Marketable Surplus and Price-Spread for Maize in Hamirpur District of Himachal Pradesh

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Abstract

A study has been conducted on the production, marketed surplus, disposal channels, margins and price-spread for maize cultivation in the Hamirpur district of Himachal Pradesh. A multi-stage stratified sampling technique has been used to select the sample of blocks (2), villages (10) and maize growers (120) for the year 2001-02. The study on factors affecting marketed surplus, and cost & margins in the marketing of maize has revealed that farm-level marketable surplus is comprised of 53.21 per cent of the total production. The practices of storing maize for sometime and selling at a later date for higher price have led to storage losses to the extent of 0.16 quintal (2.80% of marketable surplus). Much of the marketable surplus of maize (66.92%) was disposed of by a majority of farmers (74.56%) during the first quarter (October- December). Producer → Local trader → WS/ CA → Processor/ Consumer has been found as the main channel in the marketing of maize followed by about 71.93 per cent farmers, accounting for about 70 per cent of the produce. The producer's share in consumer's rupee has been estimated at 78.01 per cent in this channel.

Introduction

Maize is one of the most important cereal crops of Himachal Pradesh, contributing 36.5 per cent to its foodgrains basket with 45.8 per cent of the area under foodgrains. Its productivity (2035 kg/ha) was the third highest after Karnataka (3188 kg/ha) and Andhra Pradesh (2979 kg/ha) in India during triennium ending 1998-99. Marketing of produce in hills is a difficult task due to such problems as lack of infrastructural facilities, particularly of well-developed markets, all-weather roads due to difficult terrains, and

poor market-intelligence system. The marketing of agricultural produce in hills is more complicated as a majority of the farmers are marginal and small, largely illiterate, unorganized and scattered. They do not have time, knowledge, skills and access to marketing of their produce. Further, they do not have strong bargaining strength due to their poor financial conditions, and they are forced to sell their marketable surpluses immediately after the harvest at low prices. There is a dearth of marketing facilities in the interior, hilly and tribal areas. There is no agency actively involved in the procurement of maize grains and its marketing. Hence, there is a need to examine the whole system of marketing, including the marketing costs and margins of various intermediaries engaged in maize-marketing and various other factors affecting the marketed surplus of maize. Keeping these facts in view, this study has been designed with the following specific objectives:

(i)   To estimate the production and disposal patterns of maize and the relative contribution of factors affecting its marketed surplus,

(ii) To identify the marketing channels of maize and to analyse the marketing costs, margins and price-spread through important channels, and

(iii) To study the problems and constraints in the marketing of maize.

Methodology

The study was conducted in the Hamirpur district of Himachal Pradesh because this district had the largest area under maize as a proportion of the net cultivated area as well as total cropped area. The multi-stage stratified sampling technique was employed to select the sample of blocks (two in number), villages (ten in number) and households (120 maize growers). Two blocks were selected randomly for the study. From each selected block, a sample of five villages selected through proportional allocation. From each selected village, a sample of 12 farmers selected at random formed the third and final stage, thus making a total sample of 120 units. The selected farmers were categorized into small (up to 0.48 ha landholding) and large (above 0.48 ha landholding), based on the cultivated area under maize, using the square-root cumulative frequency method. The primary data on various aspects relating to production, consumption and disposal pattern of maize were collected from the selected maize growers of different size-groups, using schedules specially designed and pre-tested for this purpose through personal interview for the agricultural year 2001-02. Both the linear and Cobb-Douglas functions were fitted to examine the factors affecting the marketed surplus of maize. However, statistically, the linear form of the following type [Equation (1)] was found more plausible and appropriate on the basis of R^2:

$$Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + u \qquad \ldots(1)$$

where,

Y = Marketed surplus of maize in q/ household,

X_1 = Production of maize in q / household,

X_2 = Total consumption in q / household,

X_3 = Family size in adult units (1 male / female = 1 adult unit and 2 children < 15 years = 1 adult unit),

X_4 = Annual off-farm income in Rs / household,

X_5 = Average price received in Rs / q,

X_6 = Education of the head of the family, assigning value 0, 1, 2, 3, 4, 5 and 6 for illiterate, primary, middle, matriculate, secondary, graduate, and post-graduate qualifications, respectively.

To find marketing costs and margins, primary data on various aspects such as prices received and paid for the produce, different costs incurred while packing, assembling and handling, loading/unloading, transportation, wastage during handling and transit, market fee incurred by maize growers, private local traders, wholesalers/commission agents, brokers and processors/consumers in Punjab (Hoshiarpur, Moga and Amritsar markets where Himachal's maize was sold) were collected through the personal interview method.

