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SUPPLY CHAIN FOR EXPORTS OF DEHYDRATED ONIONS

Case study of Jain Irrigation
Systems Limited in India

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SUMMARY

This study presents the supply chain developed by the Jain Irrigation Systems Limited (JISL) in India for dehydrated onion exports. The company has contracted many small producers who are supported technically by the company's extension staff to produce onions to the stringent quality requirements that allow the raw material to be dehydrated optimally. A minimum guaranteed price policy gives farmers a guaranteed income, thus allowing them to provide collateral for bank loans. The company also provides extension and other support services to its farmers involved in this supply chain. The study shows how the services provided by JISL to its contract farmers contribute to mitigating the various risks faced by onion growers. This has been an incentive for these small landholders to join the supply chain. This case study thus illustrates a successful model of linkages between farmers and demanding export markets through a private company that has created exactly the right incentives to attract producers by contributing to lowering the various risks they face. The study of these incentives and how they impact on farmers' decisions to join the chain could lead other companies interested in contracting smallholders to create their own incentive packages to work with small suppliers.

1. INTRODUCTION

Horticulture produce in India is largely marketed through traditional channels. A typical chain for fresh fruits and vegetables consists of several players as shown in Figure 1. Typically, in the traditional marketing chain there is no reward for, and hence no attention to, quality issues. In recent years, with high private sector investment in processing, exports and retailing of horticultural produce, there is increasing emphasis on developing supply chains for quality produce. Quality of produce is a critical aspect to meet the requirements for processing and export markets. Thus, companies have to be involved with farmers to ensure quality and productivity of produce.

Figure 1: Traditional horticultural produce marketing chain in India

Farmer → Consolidator → Wholesaler → Semi-wholesaler → Retailer

The objective of this study is to compare a group of farmers linked with a company or organization producing high quality produce, with a group of farmers operating through the traditional market, where both groups are producing the same agricultural commodity. Key aspects of the comparison are: quality of output, productivity levels, quality of inputs used, availability of inputs, price of output, and price risk. This paper describes the supply chain for dehydrated onion developed by Jain Irrigation Systems Limited (JISL) in India. JISL is the largest producer and exporter of dehydrated onion in Asia, and the third largest in the world. Their dehydrated onion operation is located in Jalgaon district in the State of Maharashtra. The data for this study was collected by interacting with the company officials involved in developing the supply chain for dehydrated onion exports and discussions with farmers at the procurement site in Jalgaon in the State of Maharashtra.

The rest of the paper is organized as follows. The next section gives an overview of the onion sector in India including production, consumption and exports. Before conducting a detailed supply chain analysis, a background of JISL is presented in Section 3. Section 4 describes in detail the JISL's supply chain for dehydrated onion with a focus on food safety and quality issues. A comparative analysis of Jain contract farmers and farmers selling to the traditional market is presented in section 5. Section 6 concludes with insights into the company's perspective on their dehydrated onion supply chain and lessons learned from this experience.

2. OVERVIEW OF THE ONION SECTOR IN INDIA

Onion is an important vegetable crop grown in India. In terms of area, India ranks first in the world with over 480 thousand hectares accounting for around 21 percent of the world area planted under onion. Globally, the country occupies the second position after China in onion production with a production share of around 14 percent. Productivity, however, at around 13 tonne/ha, is much lower than the world average of 17.3 tonne/ha (see Table 1).

Table 1: Onion production in India

State	Area (‘000 ha)	Production (‘000 tonne)	Yield (tonne/ha)
Andhra Pradesh	22.05	197	8.93
Bihar	24.05	265.65	11.05
Gujarat	49.23	984.75	20
Karnataka	41.64	306.6	7.36
Madhya Pradesh	25.5	303.8	11.91
Maharashtra	84.48	1 661	19.66
Orissa	55.5	473	8.52
Rajasthan	28.35	380.6	13.43
Tamil Nadu	24	251.1	10.46
Uttar Pradesh	53.65	562	10.48
Haryana	13.05	257	19.69
Other	33.1	391.75	11.84
Total	454.6	6 034.25	13.34

Source: National Horticulture Board (www.nhb.gov.in)

Onion is produced in several states in India, with Maharashtra being the leading producer accounting for about one-fourth of the country’s onion production. India largely produces red onions used as fresh produce in the domestic market. White onions used for dehydration are grown on a commercial scale only in the states of Maharashtra and Gujarat, and only in a few districts. Red onions are not suitable for dehydration due to low solid content, low pungency levels and high content in reduced sugars. Hence JISL has to be involved in enhancing production of white onions for processing.

Onions grown in India are very much in demand in the Gulf countries, Singapore, Malaysia, Sri Lanka and Bangladesh because of its strong pungency. Onion exports have increased from 0.36 million tonne in 1995–96 to 0.7 million tonne in 2005–06. Being the leading producer, Maharashtra accounts for over 75 percent of the total onion exports from the country. The major markets for Indian onions are Dubai, Kuwait, Saudi Arabia, West Asia, Malaysia, Singapore, the Seychelles and Bangladesh.

3. OVERVIEW OF JAIN IRRIGATION SYSTEMS LIMITED ACTIVITIES

Jain Irrigation Systems Limited (JISL) is a multinational organization based in Jalgaon District in the State of Maharashtra in India. Information about the company's activities is available from their website (www.jains.com). JISL manufactures a number of products, including drip and sprinkler irrigation systems and components, PVC, Polyethylene (PE) piping systems, plastic sheeting, greenhouses, biofertilizers, solar water heating systems, and photovoltaic appliances. JISL also processes dehydrated, concentrated, and frozen fruits and vegetables. An overview of the company activity is shown in Box 1.

