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Corporate Organization Influence on Supply Chain System of Fresh Vegetables A Case Study in Greater Hyderabad City of Andhra Pradesh

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ABSTRACT

Indian agriculture is gradually diversifying towards high value food commodities. This is expected to benefit millions of farmers especially small holders, who rely on agriculture for their livelihood. Small holders, are efficient in production of high value commodities but are constrained to expand their scale of production due to lack of market access, access to improved technology, quality inputs, credit and high transaction cost. The study has analyzed the impact of food retail chain linkage on farmers for procuring fresh vegetables. Younger and educated farmers has entered into tie-ups with food retail chain Consolidation centre. Logistic regression analysis was estimated to identify the determinants of farmer participation in the supermarket channel. The farmers getting phone orders has a high positive impact on selecting the supermarket channel as the collection centers mostly order the produce from the farmers according to the daily indent requirement of the stores. Institutions like cooperatives, contract farming and growers associations are considered to improve producer's access to markets and the evidence indicate that these institutional innovations in marketing enhance their access to market, quality inputs, improved technology information and services which eventually lead to improvement in productivity and reduction in marketing and transaction costs.

Key words : Corporate organization, Regression coefficients, Supply chain system, Vegetable

A number of big corporate houses like Reliance, ITC, Spencers, Godrej, Food World, More have entered into the retail marketing of fresh vegetables. However, recently few of the food retail chains have established backward linkages with farmers for continuous procurement of fresh vegetables. 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. It is then believed that a single gate way to the regulated markets would save time and improve efficiency. Vertical coordination of farmers through co-operatives, contract farming and retail chains would facilitate better delivery of output, reduce market risks, provide better infrastructure, attract more public investment, acquire better extension services and would create awareness with regard to prevailing and new developing technologies and its multiplier effect would help in increasing income, output and employment (Birthal and Joshi 2007).

Institutions like co-operatives, contract farming and growers associations are considered to improve producer's accesses to markets, minimize transaction costs and alleviate production constraints (Patrick 2004). However these Institutions have their own merits and demerits. Contract farming is often criticized for firm's excessive control over farmer's production process, their tendency of monopolistic exploitation and exclusion of small farmer. On the other hand, co-operatives and growers associations are owned and managed by producers themselves and thus they are less susceptible to exploitation. Growers associations have started as an important grass root level institution enabling small holders participate in production and marketing of high value agricultural commodities (Birthal and Joshi 2007). This has hitherto provided assured markets to farmers for the disposal of their produce; however, recent entry of the corporate sector particularly at the wholesale level has started introducing farm level shifts in the cropping patterns (Goel, 2011). Towards this endeavor, the present paper has reported the results of a study conducted to find the impact of the new institutional innovations on farmers income and to analyze the determinants of channel choice selection by the farmer.

Table 1. Socio-economic characteristics of farmers in the two districts.

	Particulars	Super market supply farmers									Traditional market supply farmers								
		Tomato			Brinjal			Bhendi			Tomato			Brinjal			Bhendi		
		S	M	L	S	M	L	S	M	L	S	M	L	S	M	L	S	M	L
1	Age(years)																		
	RR	39.0	39.31	35.85	34.31	31.92	33.54	34.85	32.69	28.62	43.84	40.77	38.88	41.00	39.10	38.07	38.61	35.84	34.15
	MDK	43.2	41.46	39.53	40.07	35.07	35.30	38.53	35.00	31.61	46.38	43.38	41.84	45.61	40.0	39.69	42.61	38.69	36.38
2	Family size(No																		
	RR	5.62	5.77	5.23	5.62	5.54	5.08	5.00	4.92	4.46	6.72	6.23	5.69	5.84	5.69	5.15	5.84	5.39	4.92
	MDK	6.07	6.30	6.07	6.15	6.07	5.84	5.87	5.00	4.30	7.53	7.68	6.30	6.55	6.38	6.15	6.46	6.30	5.07
3	Literacy(years)																		
	RR	6.73	6.56	7.00	6.09	7.25	7.70	7.09	7.00	7.92	5.90	5.44	5.88	5.71	5.27	6.50	5.00	5.69	6.90
	MDK	6.30	6.36	6.54	5.81	7.00	7.50	6.81	6.20	7.60	5.60	5.07	5.00	5.25	5.33	6.08	5.08	6.10	6.50
4	Farm size (acres)																		
	RR	4.40	7.27	12.30	3.65	7.26	12.47	3.63	7.29	12.69	2.79	6.27	11.84	3.10	6.63	11.72	3.47	6.65	11.74
	MDK	3.96	7.83	10.55	4.80	7.54	11.45	3.68	6.55	10.85	3.99	7.37	10.33	4.21	7.60	10.75	4.08	4.84	10.25

