

## Leveraging Contract Farming for Improving Supply Chain Efficiency in India: Some Innovative and Successful Models

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### Abstract

*Most of the farm operators being small and marginal farmers in India, there were problems in getting quality raw materials for processing or fresh marketing, especially in perishable high value crops. The processing and marketing firms faced issues of high cost, lack of adequate availability, poor quality and timeliness. On the other hand, there were gluts in markets for such produce and farmers realised low or un-remunerative prices. After the opening up of the Indian economy and entry of many domestic and multinational players into agribusiness sector, contract farming which was restricted, largely, to seed production earlier, spread to perishable produce and has now become the dominant and growing mode of raw material production and procurement co-ordination among the processors and fresh produce marketers and exporters including that of organic produce.*

*This paper examines the nature and performance of such contract farming arrangements across crops (potato, mint and organic basmati paddy) and companies in different regions of India with primary evidence. It also examines the factors in the success of such models of vertical supply chain co-ordination and problems encountered by the contracting agencies. The paper concludes by outlining some important managerial and institutional lessons for organising supply chains in perishable produce by global and domestic agribusiness players.*

**Key Words:** Supply chains, contract farming, India, management, efficiency.

## **A. Introduction**

Contract Farming (CF) can be defined as a system for the production and supply of land based and allied produce by farmers/primary producers under advance contracts, the essence of such arrangements being a commitment to provide an agricultural commodity of a type, at a specified time, price, and in specified quantity to a known buyer. In fact, CF can be described as a halfway house between independent farm production and corporate/captive farming. Due to the efficiency (co-ordination and quality control in a vertical system) and equity (smallholder inclusion) benefits of this hybrid system, it has been promoted aggressively in the developing world by various agencies (Glover, 1987). It basically involves four things - pre-agreed price, quality, quantity or acreage (minimum/maximum) and time (Singh, 2002).

CF is known by different variants like centralised model which is company-farmer arrangement; outgrower scheme which is run by government/public sector/joint venture; nucleus-outgrower scheme involving both captive farming and CF by the contracting agency; multi-partite arrangement involving many types of agencies; intermediary model where middlemen are involved between the company and the farmer; and satellite farming referring to any of the above models (Eaton and Shepherd, 2001). In fact, CF varies depending on the nature and type of contracting agency, technology, nature of crop/produce, and the local and the national context.

The contracts could be of three types; (i) procurement contracts under which only sale and purchase conditions are specified; (ii) partial contracts wherein only some of the inputs are supplied by the contracting firm and produce is bought at pre-agreed prices; and (iii) total contracts under which the contracting firm supplies and manages all the inputs on the farm and the farmer becomes just a supplier of land and labour. The relevance and importance of each type varies from product to product and over time and these types are not mutually exclusive (Hill and Ingersent, 1987; Key and Runsten, 1999). Whereas the first type is generally referred to as marketing contract, the other two are types of production contract. But, there is a systematic link between product and factor markets under the contract arrangement as contracts require definite quality of produce and, therefore, specific inputs (Scott, 1984). Also, different types of production contracts allocate production and market risks between the producer and the processor in different ways. The price of the contracted produce can be growers' fixed price, residual (profit/loss) sharing by sponsor and grower, open market based price, spot market price, consignment based, two part split price, tournament price (fixed plus variable based on relative performance), base price plus quality based incentive price, or administered price.

For different reasons, both farmers and farm product processors/marketers may prefer contracts to complete vertical integration. A farmer may prefer a contract which can be terminated at reasonably short notice. Also, contracting gives access to additional sources of capital (credit), and a more certain price by shifting part of the risk of adverse price movement to the buyer (Hill and Ingersent, 1987). Farmers also get an access to new technology and inputs through contracts which otherwise may be outside their reach (Glover, 1987; Eaton and Shepherd, 2001). For a processor or distributor, contracts are more flexible in the face of market uncertainty, make smaller demands on scarce capital resources, and impose less of an additional burden of labour relations, ownership of land, and production activities, on management (Buch-Hansen and Marcussen, 1982). Also, food processors can minimise their overhead costs per unit of production by operating their plants at or

near fully capacity as contracting gives assured and stable raw material supplies from farms. Contracts also help improve product quality by directly introducing incentives and penalties as there are problems of adverse selection and moral hazard in any contractual arrangement resulting in underinvestment or shirking by any of the parties (Wolf et al, 2001).