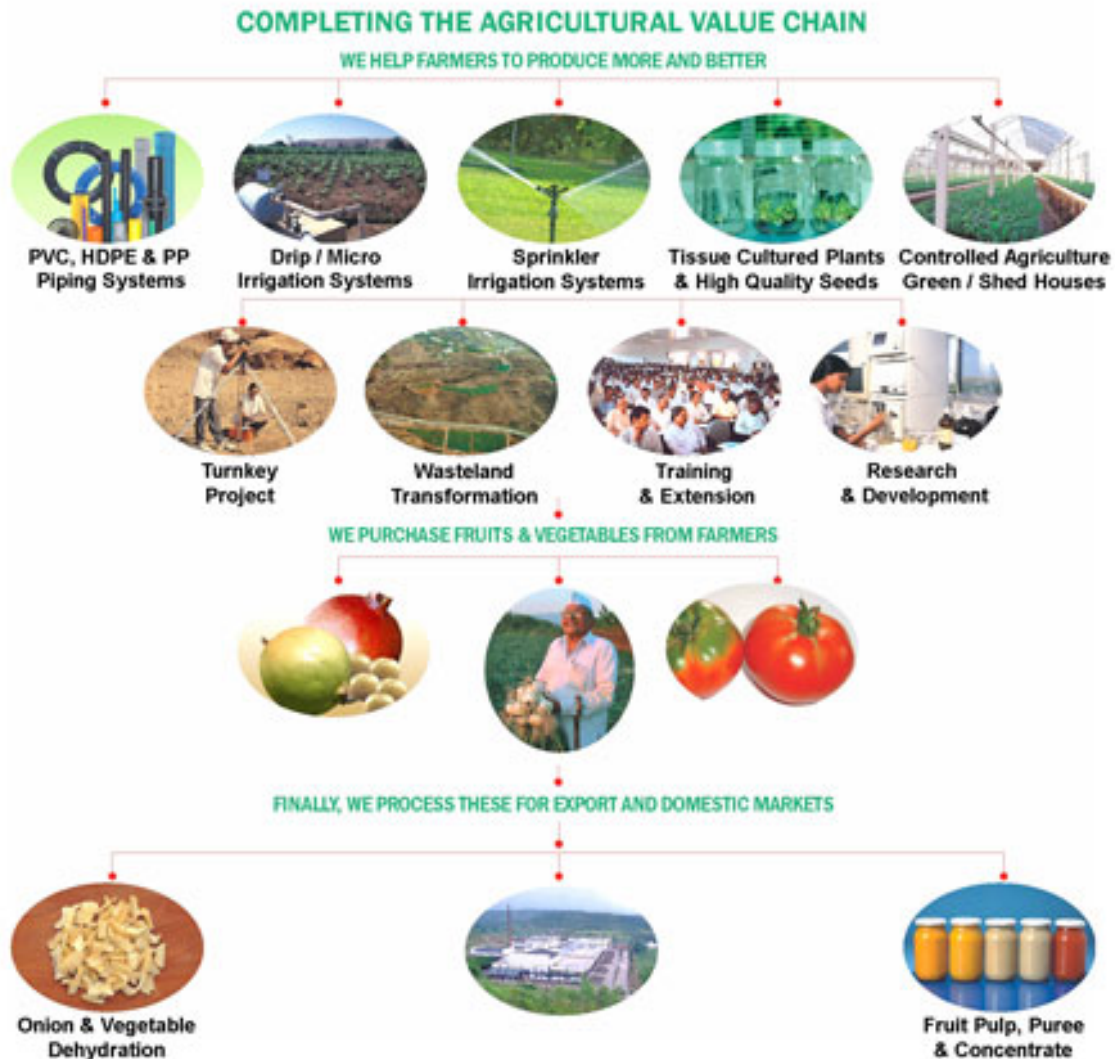
Box 1: Overview of JISL company activities

- i) Research and development thrust areas**
 - High-technology agricultural inputs
 - Processed products
 - Irrigation and plastic piping
 - Plastic sheets
- ii) Processed fruits and vegetables**
- iii) Education, training and extension**
- iv) Turnkey services and consultancy**
- v) Tissue culture, hybrid and grafted plants**
- vi) Greenhouses, polyethylene house and shade houses**
- vii) Drip irrigation**
- viii) Sprinkler irrigation**
- ix) Solar products**
- x) Bio-gas**

Based on these activities, it is evident that the company involves itself in all the aspects of the value chain by being involved in enhancing production, productivity and marketing. Production and productivity are enhanced by providing quality inputs, irrigation systems, extension and training support. The value chain is completed by being involved in the purchase of fresh fruits and vegetables for processing (see Figure 2).

The company has been a pioneer of micro-irrigation in India. The pioneering effort of the company in the area of agriculture and its commitment to quality is evident by the fact that the company has received more than 140 national and international prestigious awards and accolades during the period 1978–2007.

Figure 2: JISL completing the agricultural value chain



Source: <http://www.jains.com>

3.1 JISL dehydrated onion supply chain: focus on quality and food safety issues

Size of dehydrated onion operation

JISL sells its dehydrated onions under the brand name “Farm Fresh”. They have set up two fully export-oriented units, one in Jalgaon with a capacity of 300 tonnes per day and the other one at Baroda with a capacity of 120 tonnes per day. All of the dehydrated products are exported. Jain’s onion dehydration unit is the largest in Asia and the third largest in the world. In 2006–2007, 57 300 tonnes of white onions in both dry and rainy seasons were dehydrated with a total dehydrated onion production of 8 500 tonnes.

JISL sources its onions from contract farmers. Initial interactions with farmers for contract growing started in 2000, while the actual procurement from contract farmers started in 2001. The company is currently working with 1 766 farmers on a total of about 1 050 hectares, which is about 0.6 ha per farmer on average. The total quantity of local white onions procured from

farmers in *Kharif*¹ 2006 and *Rabi*² 2006–2007 was 34 000 tonnes, and the high solid onions procured from farmers during *Rabi* 2006–2007 was 23 300 tonnes.

