International Journal of Commerce and Management Research
ISSN: 2455-1627; Impact Factor: RJIF 5.22
Received: 15-09-2019; Accepted: 16-10-2019
www.managejournal.com
Volume 5; Issue 6; November 2019; Page No. 66-68

Supply chain management of Potato in India

Ishaan khare[1], Malempati Subhash Sri Sanjay[2*]
[1] Department of Industrial and Production Engineering, Jabalpur Engineering College, Jabalpur, Madhya Pradesh, India
[2] Department of Plant Pathology, JNKVV, Jabalpur, Madhya Pradesh, India

Abstract
Supply chain management aims at to link the producer and consumer, which includes traditional marketing channels. The present paper is intended to make aware about the model of supply chain management. This article helps in knowing concept of contract farming and relationship between processing firm and farmers in the villages around the plant. Study concludes that contract farming helpful to small farmers in the tuff times of product sale at the bulk production period. But on the other hand contract faming provides a more reliable, regular and timely sources of income to farmers. Broadly speaking, it suggested that for the successful implementation of contract farming there should be appropriate co-ordination between the farmers and buyers both acting in organized manner and advisable for both sides.

Keywords: Supply chain, pepsico, contract farming, potato

1. Introduction
In India marketing agricultural products was carried through traditional channels. A typical marketing chain for fresh produce consists of several players. Typically, in the traditional supply chain where the produce of several farmers is aggregated, there is no premium for quality produce. 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 specifications are important to meet the requirements for processing and export markets. Thus, companies have to be closely involved with farmers to ensure compliance with quality.

Traditional marketing chain for horticultural produce in India was follows
Farmer - Consolidator - Wholesaler - Semi-wholesaler – Retailer.

PepsiCo's model of supply chain management
In contrast to the traditional supply chain management, PepsiCo is one of the pioneers of contract farming in India since 2001. Their experience in contract farming has covered many crops: potato, basmati rice, tomato, chilli, peanut, oranges and more recently sea weed. PepsiCo's operations in India started in the region of Punjab in collaboration with the State Government. PepsiCo India's project with the Punjab Agro Industries Corporation and Punjab Agriculture University remains one of the most ambitious contract farming projects in the country. 100% of the potato for making Lay's and Uncle Chips were produced from India.
The company's vision is to create a cost-effective, localized agri-supply chain for its business by:

PepsiCo's commitment in agriculture supply chain
- Introducing new high-yielding varieties of potato and other edibles.
- Introducing sustainable farming methods and practising collaborative farming.
- Making world-class agricultural practices available to farmers and helping them raise farm productivity.
- Working closely with farmers and state governments to improve agro-sustainability and crop diversification.
- Providing customized solutions to suit specific geographies and locations.
- Facilitating financial and insurance services in order to de-risk farming.

Collaborative farming in Potato
PepsiCo India was the first corporate to introduce collaborative farming of process-grade potatoes in India in 2004-2005. PepsiCo presently works with farmers, spread across West Bengal, Maharashtra, Punjab, Gujarat, UP, Karnataka, Bihar, Haryana and Chattisgarh. More than 45 percent of these are small and marginal farmers with a land holding of one acre or less. PepsiCo India has helped improve their incomes through a 360-degree farmer connect program that includes:
- Assured buy-back of produce at pre-agreed prices, which insulates farmers from open market price fluctuations.
- Supply of high quality planting material, including its proprietary advanced seed varieties.
- Offering advanced plant protection program and technical know-how developed in collaboration with leading agri-input companies like DuPont, Bayer and BASF.
- Soft loans through a national level tie-up with State Bank of India.
- Facilitation of crop/weather risk insurance in partnership with leading insurance companies to protect farm incomes.

Profile of PepsiCo Potato Contract
Procurement and input based contracts are proposed by PepsiCo in which the firm agrees to procure the produce under contract at a pre-agreed price as well as at a fixed

time and also provides with inputs such as seeds to farmers. In return the farmers do pay some amount to the company in advance in proportion to the acreage under contract. The firm supplies two types of varieties to the farmer as the input. One among the two is LR type and other is CH1 type, time period of the LR variety is 60 days, and time period of CH 1 is 120 days. The process of harvesting of crop is started only when the crop attains its maturity stage. Usually, after a period of 90 to 120 days of sowing, the crops can be harvested. Classification and grading of the production is very crucial in nature. It ensures higher income to the farmers. After the process of grading by the farmers the potatoes are further graded and classified by the firm under different categories. But, the firm only acquires those potatoes that are of 45 mm, which is the recommended size of the potato. In the arrangement of contract farming of potatoes, the PepsiCo also supplies the producers with a kit which comprises of chemical fertilizers and pesticides that are to be used as liquid spray on the crop. In addition to this, the firm also delivers certain facilities and technical advices to the farmers such as an observation by the field officer at a regular interval of fifteen days, organising of meetings and lectures through seminars by the technical staff members in the villages, to encourage contract farming. And in seminars, problems related with contract farming and their solutions are discussed.

