

Cost and Revenue Statistics of Paddy Production: Farmer's Perspective

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ABSTRACT

Using farmers' perspective, the cost of and revenue from paddy production per acre were estimated under rice-wheat rotation of irrigated Punjab. The basmati varieties were planted on 99% of total rice area. It was found that family labour, harvesting and threshing, irrigation and ploughing are the major variable costs involved in paddy production. On average, the net income under imputed cost method was estimated at about Rs. 83 per acre whereas from cash cost perspective, it was Rs. 2404 per acre. Under imputed cost method, inter-tehsil comparison revealed that farmers in Gujranwala tehsil were suffering a loss amounting to Rs. 492 per acre. It is, therefore, suggested that the support prices of basmati paddy should be at least equal to the cost of production by imputed cost method so that the implicit returns from contributed resources become ensured.

Key Words: Cost; Revenue; Statistics; Paddy; Production

INTRODUCTION

In developing countries, cost of production is the most widely used method of determining the support price of farm goods. Among 38 developing countries studied by FAO, two thirds were found to be employing this criterion (FAO, 1987). Pakistan and Brazil are examples of successful case studies of its practical implementation (Aziz, 1990). The practical estimation difficulties of cost of production involves problems of regional variations in productivity of a crop, acquiring a representative sample (i.e. whether to include average farmers, progressive farmers and exclude tradition-bound farmers), computing imputed values of non-cash input (family labour and land), definition of normal production year, treatment of area and farm specific problems. The price policy experts suggest that the data from the major crop producing districts may be used for estimation of the cost of production because the estimates so determined will contain the element of inducement for the farmers to improve their efficiency and would also discourage production in inefficient farming areas and on inefficient farms (Kahlon & Tyagi, 1983). The purpose of this paper is to review and compare the various estimation methods used for computing the cost of production and their likely implications. In this paper, the costs of production of

basmati paddy are estimated from the farmers perspective, i.e. imputed and cash costs methods. This division is made because some inputs (such as land, seed, farm yard manure, labour for transplanting and harvesting) are fully or partially provided by the farm household and are valued under 'imputed costs'. On the other hand, cash costs estimates involve actual cash expenditure on different variable inputs (fertiliser, pesticide etc.) and fixed inputs (rented land etc). The difference between imputed and cash costs implies the returns from non-cash inputs contributed by farm household.

A REVIEW OF COST ESTIMATION METHODS

The method for estimating the cost of production is an important issue which needs consensus. The Agricultural Inputs and Outputs Prices Review Committee (GOP, 1991) and the Prime Minister's Task Force on Agriculture (GOP, 1993), recognised controversies over the methodology and its consequences upon the estimates of cost of production of major crops. At present, four agencies prepare cost of production estimates for the major crops. These include a) Punjab Economic Research Institute (PERI), Lahore; b) Director General Agriculture (Ext. & AR),

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Lahore; c) Département of Farm Management, University of Agriculture, Faisalabad; and d) Agricultural Prices Commission (APCOM), Islamabad.

This committee (GOP, 1991) recognised Punjab Economic Research Institute (PERI) data collection by record method through its staff posted in the field as a relatively superior technique as compared with the other three agencies. Recently, Ahmad, *et al.* (1994) estimated cost of production of major crops from survey data of 1991-92 using their own devised method (named UAF method derived from University of Agriculture, Faisalabad) and the APCOM method (named 'hired basis'). The APCOM method treats all costs including implicit ones as hired or rented. The UAF method computes the production cost on 'actual basis' i.e. all the crop production activities have been evaluated strictly in accordance with the actual costs incurred by the farmers. Treating land rent in various manners, the actual basis was further subdivided into three groups as basis-I, II and III. The basis-I appends cost by adding value of share paid by share-cropper to the land owner; basis-II includes land rent (cash) on the basis of duration of crop; and basis-III treats land as capital and land rent is return on this asset. The interest and inflation rates were accommodated in computation of land rent. The third basis of the UAF method is very weak and may lead to over-evaluation of production cost for several reasons: first, as there is a very limited market for land in villages, land value reported is doubtfully reliable; second, the nearness of a sample farmer's land to main roads, markets or village colony sometimes assumes more importance in determining the land value than its agricultural productivity; third, the location of sample villages itself also affects value of land, for instance, land of villages on urban periphery, main link roads or near the industrial estates enjoy higher value, and finally, the interviewer cannot gain access to precise value. Therefore, it is very likely that, while reporting the value of land, a farmer may give more weight to non-agricultural factors which inflate production cost significantly as compared with basis-II. Hence, including cost of production with average value of land rent from basis-I and II may give a better estimate. The estimates based on UAF, APCOM and PERI methods are presented along with support prices in Table I for basmati paddy for the same year. This table shows that the support price fixed for basmati paddy is lower than the production cost.