RR - Rangareddy district MDK – Medak district S- small farmer M – medium farmer L – large farmer

MATERIAL AND METHODS

Two districts of Andhra Pradesh viz., Rangareddy and Medak which have been supplying vegetables to Hyderabad city were selected for the present study. In order to assess to what extent the supermarket channel preferred farmers are different from farmers supplying through traditional system data was collected from two groups of farmers i.e., farmers who supply directly to supermarkets and farmers who supply to traditional marketing agents (wholesalers, retailers etc). A sample size of 468 vegetable cultivators was selected of which 234 are from Rangareddy and 234 are from Medak district. Out of 234, 117 farmers are vegetable suppliers to supermarkets and 117 are vegetable suppliers to traditional markets. Out of 117 sample farmers tomato 39, brinjal 39 and bhendi 39 were selected duly including all the three category of farmers i.e., small, medium and large at the rate of 13 farmers from the three selected vegetables in each district.

ANALYTICAL TOOLS

Logistic regression analysis was estimated to identify the determinants of farmer participation in the supermarket channel. Logistic regression or logit analysis is a popular statistical modeling technique which allows for estimating the probability that an event occurs or not, by predicting a binary dependent outcome from a set of independent variables. The logit regression model was fitted with a set of ten variables i.e. the family size, the size of the farm in hectares, the age in years of the head of the farmer, the farming years experience, the number of years of schooling of the head, agriculture as their main occupation, farmers with phone orders, farmers with transportation vehicles, farmers having borewell and well irrigation facilities. The logit model in this study postulates that Pi, the probability that farmers participate in supermarkets or not, is a function of index variables Zi summarizing a set of the individual attribute. Considering the following presentation that a farmer adopts supermarket channel

$$P_i = E(Y = 1/X_i) = 1 / (1 + e^{-(\hat{a}_1 + \hat{a}_2 X_i)})$$

If P_i, the probability of selling to is as given by (2), then $(1-P_i)$ the probability of not selling to supermarkets.

$$1-P_i = 1/ 1+ e^{-Zi}$$

Therefore, we can write

$$P_i / (1-P_i) = (1+ e^{Zi}) / (1+ e^{-Zi}) = e^{Zi}$$

Now; $P_i / (1-P_i)$ is simply the odds ratio in favour of selling to supermarkets Taking natural log of (4), we obtain:

$$L_i = \text{In} [P_i / (1-P_i] = Z_i = \hat{a}_1 + \hat{a}_i x_i$$

That is L, the log of the odds ratio, I not only linear in X, but also linear in the parameters L is called the logit, and hence the name logit model.

RESULTS AND DISCUSSION

The collection centres set up in the study area i.e., Rangareddy and Medak districts have introduced a noval agribusiness model for marketing of agricultural commodities. The centres collect locally grown varieties of vegetables, and to a small extent, fruits. Farmers from distances of 15-35 Km supply vegetables to these centres. The collection 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 and about 100-150 farmers have been registered in a single collection centre. There is no formal contract or vertical integration for production or marketing under this agreement. The centre neither supplies any inputs for production nor does it formally agree to procure the produce, which makes the farmers risk bearers. The centres have no system of providing production credit to the farmers.

Quality control practices

To ensure the quality of produce, collection centre provides information on 'Good Agricultural Practices' (GAP) to farmers like technical guidance on aspects of planting time, crop production and management, harvest time, quantity to be harvested per acre, etc, to ensure quality and marketability, are provided by the collection centres which are only non monetary inputs. To reduce rough handling of produce, member-farmers clean, grade and pack the produce as per retail chain specifications. The farmers selling vegetables to collection centres are responsible for all the post harvest operations and again cleaning, sorting, grading was done at the collection centres. By shifting such responsibilities the collection centres has been able to reduce the transaction costs which is diametrically opposite to the handling of vegetables in the traditional markets, wherein they are just dumped in market yards. Thus a beginning in quality control of fresh vegetables has been made by the farmers.

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. The collection centre emphasizes on having more 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 retail chains need a regular supply of small quantities of vegetables, they prefer to establish backward linkages with small and marginal farmers. The procurement officers strive to reduce the purchase and transaction cost and raise product quality (Reardon et al., 2003). Since collection centres procure only that produce which complies with certain grade standards, farmers depend on the commission agents or local merchants for selling of their remaining produce.