Results and Discussion

Area and Production of Maize

The average size of the sample operational holdings was 0.93 ha and the average area under maize was 0.59 ha which constituted 63.44 per cent of the operational holdings (Table 1). However, both the average size of operational holdings and the average area under maize varied largely among the two categories of farmers. While the average size of operational holdings was 0.45 and 1.54 ha for small and large farmers, respectively, the average area under maize was 0.29 and 0.96 ha, respectively (bearing a ratio of 1: 3.31). It was evident that maize crop occupied the largest area of operational holdings amongst all categories of farmers.

The average production of maize per farm was as high as 10.75 quintals and varied widely from 6.36 quintals on small farms to 16.32 quintals on large farms, with a ratio of 1: 2.57. This clearly indicated that the volume of production of maize had a positive relationship with the farm-size. However, the productivity of maize which varied widely did not follow a

Table 1. Area and production of maize for sample farmers

Farm category	Area		Total maize production	Productivity
	Average size of operational holdings (ha)	Average area under maize (ha)	(q)	(kg/ha)
Small farms	0.45	0.29 (64.44)	6.36	2193
Large farms	1.54	0.96 (62.34)	16.32	1700
All farms	0.93	0.59 (63.44)	10.75	1822

Note: Figures within the parentheses are percentages of operational holdings

similar trend, rather depicted an inverse relationship, being 2193 and 1700 kg/ha for small and large farmers, respectively with an overall average of 1822 kg/ha. The lower productivity on large farms was due to more number (8.83) of land fragments in comparison to those for small category (4.93) and larger distance of these fragments from their houses as well as from fragment to fragment.

Consumption and Marketable Surplus of Maize

Consumption and marketable surplus of maize, shown in Table 2, revealed that the average farm-level retention of maize was 5.03 quintals and this left a marketable surplus of 5.72 quintals, which constituted 53.21 per cent of the average total production of 10.75 quintals. For the individual categories of farmers, both the average size of farm-level retention and marketable surplus varied widely. The average farm-level retention for small and large farmers was 3.73 and 6.65 quintals, showing a ratio of 1: 1.78. It left a marketable surplus of 2.63 and 9.67 quintals at their disposal which constituted 41.35 and 59.25 per cent of the average production for respective category of farmers. A major proportion of the farm-level retention, being as high as 83.11 and 71.13 per cent for home consumption by small and large farmers, respectively revealed that small farmers consumed greater proportion of their production. Singh (1992) in his study on marketing of maize in the district of Rajouri of Jammu & Kashmir also found that small farmers consumed a higher proportion of their production than large and medium farmers. The payments in kind were less than 5 per cent of the farm retention for each of the farm categories. Farm-level retentions for seed and cattle feed requirements were 12.06 and 15.94 per cent for small and large categories of farmers. It reflected the differences in the consumption patterns of maize across the farm groups. However, while the

Table 2. Production, farm level retention and marketable surplus of maize

(in quintals)

Particulars	Small farms	Large farms	All farms
Production	6.36	16.32	10.75
	(100)	(100)	(100)
Farm level retention	3.73	6.65	5.03
	(58.65)	(40.75)	(46.79)
Home consumption	3.10	4.73	3.82
	[83.11]	[71.13]	[75.94]
Seed & cattle feed requirement	0.45	1.06	0.72
	[12.06]	[15.94]	[14.32]
Kind payment	0.12	0.32	0.21
	[3.22]	[4.81]	[4.17]
Retained for next year	0.06	0.54	0.28
	[1.61]	[8.12]	[5.57]
Marketable surplus	2.63	9.67	5.72
	(41.35)	(59.25)	(53.21)
Storage losses	0.12	0.26	0.16
Marketed surplus	2.51	9.41	5.56

Note: Figures within the circular parentheses and square brackets are percentages of total production and farm level retention, respectively

absolute amount of farm-level retention and its components had a positive association, the percentage share had a negative association with the size of holdings. Similar findings were reported by Goel and Singh (1998).

It can also be visualized from Table 2 that marketed surplus was not exactly equal to marketable surplus because the farmers did not sell the maize immediately during the post-harvest period but rather stored some amount to avail the price rise benefit later. But, the poor storage structure led to storage losses which were to the extent of 0.12 quintal on small category to 0.26 quintal on large farms.

