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A Novel Agribusiness Model for Backward Linkages with Farmers: A Case of Food Retail Chain

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Abstract

One of the leading food retail chains, 'Spencers' have established backward linkages with farmers for procuring fresh fruits and vegetables. The main strategy of this system ensures a steady and continuous supply of fresh vegetables to the food retail chain and flow of income to farmers. This linkage has been able to change the method of farming and the marketing arrangement followed by the food retail chains. The marketing arrangement by Spencers food retail chain has reduced the market risks and transaction cost of farmers and has helped them in breaking away from the clutches of traditional brokers/wholesalers/commission agents. Direct supply by farmers has allowed the retail chain to simultaneously increase control over quality, supply reliability and price stability. An added advantage of this model is that it provides flexibility to the farmers to exit from this system, if they are not satisfied with its functioning, since there are no written contracts. This model of linkage is specially suited to small and marginal farmers and improves their economic conditions by providing an opportunity to grow and supply high-value vegetables round the year at a fairly decent price. The study has analyzed the impact of food retail chain linkage on farmers.

Introduction

In India, the concept of food retail chains/organized food retailing started in 1990s with the advent of international formats of retailing, especially with the emergence of food retail chains, such as 'Food world', 'Nilgiris', 'Fabmall', 'MTR', 'Apna bazaar', 'Subhiksha' and 'Reliance fresh'. These food retail chains have brought in several changes in the supply chain management and logistics through the use of quasi-formal and formal contracts to ensure timely delivery of products with desired quality attributes.

Food retail chains in India, due to several factors such as their recent origin, local or regional nature of their operations, existing legislation regarding procurement of agricultural produce, etc. have not been able to change the procurement systems. Most

of the organized food retail chains procure their requirements of food grains (cereals and pulses) from the regulated market yards (APMC yards). It is being practised to comply with the APMC Act, which stipulates that all wholesale marketing of agriculture produce should be carried out at designated market yards, by paying the prescribed market fees and commission charges. Food grains that are procured from the wholesalers at the APMC yards are cleaned, sorted, graded and packed at godowns of the retail chains. Most retail chains repack the commodities under private labels. These food retail chains depend on traditional channels of food grain marketing and their entry has not led to shrinkage in the supply chains or any significant improvement in marketing infrastructure or marketing practices.

Similar has been the situation for fresh fruits and vegetables (FFV). India's traditional fresh fruits and vegetables marketing is characterized by fragmentation of the supply chain, concentration of

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market power with the wholesalers, existence of large number of intermediaries, little or no quality control, absence of standards, lack of product innovation, small volume for transactions and low inventories. The worldover, despite food retail chains reaching saturation, the penetration into fruits and vegetables section is limited (Reardon and Berdegue, 2002; Weatherspoon and Reardon, 2003). The situation is more precarious in India, where food retail chains are of recent origin. Unlike the big impact of supermarkets/ retail food chains in several other nations, they have not been able to make an impact on the supply chain in India, and continue to depend on the existing channels of marketing. However, recently few of the food retail chains have established backward linkages with farmers for procuring fresh fruits and vegetables. These linkages have been able to change the method of farming as well as marketing arrangements with food retail chains. These linkages have reduced market risks and transaction costs of farmers. Towards this endeavour, the present paper has reported the results of a study conducted to find the impact of the new institutional arrangement on producer's resource-use pattern and income.

Methodology

Farmers operating with fresh fruits and vegetables 'Consolidation Centre' run by the 'Spencers' in Hoskote near Bangalore, established in 1996 for procuring fresh fruits and vegetables, were chosen for the study. This Centre collects about 163 locally-grown varieties of vegetables (some exotic ones also), and to a small extent, fruits also. During 2005, the number of farmers registered with the Consolidation Centre was small; 19 regular suppliers and 11 seasonal suppliers. To study the impact of new institutional arrangements on producer's resource-use pattern and income, all the nineteen farmers who regularly supply vegetables, were surveyed. To compare this system of marketing with the traditional system of marketing, 30 other farmers from the same area, selected at random, were surveyed for the study.

