to the contract farmers. The number of contract farmers has increased from 473 farmers in 2001-02 to 1926 in 2011-12 (Table 2). There is no legal written contract involved in this buyback arrangement. Company relies on its relationship with farmer, pricing policy and social peer pressure for contract compliance. JISL is the only firm conducting white onion CFAs in the region.

³ Hundekari is not an employee of Company but is an intermediary playing the role of facilitator in CFAs, who resides in that region and mobilizes farmers to join CF. He provides support for documentation for the bank loan, sale of seeds; coordinates with the technical team to solve the problems of farmer and makes logistics arrangements in coordination with company staff for procurement of potatoes. He in turn is remunerated with commission based on sale of seeds and procurement of output

Table 2: White onion Contract Farmers for Rabi Season 2001-02 to 2011-12

Year	2001 -02	2002 -03	2003 -04	2004 -05	2005 -06	2006- 07	2007 -08	2008 -09	2009 -10	2010 -11	2011- 12
No. of Provinces	4	3	3	6	7	8	8	8	8	8	8
No. of village	105	105	128	166	198	198	287	340	404	400	384
No. of farmers	473	315	1028	1288	1267	1780	1616	2051	2360	2379	1926
Area in hectares	177	205	615	1121	1190	1068	1404	1442	1057	1172	1340

Source: Company records

4. Contract Farming adoption

Before any new technology or new crop is adopted, it is preceded by technology diffusion, i.e., the act of making the new technology known to the potential adopters. Diffusion is therefore a link between R & D and adoption (Arnon, 1989). In the case of reference crops (CGP and white onion), these were new variety crops developed and introduced by the respective contract farming firms. This section deals with how farmers got aware about the new contract crop and CFAs.

4.1 Awareness and first Contract with the firm

Field level discussions indicated that village meetings and fellow farmers were the first source of information about contract crop cultivation in case of both the crops. Moreover, meetings at the hundekari shop were also the important source of information of CGP cultivators. During the survey, both Contract Farmers (CF) and Attritioned Contract Farmers⁴ (ACF) were asked about how the farmers' first contact happened with the contracting firms, the results of which are presented in Table 3. 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. While around 12% of CGP and 20% of onion farmers mentioned friend/relative introduced them to the contracting firm. Overall, field interactions and survey results indicated that canvassing within the village (i.e. organising the meeting of farmers through village leaders) by the contract farming firms' staff, is an effective way of influencing farmers to grow the contract crop within CFAs.

⁴ They were previously growing the reference crop within CFAs, but had not been part of the CFAs in during the reference season (year).

Table 3: First contact with the firm
(responses 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. n=responses generated; For CGP and onion, six responses each were missing for this question

4.2 Profile of early adopters of Contract Farming

Firms who want to start CFAs in new areas can focus on early adopters that would help them expand their CFAs sooner and easily. First we define who are early adopters and followers of CFAs. 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 CFAs within the respective villages. These farmers were termed as early adopters, while rest were termed as followers.

Age and schooling profile of CGP and onion farmers based on CF adoption categories is presented in Tables 4 and 5. Tables 4 and 5 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 Tables 9 and 10. Similarly, farm experience of early adopters and followers was found to be similar for both the crops (Tables 6 and 7). Early adopters of both CGP and onion CFAs 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 farming experience of nearly 18 years compared to 12 years of followers (Table 9). 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 6). In case of onion, early adopters had farming experience of 17.7 years compared to 13.3 years of followers (Table 10).

Table 4: 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 5: 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 (2012-13)

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

Table 6: 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: 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

Operational holding⁵ pattern of early adopters and followers of CFAs for both the crops is presented in Table 8. Average operational holdings of CGP early adopters (5.7 hectares) was greater than that of followers (3.6 hectares). While for onion, average holdings of early adopters (5.8 hectares) were greater than that of followers (4 hectares). Large farmers comprised 73% of early adopters and 40% of followers.