Month-wise Disposal of Maize

Agricultural produce usually fetches less price if sold just after the harvesting season and a higher price if sold during the lean period. Month-wise disposal pattern of maize (Table 3) revealed that around 22 per cent of the farmers who were not having adequate and proper storage facilities sold 15.14 per cent of their total maize produce immediately after the harvest in the month of October. The proportion of this category was higher on small farms which indicated that immediate cash needs and inadequate storage facilities compelled them to sell immediately after the post-harvest

Table 3. The disposal pattern of maize — Monthwise

Month	Small farms		Large farms		All farms	
	Farmers (No.)	Quantity (q)	Farmers (No.)	Quantity (q)	Farmers (No.)	Quantity (q)
A. Quarter-I	43	119.35	42	326.90	85	446.25
	(70.49)	(70.98)	(79.24)	(65.54)	(74.56)	(66.92)
October	17	37.65	8	63.30	25	100.95
	(27.87)	(22.39)	(15.09)	(12.69)	(21.93)	(15.14)
November	21	66	12	68.65	33	134.65
	(34.43)	(39.25)	(22.64)	(13.76)	(28.95)	(20.19)
December	5	15.70	22	194.95	27	210.65
	(8.19)	(9.34)	(41.51)	(39.09)	(23.68)	(31.59)
B. Quarter-II	18	48.82	11	171.83	29	220.65
	(29.51)	(29.02)	(20.76)	(34.46)	(25.44)	(33.08)
January	8	29.55	3	27.15	11	56.70
	(13.11)	(17.57)	(5.66)	(5.44)	(9.65)	(8.50)
February	1	2.77	4	100.04	5	102.81
	(1.64)	(1.65)	(7.55)	(20.06)	(4.39)	(15.42)
March	9	16.50	4	44.64	13	61.14
	(14.76)	(9.80)	(7.55)	(8.96)	(11.40)	(9.17)
C. Total	61	168.17	53	498.73	114	666.90
	(100)	(100)	(100)	(100)	(100)	(100)

Note: Figures within the parentheses indicate percentages of total.

period. A majority of average farmers (29 per cent) sold 20.19 per cent of their produce in the month of November. But between the small and large farms, about 34 per cent of the small and 23 per cent of the large farmers sold around 39 and 29 per cent of their produce, respectively in November. Only 25.44 per cent of the total farmers (29.51 per cent of small category and 20.76 per cent of large category) who had better storage facilities, sold 33.08 per cent maize during the second quarter (January – March), when the prices were high.

A perusal of Table 3 concluded that sale of maize by average farmers was higher (66.92%) during the first quarter (October - December) than during the second quarter (33.08%) after the harvest. After March, no sale of maize was recorded in the study area, and on the whole, the marketing of maize was spread over six months, from October to March in the study area.

Factors Affecting Marketed Surplus of Maize

The results of regression analysis of marketed surplus of maize pertaining to pooled farms, given in Table 4, depicted that production, family

Table 4. Estimated coefficients of linear production function on pooled situation
(N=120)

Variables	Coefficients	Standard error
Constant	5.5136***	1.3696
Maize production (X_1)	0.7469***	0.0445
Total consumption (X_2)	-0.0013	0.0017
Family size (X_3)	-0.4330***	0.1800
Off- farm income (X_4)	-7.5218*	4.5277
Average price received (X_5)	-0.0073***	0.0022
Education of head of family (X_6)	-0.0250	0.1141
Coefficient of multiple determination (R^2)	0.7188	

*, *** show significance at 10 % and 1 % levels, respectively

size and average price received were the major factors responsible for a significant impact on the size of marketed surplus. Only the production of maize showed a positive effect on the size of marketed surplus while the family-size and average-price received revealed an inverse relationship with the market supply. Production was the most dominant and significant factor to increase the marketed surplus indicating that one unit (quintal) increase in production of maize could result in an increase of about 75 kg in the marketed surplus of maize.

The most important factor having inverse relationship with the marketed surplus and causing significant reduction in it was the 'family-size'. It was found that with the increase of one family-member, the marketed surplus decreased by around 43 kg. The coefficient of average price having negative sign was due to distress sale by a fraction of maize growers just after the harvest. A perusal of Table 4 also revealed that all the explanatory variables collectively explained about 72 per cent of the variations in the marketed surplus of maize.