At more macro economic level, contracting can help to remove market imperfections in produce, capital (credit), land, labor, information and insurance markets; facilitate better co-ordination of local production activities which often involve initial investment in processing, extension etc.; and can help in reducing transaction costs (Grosh, 1994; Key and Runsten, 1999). It has also been used in many situations as a policy step by the state to bring about crop diversification for improving farm incomes and employment (Benziger 1996; Singh, 2000). CF is also seen as a way to reduce costs of cultivation as it can provide access to better inputs and more efficient production methods. The increasing cost of cultivation was the reason for the emergence of CF in Japan and Spain in the 1950s (Asano-Tamanoi, 1988) and in the Indian Punjab in the early 1990s (Singh, 2000).

From an institutional economics perspective, the logic for CF could also come from the creation of positive externalities like employment, market development or infrastructure, if agribusiness firms create them better than the open market or the state (Key and Runsten, 1999). Some others recommend CF as the only way to make small scale farming competitive as the services provided by contracting agencies can not be provided by any other agencies (Eaton and Shepherd, 2001). CF also lowers transaction costs for the farmers as many of the transactions are internalised by the procuring firm (IFPRI, 2005). CF is also an alternative to corporate farming which may be costly, risky, and difficult to manage and still not viable (Payer, 1980). Even new IPR regime which encourages protection and exploitation of proprietary genetics is likely to accelerate contract farming practice (Wolf et al, 2001).

### **Status and Experience of CF in India**

In India, food supermarket chain growth including FDI in retail, international trade and quality issues like SPS, organic trade, fair trade, and ethical trade, promotion by the central and the state agencies, banking and input industry push for CF, farming crisis and reverse tenancy, and failure of traditional cooperatives, are likely help spread of CF across crops and regions as they provide new space to this arrangement in the context of withdrawal of state from agricultural space.

CF has various models/variants being practiced in India at present. There have been some studies of the CF system in India more recently. But, most of them look at the economics of the CF system in specific crops, compared with that of the non-contract situation and/or competing traditional crops of a given region, e.g. in gherkins (hybrid cucumber) in Andhra Pradesh (Haque, 2000; Dev and Rao, 2004), tomato in Punjab (Haque, 2000; Rang and Sidhu, 2000) and Haryana (Dileep et. al., 2002) and cotton in Tamilnadu (Agarwal et al, 2005). It is found that CF gave much higher (almost three times) gross returns compared with that from the traditional crops of wheat, paddy and potato in case of tomato (Rang and Sidhu, 2000), and in cotton (Agarwal et al, 2005) due to higher yield and assured price under CF. The studies of tomato CF in Punjab and Haryana (Haque, 2000; Dileep et. al., 2002), of cucumber in Andhra Pradesh (Haque, 2000) and cotton in Tamilnadu (Agarwal et al, 2005) also found the net returns from these crops under CF being much higher than those under non-CF situations though production cost in tomato was higher under CF (Dileep et. al, 2002). A more recent study across crops, companies, and locations in Punjab also confirms this (Kumar, 2006). In case of cotton in Tamilnadu, the contract growers had lower input cost, lower interest loans, faster payment for produce, and the crop insurance facility (Agarwal et al, 2005). The

studies in the states of Punjab and Haryana also reveal that contract growers faced many problems like undue quality cut on produce by firms, delayed deliveries at the factory, delayed payments, low price and pest attack on the crop (Rangi and Sidhu, 2000; Singh, 2002; Dileep et. al., 2002; and Satish, 2003). DSCL run input supply and CF program (Haryali Kisan Bazaar) for potato in Haryana also showed higher net returns for growers compared with non-growers due to higher yields and higher prices, though the cost of cultivation was also higher (17-24%) (Tripathi et al, 2005).