Table 8: Operational holding pattern of early adopters and followers of CFAs

CGP			
Holding categories (hectares)	Early Adopters (n=41)	Followers (n=81)	Total (n=122)
Marginal and Small (0.0 – 1.9)	7.3	19.8	15.6
Medium (2.0 – 4.0)	29.3	37.0	34.4
Large (4.01 and above)	63.4	43.2	50.0
Onion			
Holding categories (hectares)	Early Adopters (n=56)	Followers (n=100)	Total (n=156)
Marginal and Small (0.0 – 1.9)	8.9	22.0	17.3
Medium (2.0 – 4.0)	17.9	38.0	30.8
Large (4.01 and above)	73.2	40.2	51.9

Source: Primary survey (2012-13);

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

⁵ Agricultural Census of Government of India defines operational holding as "all land which is used wholly or partly for agricultural production and is operated as one technical unit by one person alone or with others without regard to title, legal form, size or location".

Table 9: Summary statistics (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 (hectares)	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; Annual average exchange rate in 2012-13 of the Indian rupee was Rs. 54.4 per US dollar.

Table 10: Summary statistics of early adopters and followers of onion CFAs

Particulars		Early Adopters	Followers	Total
Age (years)	Mean	44.9	43.7	44.1
	<i>SD</i>	12.5	10.4	11.2
	<i>U</i> = 2630; <i>p</i> = 0.27; <i>r</i> = -.05	Median	44.0	41.0
Schooling (years)	Mean	8.3	8.0	8.1
	<i>SD</i>	4.6	4.5	4.5
	<i>U</i> = 2725; <i>p</i> = .39; <i>r</i> = -.11	Median	10.0	9.0
Farming experience (years)	Mean	25.2	23.9	24.4
	<i>SD</i>	12.6	11.7	12.0
	<i>U</i> = 2635; <i>p</i> = .27; <i>r</i> = -.05	Median	25.0	24.0
Contract crop experience (years)	Mean	17.7	13.3	14.9
	<i>SD</i>	11.1	9.3	10.2
	<i>U</i> = 2144; <i>p</i> = .00; <i>r</i> = -.19	Median	15.0	10.0
Farm to road distance (km)	Mean	1.6	1.5	1.6
	<i>SD</i>	1.6	2.9	2.5
	<i>U</i> = 2483; <i>p</i> = .10; <i>r</i> = -.10	Median	1.0	.0
Operational landholding (hectares)	Mean	5.7	3.9	4.6
	<i>SD</i>	3.2	2.7	3.0
	<i>U</i> = 1733; <i>p</i> = .00; <i>r</i> = -.32	Median	5.1	3.2
Livestock (Rs.)	Mean	171271	113018	133930
	<i>SD</i>	343365	253718	289373
	<i>U</i> = 2258; <i>p</i> = .02; <i>r</i> = -.20	Median	75000	62000
Physical farm assets (Rs.)	Mean	156420	75130	104311
	<i>SD</i>	236758	139359	183916
	<i>U</i> = 1086; <i>p</i> = .00; <i>r</i> = -.16	Median	43350	26475
Household size	Mean	6.6	5.3	5.7
	<i>SD</i>	2.4	2.2	2.3
	<i>U</i> = 2049; <i>p</i> = .00; <i>r</i> = -.27	Median	6.0	5.0

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

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 9 and 10). Thus, 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).

4.3 Motivation to start growing under contract

To understand the factors that motivated farmers to join CFAs, 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 software. In case of CGP, overall 371 responses were generated by 122 respondents (both CF and ACF), results of which are presented in Table. The majority of the respondents cited credit availability, success of co-farmers and minimum guaranteed price (MGP) as the reasons for joining CFAs. 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 facilitated by the contracting firm.

Table 11: 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 12. Most of the respondents (90.5%) cited MGP as one of the reasons for joining onion CFAs. 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 CFAs.