Analytical Tools

Logistic Regression Analysis

Logistic regression was estimated to identify the factors that have a bearing on farmers' supply of

vegetables to food retail chain Consolidation Centre and this limited dependent variable model was used for capturing the influence of several factors on the selling behaviour of farmers.

Logit Regression Function

$$\text{Let, } P_i = E\langle Y = 1 | X_i \rangle = \frac{1}{1 + e^{-Z}} = \frac{e^Z}{1 + e^Z}$$

where,

$$Z = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5$$

$$\log - Odds = Li = \ln\left(\frac{P}{1-P}\right) = \hat{b}_0 + \hat{b}_i \bar{X} + u_i$$

where,

P_i = Probability that farmers will supply vegetables to Consolidation Centre,

$1 - P_i$ = Probability that farmers will not be willing to supply vegetables to Consolidation Centre,

Y_i = Farmers willing or not willing to supply vegetables to Consolidation Centre (Willing = 1, Not willing = 0),

X_1 = Age (Number of years),

X_2 = Education (Number of years of schooling),

X_3 = Transport vehicle (dummy variable: Owning = 1, Not owning = 0), and

X_4 = Area under vegetables (acres)

Results and Discussion

The leading food retail chain (FRC), Spencers through the establishment of a Consolidation Centre at Bangalore, have introduced a novel agribusiness model for marketing of agricultural commodities. To ensure the quality of produce, Consolidation Centre provides information on 'Good Agricultural Practices' (GAP) to farmers, who cultivate crops based on its specifications. To reduce rough handling of produce, member-farmers clean, grade and pack the produce as per retail chain specifications. The

packaging materials are provided by food retail chain for specialty products while for general packaging, materials are purchased by the farmers. Every product is labelled and depicts its weight, which is done at the farm level.

The farmers selling vegetables to the Consolidation Centre are responsible for all the post-harvest operations. By shifting such responsibilities as cleaning, sorting, grading and packaging to farmer-vendors, the Consolidation Centre has been able to reduce the transaction costs of the retail chain. This practice is diametrically opposite to the handling of fruits and vegetables in the traditional markets, wherein they are just dumped in market yards. Thus, a beginning in quality control of fresh fruits and vegetables has been made by the Spencers through food retail chains.

This linkage has been able to change the method of farming. The small and marginal farmers, through their intensive cultivation, have been able to earn higher incomes. In contrast to Kenya, where supermarkets have to deal with a fewer and larger suppliers (Neven and Reardon, 2004), in the present study, food retail chain Consolidation Centre emphasizes on having supplies from small and marginal farmers, because of their relative high care in managing farm-scale operations due to the absence of mechanization in small-scale farming. Since food retail chains need a regular supply of small quantities of vegetables, they prefer to establish backward linkages with small and marginal farmers.

Supply Chain Management by Spencers

The Consolidation Centre in Hoskote (in the vegetable production belt) collects about 163 locally-grown varieties of vegetables (including some exotic ones), and to a small extent, fruits. Farmers from distances of 50-80 km supply fruits and vegetables to this Centre. The concept adopted by Spencers is 'Ready to Retail', in which agri-products are graded and packed in the required form by the suppliers (farmers). The new model of Spencers has helped in shrinking the traditional supply chain for fresh fruits and vegetables, as depicted in Figure 1.