COST OF PRODUCTION AND SUPPORT PRICES

An overtime comparison between cost of production and support prices shows that before 1991-92, the support prices of basmati paddy were much below than the costs at farm gate². After 1991-92, although the situation was improved but still it is about 2% less than the costs at farm gate (Table II). On the other hand, the comparison of support prices with the international prices of basmati rice received by Pakistan shows that before 1990-91, less than half of these international prices were offered as support price (Table III). An intuitive question arises that when basmati prices were continued to be lower than per unit production cost, why farmers did not stop basmati planting and move to an other profitable crop? The reason for continued planting basmati may be due to: first, no other kharif crop is better suited for this area due to various reasons such as comparative advantage in terms of soil type, inputs and output marketing system. Secondly, many imputed costs such as land rent, interest on capital, management cost, expenses saved by employing own-labour for operations like transplanting, harvesting and threshing, which are part of the cost of production estimation, may not be duly considered by the farmers. Therefore, farmers may evaluate profit as money above cash costs of purchased inputs. This consideration of rice growers is empirically tested in this paper by estimating their production costs and revenues on the bases of imputed and cash costs.

MATERIALS AND METHODS

The stratified random sampling approach was adopted for data collection from the Gujranwala, Sheikhupura and Sialkot districts during the formal survey. Following Kahlon and Tyagi (1983), three contiguous tehsils from the heart of the rice-wheat zone (one from each sample district) were selected. Three villages were chosen at random from hamlets around the urban periphery beyond the vegetable-growing belts and another three from more remote areas. From each

²This comparison is at mean level, very general and does not consider variations in the cost of production between producers of various types. Moreover, setting prices below average costs does not necessarily mean that a significant proportion of producers will not make a profit. It has dynamic aspect too, such as the potential for reducing costs through adoption of more modern technologies.

chosen village, a representative sample of ten households, based on the farm size composition of farming families in the village, was randomly drawn for interview. However, the large farmers were excluded from the sample because first, the study area is dominated by small and medium farms; and secondly, due to the wide range of their activities, it is very likely that large farmers would be unable to recall accurately many items in the questionnaire. A sub-sample of 60 farm households per tehsil and in total, 180 farm households were formally interviewed during the

survey. Later due to serious deficiencies in the data recorded, three cases were discarded and finally the information of 177 cases was analysed. The collected data were pertained to rice crop for the kharif season of 1995-96. For estimating imputed costs, the implicit value of farm inputs owned or contributed by farm household and the cash costs for the purchased inputs used were considered. On the other hand, for estimating cash costs, only the actual cash expenses on purchased items were taken into consideration. For instance, if an

Table I. Cost of production of basmati paddy for the rice-wheat cropping system of irrigated Punjab(1991-92)

Crop/ Estimation Method	Cost of Production Methodologies			Price Fixed by by Govt.
	UAF	APCOM	PERI	
Basmati Paddy:				
Actual Basis				
Basis-I	223.92	----	----	
Basis-II	181.31	----	----	
Basis-III	214.27	----	----	
Hired Basis	----	183.48	179.75	155.00

Source: Ahmad *et al.* (1994) and Cheema *et al.* (1994); UAF=University of Agriculture, Faisalabad; APCOM=Agricultural Prices Commission; PERI=Punjab Economic Research Institute

Table II. Differences between prices proposed by Cost of Production Committee and prices set by the government for basmati paddy