Table 2: JISL contract farming for onion

Year	Talukas	No. of villages	No. of farmers	Area (hectares)
2001–02	10	105	441	100
2002–03	20	105	306	206
2003–04	19	128	1 023	612
2004–05	22	166	1 293	1 144
2005–06	22	198	1 241	1 190
2006–07	24	323	1 766	1 077

Note: *Taluka* is a subdivision of a district

Source: JISL

The average yield under micro irrigation is 30–35 tonnes per hectare compared with the conventional system which gives only an average of 15–17 tonnes per hectare and at the most 20 tonnes per hectare. Recent studies have shown that use of drip in combination with micro-sprinklers have also resulted in very good yields.

Buyer and processing requirements

The quality parameters set in place through the chain are driven by the buyer requirements and specific requirements for processing. Dehydrated onions are used in soup dry mixes, pizza toppings, sauces and many other food preparations. The United States of America is the biggest market for Farm Fresh dehydrated onions, followed by Europe and South America. The demand is for pure white onions with high pungency. Since all the produce is exported, the food safety requirements of the importing countries have to be complied with. Finally, high solid content is a requirement for economizing processing costs. Low solid content in onions significantly increases the processing costs and results in low recovery or yield of the dehydrated product.

The requirements for exports and processing are met by ensuring quality at every stage, research and development, farming, processing, packaging and storing (see Box 2 for the specific quality tests undertaken to ensure quality). Special varieties of onion and vegetable are grown under contract in the vicinity of the dehydration plants. Cultivation and harvesting is supervised by the company's agronomists, who also provide agronomical guidance to the contract growers. Raw onions and vegetables are harvested carefully and transported to the processing plants for cleaning, grading and sorting. Selected material is taken to the dehydration plant and is subjected

¹ *Kharif* is the monsoon crop planted in July–August and harvested in October–November

² *Rabi* is the winter crop planted in October–November and harvested in December–January

to washing, peeling, inspection, cutting, and coring. The cut pieces are fed to the continuous belt dryers. Dehydrated flakes are milled in a modern custom-built mill. During milling, the products undergo metal detection and colour sorting at the last stage and are then packed in airtight boxes. These are then stored at low temperature and humidity. Finished products are stored in warehouses. Finally, elaborate marking, labelling and recording systems have been evolved to ensure complete traceability through the chain, which ensures the safety of the produce till the produce reaches the consumer. A detailed exposition of the activities at every level in the chain is presented here.

Research and development thrust areas

As mentioned earlier, onions grown for table purposes in India are mostly of the red variety. The company undertakes research activities for evolving hybrid high total-soluble-solids onion varieties suitable for dehydration. Currently contract farming is done using the variety JV12. Furthermore, a specific package of practices is developed for standardization of farm agronomic practices for higher resource productivity. The package of practices describes in detail the fertilizer requirements, spraying schedule etc.

Box 2: Quality specifications

Quality specifications

- “Farm Fresh” is a registered trademark of Jain for marking its dehydrated onion products worldwide. The processing stringently follows Good Manufacturing Practices (GMP), Quality Management Systems (QMS), Quality Assurance (QA), Statistical Process Control (SPC), Food Safety, Strict Sanitation & Hygiene, and similar modern practices
- The dehydration plant is certified for ISO 9001-2000 and HACCP by RWTUV, Germany.
- The plant is also certified for ISO 22000-FSMS and BRC.
- The plant is also approved for Kosher and meets ADOGA and other international standards.

Farm production

Contract farmers working with the company have to adopt the specified package of practices. JISL has employed agricultural graduates, who work as *gram sevaks* (village workers or extension agents) to monitor the production with the farmers in their contract area. One *gram sevak* manages about 22–26 ha. The land under contract is approximately 1 076 ha, thus, there are around 50 *gram sevaks* currently employed by the company. They regularly monitor the fields at the time of planting, spraying, harvesting etc. If there is expectation of an outbreak of any disease or pest, they inform the farmers about timely spraying. Any major problems are attended in priority with input from the company researchers if necessary. Specific details of white onion production are presented in the company’s manual entitled *Improved cultivation of white dehydrated onion* (Jains, no date).

Harvesting and packaging

When the onion bulb matures, the green tops weaken just above the bulb and fall over; this process is known as neckfall. When neckfall begins, irrigation is stopped. When more than 50 percent of the tops are down, the bulbs are harvested along with the leaves by hand pulling from

beds. The harvested plants are allowed to cure in the field for about 3–4 days, after which the roots and tops are clipped and filled in bags of 35–40 kg capacity. Curing is the drying of neck, roots and outer scale tissues, which prevents disease infection. Field curing begins when bulbs mature. Field curing is accelerated by stopping irrigation, cutting roots, and clipping the tops. After 3–4 days of curing, the roots and tops are clipped and the produce is collected and brought to the processing centre. The company provides bags to the farmers so that the produce can be brought to the processing centre with minimum damage.

Post-harvest management

In the dehydration plant, grading and sorting is undertaken to separate the onion bulbs that are damaged or do not meet the requirements. Health of bulbs and size are the two important criteria for processing; bulbs smaller than 35 mm are rejected.

Storage

Critical factors in successful storage include variety, methods of culture, harvest, field curing, temperature and humidity control, storage and sprout inhibition. Cool, dry and well circulated air keeps onion bulbs in good condition for many months. Onions can be stored for nearly 10–12 months in cold stores by maintaining proper temperature and humidity.

Processing centre

JISL has commissioned its onion dehydration plant 10 years back, a 100-percent export-oriented unit. The raw materials undergo quality inspection, careful sorting and dehydration ensuring maximum retention of flavour, aroma, colour and taste. Dehydrated flakes are then carefully milled into different fractions at its state-of-the-art milling facility ensuring strictest sanitation, food safety and hygienic conditions. During milling, the products undergo metal detection, colour sorting at the last stage and are then packed in air-tight boxes. These are then stored under lower temperature and humidity and are supplied to customers throughout the world. Elaborate marking, labelling and recording systems have been evolved to ensure complete traceability. Jain's dehydration facility is the most modern and integrated facility in the world and has been accredited with quality certificates which have already been detailed in Box 2.

