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Resource use efficiency and economics of marketing of green chilli

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Abstract

The study was conducted in Achalpur tahsil of Amravati district of Maharashtra with a sample of 80 farmers selected randomly from four villages with twenty farmers from each village. Data used were pertaining to the period 2009–10. Production function analysis of data indicated that, among various resources selected, human labour, bullock labour and machine power in small farmers, seed, bullock labour and fertilizers and manures in medium farmers and the fertilizers and manures in large farmers were statistically significant. The ratio of marginal value product to its acquisition cost per unit was found to be greater than unity for the variables plant protection chemicals and fertilizers and manures in small farmers, variables human labour and fertilizers and manures in medium farmers and the variables seed, human labour and fertilizers and manures in large farmers. Also economic analysis of data indicated that majority of farm produce was routed through two marketing channels, Channel-I (Producer-commission agent-retailer-consumer) and Channel-II (Producer-commission agent-Wholesaler-retailer-consumer). Producer's share in consumer's rupee was found to be 56.31%, 40.59% and price spread was Rs. 655.35 Rs. 891 q^{-1} for Channel-I and Channel-II respectively.

Keywords: chilli, marginal value product, marketing efficiency, price spread, resource use efficiency

Introduction

Chilli is the major spice contributing 40-42% by volume 20-22% by value of total spices exported from India. In Maharashtra state, area and production of chilli was around 111 million ha and 96 million tones, respectively during 2009–10. The present study was undertaken to study resource use efficiency in chilli production and to analyze marketing cost, price spread and producer's share in consumer's rupee of green chilli in Amravati district of Maharashtra state.

Materials and methods

Achalpur tahsil in Amravati district have emerged as the most popular for chilli production because of best suited climate, soil, irrigation facilities, skill and intensive cultivation practices adopted by the farmers of this area and selected for the study. Total four villages and twenty farmers from each village i.e. 80 farmers were selected randomly as sample

Table 1. Farmer category and economics of chilli production

Farmer category	Criteria (Holding size ha^{-1})	Number	Average yield q acre^{-1} (Green chilli)	Sold		Gross return (Rs. acre^{-1})	Cost of cultivation (Rs. acre^{-1})		
				Green	Dry		Cost A	Cost B	Cost C
Small	0-2	30	73.51	41.83	7.92	59,871	25,523	36,153	40,541
Medium	2.01-5.0	25	80.97	43.65	9.33	66,925	27,203	39,029	42,811
Large	> 5.01	25	83.73	43.81	9.98	74,821	34,778	50,510	53,421

(Figures in parenthesis indicates percentage to total sample size and total area)

size (Table 1). Data collected during 2009-10, by interviewing selected farmers by survey method with pre tested designed schedule. The conventional tabular analysis and percentage analysis were made. The resource use efficiency was studied through production function analysis.

The Cobb-Douglas production function which gave best fit was selected to establish the input-output relationship with returns per farm as dependent variable and inputs *viz*., seed, human labour, bullock labour, machine power, plant protection chemicals expenditure manures and fertilizers and as independent variables. The regression coefficients of different inputs used in the production function were estimated separately for each size group of sample farms. The general form of the function fitted was specified as follows -

$$Y = aX_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} X_6^{b6}$$

Where, Y=Gross returns in rupees; a =Constant; X_1=Value of seed in rupees; X_2=Value of human labour in rupees; X_3=Value of Bullock labour in rupees; X_4=Value of machine power in rupees; X_5=Value of plant protection chemicals in rupees; X_6=Value of manures and fertilizers in rupees b_1-b_6=The Regression coefficient of ith independent variable (i=1 to 6).

To estimate resource use efficiency marginal value product of each input was worked out at its geometric mean level. To examine the economic efficiency of resource use, the marginal value of product of each resource was worked out by using following formula:

$$MVP = bi\ (\bar{y} / \bar{x})\ Py$$

Where, bi=Regression co-efficient for ith independent variable; $\bar{y}$ =Geometric mean of gross return of the chilli; $\bar{x}$=Geometric mean of ith independent variable; P_y=Price of output (Rs q^{-1}).

Price spread was calculated by estimating difference between price paid by consumer and net price received by producer. It includes all market charges incurred during the process of marketing. Producer's share in consumer's rupee is the price received by farmers expressed as percentage of retail price i.e. consumer's price. This indicator was very helpful in deciding the appropriate strategies for reducing the market costs and to balance the price of producer and consumer.