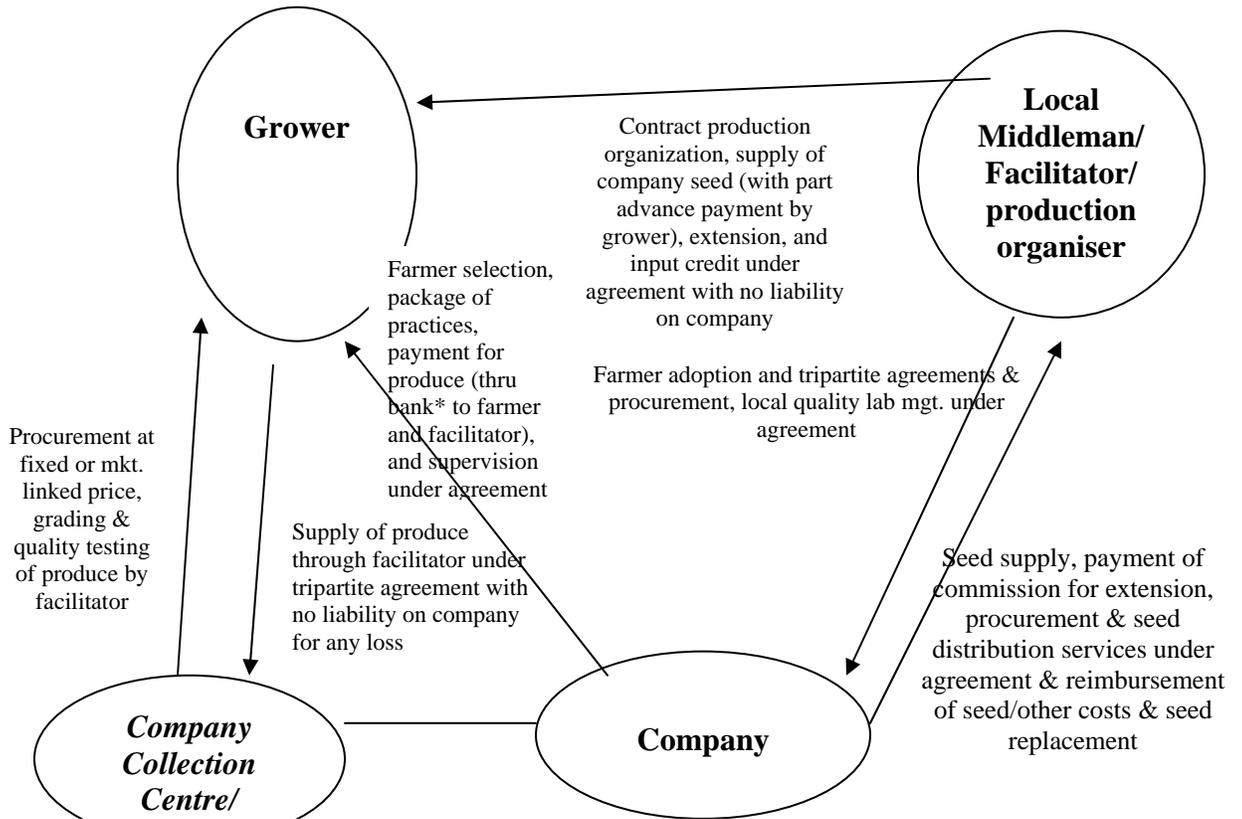
Many CF projects fail due to either poor design of the project or default by any of the contracting parties. In CF, both companies and growers try to improve their own positions, as a negotiation, which change over time (Vellema, 2004). Further, contract design is a complex task given that there is always a problem of incomplete contracts due to bounded rationality of the contracting parties (Lorenz, 1999; Tirole, 1999). It is the adverse selection and moral hazard problems in contracting which pose challenges and need to be managed in order to make the farmer deliver the contracted terms and conditions. This paper examines three cases of sustained successful contracting in three crops by three different companies and tries to examine the factors which could have led to such success. The next section discusses the three cases and the last section concludes the paper with lessons for successful contract farming in the nature of partnership between growers and the sponsoring company.