3.2 Comparing Jain contract farmers with farmers selling to traditional markets

Availability of quality inputs

Availability of inputs such as fertilizers and pesticides is not an issue with the farmers in that region. Onion seeds are provided by the company at a very subsidized rate. This planting material is of the specific variety of white onion (JV12) used for processing. An important feature of the planting material provided by the company is the high germination rate about 80–85 percent.

Availability of production technology or equipments

Jain Irrigation has a prescribed set of practices for its contract farmers, specifying the fertilizer requirements and spraying time. Also, they have educated farmers about cropping patterns. Earlier farmers in the region were largely cotton growers. After working with the company they have shifted to rotation with legumes. Two key advantages from growing legumes is nitrogen fixation which helps enhance soil fertility. Also, the legume cycle is shorter than that of cotton and more appropriate for planting onions. The farmers feel that overall, they have benefited from the legume–onion rotation. Cotton is a high-value crop but the overall benefits of soil fertility and income are higher in legume–onion crop rotation. The productivity for the farmers working with

JISL was between 25 tonnes to 35 tonnes per hectare (average productivity 30 tonnes per hectare) whereas the average productivity in the case of traditional production is around 12–17 tonnes/ha.

An important aspect of technology is that the farmers working with JISL are using drip irrigation. Use of microirrigation technology enables higher productivity by ensuring adequate availability of water. In the long run the farmers are using much less water than the traditional flood irrigation approach, which is better for the environment and ensures lower cost and higher productivity for the farmer. If the farmers cannot pay for irrigation up front, the company either arranges a loan for them, or provides drip irrigation on credit, for which the cost is deducted from the sales of onions. Currently, there are a few contract farmers with the company who do not have drip irrigation. However, from the coming cropping year, the company will make it necessary that all farmers working with them have drip irrigation.

Margins

Detailed information regarding production costs and value of output is presented in Table 3. Based on this, the margins for both groups are calculated. The gross margin for the farmers working with JISL is much higher than the margins for farmers selling to the traditional market.

Table 3: Gross margin for JISL contract farmers and farmers selling to traditional markets. Costs in Indian rupees per hectare

The variable cost of production for farmers working with JISL is INR43 539 per hectare, whereas the same is INR29 018 per hectare for the farmers selling to the traditional market. The main difference is due to the higher costs for the irrigation system and associated water costs incurred by JISL farmers. There is however, a significant difference in the productivity levels of both groups.

Parameters	JISL contract farmers			Farmers selling to traditional markets		
(A) Labour	No.	Cost (INR.)		No.	Cost (INR)	
Sowing	12	480 (40/day)		12	480 (40/day)	
Transplanting	99	3 954		37	1 483	
Weeding	148	5 930		148	5 930	
Harvesting	99	3 954		99	3 953	
Total	358	14 318		296	11 846	
(B) Input	QTY	Unit Cost	Tot. Cost	QTY	Unit Cost	Tot. Cost
Land preparation			3 954		3 954	3 954
Seed	7	800	5 600	7	300	2 100
Fertilizers (NPK)	60:50:80		6 177	Random		3 706
Pesticide			3 706			3 706
Irrigation water (including system)			9 884			3 706
Total			29 321			17 172
Cost of production (A + B) (INR)	43 639			29 018		
Average yield (tonnes)	30 (under drip only)			17		
Variation of farmgate price (INR/kg)	3 to 7			2 to 7		
Value of production (INR)	90 000 (at minimum guaranteed price) to 210 000			34 000 to 119 000		
Type of marketing relationship	Contract			Spot		
Margin (INR)	46 361 to 166 361			4 982 to 89 982		

While the average productivity of the farmers selling to the traditional market is approximately 17 tonnes per hectare, it is almost twice at 30 tonnes per hectare for the contract farmers with irrigation. As mentioned above, most of the contract farmers have irrigation and the company is going to make it mandatory for farmers working with them to implement irrigation. High productivity is attributed to superior quality planting material, timely input advice and high-technology production processes provided by the company's agronomists such as drip irrigation and fertigation, which enable better monitoring of water and fertilizers supplied.

Onion is a staple commodity in India and the price varies significantly given the market conditions. Often times, because of market glut, the prices crash to very low levels. In 2006 for instance, the lowest price was around INR1.50/kg. The company price policy is such that on the lower side, the company has fixed a minimum guaranteed price (MGP) of INR3/kg for its contract growers while on the higher side, the prices are linked to the market price. The MGP of INR3/kg is the break-even cost calculated by the company based on all calculations including fixed costs. If the market price falls below that minimum level, the Jain contract growers get the MGP. Based on the yield and prices, the value of production in case of contract farmers is in the range of INR90 000 to INR210 000 per hectare whereas the same is in the range of INR34 000–119 000/ha for farmers selling to the traditional market. Owing to the higher productivity and higher minimum price support, the margin for Jain farmers is in the range of INR46 361–166 361/ha. In the case of farmers selling to the traditional market, the margin is in the range of INR4 982–89 982/ha. However, in the case of farmers selling their produce to the open market, other overheads such as gunny bags, commission for agents, labour charges, and market fee and handling charges all add up to 10 percent of the value of the harvest; eventually the margin is only between INR4 900–82 730 per hectare. Evidently, JISL contract farmers have higher profits. Further, since the minimum price is announced ahead of the planting season, they know the value of their output before production and hence can invest in inputs required for higher productivity. If the farmer does not know what price he or she will get at the end of the season, there is hesitation to investment in inputs, which further reduces earnings by low productivity.

Risk analysis: contract farmers versus farmers selling to traditional markets

Table 4 shows the risk analysis between JISL contract farmers and farmers selling to the open market. The second column shows whether the risk for the contract farmers is higher, lower or same as the farmers in the traditional market. It is evident that on no account is the risk for the contract farmers higher than that for the farmers selling to the traditional market. Risks involving weather-related issues and biological pests as well as financial risks are reduced in the case of the farmers working with the company as they have support on these fronts.