Results and discussion

Production function analysis and resource use efficiency

For small farmers the regression coefficient (Table 2) of human labour, bullock labour and machine power was found to be significant at 10% and 5% level of significance. Value of coefficient of determination i.e. R^2 was 88.85 indicating that 88.85% variation in gross returns were explained by selected variables. For medium farmers the regression coefficient of seed was negative and significant at 1% level. Bullock labour was found to be significant at 10% level and fertilizers and manures were found to be positive and significant at 5%. Value of R^2 was 93.90%. For large farmers the regression coefficient of fertilizers and manures was found to be significant at 5% level and value of R^2 was found to be 93.50%. Negative elasticity of production of variables indicated excessive use of these inputs of which increase in further quantity decreases the gross returns. These

Table 2. Resource use efficiency in chilli production

Sl. No	Particulars	Size Group		
		Small	Medium	Large
1	Constant	12.5384 (3.0705)	6.1091 (1.5721)	2.2163 (5.9547)
2	Seed (X_1)	-0.1049 (0.3695)	-0.9121*** (0.4041)	0.0591 (0.4693)
3	Human labour (X_2)	-1.3251* (0.6846)	0.6132 (0.3434)	1.1145 (1.1908)
4	Bullock labour (X_3)	-0.6047** (0.2539)	-0.0950* (0.2509)	0.0035 (0.4179)
5	Machine power (X_4)	-0.8062** (0.3460)	-0.2693 (0.2836)	-0.5755 (0.6879)
6	Plant Protection chemical (X_5)	0.2192 (0.1747)	-0.1082 (0.1754)	-0.3487 (0.3619)
7	Fertilizers and Manures (X_6)	0.4125 (0.2519)	0.1681** (0.2346)	0.1944** (0.2232)
8	Coefficient of determination (R^2)	88.85	93.90	93.50
9	Number of observation (N)	30	25	25

Note: Figures in parenthesis are standard errors of regression coefficients
* significant at P<0.01, ** significant at P<0.05, *** significant P<0.01.

findings are in conformity with the earlier reports by Korikanthimath *et al.* (2002) and Dumbare (2004).

In order to examine the resource use efficiency the ratio of marginal value of product (MVP) to their acquisition cost were calculated for each size group separately for all variables. If the value of M.V.P. to factor cost ratio is positive and > 1, there exists scope for increasing the level of it's use to maximize the profit and negative values indicates excessive use of these variables on the farm which must be reduced to recommended level.

From Table 3 it is observed that, in case of small farmers M.V.P. to factor cost ratio for the variables plant protection chemicals and fertilizers and manures were > 1 indicating that there is scope to increase the level of these inputs in chilli crop production and the variables seed, human labour, bullock labour and the variable machine power were found to be negative indicating excessive use of these inputs. In case

Table 3. Ratio of MVP to its acquisition cost per unit for inputs used for chilli production

Sl. No.	Particulars	M.V.P. to factor cost size group		
		Small	Medium	Large
1	Seed (X_1)	-3.3744	-36.3952	2.1006
2	Human labour (X_2)	-6.0804	3.4985	6.3960
3	Bullock labour (X_3)	-22.3106	-4.9560	0.4125
4	Machine power (X_4)	-42.3627	-17.7824	-33.8786
5	Plant Protection chemical (X_5)	4.8054	-3.1458	-7.7923
6	Fertilizers and Manures (X_6)	5.9835	2.6472	2.7614

Note: M.V.P. compared with Rs.1.00.

of medium farmers M.V.P. to factor cost ratio for the variables human labours and fertilizers and manures were > 1 and the variables seed, bullock labour, machine power, plant protection chemicals were found to be negative. In case of large farmers M.V.P. to factor cost ratio of the variables seed, human labour and fertilizers and manures were > 1, the variable bullock labour was < 1 indicating that these inputs are underutilized and the variables machine power and plant protection chemicals were found to be negative. Similar reports were made by Thilagavathi *et al.* (2002).

Channels of distribution of green chilli

In case of green chilli there were two major channels of distribution seen in the market *viz*., Channel I: Producer → Commission agent → Retailer → Consumer; Channel II: Producer → Commission agent → Wholesaler → Retailer → Consumer.

Among these channels about 45% of the major share of produce was routed through Channel-I and about 65% of major share of produce was routed through Channel-II.

Price spread and producer's share in consumer's rupee

From Table 4 it was observed that, total marketing cost was Rs.219.70 for Channel-I and Rs.289.99 for Channel-II. In Channel-I the highest cost accounted for the commission charges paid by the farmer (27.31%) followed by the transport cost (18.30%) and in case of Channel-II the highest cost accounted for the commission charges paid by the farmer (15.52%) followed by the transport cost (14.32%). Similar results were observed by Raut (1998) and Kharse *et al.* (1999).

In case of Channel-I, the total market margin was found to be Rs.495.69 and the market margin of retailer was Rs.453.02 (91.39%) higher than the market margin of commission agent Rs.17.37 (7.91%). In case of Channel-II, the total market margin was Rs.646.11 and the market margin of retailer Rs.453.02 (70.11%) was comparatively higher than the market margin of wholesaler Rs.165.46 (25.61%) followed by market margin of commission agent Rs.17.37 (5.99%). It was also observed that the price spread in Channel-I and Channel-II was Rs.655.35 and Rs.891.10, respectively. From this it was revealed that the price spread was higher in Channel-II. It was also observed that in case of Channel-I the producer's share in consumer's rupee was 56.31% and in case of Channel-II it was 40.59%. Similar results were observed by Patil *et al.* (2007).