## **B. Case Studies of Successful CF**

### **1. FLI (Pepsi) Potato CF in Maharashtra and Karnataka**

Given the small land holdings of the farmers in these states, the company decided to work through an intermediary called Hundekari in Maharashtra who manages the relations with small contract growers, who own 1-2 hectares and grow 1-2 acres of potato crop under contracts, on behalf of the company, right from registering farmers, input supply, credit and buy back arrangements. On the other hand, in Karnataka, the company has organised informal associations of growers who manage the local operations like seed distribution, supply schedules for delivery of produce and so on among themselves, for the company. The farmers generally own about 2-4 hectares of land and grow 2-4 acres under contract. There are a total of 11000 growers of the company in Maharashtra and 3500 in Karnataka which deliver to the Ranjan Gaon plant of the company (table 1). Not only has the company been able to send right quality signals by buying only quality price under two price options – fixed contract and open market linked prices, but also has managed production risk of the growers by bringing in insurance, and low cost input supply and credit into contracting with formal contracts and tie ups (fig. 1). The market linked price is 4-14 paise per Kg. lower, depending on the level of price in the market; higher the market price which can vary from a minimum of Rs. 3/kg. to Rs. 10/kg., higher the gap between market price and purchase price offered by the company. Reference rate for chip potato purchase is the average of the preceding three days' block of published newspaper rates for potato at Gultekadi market yard, Pune and is inclusive of transportation cost upto factory. Further, there are quality incentives in terms of solid % and total potato defects (TPOD) (table 2). This CF system of the company is different from its individual contract grower system being used in Punjab where farmers are larger land holders and even lease large chunks of land for contract farming.

Fig. 1: Tri-partite (Intermediary) model of contract farming by FLI (Pepsi) in Maharashtra



\* Bank finances contract production @ Rs. 10,000/acre (NABARD norm is Rs. 13,000/acre for the given crop) at 7.5% rate of interest. It receives the money from the company for payment to the farmer for his produce, from which it pays the facilitator (as per authorization given by the grower), deducts its own dues, and transfers the remaining amount in the farmer's bank account

**Table 1: A Comparative Picture of the Contracts of Agrocel, FLI, and AM Todd**

Company> Parameter	Agrocel*	FLI(Pepsi)**	AM Todd*
Area ( states)	Gujarat	Maharashtra and Karnataka	Punjab
No. of farmers	190	14500	2000
Contracted Acreage	814	28,000	10,000
Average size of holding (acres)	31.94	5 acres	40 acres
Average area under contract per grower	9 acres	2 acres	11 acres
Nature of contract	Acreage and 5 year organic commitment	Acreage	Acreage
Pricing formula	Market price of conventional basmati plus 25% premium; same for	Fixed price of Rs. 5 per Kg. for September, October harvest and Rs. 5.50/kg. for the November 03 harvest of multiplied chip grade	Fixed price of oil per Kg. – variety wise