Year	Cost at Farm gate	Proposed Support Price	Price fixed by Government	Support Price (Rs. /40 kg) as % of		Margin Suggested by APCOM
				Cost of Production	Proposed Price	
1981-82	91.43	104.18	85.00	92.97	81.59	13.9
1982-83	113.85	118.84	88.00	77.29	74.05	4.4
1983-84	119.90	135.50	90.00	75.06	66.42	13.0
1984-85	113.25	128.18	90.00	79.47	70.21	13.2
1985-86	127.45	156.88	93.00	72.97	59.28	23.1
1986-87	149.50	183.34	102.00	68.23	55.63	22.6
1987-88	151.36	185.57	102.00	67.39	54.97	22.6
1988-89	160.57	196.62	135.00	84.08	68.66	22.5
1990-91	193.66	236.33	143.50	73.84	60.51	22.0
1991-92	165.33	175.00	155.00	93.54	88.57	5.8
1992-93	173.92	175.00	170.00	97.75	97.14	0.6
1993-94	188.80	185.00	185.00	97.99	100.00	-2.0
1994-95	212.81	220.00	210.90	99.10	95.86	3.4
1995-96	227.58	222.00	222.00	97.55	100.00	-2.5
1996-97	258.77	275.00	255.30	98.66	92.84	6.3
Average				85.09	77.73	11.2

Source:- From 1981-82 to 1990-91, Report of the Agricultural Inputs and Outputs Prices Review Committee 1991, p. 50.
From 1991-92 to 1996-97, Agricultural Prices Commission (APCOM), Pakistan.

input such as seed, was partly purchased and partly contributed by farm household, then the opportunity value for the contributed part and actual expenses for the purchased component were combined for computing imputed cost of that input. However, on the cash cost side, only the actual expenditures were taken into consideration. As majority of sample farmers sell their output in grain markets directly and a few used other marketing channels. The marketing channels were classified into two groups: within-village and outside-village channels. Within-village channels include village brokers (locally called 'grain beoparies'), landless households and village shopkeepers. Outside-village marketing channels were rice shellers, input dealers and the commission agents. If a farmer sold his output through both types of marketing channels, the average field price for his output was computed as:

$$AFP = \frac{(AFP_{ov} \cdot MS_{ov}) + (AFP_v \cdot MS_v)}{MS}$$

Where

- AFP = Average field price.
- AFP_{ov} = Average field price received for marketable surplus sold outside village.
- MS_{ov} = Marketed surplus sold in markets outside village.
- AFP_v = Average field price received for marketable surplus sold in the village
- MS_v = Marketed surplus sold in markets in the village.
- MS = Total quantity of marketed surplus

The average field prices received for marketable surplus sold outside village were computed after deducting all marketing costs per unit from the sale price received in the market.

RESULTS AND DISCUSSION

The average farm size of sample farmers was estimated as 11.62 acres; of which 9.45 acres were planted under rice. In Daska, Gujranwala and

Table III. Domestic support prices of basmati rice relative to world prices

Years	Export Price of Basmati Rice (\$/ton)	Basmati Rice Proc. Price (Rs./40 Kg)	Exchange Rate (Rs./\$)	Procurement Price in (\$/ton)	Ratio of Proc. Price to Export Price (%)
1975-76	524.74	96.45	11.00	219.20	41.77
1976-77	345.27	108.80	11.00	247.27	71.62
1977-78	451.11	108.80	11.00	247.27	54.81
1978-79	743.00	117.89	11.00	267.93	36.06
1979-80	714.78	117.89	11.00	267.93	37.48
1980-81	712.85	137.00	11.00	311.36	43.68
1981-82	721.29	150.00	11.00	340.91	47.26
1982-83	639.05	154.00	12.71	303.00	47.41
1983-84	603.68	157.00	13.48	291.09	48.22
1984-85	628.41	160.00	15.15	264.01	42.01
1985-86	671.60	166.00	16.14	257.14	38.29
1986-87	720.02	230.00	17.18	334.71	46.49
1987-88	725.25	250.00	17.60	355.13	48.97
1988-89	699.15	258.00	19.22	335.67	48.01
1989-90	685.33	276.00	21.45	321.75	46.95
1990-91	468.38	293.00	22.42	326.68	69.75
1991-92	413.01	308.00	24.84	309.93	75.04
1992-93	431.31	340.00	25.96	327.43	75.92
1993-94	412.02	360.00	30.16	298.37	72.42
1994-95	406.23	388.80	30.58	317.84	78.24

Source: Government of Pakistan (GOP) 1996, 'Economic Survey 1995-96'.