Table 12: 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	

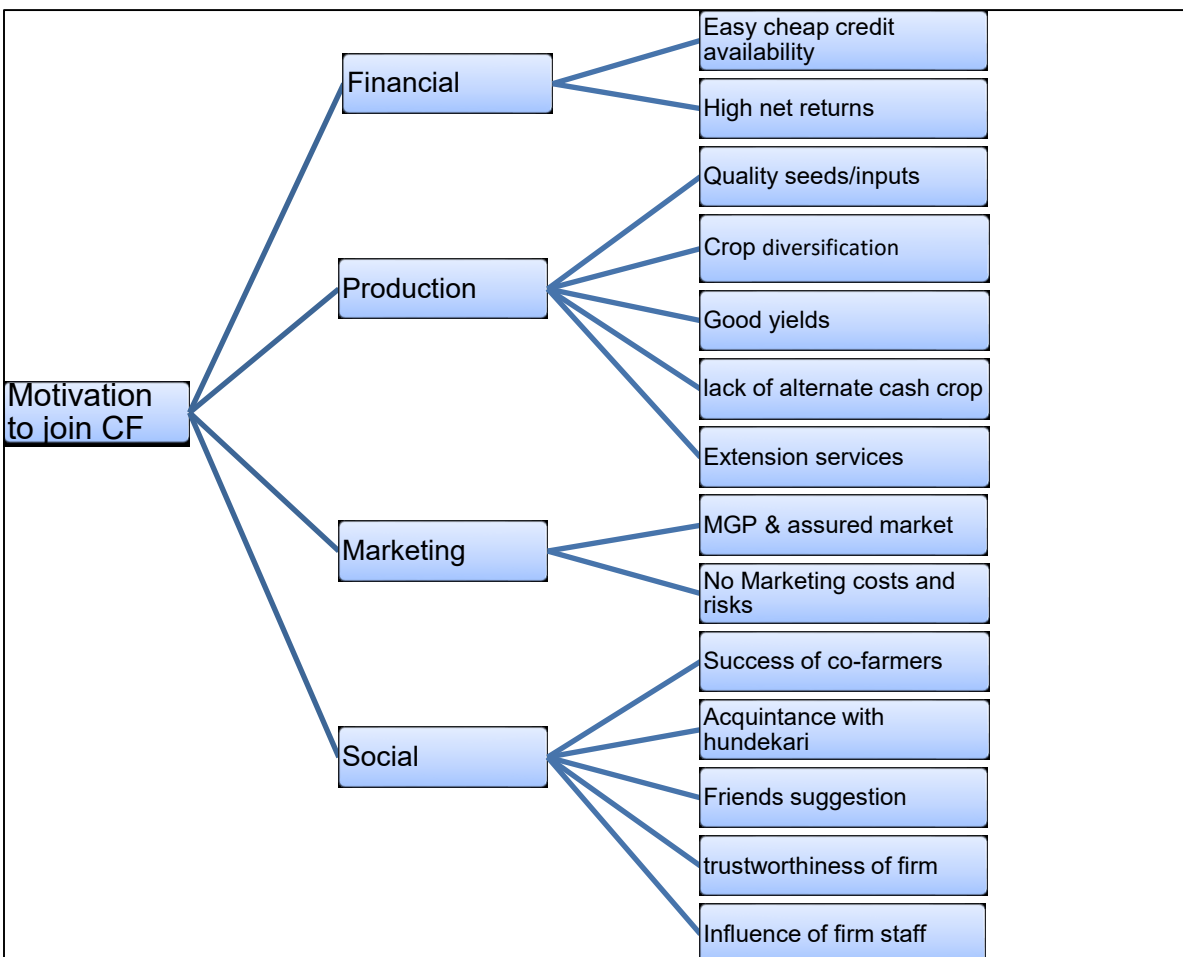
Source: Computed from primary survey

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 Tables 11 and 12 and discussions with farmers, the motivations to join CF are summarized in Figure . These motivations are broadly classified into financial, production, marketing, and social parameters. 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 (intermediaries). Overall, farmers viewed contract crop cultivation, as means to overcome uncertainties and imperfections of input and output markets.