As discussed above, risks from price fluctuation are minimized because of a minimum guaranteed price given to the farmers. Personal risks remain the same as there is no provision for these in the contract. Finally, the repercussions for legal risks can be higher in the case of contract farmers if there is retaliation from the company on defaulting farmers. The number of farmers contracted being so large, a number of problems and disputes do arise – sometimes trivial, many a times genuine – quite often due to adverse climate.

However, in the event of any problem, the dispute resolution mechanism set up by the company is so efficient that the problems are settled amicably. It is highly unlikely that the processor will take legal action against a small farmer for any breach of contract. The costs involved are far in excess of the amount claimed and the legal action threatens the relationship with the farming community. There is normally no breach or serious defaults from the parties concerned. However,

currently there are no regulations in place for enforcing contracts. Thus, this risk currently is not very high, but can become important when these regulations are put in place.

Table 4: Risk analysis – Jain contract farmers versus traditional farmer

	Jain contract farmers	Increased(↑) Minimized(↓) Same(⇔)	Farmers in traditional market
Weather or drought-related risks	This risk is minimized as the company's extension agents are in touch with the farmers. In case of expected outbreak or weather change, they inform the farmers to take the necessary action. However, in reality this is also a problem as this is a natural calamity, some losses do occur.	↓	The farmers themselves have to decide what to do in a critical situation
Risk from short-term commodity price fluctuation	This risk is also minimized as a minimum guaranteed price is fixed for the contract farmers.	↓	Farmers selling to the spot market have to bear the brunt of fluctuating market prices.
Risk from long-term price fluctuation	NA	⇔	--
Asset risks	There is no provision for asset risk management in the contract	⇔	--
Financial risks (loans and credit)	Company can be involved in arranging the loans between the financing company and farmers. These farmers will probably have more leeway in the case of a default.	↓	--
Exchange rate risks	NA	NA	--
Risks of poor or deficient information	This risk is minimized as the company extension workers inform the farmers if a disease outbreak is expected.	↓	--
Biological risks	These risks are also minimized as the company extension agents are scouting the fields regularly	↓	--
Legal and governmental risks	Currently, there are no regulations in the country. Consequently the risk from defaulting and legal implications is not very high.	⇔	--
Farm management risks (impact on technical production systems)	Company extension agents are also providing information on these issues as well.	↓	--
Personal risks	--	⇔	--

Note: NA = Not applicable

3.3 Issues in dehydrated onion supply chain

There are three key issues in managing the supply chain operations for dehydrated onions.

Fluctuating onion prices

Onion prices in India undergo high fluctuations. For a company using onions as a raw material for processing, this has significant implications on choosing an appropriate price to sell to buyers. India as a supplier of dehydrated onion enjoys only 7 percent of the world's supply. Hence India is not a significant player when it comes to pricing of the finished product. It cannot dictate or influence the world market price. Therefore excess or shortage of supply in India does not affect the market of dehydrated onion very much. The company has to sell at a fluctuating price to the world market when it has agreed on a price with its suppliers and signed a contract at least one year in advance. Although farmers are protected from fluctuating world prices, this mechanism can lead to losses for the company if the market price in India is more than the assumed MGP. The MGP is the basis on which the annual contract is signed in advance. In 2006–2007 the onions were purchased from the farmers at a total cost of INR163 million (INR7/kg) compared with INR69 million had it been on a MGP of INR3/kg. This means that the company shelled out INR94 million extra from its margin. The issue of fluctuating onion prices can have significant negative impacts on the company's profit margin. Since the company cannot incur losses year after year, there is no other way except to improve the productivity at the farm level. The yields as well as the quality should be continually improved so as to get a higher price than the average in the world market.

Contract regulation

Currently there is no regulation in place to ensure compliance to the contract from both parties – farmers as well as company. The functioning of the contract depends on trust between the two parties. However, there needs to be a system in place to protect the rights of the farmers as well as those of the company.

Risk management

Given that the farmers are working with the company, the company feels that risk management instruments, specifically insurance, will benefit the farmers. However, the premium for insurance at 7–8 percent of coverage is very high for the farmers. Premium rates are high due to higher transaction costs and high risk of dealing with small and marginal farmers. In the case of companies involved with farmers, this risk is minimized. It is then possible to negotiate a lower premium rate with insurance companies