The Consolidation Centre covers a radius of 160 km, and currently handles around 20 tonnes of agri-

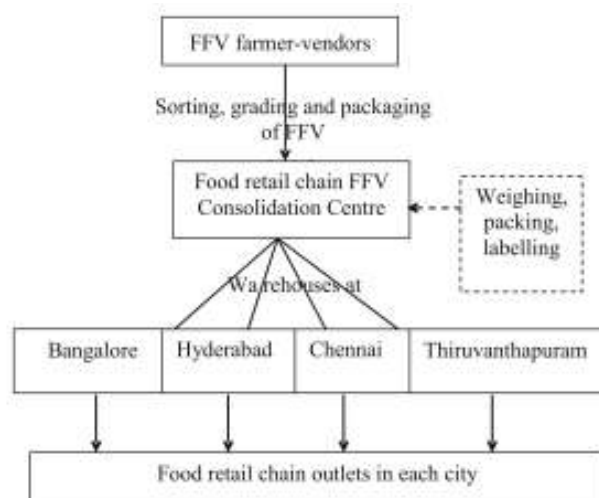


Figure 1. Supply chain of a food retail chain for fresh fruits and vegetables (FFV)

products per day. At present, it meets only about 70 per cent of its requirement of fresh fruits and vegetables from farmers, and the remaining 30 per cent is procured locally from the Modern Auction System (MAS) market, established by the National Dairy Development Board (NDDB) through a consolidator. The Consolidation Centre follows the 'Vendor Development' model, which is characterized by the absence of intermediaries in the supply chain, i.e. the farmers themselves are the preferred suppliers. In this model, farmers registered with the Consolidation Centre, are known as 'vendors', and under each vendor a group (usually 10) of farmer-members (independently) cultivates and supplies fruits and vegetables.

The relationships with farmers have been informal, with no written contracts, but are based on oral confirmations of volumes to be delivered. The assured irrigation is a must for farmers who wish to register with the Consolidation Centre. The selection of vendors is also determined by their business management skills. Supply to the Centre also involves more formal transaction methods as well as stringent delivery conditions, frequency of supply and quality standards for the product.

The registered farmer-vendors collect the produce from other farmer-members and deliver it to the Consolidation Centre; quality controls in production and packaging being the responsibility of farmer-vendors. At the Centre, packed produce

are bar coded and transported to the central warehouse in Bangalore, from where it is further transported to other south Indian cities, viz. Chennai, Hyderabad, Thiruvanthapuram. The Consolidation Centre plans to serve as a captive supply centre to meet the requirements of their own outlets, as well as other retail chains, bulk purchasers and processors, which would ultimately benefit the farmers. With plans to set-up more retail outlets in major cities, the procurement at the Consolidation Centre is set to increase. The success of this model (backward linkages directly with the farmers and good quality produce) has motivated several agro-processing industries to procure from this Consolidation Centre.

Quality Control Practices at Consolidation Centre

The quality of produce is maintained at three levels, referred to as QG (Quality Grading) (Quality Logistics), QC₁ (Quality Control) and QC₂ (Quality Care). The QG is the concern of the Consolidation Centre, the QC₁ is the maintenance of quality of packed products till it reaches the retail outlets, i.e. in loading, transporting and unloading of the produce. The QC₂ refers to the quality to be maintained at the display section of the retail outlets.

Fruits and vegetables are graded based on uniformity of size, maturity and colour, physical appearance and freshness. The Consolidation Centre supplied the materials needed for packaging (for both speciality products and general packaging). Farmers themselves carry out grading and packing; it reduces the number of people handling the produce before it reaches the consumers. At the Consolidation Centre, each packed product is labelled with details like product name, weight and price; some of them are bar-coded, also.

Changes in Cultivation Practices Introduced by FRC Consolidation Centre

The FRC Consolidation Centre has introduced changes in the way crops, particularly vegetables were cultivated. Crops to be cultivated are assigned to each farmer based on farmer's proficiency and history of production, which is documented at the time of enlistment. Investments in irrigation systems are preferred, as it provides the farmers greater

control over quality and allows them to produce round-the year. A crop calendar is drawn up, keeping in view the requirements of the FRC retail outlets. Once the crop to be cultivated has been decided, farmers are provided with a package of 'Good Agricultural Practices' (GAP). This package ensures the optimum use of resources with emphasis on minimum use of pesticides. The vendor-leader ensures that the practices are strictly adhered to. Direct supplies by farms also allow the Centre to inspect farm and growing practices, first-hand.