Figure 3: Motivation to join contract farming



Source: Primary survey

5. Non-participation in CFAs

In this section, non-participation aspects of contracting of CGP and onion crops are discussed. Firstly, some aspects of contract crop cultivation without contract is discussed. Farmers growing contract crop without contract in reference season is termed as NCF. Factors influencing ACF to disadopt from contracting and NNCF (Never Contracted Farmers), not to grow in the contract is discussed in a later subsection.

5.1 Functioning of non-contract mode of production of reference crops

With the rising demand for CGP due to growing demand for potato chips market in India, the sample regions have seen the growth of non-contract hundekaris as well as the other firms viz.

ITC and Siddhivinayak Agro-processing Pvt. Ltd. carrying out their respective CFAs in Maharashtra region. Non-contract hundekaris go every year and buy the seeds from Punjab region to redistribute in Maharashtra region, partly or fully on credit basis. 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 themselves. The payment of seed tubers bought on 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 and also arranges the sale of the output. There seems to be interlocking of factor markets in case of NCF. 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 commission agents.

However, there are risks linked to growing CGP without contract. 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 sell and at what price. However, many 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 province says,

“Farmers staying in the nearby villages of Pusegaon (Satara Province), know traders in Pusegaon as they have been producing potato for many years. Hence, they can trust them. In case, they get bad quality 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 for onion making onion cultivation very risky for farmers, but returns could be very high as well.

5.2 Disadoption from contracting

Disadoption from contracting refers to the case farmers cease to grow crops under CFAs. However, it was observed that such disadoption is temporary. As farmers may not grow the crop within contract for one season, but may return to grow in another season. For e.g. 23% of onion farmers who were growing crop under CFAs in 2011-12, had taken a break for a season or more

from contracting earlier. The majority of farmers, who had taken a break from CFA in one of the season earlier, had mentioned losses in the previous season as one of the reasons for taking a break. i.e., 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 better pay off within CFAs, 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. Such churning in and out of CF was also reported by Narayanan (2011).

The reasons for ACF (CGP and onion) not growing under contract is presented in Table 13 and 14. The majority of CGP ACF 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. The conduct of hundekari and the firm staff is crucial in the continuance of farmer growing under contract.

Table 13: 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

The availability of alternative crop production opportunities also plays an important role in farmers' decision-making about growing contract crop in CFA or not, whether to grow in the contract and without a contract. For e.g., farmers in Satara province do not have alternative cash crop opportunities on their land, moreover growing CGP without a contract is highly risky. Therefore, attrition of CGP is lower in Satara compared to Pune. Cai et al. (2008) also observed in their study that attrition of farmers among CFAs in remote areas is low.

In case of onion, more than one-third of ACF had exited CF, due to higher costs and losses in contract cultivation (Table). The next important reason is the water scarcity and longer duration of maturity of V12 Crop, mentioned by more than quarter of ACF. Greater duration of onion contract crop needs additional couple of irrigation, i.e. increased water requirement. Therefore, those farmers, who have shortage of water for irrigation, may opt out of contracting for that season. Thus, farmers' decision whether to contract or not is also dependent on its resource conditions. 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 14: 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