	in-conversion produce but 15% premium only after fully certified organic	potatoes delivered by the GROWER to FLI plus an incentive based on the solids and TPOD (table 1) OR Market linked price plus an incentive based on the solids and TPOD %.	
Nature of Organisation of growers	Contract growers as a group (bi-partite)	Contract growers thru Hundekari in Maharashtra and through informal farmer associations in Karnataka (bi-and tri-partite agreements). A commission of -- paisa/kg. on the total accepted quantity of potatoes procured by FLI from the specified farmers. Hundekari to manage local quality labs for cook test & solids measurement and to provide inputs given by FLI and loans from his account to growers for purchase of inputs. For this, he gets a service charge of -- paisa/Kg. of seed supplied to specified farmers, and another service charge of -- paisa/kg. on the total accepted quantity of potatoes procured by FLI from specified farmers for providing extension support including lab operation and FLI board maintenance. In Karnataka, an elected farmer representative manages most of these functions.	Direct contracts (bi-partite)
Input Supply	Partly	Through Hundekari but FLI shall replace the rejected seed at the time of delivery in case the seed is found to be of inferior grade or of lower germination. FLI shall replace the seeds in case the germination fails due to virus; 50% advance payment for seed, 50% on delivery of produce	Seedlings @Rs. 1000/acre, farmer can also use his own root stock, recovery at the time of delivery of produce
Technical advice and extension	Free of cost	Free of cost	Free of cost; even oil extraction
Quality	Certified produce only	Under size/over size potatoes to be paid @ 30% of FLI rate. Rotten/soil/green mechanical damage potato to be returned the	No quality issue, only oil price

		same day.	
Delivery point	Collection centre	Factory	Extraction plant
Payment	On the spot or within a week	Within 15 days	Within 21 days
Seeds/roots and produce	Not to be sold w/o company permission	Not to be sold to anyone w/o company permission	Not to be sold w/o co. permission
Major markets	export (fair trade, sold as non-organic)	Domestic and export	Domestic and Export
Crop failure	No liability of co.	No liability of co.	No liability of co.

Note: \*- based on primary evidence, contract agreements, and company interviews

\*\* - based on contract agreement and company observations

## 2. AM Todd Mint CF

AM Todd which started with just 69 acres contracting in 1996 for mint crop, had 10,000 acres in 2004 working with more than 2000 growers. It organizes contract production of peppermint, spearmint and even buys Koshi variety oil from contract and non-contract growers. It has even started contract farming in UP recently (table1). The company has helped and advised local growers to set up mint oil extraction units besides the three which are owned by the company in Punjab. There are 15 such units which are tied to the company for extraction and sale of mint oil. The mint oil extraction at the company plants is free of cost. Though the crop is a third crop for most of the farmers in Punjab and therefore quite profitable, the company also advises farmers for intercropping of mint with other crops especially wheat for better economics of the crop (Singh, 2005c). The successful and smooth functioning of the CF system in mint by AM Todd in the state (Punjab) with no involvement of the state, largely due to the nature of the crop, clear terms of the contract, assured returns to growers by competitive prices and the commitment of the company, corroborates the point that CF is best left to the company and the growers (Singh, 2005c). This was also the case in Thailand where the state facilitated it from outside with credit and extension (Singh, 2005d).