There is no formal contract or vertical integration for production or marketing under this arrangement. The Centre does not supply any production inputs nor it formally agrees to procure the produce, which makes the farmers risk-bearers. The Centre has no system of providing production credit to the farmers, but helps farmers in procuring inputs from suppliers at reduced rates. Technical guidance on aspects like the time of planting, crop production and management, harvest time, quantity to be harvested per acre, etc., to ensure quality and marketability, are provided by the Consolidation Centre.

Generally, the Centre procures the entire quantity of fresh fruits and vegetables supplied by the vendors, except in cases where the specified quality requirement is not met. During the initial stages of establishment, the percentage of rejection in procurement from farmers was high because the farmers were not accustomed to producing good quality produce in a scientific manner. The large-scale rejection of their produce for failing to meet the quality specifications led farmers to change their cultivation practices, following which the rate of rejection reduced and now stands at 8 per cent only. The impact of adhering to Good Agricultural Practices (GAP), such as staggered sowing introduced by the Centre, has led to increase in the intensity of cultivation as well production.

Pricing Policy of Consolidation Centre

Prices of fresh fruits and vegetables are determined on the basis of the prices prevailing at different markets in Bangalore. The benchmark price is determined by considering the prices prevailing at MAS market, HOPCOMS and Krishna Rajendra market in Bangalore. In this mechanism,

Consolidation Centre ensures a sort of support price even during the glut in the market, so that farmers do not incur losses. The Consolidation Centre procures limited quantities from a limited number of farmers. Hence, it has limited liability to each farmer who also cultivates a given crop on a limited area. This produce is bought from food retail chains by consumers, who are quality-conscious than price-conscious. Under this format, the Centre ensures input-cost plus minimum profit for a limited quantity of produce. During the lean season, farmers are naturally benefited with good prices on par with market with assured market. It was found that farmers preferred to supply their produce to the Consolidation Centre, as it provided them stable prices and assured market, compared to the highly volatile prices at the wholesale market.

Socio-economic Implications of Linkage of Consolidation Centre with Farmers

It was found that younger and educated farmers had entered into tie-ups with food retail chain Consolidation Centre, which could be due to their better awareness and enthusiasm to take risks and experiment with a new business model. Family size was relatively larger for farmer families associated

with the Centre compared to the traditional market farmers. Larger family-size was advantageous to the Consolidation Centre, as family labour was totally devoted to post-harvest operations like washing, sorting, grading, packing, labelling and also reduced the cost on hired labour.

The landholding size of FRC farmers was around six acres, while that of non-FRC farmers was two acres. The share of area under well command was also higher for FRC farmers than traditional market farmers. The gross income from agriculture of a FRC farmer was Rs 1,72,000 per year while that of a traditional market farmer was Rs 70,000, due to improved agricultural practices and growing of exotic vegetables for FRC round-the-year, which provided extra income to these farmers (Table 1)).

Cropping Pattern

Along with traditional vegetables, the FRC farmers were also cultivating exotic vegetables, such as broccoli, iceberg, lettuce, parsley, leek, red cabbage, Chinese cabbage, colour capsicum, green onion, turnip, basil, table radish, etc. (Table 2).

Thus, it was found that crop diversity was higher for FRC than traditional market farmers. This

Table 1. Socio-economic characteristics of farmers

Particulars	Food retail chain farmers	Traditional market farmers
Number of farmers	19	30
Age (years)	39	48
Literate (%)	100	67
Family size (No.)	7	5
Total landholding size (acres)	6	2
(a) Irrigated land	4.5	1.5
(b) Dry land	1.5	0.5
Bore wells per farmer	2	1
Gross income from agriculture (Rs)	1,72,000	70,000
Category of farmers		
a. Marginal (< 2.5 acres)	3 (15.8)	28 (93.3)
b. Small (2.5 -5 acres)	9 (47.4)	2 (6.7)
c. Large (> 5 acres)	7 (36.8)	0 (0.00)

Note: Figures within the parentheses are percentages to the total number of farmers, in Columns 2 and 3.