Marketing Channels of Maize

There were three channels for marketing of maize in the study area (Table 5):

Channel-I: Producer $\rightarrow$ Consumer

Channel-II: Producer $\rightarrow$ Local Trader $\rightarrow$ WS/ Commission Agent $\rightarrow$ Processor / Consumer

Channel-III: Producer $\rightarrow$ Local Trader $\rightarrow$ WS/Commission Agent $\rightarrow$ Broker $\rightarrow$ Processor/ Consumer

It was observed from Table 5 that Channel-I did not show much relevance because the sale within the village communities was not even

Table 5. Disposal of maize thorough different marketing channels

Channels	Small farms		Large farms		All farms	
	Farmers (No.)	Quantity (q)	Farmers (No.)	Quantity (q)	Farmers (No.)	Quantity (q)
Producer → Consumer	3 (4.92)	1.60 (0.95)	-	-	3 (2.63)	1.60 (0.24)
Producer→Local trader→WS/ Commission agent→Processor / Consumer	45 (73.77)	120.04 (71.38)	37 (69.81)	350.08 (70.19)	82 (71.93)	470.12 (70.46)
Producer→Local trader→WS/ Commission agent→ Broker→Processor / Consumer	1 (21.31)	46.53 (27.67)	16 (30.19)	148.65 (29.81)	29 (25.44)	195.48 (29.30)
Total	61 (100)	168.17 (100)	53 (100)	498.73 (100)	114 (100)	667.20 (100)

Note: Figures within the parentheses show percentages to total

one per cent. Channel-II was the main channel in the marketing of maize produce because 71.93 per cent of the farmers marketed around 70 per cent of their produce through this channel in the study area. It was also observed during the investigations that on the whole, 95 per cent of the farmers had marketed surplus of maize where the percentage of small farmers was around 91 per cent and that of large farms almost 100 per cent. Channel-III was another important channel involving broker as an additional intermediary through which 25.44 per cent growers marketed 29.30 per cent of their produce.

Marketing Costs, Margins and Price-Spread in Different Channels

Marketing costs involved in the marketing channels have been always a matter of great interest, as the higher marketing costs make the marketing system inefficient and are against the interests of both producers and consumers. Marketing costs and margins of different intermediaries involved in the marketing of maize were analyzed and have been presented in Table 6. Producer-farmers received a net price of Rs 518.29/q in both the channels which accounted for 78.01 per cent of consumer's price in Channel-II and 77.81per cent in Channel-III. Also, no marketing cost was incurred by the producer-farmer. Different costs incurred by the local traders were to the

Table 6. Marketing costs, margins and price-spread through two main channels in the study area

(Rs / q)

Particulars	Channel II	Farmer's share in consumer's price, %	Channel III	Farmer's share in consumer's price, %
Net price received by the producer	518.29	78.01	518.29	77.81
Costs incurred by local trader	93.56	14.08	93.56	14.05
(i) Packing	13.29	2.00	13.29	1.99
(a) Gunny bags	12.61	1.89	12.61	1.89
(b) Labour	0.68	0.10	0.68	0.10
(ii) Assembling and handling charges	10.60	1.59	10.60	1.59
(iii) Loading	0.82	12.34	0.82	0.12
(iv) Transportation costs	38.65	5.82	38.65	5.80
(v) Wastage during handling and transit	2.04	0.31	2.04	0.31
(vi) Market fee	12.72	1.91	12.72	1.91
(vii) Misc. (State tax & toll tax, etc.)	12.58	1.89	12.58	1.89
(viii) Unloading, cleaning, grading, and weighing charges	2.86	0.43	2.86	0.43
Sale price of local trader/ purchase price of WS/CA	636.00	95.73	636.00	95.48
Gross margin of local trader	117.71	17.72	117.17	17.67
Net margin of local trader	24.15	3.63	24.15	3.63
Costs incurred by WS/CA (storage, postage, communication, etc.)	0.10	0.02	0.10	0.02
Sale price of WS/CA / cost price of broker	651.90	98.12	651.90	97.86
Gross margin of WS/CA	15.90	2.39	15.90	2.39
Net margin of WS/CA	15.80	2.38	15.80	2.37
Costs incurred by broker (rent, postage, communication)			0.02	0.01
Sale price of broker			653.65	98.13
Gross margin of broker			1.75	0.26
Net margin of broker			1.73	0.25
Costs incurred by processor/ consumer	12.48	1.88	12.48	1.87
i) Cleaning, grading, weighing, loading/unloading	1.90	0.29	1.90	0.29
ii)Transportation charges	10.58	1.59	10.58	1.58
Purchase price of processor/ consumer	664.38	100	666.13	100
Price-spread	146.09	-	147.84	-