3.4 Participatory system analysis of onion producers

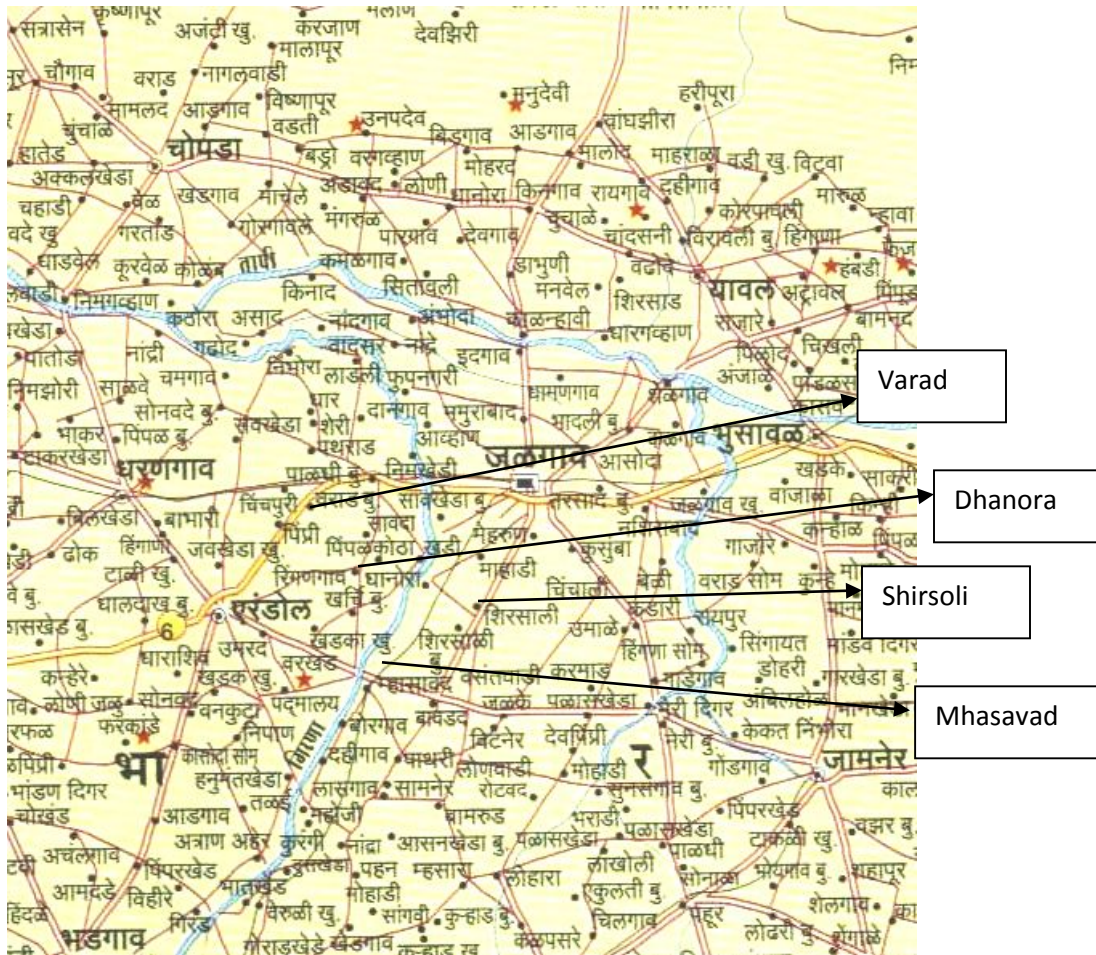
The data for this study was collected by interacting and discussing with farmers who participate and those who do not participate in contract farming with Jain Irrigation for supply of white onion for export of dehydrated products by JISL, Jalgaon Unit.

Jalgaon District is located in the north-west region of Maharashtra State, which is situated in the western part of India with Mumbai as its capital. Jalgaon is bounded by Satpuda mountain ranges in the north and Ajanta mountain ranges in the south. The district is recognized for its agricultural advances especially in horticulture with bananas occupying the largest land area at 70 percent of the land under cultivation. More than 60 percent of almost 4 million people is engaged in agriculture.

JISL has pioneered mass usage of drip irrigation systems among the district's farming community and has created a role model for cultivators in other parts of India. JISL started contract farming in 2000, while actual procurement started in 2001. Though the contract farming expands up to 200 km from the JISL plant located at Jalgaon, 70 percent of the production is procured within a 80-km radius of the factory.

Figure 3: Location map





Sources:

www.MapsofIndia.com;

[http://jalgaon.gov.in/Images/Inner/Maps/Location_of_Jalgaon.jpg?name=../Images/Inner/Maps/Location_of_Jalgaon.jpg%27%29](http://jalgaon.gov.in/Images/Inner/Maps/Location_of_Jalgaon.jpg?name=../Images/Inner/Maps/Location_of_Jalgaon.jpg%27%29;);

http://jalgaon.gov.in/Images/Inner/Maps/General_map_3.jpg

A brief introduction on the purpose and methodology of the study was made to the contract farming head G.I. Desarda and his associate Shriram Patil along with V.R. Subramaniam, Senior Manager (R&D) at JISL. Villages were identified for field visits: four villages were selected within a radius of 30 km from the JISL onion dehydration unit. After a brief introduction and explanation of the purpose and methodology of the study to the participant farmers, they were asked “What are the reasons that have made you decide to start dehydrated onion production for Jain Irrigation?” to groups of participating farmers and “What are the reasons that have made you decide not to start dehydrated onion production for Jain Irrigation?” to non-participating farmer groups.

Results from focus group discussions

Farmers involved in the onion supply chain with JISL identified the following elements as factors that had influenced their decision:

1. Risk sharing. JISL shares risk arising from lower market price due to higher production of onion in the region.

2. Secured price. A minimum guaranteed price (MGP) is fixed prior to produce purchase assuring minimum return to participant farmers.
3. Trust. Trust between JISL and farmers due to long-term commitment of JISL in the region.
4. Extension services. Extension services and training for productivity and quality enhancement.
5. Information. Farmers get information on market trends and market price behaviour of onion in the local market through short messaging services.
6. Access to resources. Farmers get credit, free good-quality seeds from JISL and easier access to credit from financial institutions as JISL vouches itself as a guaranteed produce buyer.
7. Market requirements. Through quality seeds and correct agronomic practices JISL helps farmers produce as per market need.
8. Supporting services. Easy access to new production techniques and drip irrigation system.
9. Infrastructure. No storage requirement for farmers and savings on storage cost as produce is transported to JISL unit after harvest.

Figure 4 shows the relationship between various elements identified by these producers. Secured price and risk sharing are critical elements; information, extension services, infrastructure and supporting services are located in the motor zone.

The farmers who were not involved in JISL's onion supply chain identified the following elements that influenced their decision not to join this quality-led chain:

1. Low price. The minimum guaranteed price of onion is not encouraging for the farmers to participate.
2. Not enough risk sharing. The level of risk sharing does not provide an incentive for farmers to participate.
3. Lack of information. Lack of understanding of benefits of JISL Onion contract farming.
4. Don't need extension services. Growing techniques and productivity enhancement is not a major concern.
5. Not aware of supporting services. Farmers are not aware of the costs or advantages of using quality certification or new equipment like drip irrigation.
6. Infrastructure. Need to cover extra costs of transportation from field to unit, irrigation, electricity and small processing unit.
7. Institution. No transparency and clarity of the contract.
8. Access to resources. Lack of information on using JISL contract for access to credit.
9. Market requirements. Currently satisfy quality requirements as per market demand.

Figure 5 presents the relationship between various elements. Lack of information, infrastructure and other supporting services fall under the motor zone while, not enough risk sharing and low price fall under the critical element zone. Institutions, access to resources and market requirements are classified as buffer elements in the farmers' decision not to join this supply chain.