Potato crisp supply chain: food quality and safety issues
Processing and quality requirements
The quality parameters set in place through the chain are driven by the buyer requirements and specific requirements for processing. Potatoes grown in India for traditional use have high sugar content and fewer solids. Processing requires potatoes with no sugar content and high solids (between 15 and 20 percent). Apart from these requirements, the company is HACCP- and ISO certified, which requires stringent quality control at all levels in the chain. Specific requirements are met by ensuring quality compliance at every stage, research and development, farming, storing, processing, and packaging. This section describes in detail the steps taken to ensure quality at every stage in the chain.

Research and development thrust areas
As mentioned above, potatoes required for making crisps, French fries and other fried products must have low sugar content to avoid browning of the finished product. The sugar content of potatoes is determined by the genotype and several pre- and post-harvest factors. The major pre harvest factors affecting sugar content are crop maturity, temperature during growth, mineral nutrition and irrigation, while important post-harvest factors are mechanical stresses and storage conditions. Each genotype requires an ideal pre- and post-harvest treatment to maintain low sugar levels; any kind of stress results in sugar accumulations. As most of the potatoes in India are used as cooking potatoes the most common variety grown in West Bengal is Kufri Jyoti, another major variety is Kufri Chandramukhi. Chipsona I, Chipsona II and Atlantic with low sugar and high solid contents have been introduced for processing purposes. Before introducing the varieties to the farmers, extensive trials of various varieties were undertaken. A package of agronomic practices suitable to the local agroclimatic conditions has also been developed in collaboration with the Central Potato Research Institute (CPRI). The package of practices developed includes specific fertilizer requirements and a spraying schedule.

Farm inputs
The company ensures the availability of inputs to farmers working in the area under contract. The
Vendor in the region ensures that the farmers falling under his or her supervision have all the 7 required inputs at the right time. In the case of Pune, farmers working with the company are given an input kit. Initially the kit is made available free of charge. In West Bengal, the company advises on the use of quality inputs. If the company provides inputs then the cost is deducted when potatoes are purchased from farmers. Seed potatoes of specific varieties for processing are provided by the company. Apart from providing inputs, the company had also introduced crop insurance by the Agricultural Insurance Company (AIC) and weather insurance from ICICI Lombard. Generally, the transaction cost of insurance companies is high when dealing with many individual farmers. If the farmers are linked with a company, the transaction costs are significantly lowered. Hence the company was able to negotiate special premium rates with AIC for its contract farmers. Furthermore, clearance of claims is also much faster because of the company's involvement instead of each individual farmer dealing with the insurance company. The special premium rates negotiated with AIC are no longer available, but the company is exploring options with other insurance companies. Similarly, in Karnataka PepsiCo also created an institutional setup with the Shimla-based Central Potato Research Institute (CPRI), agro-chemical giant Du Pont and it provided weather insurance from ICICI Lombard General Insurance (Economic Times, 2007).

Farm production
In order to produce a specific variety of potato and to enhance productivity PepsiCo is very closely
involved with its potato contract farmers. The company has employed a team of agricultural graduates, who work with the farmers to provide technical input and to monitor the production of the farmers in their specified area. One technical expert deals with approximately 100 farmers. The farmers reported that because of the technical information provided by company agronomists the use of chemicals and fertilizers is much more timely and effective. A change from traditional practices of production management is crop spacing. In the traditional method row spacing is 46−51 cm and plant spacing is 10−13 cm but in the case of Frito Lay the distances between rows and plants are respectively 66 and 20 cm. This increased spacing helps to increase yield, reduce greening of potatoes, and reduces the share of undersized potatoes which cannot be used for crisp making. The agronomists 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 to in priority, with inputs from the company researchers if necessary. Regular scouting helps early identification of infestation by pests and diseases. This significantly helps to reduce crop loss. It is not only the PepsiCo contract farmers but all potato growers who benefit from early detection of diseases, which can be considered as a positive externality of the company's operations. The general practice in West

Bengal is to grow the potato crop after paddy. Early planting of potatoes leads to early harvesting of the produce, which fetches a higher price. To produce potatoes early, farmers are recommended to go for short duration paddy so that land is available for early potato cropping.