Ferozwala tehsils, the area under rice was estimated as 7.36, 9.27 and 11.84 acres, respectively. On average, the sample farmers planted basmati varieties on 99% of total rice area. The per acre cost and revenue statistics of paddy production are presented in Table IV. The gross value of output was composed of the value of grain estimated at average field price and the imputed value of paddy straw. The expenses incurred on variable and fixed inputs were estimated in terms of imputed and cash costs. In other words, economic cost and cash cost accounting bases were used in the estimation of net income. Net income was estimated by deducting both variable and fixed costs from the gross value of output. It was found that sample farmers had produced paddy of gross value amounting to Rs. 6152 per acre. The average imputed and actual variable costs were estimated as Rs. 4605 and Rs. 3163 per acre, respectively. The average imputed and actual fixed costs were computed as Rs. 1465 and Rs. 585 per

acre, respectively. The net income by imputed and cash costs methods were estimated as Rs. 82.46 and Rs. 2404 per acre, respectively. The family labour, harvesting and threshing, irrigation and ploughing were the major variable costs in paddy production (Table IV). The per farm statistics of paddy production are presented in Table V. It is clear that when net income was estimated by the imputed cost method, the average net income/acre was about Rs. 83 only. From an economic cost accounting perspective, the inter-tehsil comparison shows that farmers in Gujranwala tehsil were incurring losses whereas in the other two tehsils, the net income consisted of only a few hundred rupees per acre (Table IV). This implies that from an economic cost accounting perspective, the sample farmers were obtaining a very low income from paddy production. Therefore, what they obtained actually gained from implicit value of land rent and wage earnings by employing family labour on their own farms.

Table IV. Cost and revenue statistics per acre of paddy production in the study area (1995-96)

Items	SAMPLE TEHSILS							
	Daska		Gujranwala		Ferozwala		All	
	A ¹	B ²	A	B	A	B	A	B
Gross values of output:								
Value of grain	6413.82	6413.82	5809.62	5809.62	5717.39	5717.39	5932.03	5932.03
Value of paddy straw	258.70	258.70	253.73	253.73	168.44	168.44	220.65	220.65
Gross value of the output	6672.51	6672.51	6063.35	6063.35	5885.83	5885.83	6152.68	6152.68
Variable Costs:								
Farm Yard Manure Application	67.61	38.65	38.39	21.08	25.85	15.52	41.05	23.48
Raising nursery	62.96	48.33	62.62	39.42	64.12	42.92	63.31	43.19
Dry ploughing and Puddling	685.73	685.73	691.22	691.22	647.41	647.41	672.11	672.11
Nursery transplantation	450.14	318.26	375.25	217.83	334.08	202.14	378.42	238.01
Fertiliser application	522.48	522.48	624.35	624.35	498.47	498.47	546.68	546.68
Weedicide application	179.02	179.02	178.85	178.85	133.46	133.46	160.58	160.58
Pesticide application	117.69	117.69	195.06	195.06	346.10	346.10	235.58	235.58
Tubewell Irrigation	872.38	872.38	1059.57	1059.57	349.70	349.70	723.75	723.75
Paddy harvesting & Threshing	806.51	420.73	738.88	533.12	720.19	572.94	749.21	519.52
Opportunity cost of family labor ³	1012.13	-	1256.57	-	865.73	---	1034.36	---
Total =	4776.65	3203.27	5220.76	3560.50	3985.09	2808.65	4605.04	3162.90
Fixed costs:								
Payment in kind to PHL	119.35	119.35	104.13	104.13	140.54	140.54	122.84	122.84
Payment in kind to artisans	161.55	161.55	124.36	124.36	111.95	111.95	129.17	129.17
Land rent	1303.36	338.23	1106.35	268.71	1290.87	400.65	1213.16	333.75
Total =	1584.36	619.13	1334.84	497.20	1543.36	653.14	1465.18	585.77
Net income/acre ⁴	311.51	2850.11	-492.25	2005.65	357.38	2424.04	82.46	2404.01

¹Costs indicate imputed value of an input; ²Cash cost indicate amount of cash paid as input cost.