Figure 4: PSA graph for participating group in JISL dehydrated onion supply chain

Coordinates of elements			
No.	Elements	Activity ratio	Degree of inter-relationship
1	Risk sharing	1.08	42.84
2	Secured price	1.29	34.84
3	Trust	0.86	44.64
4	Extension services	1.12	12.92
5	Information	1.1	16.77
6	Access to resources	0.69	5.8
7	Market requirements	0.44	6.63
8	Supporting services	1	0.64
9	Infrastructure	1.81	4.64

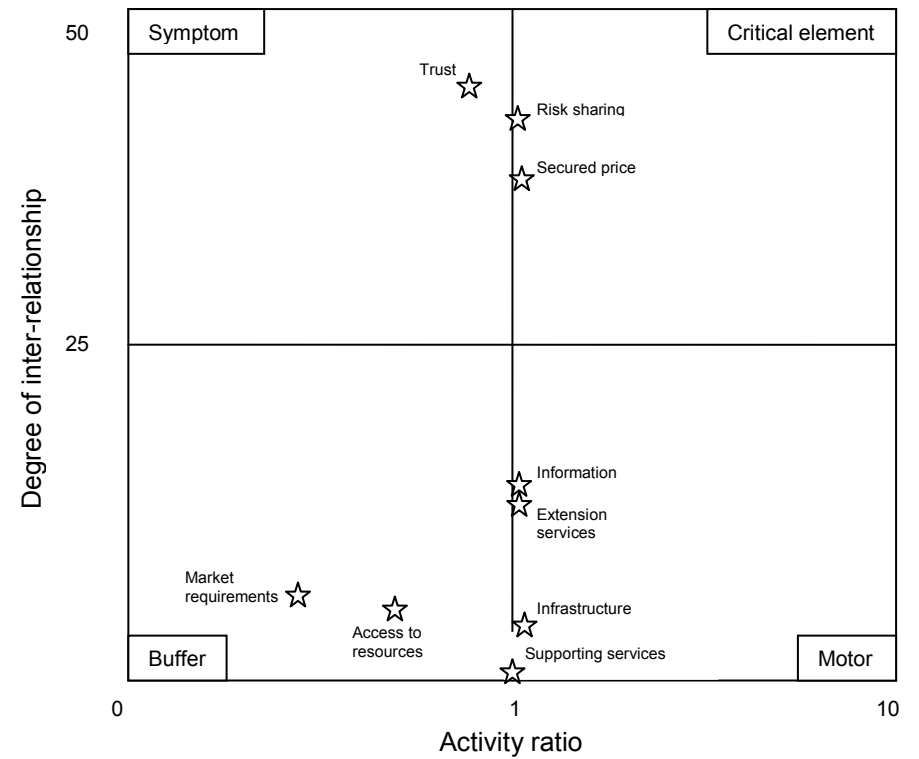
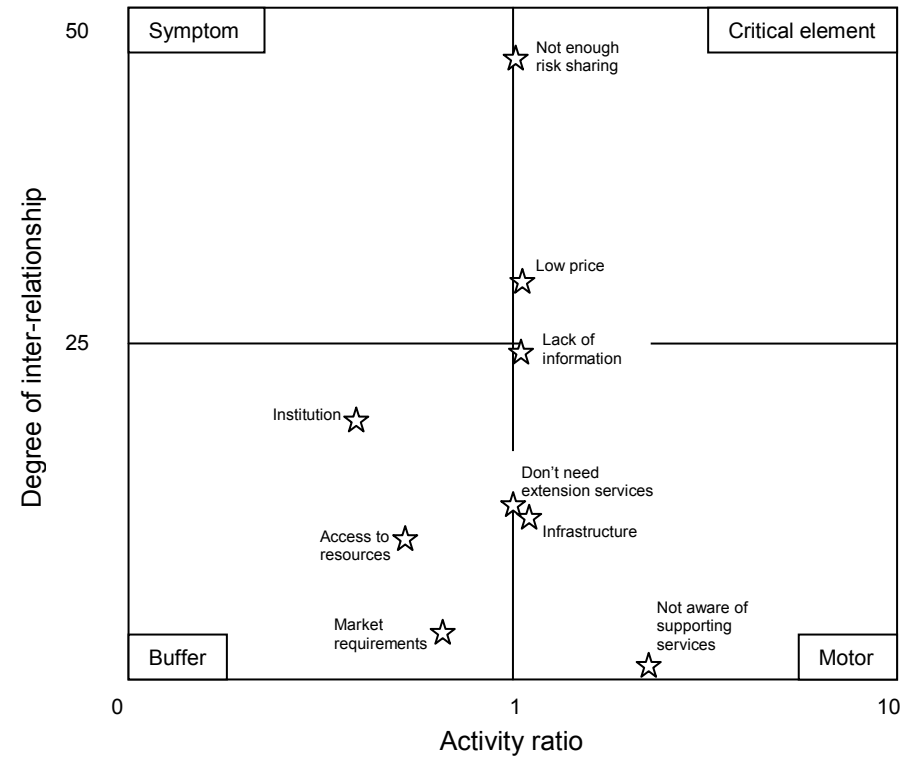


Figure 5: : PSA graph for non-participating group in JISL dehydrated onion supply chain

Coordinates of elements			
No.	Elements	Activity ratio	Degree of inter-relationship
1	Low price	1.08	29.12
2	Not enough risk sharing	1.02	44.22
3	Lack of information	1.11	24.44
4	Don't need extension services	1	11.56
5	Not aware of supporting services	3.75	2.4
6	Infrastructure	1.31	11.02
7	Institution	0.58	18.81
8	Access to resources	0.68	9.25
9	Market requirements	0.8	5



Analysis of PSA graphs

For farmers who have joined the JISL onion supply chain, the critical elements are secured price and risk sharing. These two are the factors which can make or break the contract farming arrangement. This argument is also logical because if the farmers do not get a fair price or have to bear higher risks during time of price crash, they will explore other markets and the arrangement will fall apart. The motor elements or enablers include the services made available to the farmers by JISL including extension, resources, information, and infrastructure. In the absence of the provision of these services by JISL, the farmers would have been reluctant in participating in JISL's onion supply chain. Extension and support services do play an important role as these elements encourage farmers to plan better and increase their productivity which in turn helps them generate more revenue. Interestingly trust is classified as a symptom element, thus indicating that it could be a result of the other elements' interactions.