From production function analysis, it is concluded that more returns from chilli crop can be gained by optimum use of human labour, manures, fertilizers and plant protection chemicals. It can also be concluded that Channel- I (Producer- Commission agent- Retailer- Consumer) was more profitable than Channel- II (Producer- Commission agent- Wholesaler- Retailer- Consumer). There is need to develop farmers cooperative marketing system for efficient marketing in order to increase the producer's share in consumer's rupee and to avoid the monopoly of traders/ commission agents.

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Table 4. Channelwise marketing cost, market margin, price spread and producer's share in consumer's rupee (Rs. q^{-1})

Sl. No.	Particulars	Channel-I	Channel-II
1	Gross price received by farmer (P_F)	1000	750
2	Marketing cost of farmers (MC_F)		
	a) Preparation of produce for market	5.00(2.28)*	5.00(1.72)*
	b) Packaging cost	26.04(11.85)*	25.33(8.74)*
	c) Transportation cost	40.21(18.30)*	41.52(14.32)*
	d) Octroi	5.00(2.28)*	5.00(1.72)*
	e) Market fees	2.25(1.02)*	2.25(0.78)*
	f) Commission	60.00(27.31)	45.00(15.52)*
	g) Weighing charges	2.00(0.91)*	2.00(0.69)*
	h) Labour charges for loading & unloading	10.50(4.78)*	10.50(3.62)*
	i) Other charges	4.35(1.98)*	4.50(1.55)*
	Total marketing cost of farmers (MC_F)	155.35(70.71)*	141.10(48.66)*
3	Net price received by farmers ($P_F - MC_F$)	844.65	608.90
4	Marketing cost of commission agent (MC_{CA})		
	a) Rent for shop	6.66(3.03)*	6.66(2.30)*
	b) Labour cost	5.00(2.28)*	5.00(1.72)*
	c) License fee	2.15(0.98)*	2.15(0.74)*
	d) Other	3.56(1.62)*	3.56(1.23)*
	Total marketing cost of commission agent (MC_{CA})	17.37(7.91)*	17.37(5.99)*
5	Commission received by commission agent (C_{CA})	60.00	45.00
6	Market margin of commission agent (MM_{CA}) ($MC_{CA} - C_{CA}$)	42.67(8.61)**	27.63(4.28)**
7	Price paid by wholesaler	-	750
8	Marketing cost of wholesaler (MC_w)		
	a) Transportation cost	-	40.58(13.99)*
	b) Labour cost	-	10.50(3.62)*
	c) Market fees	-	3.45(1.19)*
	d) Rent for shop	-	7.50(2.59)*
	e) Spoilage	-	17.01(5.87)*
	f) Other	-	5.50(1.89)*
	Total marketing cost of wholesaler (MC_w)	-	84.54(29.15)*
9	Price received by wholesaler (P_w)	-	1000.00
10	Market margin of wholesaler (MM_w)	-	165.46(25.61)**
11	Price paid by retailer (P_r)	1000	1000
12	Marketing cost of retailer (M_r)		
	a) Transportation cost	15.05(6.85)*	15.05(5.19)*
	b) Labour cost	5.11(2.33)*	5.11(1.76)*
	c) Market fees	4.10(1.87)*	4.10(1.42)*
	d) Municipal fees	2.00(0.91)*	2.00(0.67)*
	e) Rent for stall	2.50(1.14)*	2.50(0.87)*
	f) Spoilage	15.22(6.92)*	15.22(5.25)*
	g) Other	3.00(1.36)*	3.00(1.04)*
	Total marketing cost of retailer (MC_R)	46.98(21.38)*	46.98(16.20)
13	Price received by retailer (P_R)	1500	1500
14	Market margin of retailer (MM_R)($P_r - MM_r$)	453.02(91.39)**	453.02(70.11)**
15	Total marketing cost($MC_F + MC_{CA} + MC_W + MC_R$)	219.70(100)	289.99(100)
16	Total marketing margin($MM_{CA} + MM_W + (MM_R$)	495.69(100)	646.11(100)
17	Producer's net price ($P_F - MC_F$)	844.65	608.90
18	Consumer's price (P_C)	1500	1500
19	Producer's share in consumer's rupee (%)	56.31	40.59
20	Price spread Rs. q^{-1}. ($NP_F - P_C$)	655.35	891.10

Note: Figures ()*, ()** in parenthesis are percentage to total marketing cost and total market margin of channel respectively.

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