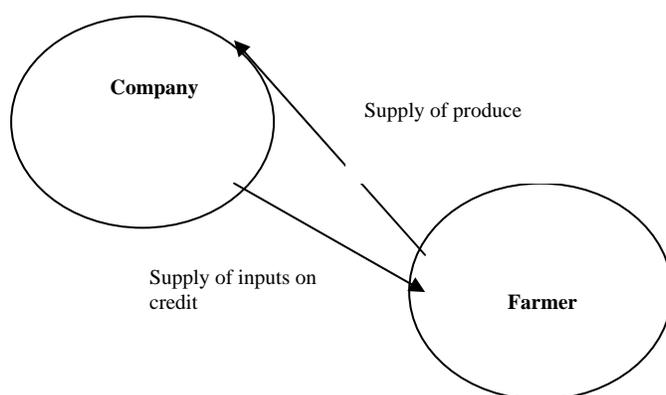


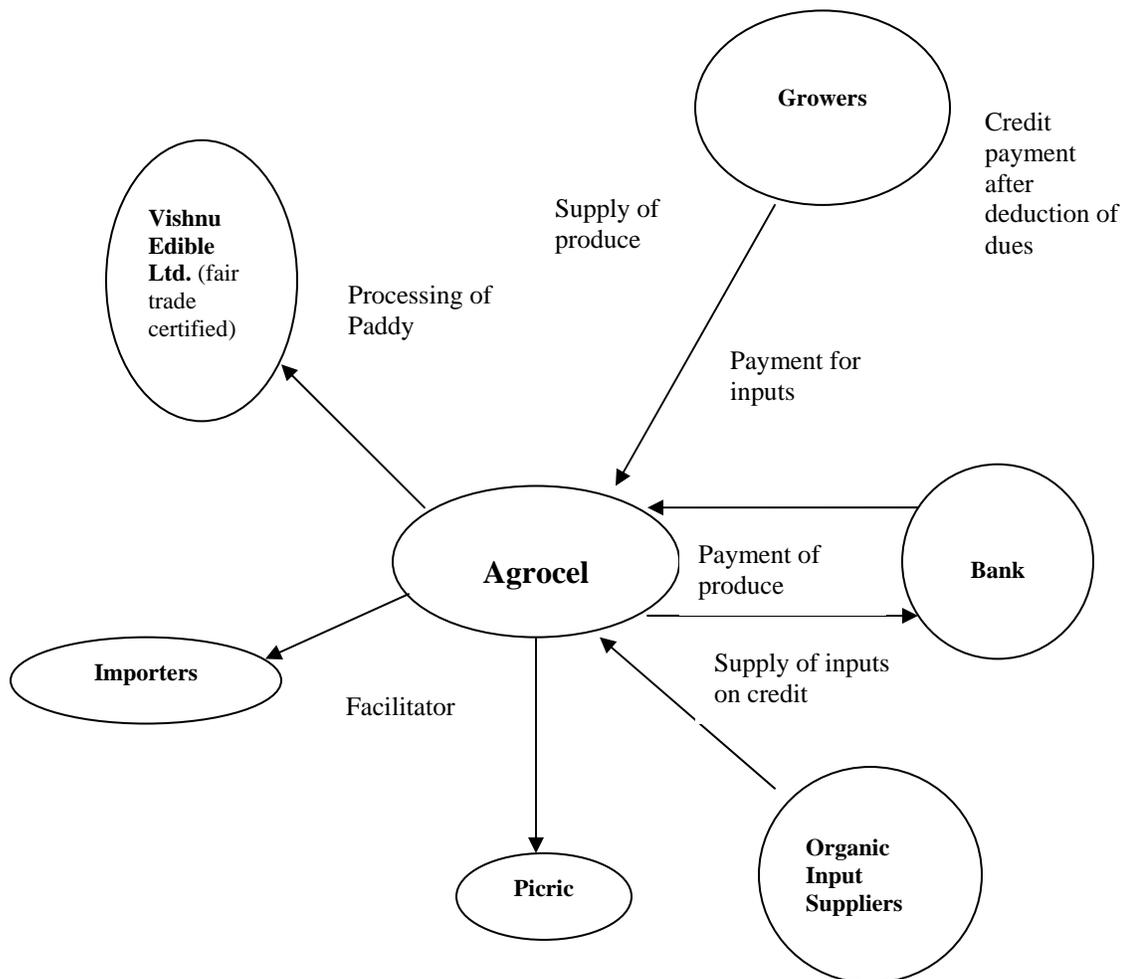
Fig.2: Bi-partite CF model

### 3. Agrocel Organic Basmati Paddy CF

The Kaithal operations in organic Basmati by Agrocel Industries started in 1998 and certified organic Basmati production had begun with 35 farmers and 277 acres in 2001. Today, there are a total of 260 farmers including 70 farmers with 600 acres for Picric Ltd., another rice exporting company based in Delhi with a plant in Sonapat for which Agrocel co-ordinates CF for a service fee. The company has been working for Picric since 2000. Company has been in Kaithal since 1995 in ICM promotion and input sales. Of the total, 160 are certified organic and others in-conversion farmers. These farmers are spread over a total of 30 villages with 27 in Kaithal and 3 in Kurukshetra district and Picric farmers in 15 of these Kaithal villages, with all of the villages being in 25 kms. from Kaithal. Besides, there are 20 farmers in U.P. and Uttaranchal also which are looked after by the Kaithal project. Agrocel charges Rs. 500/- per acre from Picric as service charge for co-ordinating contract organic basmati production with farmers (Fig.3). The Agrocel direct contract farmers number 190 with 814 acres of which only 212 acres are under conversion with new and old farmers. Most of the farmers have put only a part (28.5%) of their farmland under organic which is certified and rest of the acres is being put to organic in stages. The land holding of the organic growers ranges from 5 to 60 acres with average being 32 acres. The acreage under organic crop varies from 2 to 30 acres with average being 9 acres.