Table 2. A comparison of cropping pattern followed by FRC and traditional market farmers : 2005

Crops grown	Food retail farmers (n=19)		Traditional market farmers (n=30)	
	Area (acres)	Percentage	Area (acres)	Percentage
Vegetables				
Ash gourd	0.5	0.5	-	-
Baby corn	2.0	2.5	-	-
Beet root	2.0	2.5	-	-
Bitter gourd	1.0	1.0	0.5	-
Bottle gourd	1.0	1.0	-	-
Brinjal (egg plant)	2.5	3.0	-	-
Cabbage	3.0	3.5	5.7	12.0
Capsicum	0.5	0.5	-	-
Carrot	8.5	10.0	13.5	29.0
Cauliflower	10.0	12.0	6.2	13.5
Chicdi Avare	5.5	6.5	6.0	13.0
Chow chow	2.0	2.5	3.5	7.5
Cucumber	1.5	2.0	-	-
Double beans	1.0	1.0	6.5	14.0
Exotic vegetables	16.0	19.0	-	-
Green Chilli	2.0	2.5	0.5	1.0
Little gourd	-	-	1.2	3.0
Musk melon	0.5	0.5	-	-
Potato	9.0	10.5	0.5	1.0
Pumpkin	0.5	0.5	-	-
Ridge gourd	1.0	1.0	-	-
Tomato	15.0	17.5	2.7	6.0
Total area under vegetables	85.5	100.0	47.0	100.0
Cereals				
Ragi	28.5		15.0	
Grand total	114		62	

diversity in crops had increased after their association with FRC Consolidation Centre, as they had assured market for their produce and their marketing risks were minimized under the new institutional arrangement. Some of these farmers had additional income by growing low value-high volume leafy vegetables like mint, spinach, red amaranthus or coriander.

The cropped area of FRC farmers varied from 500 sq ft to 10 acres. Exotic vegetables were grown in staggered small multiple plots, to ensure supply round-the-year, as per the requirements of FRC Consolidation Centre. Seasonal vegetables like cauliflower, carrots, potatoes, tomatoes, etc. were

grown on large plots by both FRC and non-FRC farmers.

Farmers' Association with FRC Consolidation Centre

During the initial years, farmers had to be persuaded by the Consolidation Centre to enlist themselves as vendors. Though the Centre was set up in the year 1996, farmers were registered as vendors in 2002. Under the new system of direct marketing, farmers had to incur extra expenses on cropcare and post-harvest operations, like sorting and grading, which involve considerable labour. Also, if a portion of produce was of unacceptable quality,

then farmers had to make arrangements for its disposal through other channels at lower prices. During 2005-06, when the survey began, around 25 farmers were supplying vegetables, 50 per cent of them were in the system since three years (Table 3).

A Comparison of Unit Cost of Production and Net Returns of Vegetable Crops under FRC and Traditional Marketing Channels

In this section, profitability and transaction costs of four major crops, namely, cabbage, cauliflower, carrot, and tomato under the two institutional arrangements have been assessed. The differences in profits and transaction costs have been used as indicators of the performance of an institutional

Table 3. Duration of farmers' association with FRC Consolidation Centre :2005

Duration of association	No. of farmers	Percentage of farmers
Two years	3	16
Three years	10	53
Four years	5	26
More than 4 years	1	5
Total	19	100

Note: Initial year, 2002

arrangement in the marketing of agricultural commodities. Noticeable differences in net return per quintal can be seen for all vegetable crops in Table 4.