Therefore, it is highly desirable that the entire marketed surplus is to be collected by collection centres, they should try to meet credit needs of farmers and play a role more than just being a wholesale marketer. During the initial stages the percentage of rejection in procurement from farmers was high as they were not accustomed to produce good quality produce. The quality specifications led farmers to change their cultivation practices leading to increase in the intensity of cultivation as well as production.

Pricing policy of consolidation centre

Prices of fresh vegetables are determined on the basis of the prices prevailing at different markets in Hyderabad city. The bench mark price is determined by considering the prices prevailing at Bowenpally wholesale market in Hyderabad city. 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. Under this format, the centre ensures input- cost plus minimum profit for a limited quantity of produce. It was found that farmers preferred to supply their produce to the

Table 2. A Comparision of gross returns from vegetable production under supermarket and traditional marketing channels.

	Particulars	Super market supply farmers									Traditional market supply farmers								
		Tomato			Brinjal			Bhendi			Tomato			Brinjal			Bhendi		
		S	M	L	S	M	L	S	M	L	S	M	L	S	M	L	S	M	L
1	Yield(Q/hect) RR	134	132	130	135	133	131	68	66	67	131	130	128	133	131	128	67	63	66
	MDK	151	149	148	153	151	149	73	71	70	149	147	146	150	149	148	71	70	68
2	Market price RR (Rs/Q)	693	691	688	703	701	693	1269	1233	1228	552	550	548	586	584	570	1148	1146	1131
	MDK	696	690	680	675	630	624	1168	1156	1150	470	468	460	511	500	494	1059	1057	1050
3	Input cost RR (Rs//hect) 000'	36	33	29	38	33	31	36	33	30	38	34	31	39	35	33	38	34	31
	MDK	35	31	30	37	32	30	37	32	29	37	32	30	38	34	31	36	35	30
4	Transport cost RR	50	58	65	45	49	53	55	60	65	290	340	380	250	280	310	23	245	260
	MDK	62	73	81	54	60	65	58	62	71	380	400	440	320	335	340	300	320	350
5	Grossreturns RR (Rs//hect) 000'	92	91	90	94	92	88	86	83	82	72	71	70	78	77	73	77	75	72
	MDK	105	103	100	103	95	93	85	84	81	70	69	66	77	74	72	76	75	73

RR - Rangareddy district MDK – Medak district S- small farmer M – medium farmer L – large farmer

Consolidation Centre, as it provided them stable prices and assured market, compared to the highly volatile prices at the wholesale market. The entry of organized sector helped the farmers in selling the produce directly to the retailer often without the predicament of the middle man (Bhatt 2008).

This offer a great hope for the farmers who can potentially fetch better price for their produce and can find a market on their door step. Under the new system of direct marketing, farmer had to incur extra expenses on crop care and post-harvest operations, like sorting and grading, which involves 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.

Socio-economic Implications of linkage of consolidation centre with farmers

A brief profile of the socioeconomic features of the sample farmers in the selected districts are presented in Table 1. The socioeconomic profile revealed that mean age of pooled supermarket supplying small farmers for tomato, brinjal, and bhendi crops was relatively less than that of traditional market supplying farmers which imply that supermarket supplying farmers are younger than traditional market supplying farmers. The literacy profile of supermarket supply small farmers for the three selected vegetables was lower than that of traditional market supplying farmers which revealed that supermarket supply farming was being practiced by more literate farmers. Younger and educated farmers prefer to sell their produce at Collection centers. Family size and farm size was relatively less for farmers associated with the Collection centre compared to traditional market farmers. These characteristics are expected to influence producer's decision whether to register in Collection centres or not.

A comparison of unit cost of production and gross returns of vegetable crops under supermarket and traditional marketing channels

In this section averages of input costs, transaction costs, prices, yield and revenue of three major vegetables, namely tomato, brinjal, bhendi under the two institutional arrangements have been assessed and presented in Table 2. The differences in profits and transaction costs have been used as indicators of the performance of an institutional arrangement in the marketing of agricultural commodities. Average yields of supermarket brinjal small farmer of Medak district was 151 q/hect which was slightly higher than the traditional market supply farmers. The price received by supermarket farmers of the three vegetables was higher than that of the traditional farmers due to the freshness retained and less damage caused during transportation.