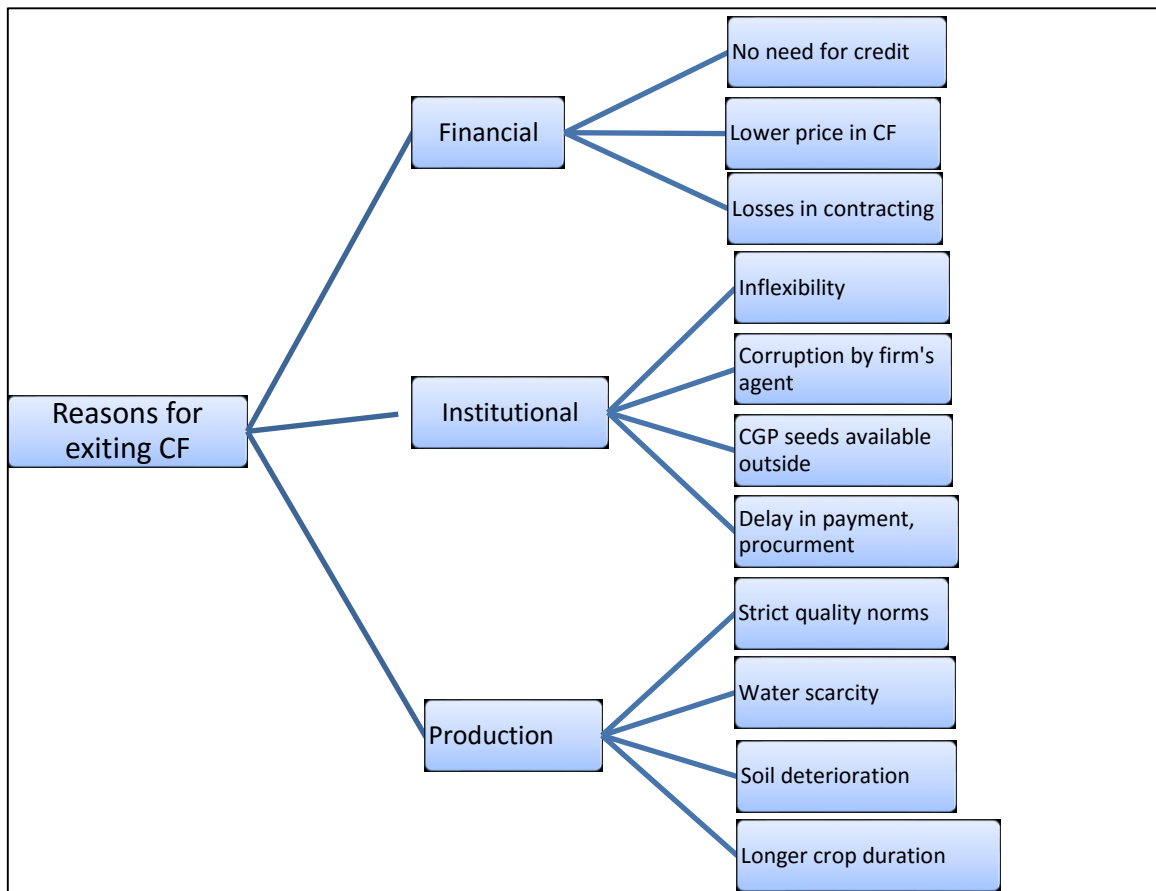
Note. Multiple-response question

*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 13 and 14 and discussions with ACF, the reasons of exiting CF are summarized in Figure . 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 CFAs, as they thought they were better off without it. In case of CGP, after few years of joining CFAs, when demand for CGP crop started rising and competition increased. The other traders started offering higher prices compared to contracting firms 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 4: Reasons for exiting contract farming



Source: Field survey (2012-13)

5.3 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 15 and 16 respectively. Similar to the reasons for CGP ACF exiting CFAs, 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. 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 15: 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, majority of the NNCF cited water scarcity as one of the reasons for not growing V12 onion. Another reason which deterred NNCF from growing company V12 onion was the rumour that it leads to loss of fertility of the soil (Table 16).

Table 16: 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;