³It includes the opportunity cost of family labour used for paddy production except transplanting, harvesting and threshing operations;

⁴Net-income = Gross value of output - (variable + fixed costs). A= Imputed Cost; B=Cash Cost

Table V. Cost and revenue statistics per farm of paddy production in the study area (1995-96)

Items	SAMPLE TEHSILS							
	Daska		Gujranwala		Ferozwala		All	
	A ¹	B ²	A	B	A	B	A	B
Gross values of output								
Value of grain	47205.70	47205.70	53855.20	53855.20	67693.93	67693.93	56057.68	56057.68
Value of paddy straw	1904.00	1904.00	2352.08	2352.08	1994.30	1994.30	2085.10	2085.10
Gross value of the output	49109.70	49109.70	56207.28	56207.28	69688.23	69688.23	58142.78	58142.78
Variable Costs								
Farm Yard Manure Application	497.62	284.46	355.92	195.42	306.02	183.77	387.89	221.85
Raising nursery	463.38	355.71	580.50	365.46	759.13	508.20	598.32	408.12
Dry ploughing and Puddling	5047.00	5047.00	6407.58	6407.58	7665.31	7665.31	6351.40	6351.40
Nursery transplantation	3313.00	2342.38	3478.54	2019.27	3955.47	2393.28	3576.06	2249.24
Fertiliser application	3845.44	3845.44	5787.76	5787.76	5901.87	5901.87	5166.10	5166.10
Weedicide application	1317.56	1317.56	1657.92	1657.92	1580.14	1580.14	1517.50	1517.50
Pesticide application	866.21	866.21	1808.23	1808.23	4097.79	4097.79	2226.22	2226.22
Tubewell Irrigation	6420.75	6420.75	9822.17	9822.17	4140.39	4140.39	6839.42	6839.42
Paddy harvesting & Threshing	5935.88	3096.57	6849.45	4942.02	8527.08	6783.65	7080.02	4909.51
Opportunity cost of family labor ³	7449.27	----	11648.40	----	10250.27	----	9774.72	----
Total =	35156.11	23576.08	48396.47	33005.83	47183.47	26355.40	43697.65	29889.36
Fixed costs								
Payment in kind to PHL	878.40	878.40	965.30	965.30	164.01	1664.01	1160.85	1160.85
Payment in kind to artisans	1189.03	1189.03	1152.83	1152.83	1325.46	1325.46	1220.70	1220.70
Land rent	9593.47	2489.39	10255.86	2490.91	15283.90	4743.75	11464.36	3153.93
Total =	11660.90	4556.82	12373.99	4609.04	18273.37	7733.22	13845.91	5535.48
Net income/farm ⁴	2292.69	20976.80	-4563.18	18592.41	4231.39	28700.61	779.22	22717.94

¹Costs indicate imputed value of an input; ²Cash cost indicate amount of cash paid as input cost

³It includes the opportunity cost of family labour used for paddy production except transplanting, harvesting and threshing operations; ⁴Net-income = Gross value of output - (variable + fixed costs); A= Imputed Cost; B= Cash Cost

CONCLUSIONS

It was found that family labour, harvesting and threshing, irrigation and ploughing are the major variable costs of paddy production. The itemised comparison of the difference between imputed and cash costs shows that land and family labour are the most significant inputs contributed by farm households. Continued fixing support prices below the imputed cost implies less than the opportunity returns from owned resources. In the long-term, this may discourage basmati cultivation. It may also result in less use of purchased inputs including hired labour, renting out land and out-migration of farm labour. It is recommended that in order to promote intensive use of purchased inputs, the support prices of basmati paddy should be fixed above the cost of production from the imputed cost method.

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