Supermarket supply tomato, brinjal and bhendi farmers of Medak district realize higher output price than the traditional farmers by Rs 226 q^{-1} more in case of tomato, Rs 164 q^{-1} more in brinjal and Rs109 q^{-1} in case of bhendi. The farmers selling their produce to SAFAL realized 10-15 per cent higher profit than that through traditional channel (Changappa and Nagaraj 2005). The huge difference in the transportation costs is because the traditional farmers are travelling long distances in order to dispose off their produce in the wet markets, in spite of huge transportation costs the traditional farmers have to pay market fee and commission charges in wholesale market at Hyderabad city which comprises of 10 per cent of the value of the commodity traded. In nutshell, the results indicate that institutional linkages between producers and markets though make a smaller impact on crop yield and production cost they significantly reduce transaction costs to the producers.

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 model. In this model, the farmer's decision to choose a particular market channel follows a binary choice. The estimated coefficients â's for logistic regression with their significance levels are presented in Table 3. The log of odds in favour of selling vegetables at collection centres in Rangareddy district was positive and significantly associated with farm size, farming year's experience, farmers getting phone orders, with their chances of selling through supermarket channel increasing by 0.82,1.40 and 77.29 times. In Medak district farm size, farming year's experience, education, farmers getting phone orders and farmers with transport vehicles are significant and positively associated, with their chances of selling through supermarket channel increasing by 0.87, 1.26, 1.18, 31.57, 0.10 times. Farmers getting phone orders has a high positive impact on selecting the food retail chain marketing channel as the collection centers mostly order the produce from the farmers according to the daily indent requirement from the higher authority.

Table 3. Logistic regression coefficients of determinants of farmers channel choice in rangareddy and medak districts

S.No	Districts / Variables	Rangareddy district		Medak district.	
		Odds ratio exp (β)	Coefficients (β)	Odds ratio exp (β)	Coefficients (β)
1.	Family size	0.813	-0.206	0.556	-0.586**
2.	Farm size	0.829	0.187*	0.870	0.138*
3.	Age in years	0.734	-0.308***	0.844	-0.169***
4.	Farming years experience	1.407	0.341***	1.260	0.231***
5.	Education in years	1.114	0.108	1.180	0.166*
6.	Agriculture as main occupation	0.329	-1.111	0.815	-0.204
7.	Farmers getting phone orders	77.29	4.347***	31.575	3.452***
8.	Farmers with Transport vehicles	3.84	1.347	0.109	12.21**
9.	Irrigation (Borewell)	0.211	-1.553*	0.195	-1.632*
10.	Irrigation (well)	0.750	-0.287	1.079	0.1762
11.	χ^2	190.015		165.932	
	-2log λ	134.37		158.460	

*** Significant at one percent level
** Significant at five percent level
* Significant at ten percent level

The results reveal that farmers getting phone orders has a high positive impact on selecting the supermarket channel as the collection centers mostly order the produce from the farmers according to the daily indent requirement from the higher authority. With the increase in farming year's experience the probability of selecting the supermarket channel has increased. This is expected as experience enables producers to analyze advantages and disadvantages of alternative marketing channels.

The education of the farmer has a positive impact showing that with the improvement in the level of education, probability of selling vegetables at the collection centre increases. Hence it was found that younger and educated farmers had entered into tie-ups with food retail chain Consolidation Centre, which was due to their better awareness and enthusiasm to take risks and experiment with the new model (Mangala and Changappa 2008).With the ownership of transport vehicles, the chance of selling to the collection centre has increased. The coefficients of age, family size of the farmers were negative, which indicated that with the increase in age, family size the probability of selling vegetables at food retail chain collection centre reduced and the probability of selling at traditional market increases. The younger and small family size farmers preferred the supermarket channel than the traditional marketing.

CONCLUSIONS

The efforts of retail food chains in terms of backward integration to link with farmers have benefitted the small farmers to a great extent. The food retail chains has organized vegetable consolidation centre and is offering better price to farmers, provided the produce is of better quality. Lack of access to markets and thereby higher transaction costs, however, is one of the major barriers to expansion of high value agriculture on small farms. Evidence shows that small holders are involved in such institutions and derive significant benefits from reduction in transaction costs. The

new institutional arrangement by Consolidation centre has helped the farmers to break away from the clutches of traditional brokers/wholesalers/ commission agents. Direct supply by farmers has allowed the retail chain to simultaneously increase control over the quality, supply reliability and price stability. Institutional innovations that link production with markets, enable producers cope up with such risks, contribute towards development of efficient markets and extension systems, and reduce burden on public exchequer of providing such services.

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