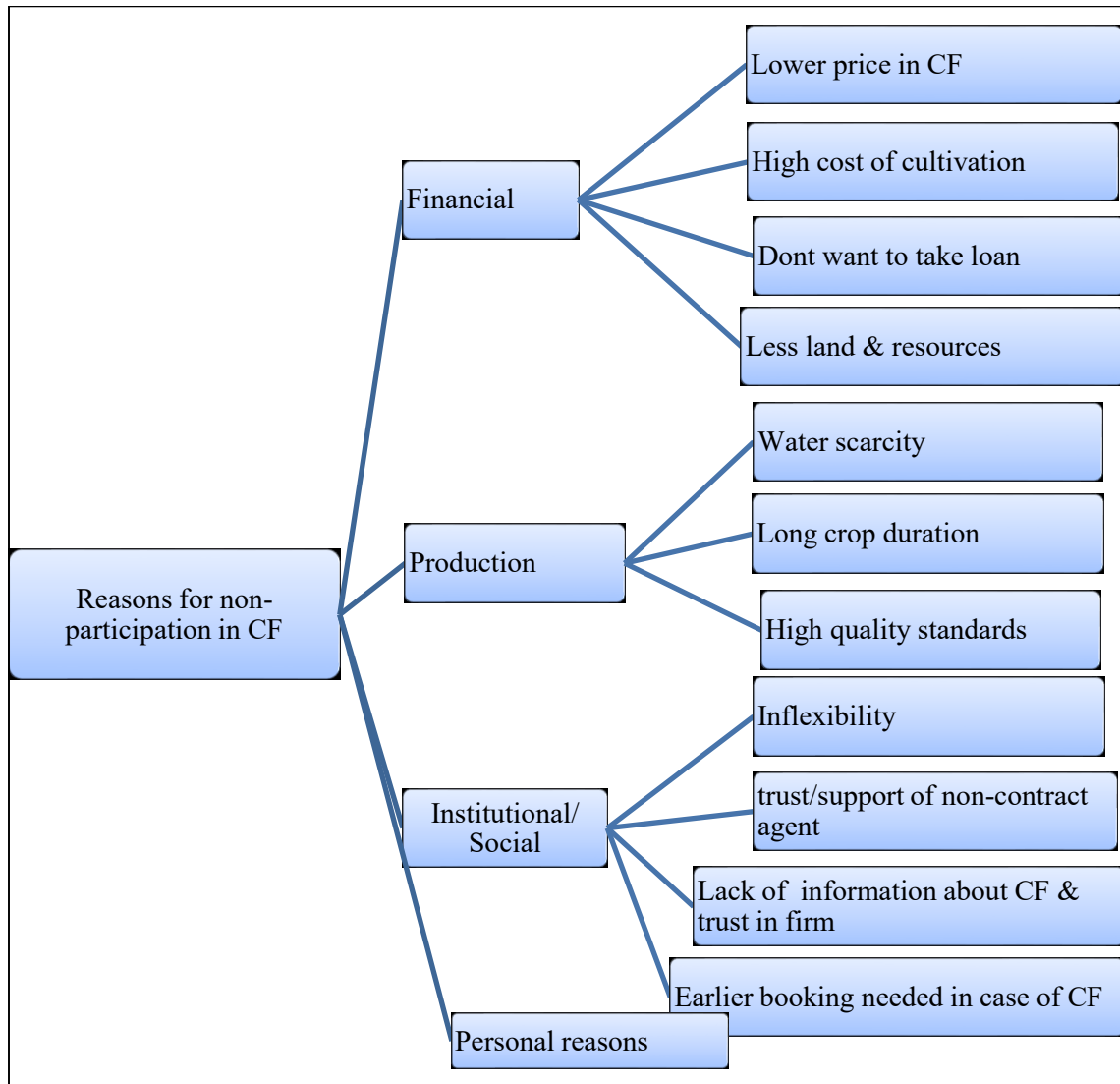
* Personal reasons lack of trust, high-quality standards, lack of trust, earlier booking, and nursery risks

In the case of onion, majority of the NNCF cited water scarcity as one of the reasons for not growing V12 onion. Another reason which deterred NNCF from growing company V12 onion was the rumour that it leads to loss of fertility of the soil (Table 16). Based on the results of Tables 15 and Table 16, and discussions with NNCF of CGP and onion, the reasons for non-participation in contracting are summarized in Figure . 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.

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 of growing season. As in CGP/onion contracting. Usually, farmers have to inform hundekari/firm staff 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 in open market.

Figure 5: 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. 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. 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 net returns of farmers.

As in the case of ACF, NNCF were also 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 CFAs 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 CFAs.

6. Determinants of Contract Farming Participation –Logit Regression

The determinants of participation in the contract farming (compared to being without contract) using the logit regression model (Equation 1) for both the crops are modelled separately.