Farmers who are not involved with JISL lack certain information about JISL's onion contract farming scheme and how they could benefit by participating. It was also very clear during the discussion phase that farmers wanted to know more from the JISL staff. Farmers also indicated the following issues were deterring factors for participation: they are not fully aware of the cost versus advantage of establishing drip irrigation system for the onion crop and subsequent use of the same system for other crop production (not aware of supporting services) and they encounter transportation problems as farmers need to take their produce to the JISL factory gate, which adds to their cost (infrastructure).

Most farmers involved in focus groups highlighted that price and risk sharing were critical elements. This could be due to the reason that farmers were not fully educated on the benefits of the JISL scheme and emphasize the purchase price and risk sharing, especially when the market prices fall due to a glut situation or because of production loss due to bad weather conditions. As these parameters are classified as critical elements, changing them can impact the marketing system.

JISL procures onion from contract farmers through a fixed minimum guaranteed price or at the market price prevailing on the date of purchase, whichever is higher. Participating farmers understand and accept this point and focus on productivity enhancement and improved agronomic practices rather than price. This also ensures that farmers have a fixed return in case of any market fluctuation on the lower side, thus safeguarding their return. This is one of the major deciding factors for farmers together with ability to increase productivity, better crop management and higher return to participate in the JISL-led onion supply chain for export of dehydrated onion products.

The non-participating farmers on the other hand, identified low price as one critical element for them not to participate as they believed that the purchase price offered was not high enough according to the risk they undertook. However, it is also very clear with lack of information as motor element that lack of correct understating of the contract scheme and its benefits limits their participation.

4. LESSONS LEARNED, RECOMMENDATIONS AND IMPLICATIONS

This case study of the JISL onion supply chain shows that it is possible to meet international quality requirements while working with small and marginal farmers. The company's involvement in input supply and extension activities helps to maintain quality of produce at the farm level. Apart from these conventional factors, quality can be improved further by: supply of improved quality planting material; training and education of farmers for proper timing and method for sowing, harvesting and other field operations; and improving the farmer's overall management capabilities by demonstration or through seminars and meetings as well as visits by agricultural experts from time to time. The company firmly believes in its continual improvement programme as this is the only way by which one can achieve the right quality on the raw material that is used for dehydration.

The farmers working as contract growers are benefiting on several fronts: higher margins due to higher productivity, lower price risk due to minimum guaranteed price. Other risks from infestation and weather changes are also minimized as the company's extension officers are constantly working with the farmers to give timely input on these issues. Loans for drip irrigation are also arranged for contract farmers. Thus, overall the farmers seem to benefit from working with the JISL Company.

Almost all activities of the company, from manufacturing to marketing, are related to agriculture, farming and farmers. Over four decades, the company has been actively involved in selling the concept of high-technology, precision farming and has always been farmer-friendly. Furthermore, the efficient dispute resolution mechanism of the company and the minimum guaranteed price policy are the key factors that are responsible for the smooth functioning of the contract farming scheme. This is the main reason why the company has been successful in this unique approach.

It was observed during the study that some farmers were eager to participate in the onion contracting farming scheme and willing to listen to JISL staff to understand the benefit of participation. This indicates and supports that information flow and a suitable model for extension services plays an important role in educating farmers, which in turn enables them to take an informed decision for participating or not participating in a given supply chain.

It was also observed during discussion groups with farmers that the level of education and landholding pattern impacts on the farmers' decision making process. However, the scope of the study did not allow further differentiation of farmers on that level.

There are three key issues in the supply chain for dehydrated onion. A major issue for a processing company in the international market is balancing the fluctuating price of raw materials, in this case onions, with the price of the processed product in the international market. In the case of JISL, the price of dehydrated onion is sold at a fixed price to the world market against a contract signed at least one year in advance. Thus, the company incurs a loss if the market price in India is more than the MGP. In 2006–2007, the market price of onions was more than twice the MGP, and the company paid INR94 million above the MGP for onion procurement. This severely affects the company's margins if it occurs year after year. A second issue relates to the absence of a legal framework for dispute settlement if either party does not meet the contract requirements. In the absence of a legal framework, trust between both parties is important for success in contract farming. JISL has a strong history of working with

farmers as an irrigation and input supplier. This has enabled it to develop trust in the company overtime. From the farmer's perspective, assurance of a minimum guaranteed price goes a long way in ensuring that the farmers do not default on the contract. However, a legal mechanism needs to be put in place for efficient dispute settlement. Finally, insurance for contract farmers will go a long way in minimizing the farmers' risk. Currently, the premium rates in India for agricultural insurance are very high because of the high transaction costs of dealing with individual farmers. These transaction costs are significantly reduced in case of farmers working with customer companies. Insurance companies can explore ways of working with companies to provide special packages for the contract farmers.

From the PSA analysis, one can conclude that organizations who wish to develop a procurement channel for high-quality exported products, like the one evolved by JISL, need to invest in the motor elements that will encourage farmers to join their supply chains. Although a suitable and guaranteed purchase price is a critical element for initial encouragement to sign on, it needs to be backed by three pillars of a sound agricultural procurement channel:

- Extension services to improve agronomic practices and productivity;
- Information regarding price and market behaviour to build trust and credibility;
- Supporting services through new equipment and technology.

Other companies who have developed an enticing pricing strategy also need to emphasize on these three elements, which act as roadblocks to farmers' long-term participation in quality-led supply chains, as indicated by the PSA results of non-participating farmers.

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