The contract with individual growers, some of whom are members of the fair trade group called Agrocel Pure and Fair Rice Growers' Association (registered under the Societies Act) across 12 villages with 70 members, are written and for five years after certification. Agrocel supplies some of the organic inputs which are SKAL certified including seed supplied by PICRIC from their contract seed production programme, and procures the produce from the farmers (Fig. 3). All the inputs are on credit and the recoveries are made from payment for the produce. The certification cost was borne by Agrocel and Picric for their respective farmers. Of the 34 certified organic farmers surveyed, 5.85% were in the 3<sup>rd</sup> year, 18% in 4<sup>th</sup> year, 38% in 5<sup>th</sup> year, 21% in 6<sup>th</sup> year and 18% in 7<sup>th</sup> year of the contract. More of the very large and large growers were into long relationships with the company as they were the first ones to align with the company. The ICS followed is documented by the staff entirely with three supervisors for 16 villages and 260 farmers. Agrocel uses SGS certification for product quality purposes and SKAL for organic process certification. Due to certification problems, some farmers have been also excluded from the groups. Only bio-compost is sourced by farmers on their own from a local cooperative society which promotes vermiculture and also supplies cow urine and herbal abstracts for bio-pesticide applications, in unbranded bottles. But organic weedicides are not available which causes a major problem in organic production. In fact, small farmers make their own inputs while large farmers buy them from the market. There is no subsidy on inputs by the company. The company has made arrangements with ICICI bank since last year under which a loan of Rs.10,000/- per acre in cash and kind is given under the guarantee of the company.

**Fig.3: Agrocel Supply Chain for Organic Basmati Paddy and Rice**



All of the farmers described land improvement as the major reason for organic farming. About 70% valued price premium for organic produce, 29.4% low input use, 53% own consumption, , 17.6% regular monitoring, 11.8% organic husk, 8.8% assured market 14.7% self esteem and 38.2% lower pest attack. Only about 1/4<sup>th</sup> of the growers reported some instance of crop failure. About 85% of the farmers entered into the contract because of premium considerations. 32.3% did so for the sake of interest free inputs on credit. One time payment ( 20.6%), lower input cost (41.2%), regular monitoring (32.3%) and improved land fertility (14.7%) were the other major reasons for contract farming (Singh, 2006). Another study of 60 organic paddy growers in Kaithal and Sonapat districts also found that the contract price was higher than the local market price of basmati paddy with share of producer in consumer rupee being higher in this organic channel as compared to that in the conventional paddy channel though the marketing margin was same in both the channels. Though the farmers reported problems like difficulty in meeting quality requirements, lack of independent testing and certification facilities in the producing area, lack of government regulation on quality of inputs and their prices, poor service provision by the contracting firms, lower prices, lack of market information, and discount in the name of quality, they agreed that contract organic production increased income and reduced marketing risk (Chikkamath et al, 2005). 85.3% of the

farmers wanted to continue to work under contract, major reasons being land improvement, premium, and better quality of produce. All the farmers were of the view that increased incomes and better soil management was ensured under contract organic farming. Further, 23.5% viewed the better farming skills as the major benefit of contract farming. The reported problems included delayed payment (32.3%), lower price (32.3%), and only single crop contract (17.6%). Other factors that could contribute to improving effectiveness of the contract included timely procurement, higher premium, soil and water testing, crop insurance, improved inputs, timely payments, prior price information, more crops coverage, direct purchase from farm, collective payment of bonus and produce price, better extension, and transparency in grading system (Singh, 2006).