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

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 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. The strategies suggested in Hosmer and Lemeshow (2000) for the variable selection for the participation model were adopted. The linearity and no-multicollinearity assumption was checked for the Logit Model. As per CGP participation logit model (Table 17), five variables viz. crop experience, livestock ownership, operational holding, GCA (gross cropped area), and CGP acreage were found to be statistically significant. Similarly, onion participation logit model (Table 18) indicated that farm and crop experience, operational

holding, GCA, winter season onion acreage, and agricultural assets variables were found to be statistically significant.

Table: 17 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 (hectares)**		-.08	.03	4.85	.03	.93	.87	.99
	CGP acreage (hectares)*		.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;

Table 18: 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 (hectares)***		-.04	.02	3.37	.07	.96	.93	1.00
	Onion area (hectares)***		.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 contract, however inexperienced farmers are more likely to grow crop under contract. In case of both the crops, the odds of contract farming participation was lower as crop experience increase. In 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 was 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 sizes, access to subsidiary source of income within the household, were not found to be playing 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 had 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 farmer being under contract for medium and large category farmers were is 2.8 times and 6 times more likely compared to 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 one-hectare increase in contract crop acreage for the reference season, probability of contract farming participation increases by 30% for both CGP and onion farmers. In contrast, with one-acre increase in GCA, 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. Farmers within category of agricultural assets less than Rs. 25,000 were twice more likely to be under contract than farmers within category of agricultural assets of Rs. 25,001-50,000. This indicates in case of 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.

7. Conclusion

In this paper, it was found that those farmers who were experienced and better resource endowments were the early adopters of CFAs. MGP and success of co-farmers were the major influencing factors to join CFAs. Also, credit availability in case of CGP was very important, as CGP cultivation required high working capital. 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.

Descriptive statistics and logit regression results indicate that CFAs were inclusive, as less experienced farmers and farmers with low agricultural asset resource base grew contract crop. However, it was found that the wealthier and more experienced farmers were the first ones to join CFAs. Farmers with high contract crop acreage had a higher likelihood of being under contract. Also, the average contract crop acreage is low in NNCF compared to CF. This signifies farmers seem to perceive CFAs as risk mitigation strategy, as in contract they have assured buyer and MGP, which reduces the risk coverage. However, whenever, the market price of crop is higher than that of the price offered by the contracting firm, farmers feel they are losing on the gain. This becomes the reason for them to cultivate the crop, outside the region. Interactions with the key informants and farmers suggested that as farmers get used to the new technology and get financially better off, they no longer feel the need for technical support to grow the crop. Then what matters to them is the good price of their crop. So firms have to offer the competitive prices to their farmers to retain them in CFAs

Field study also showcased that it is generally the farmers who self-select themselves in CFAs. Moreover, their participation and non-participation in CFAs is not a permanent feature. Farmers' decision to contract in the forthcoming season is based on number of factors viz. agro-climatic conditions, financial position, farmers' expectation of returns in the contract and other alternatives, theirs and co-farmers' past experience of the same.

Firms need to 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. Overall, PepsiCo 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 CFAs in that area.

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. While, those villages which are far away from input and output markets, their farmers prefer to grow in the contract. Also, the villages in which there were more than one non-contract hundekari there farmers have an alternative to growing CGP without 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.

Naryanan (2011) points out that 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. Hence, our results are limited to the sample contracting firm and for the short-duration high-value crops. As inclusiveness aspects in CFAs for perennial crops may be different.

Due to time and resource constraints, certain issues pertaining to adoption of CFAs could not be dealt in the present study. Following are the areas of research in the subject of contract farming, which should be on for better understanding of the inclusiveness aspects of the CFAs:

- a) There are handful of Indian studies viz. Narayanan (2011) and (Singh M. P., 2007) that have conducted village levels analysis, to find out what kind of villages get selected into CFAs, and which do not. It may be essential to know from policy point of view, to know whether only villages with good infrastructure are where CFAs are practised or even in backward regions.
- b) Is the churning in and out of CFAs temporary and permanent? Duration analysis of contract farming, shall help us to know how much time, it takes to adopt farmers to take up contracting.
- c) There is a scope for studying participation aspects within CFAs for perennial crops.

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