The increase in net returns was highest for cabbage (48 %), followed by cauliflower (40 %). The figures for carrot and tomato were 34 per cent and 18 per cent, respectively. The high net returns for FRC farmers were due to drastic reduction in transaction costs, particularly transportation cost and commission charges.

Factors Influencing Farmer's Choice of Different Marketing Channels

The factors influencing the probability of selecting food retail chain marketing channel as against traditional marketing channel was analyzed using the logistic regression analysis model because the farmers' decision to choose a particular marketing channel follows a binary choice. The log of odds in favour of selling vegetables at Consolidation Centre was positively associated with education, owning transportation facility and area cropped under vegetables, but was negatively associated with age.

The coefficient of age factor of the farmers was negative, which indicated that with increase in age,

Table 4. A comparison of net returns from vegetables production under FRC and traditional marketing channels: 2005

Particulars	Cabbage		Cauliflower		Carrot		Tomato	
	FRC farmers	Traditional market farmers	FRC farmers	Traditional market farmers	FRC farmers	Traditional market farmers	FRC farmers	Traditional market farmers
Yield (tonnes/ acre)	33	30	12.5	12	12	13	30	25
Market price (Rs/tonne)	3490	3000	8430	7000	15500	14000	6540	5500
Input cost/ tonne (Rs)	897	1039	1871	2019	2589	2188	1396	1550
	(83)	(60)	(91)	(63)	(77)	(53.5)	(69)	(61)
Transaction cost/ tonne (Rs)	180	700	189	1200	775	1905	640	1000
	(17)	(40)	(9)	(37)	(23)	(46.5)	(31)	(39)
Total cost/ tonne (Rs)	1077	1739	2060	3219	3364	4093	2036	2550
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Net returns/ tonne (Rs)	2413	1261	6370	3781	12136	9908	4504	2950
Net returns / q (Rs)	241	126	637	378	1214	991	450	295
Increase in net returns (%)		48		40		18		34

Note: Figures within the parentheses are percentages to the total cost

Table 5. Logistic regression coefficients of determinants of supply to Consolidation Centre

Variables	b	e ^b	Sig	Elasticity of probability
Age (years)	-0.029	0.971	0.63	-0.15
Education (No. of years of schooling)	2.394	10.958	0.09**	0.29
Transportation (own transportation =1, otherwise=0)	3.681	39.693	0.02*	
Area under vegetables (acres)	1.409	4.093	0.04*	0.44
Constant	-6.44	0.002	0.11	-
Correctly predicted cases				91.8
Chi-square				48.13
Odds ratio				7:1
Probability				0.88

* Significant at 5 per cent level

** Significant at 10 per cent level

the probability of selling vegetables at FRC Consolidation Centre reduced and probability of selling at traditional market increased. The young farmers preferred FRC marketing channel than the traditional channel. The education of the farmer had a positive impact on selection of FRC marketing channel. With improvement in the level of education, probability of selling vegetables at FRC Consolidation Centre increased. The farmer's having own transport vehicle influenced to sell through FRC marketing channel. With the ownership of transportation vehicle, the chances of selling through marketing channel were 40-times more. The odds ratio was 7:1, indicating that for every 1 farmer not willing to supply vegetables to FRC Consolidation Centre, 7 farmers were willing to supply (Table 5).

Conclusions

The efforts of retail food chains in terms of backward integration to link with farmers have been found limited. Spencers food retail chain has organized a fruit and vegetable Consolidation Centre and is offering better price to farmers, provided the

produce is of better quantity. This new institutional arrangement by FRC Consolidation Centre has helped the farmers to break away from the clutches of traditional brokers/wholesaler/commission agents. The marketing arrangement by FRC has also reduced the market risks and transaction costs to farmers. Direct supply by farmers has allowed the retail chain to simultaneously increase control over the quality, supply reliability and price stability.

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