Harvesting and packaging

"Handle potatoes like eggs, not like stones" was the message the company agronomists were giving farmers. This statement conveys the care taken through the post-harvest management 8 process. Traditionally, jute bags have been used for packaging potatoes. Instead of jute bags, the company has propagated the use of plastic bags for packaging as it ensures better storage.

Grading and sorting

At the company's unloading dock, the potatoes are mechanically graded for size. Potatoes that are too small for processing are separated. There is also visual inspection for damaged potatoes. Test for sugar content is undertaken by frying a small sample from this lot. Potatoes with high starch content will turn red on frying. Sample tests are also undertaken for solid content. Potatoes that do not meet the requirements are rejected.

Storage

Critical factors in successful storage include variety, methods of culture, harvest, field curing, temperature and humidity control, storage and sprouting inhibition. Potatoes are stored at 12°C to control conversion of starch into sugar. At this temperature potatoes can be stored up to four months. Potatoes are also treated to limit sprouting.

Processing centre

The selected produce is taken to the processing plant and is subjected to washing and peeling. Peeled potatoes are subject to metal detection and inspection for physical damages and discoloration. Following this, the potatoes are run through rotating slicers and are subjected to deep frying. The fried crisps undergo optical testing for colour. As mentioned earlier, rice bran oil is used for frying which significantly reduces saturated fat content. At the last stage the crisps are mixed with spices and packed. Thorough testing of inputs and packaging materials is also conducted. The plant has a well-equipped quality testing lab.

Conclusion

This review of the potato supply chain to is a good example of how value addition was contributing in supply chain management and helping met by small farmers in India. A very strong extension network by the company helps to monitor marketing as well as quality of product. Evidently the farmers working as contract growers benefit on several fronts: there is extensive training and education of farmers for proper timing and method of sowing, harvesting and other field operations; farmers' overall management capabilities are enhanced by meetings and visits by agricultural experts from time to time. Gross margins for contract farmers are higher.

Furthermore, because the companys announces prices ahead of the production season, they are sure of covering at least their production costs and can invest in agrochemicals and other inputs, which in turn leads to enhanced productivity. Other risks from crop infestation and weather changes are also minimized as the company's extension agents are constantly working with the farmers to give timely input on these issues. Finally, weather insurance is also available for the company contract farmers, which further minimizes risks.

The obvious advantage for the company is getting an assured quantity and quality for crisp making to enable utilization of the processing plant at optimal capacity. Direct involvement with farmers enables good communication to ensure availability of produce which meets the specific quality requirements for processing and indicators for the company's HACCP and ISO certification. In the absence of a legal framework, and even if there were a regulatory mechanism, trust between both parties is important for success in contract farming. The company field officers have close interactions with farmers to discuss issues and problems in potato production. This has enabled them to develop trust in the company overtime. The company announces prices for potatoes in advance, which is a critical factor in maintaining farmer loyalty. However, there is always a risk of farmers selling to the open market when market prices are high. This issue can be addressed in time by developing a long-term relationship with farmers. Furthermore, the company encourages farmers to plant part of their crop for processing and a part for selling to the open market, so farmers can capitalize on the rise of open market prices.

Reference

1. Bhattacharya S. Frito Lay's to set up new facility near Kolkata. *The Hindu Business Line*, 2004. (Also available at www.hindubusinessline.com).
2. Commodity Online Special. Pros and cons of contract farming, 2007. (Available a www.rediff.com).
3. Economic Times. *Pepsi helps out potato farmers in Karnataka*, 2007. (Available at www.economictimes.com).
4. Financial Express. *Pepsico to procure 30 000 tonnes potato from West Bengal Farmers*, 2008. (Available at www.financialexpress.com).
5. Kumar B, Mistry NC, Singh B, Gandhi CP, eds. Indian Horticulture Database 2006.
6. http://www.thehindubusinessline.com/todays-paper/tp-agri-biz-and-commodity/pepsico-engages-contract-farmers-for-potatoes/article987370.ece
7. http://www.pepsicoindia.co.in/purpose/environmental-sustainability/partnership-with-farmers.html
8. https://www.nabard.org/english/contract_farm.aspx
9. http://www.ijsrp.org/research-paper-0614/ijsrp-p3040.pdf
10. Singh R, Bhagat K. Farms and corporate: new farm supply chain initiatives in Indian agriculture. *Indian Management*, February. 2004; 24:76–77
11. Gandhi D, Jain V. Institutional Innovations and models in the development of agro-industries in India: Strengths, weaknesses and lessons. In C. A. da Silva (ed.), *Innovative policies and institutions to support agro-industries development*. FAO: Rome, 2011.
12. CII-McKinsey, Co. *Modernising the Indian food chain: food and agriculture integrated development action plan (FAIDA).* New Delhi: CII and McKinsey and Co, 1997.