### **C. Conclusions**

The experience of CF across the globe suggests that it is not the contract per se which is harmful as a system but how it is practised in a given context. If contracts are well designed and implemented, they can certainly lead to a betterment of all the parties involved, especially farmers. But, there can not be a single blue print or CF model for all situations. Even for individual farmers, it is not contract per se but the relationship it represents which is crucial as the divergence between the two may prove crucial in determining the development of CF as an institution (White, 1997). Further, it is the context of the contract which can make a whole lot of difference as there are many actors and factors in the environment which influence the working and outcome of contracts and lead to a culture of contracting which is location and community specific. The way farmers perceive CF, i.e. define their relationship with the companies, differs in each cultural context (Asano-Tamanoi, 1988; White, 1997; Ornberg, 2003).

Major conditions for successful interlocking between agribusiness firms and small producers include increased competition for procurement instead of monopsony, guaranteed market for farmer produce, effective repayment mechanism, market information for farmers to effectively bargain with companies, large volumes of transactions through groups of farmers, for lowering transaction costs, co-operation among genuine agribusiness firms in the area, and no alternative source of raw material for firms (Kirsten and Sartorius, 2002). Further, for success of company-farmer partnership schemes, it is important that the company is able to successfully market its products so that farmers do not suffer from lack of market (Baumann, 2000; Haque, 2000). Building of relationships of trust with farmers through company reputation rather than marketing gimmicks is crucial. This requires mutual respect, fair and transparent negotiation process, realistic assessment of benefits, long term commitment, equitable sharing of risk, and sound business plans (Mayers and Vermeulen, 2002). Innovative pricing mechanisms like bonus at the end of the processing cycle, shares in company equity, dividends, producer's fixed price, and quality based pricing, which reward performance can help contract performance. What is also required is marketing extension in terms of better product planning at the farmer level, provision of market information, securing/accessing markets for farmers, provision of alternative markets and market orientation in terms of improved marketing practices at the farmer level (Patnaik, 2003).

Co-ordination, Motivation, and Transaction costs are three pillars of a contract arrangement. Therefore, it is important to consider contract design as a multi-criterion decision problem. Some basic rules of contract design include (i) co-ordinating to minimize production costs which means using price signals or instructions or both, (ii) balancing decentralization and centralisation in

farm decisions which impacts problems like moral hazard and hold up, (iii) minimizing or sharing risk and uncertainty, (iv) reducing the costs of pre- and post contractual opportunism (adverse selection and moral hazard) by various mechanism of allocating contracts and monitoring them like other party bears part of the cost, social pressure, incentive structure, or group contract/incentives (moral hazard) and by rationing i.e. offer a contract suited only for some 'good' farmers; 'menu of contracts' for screening farmers so that they reveal their true type by choosing certain contracts; group contracts, and individual risk rating/information collection before contract is signed (adverse selection), (v) encouraging group or co-operative action among producers to lower costs and ensure better compliance, (vi) motivating long term contracts to reduce hold up problem, (vii) balancing pros and cons of renegotiation of contracts over time, (viii) reducing direct costs of contracting, and (ix) using transparent contracts (Bogetoft and Olesen, 2002).

Finally, there is no need to look for permanence in CF arrangements though short or medium term sustainability is desirable for availing of its effects on the growers and the local economy. But, as market conditions for a crop/commodity change, CF can wither away as market becomes efficient. CF as a vertical co-ordination mechanism is only a response to a situation of market failure and depends on commodity/crop/sector dynamics which are liable to change anytime, especially in globalised and liberalised world. But, there are many indications that CF can continue even in the presence of competitive markets as has been the case in the developed countries or even Thailand (Ornberg, 2003). Finally, CF is only an instrument/means to agricultural and rural development, not an end in itself.

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