extent of Rs 93.56/q in both the channels. These included costs on packing, assembling and handling, loading, transportation and wastage during transit, market fee, state tax, octroi, unloading, cleaning, grading and weighing. The net margin of the local traders was Rs 24.15/q, which accounted for 3.63 per cent of consumer's price in both the channels. Net cost borne and net margins of ws/commission agent were Re 0.10/q and Rs 15.80/q, respectively in both the channels. The broker was found to be an important intermediary in Channel-III, whose marketing cost and margins were Re 0.02 and Rs 1.73/q, respectively. Marketing cost incurred by processor / consumer before using it for further consumption was Rs 12.48/q in both the channels. Thus, the final consumer's price was determined at Rs 664.38 and Rs 666.13 per quintal in Channel-II and Channel-III, respectively. The slightly higher market price paid by the consumers through Channel-III was due to the involvement of an additional intermediary — the broker (Table 6). Moreover, the two channels pertained to two consuming markets at Hoshiarpur (Channel- II) and Moga/Amritsar (Channel-III) located at a distance of about 100 km.

Problems and Constraints in Marketing of Maize

The increased production of agricultural commodities as a result of technical breakthrough has posed numerous marketing problems and constraints due to non-development of appropriate infrastructure like transportation, storage and processing, etc. required for the management of the surplus produce in Himachal Pradesh. A study was, therefore, made on various problems encountered by the farmers and local traders in the marketing of maize.

Firstly, the low-cost transportation which is the back-bone of an efficient marketing system is lacking in the study area, particularly, during the peak season, as per the local traders. Secondly, although the government has established a maize market at Kuthera, but due to high standards of procurement at this market, the average farmer in the study area was not found selling his produce in this market. Also, the per unit price of maize offered was less in this market as compared to one which the farmers could get from the private local traders who further marketed it in foodgrains markets of Hosiarpur, Amritsar and Moga in Punjab state. Thirdly, due to small marketable surplus, farmers could not themselves go to the distant markets and were fully dependent on the local traders who purchased their marketable surplus and sold in the district markets. So there was monopoly of local traders in the market. Fourthly, due to lack of proper and scientific storage facilities and lack of market information on arrivals and prices, a majority of farmers sold their produce immediately after the harvest. Finally, due to high cost and scarcity of good quality gunny bags, during the peak

season, local traders were forced to use gunny bags of inferior quality, which increased the post-harvest losses. The higher inter-state tax was another problem forcing its local sale. All these reduced producer's share in the consumer's rupee.

Conclusions and Policy Implications

The study concludes that maize is the single largest *kharif* crop grown among all the categories of farmers in the study area. Both the average productivity and the average farm level retention vary across the two categories of farmers. But, the former has depicted a positive, and the latter a negative relationship with the size of holdings. A major portion of the marketed surplus is sold through Channel –II (i.e. Producer→Local Trader → WS/Commission Agent → Processor / Consumer). Producer's share in consumer's rupee has been found to be 79.50 per cent in Channel II, and 79.29 per cent in Channel III. A majority of the farmers (28.95%) sell their produce just after the harvest, in the month of November. Lack of transportation, high procurement standards at the Kuthera market, monopoly of local traders, lack of proper and scientific storage facilities, high cost and scarcity of gunny bags during the peak season, and high inter-state tax are the major problems being faced by the producer-farmers and local traders in the marketing of maize.

To help farmers and minimize post-harvest losses, proper storage infrastructure facilities need be established in the production areas of maize. The policy implications call for educating the farmers about cleaning, drying and other standards of procurement. The Himachal Pradesh Marketing Board should prepare a market plan to tone-up the procurement system for maize. The co-operative societies need to be established in the potential maize-producing areas which should also be given a task of purchasing marketed surplus of maize on one hand, and providing market information on arrivals and prices of maize, on the other.

References

Goel, Veena and Jasbir Singh, (1998) A study of marketable surplus of wheat in Ludhiana district of Punjab. *Indian Journal of Agricultural Marketing*, **12** (1&2): 143-147.

Singh, R.S., (1992) Marketing of maize in intermediate zones of Jammu & Kashmir. *Indian Journal of Agricultural Marketing*, **6** (1): 61-67.

Thakur D.S. and D.P. Pandey, (2002) Strategy for higher production and the industrial utilization of maize in HP. In: *Advances in Maize Production Technology and Quality Improvement*. Ed: C.P. Awasthi. Palampur: Agricultural Society of Biochemists, pp. 209-212.