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Economic Analysis of Wheat Profitability in Peshawar Valley, NWFP

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Abstract

This study was conducted in six villages located in three districts of Peshawar valley, North West Frontier Province (NWFP) during 2006-07. A total of 136 respondents were interviewed. Cost and returns (gross margins) of wheat producers were estimated. Farm budgeting technique for estimating cost, returns (gross margins) and profitability in wheat production was applied. The per acre yield was 27.30 mounds (50kg). Total cost of wheat production came to be Rs. 10757.51 per acre. Operations like harvesting/ threshing and land rent were major cost components in wheat production and were 14.28 and 45.54 percent of the total cost, respectively. The gross margins from wheat production were Rs. 5225.75 per acre.

Key words: wheat, cost, returns, profitability, Peshawar

Introduction

Wheat is the major crop grown all over the world and has the largest area and tonnage among all food crops. Wheat has several uses. It is both staple food and cash crop for majority of the population world wide including Pakistan. Wheat grain and straw are fed to livestock as a feed. It supplies around 53 and 59 percent of the total daily caloric and protein intake of the people (Landes and Ash 1993). Wheat is grown extensively in Pakistan. It is grown on a subsistence level for consumption purpose in the farm household and also as a cash crop. On an average, the households incur 16.26 percent of the monthly expenditures on wheat and wheat flour. Average per capita monthly consumption of wheat and wheat flour is 9.27 Kgs (GOP 2001). Wheat alone accounted for about one third of the total value of major crops at current factor prices in 2000-2001. It constitutes around 74.92 percent of the total area under food grain crops (GOP 2003). Wheat productivity and yield are the important determinants of the supply of wheat.

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Availability of sufficient food is of prime concern at household, regional and country level for food security. Self-sufficiency in food is emphasized in all five-year plans over time in Pakistan. Any fluctuation in the demand and supply of wheat in international market affects the welfare of consumers, farmers, taxpayers and those depend on agriculture directly or indirectly.

The area under wheat crop in NWFP in 1991-92 to 1999-2000 decreased from 842.187 thousand hectares to 806.481 thousand hectares showing a decline of 4.23 percent. Similarly, total production of wheat in NWFP during the same period decreased from 1163.383 thousand tones to 1067.844 thousand tones showing a decline of 8.21 percent and the yield of wheat per hectare also declined from 1381 Kgs per hectare to 1324 Kgs per hectare in NWFP showing a decline of 4.12 percent.

Wheat consumption in Pakistan is increasing with the passage of time. This increase can be attributed to high rate of population growth, improvements in wheat processing technology and people income. Wheat production can be increased either by increasing area under wheat cultivation or by increasing yield of wheat per units of input. The scope for increase in area under wheat is limited due to scarce availability of land on one hand and competitiveness of other crops including oil seeds, pulses, sugar cane, fodder crops for the same available land. Therefore, major emphasis is to lay on increase per hectare yield which can only be achieved when an appropriate production technology is adopted including use of high yielding varieties, proper sowing time, proper and timely inputs use, weed control and above all sufficient availability of water for irrigation purposes.

This study was conducted during 2006-07 in Peshawar Valley, with the objective to estimate the cost and gross margins of wheat production and to estimate the determinants of wheat profit function. Peshawar Valley is important farming region of NWFP as soil and climatic conditions are very conducive for both agricultural crops like wheat, maize, sugar beat, sugar cane and tobacco and fruits like apricot, plums, citrus and walnut. Most

of the cropped area is irrigated through canal water coming from river Kabul.

The study was designed to study the following objectives:

1. to estimate the cost and gross margins of wheat production in Peshawar Valley
2. To estimate the determinants of wheat profit function

Materials and Methods

A. Study area, sampling and data collection

1. Study area

Peshawar Valley is comprised of three districts; i.e. Peshawar, Nowshera and Charsadda. Due to financial and time constraints study included only two villages from each of the above districts. Villages were selected using purposive sampling technique and included Mulagoo and Nasarpur in Peshawar district, Qasam and Taru in Nowshera district and Nawan Killi and Chak Charsadda in Charsadda district. Another reason for this selection was the presence of canal irrigated system and also these villages have a well established network of extension and research services.

2. Proportional sampling allocation technique

The proportional allocation sampling technique (Chaudhry 1997) was used to determine the sample size that came to be (n=136) at the rate of 5 percent from the above six villages as detailed below:

$$NI = \frac{n}{N} * Ni$$

Where

NI	=	No of the sampled respondents in each village
I	=	No of villages in the study area i.e is 1,2,…6
n	=	*Total sample size*
N1	=	No. of respondents in mulagoo village
N2	=	No. of respondents in Naser pur village
N3	=	No. of respondents in Qasam village
N4	=	No. of respondents in Taru village
N5	=	No. of respondents in nawan killi
N6	=	No. of respondents in chakcharsada village
Ni	=	Total No of growers in each village
N	=	Total No of growers in the research area

N1	=	136/2719*555	=	28			
N2	=	136/2719*390	=	19.21	=	20	(Approx)
N3	=	136/2719*395	=	19.75	=	20	(Approx)
N4	=	136/2719*588	=	29.41	=	29	(Approx)
N5	=	136/2719*264	=	13.20	=	13	(Approx)
N6	=	136/2719*527	=	26.359	=	26	(Approx)
		Total		**136**			

3. Data collection

Primary data on cost, returns and yield of wheat were collected using prescribed questionnaire. The questionnaire was pre-tested in the field and modified accordingly. Simple random technique was used to select the respondent farmers. Data were collected by personal interview method.

B. Methods of analysis

Statistical Package for Social Sciences (SPSS) was used for data analysis. The following procedures were applied:

1. Wheat profit function

Profit or net revenue (Π) = total revenue (TR) - total cost (TC) (Debertin 1986).

$$\Pi = TR - TC \qquad (1)$$

where TR = P*Q (P is price of output and Q is output)

TC = V*X (V is the input price and X is input purchased)

Therefore:

$$\Pi = PQ - V X \qquad (2)$$

2. Modeling wheat profit function

The empirical model of wheat profit function in econometric form may be given as:

$$\Pi = \beta_o + \beta_1 P + \beta_2 Q + \beta_3 C \qquad (3)$$

Equations (1) and (2) are used to generate Equation (3) above. It indicates that profit (Π) depends on output price (P), total output (Q) and cost per unit (C) of output produced βs are the parameters to be estimated and measure the change in Π with a unit change in the variables on RHS as the case may be.

Results and Discussion

This section presents the analysis and discussion of results in the light of the objectives of the study. Necessary explanations have also been added along with the findings of the research at the appropriate places. This section includes two sub sections. The first section deals with the costs and gross net revenue from wheat crop and the second section clarifies the description and estimation of the net revenue function.

A. Cost of production of wheat

The major component in cost of wheat production were the variable costs (V) that includes land preparation, seed, chemical fertilizer, farm yard manure, irrigation water, weeding and hoeing, pesticides, weedicides, harvesting, threshing and land rent.

Table I shows cost spent on important inputs in the production of wheat.

i) Land Preparation

The first and important step in wheat cultivation is land preparation that enhances the water holding capacity of the soil for long time and also it maximizes the ability of wheat plant to get required nutrients from soil. The average cost of land preparation came to be Rs.920.72 per acre which was 8.56 percent of the total cost of production.

Table 1. Cost of production of wheat in Peshawar Valley (rupees/ acre)

Item	unit	quantity	rate/ unit (Rs)	total cost (Rs)	percent share in total cost
1.1 Tractor	Hours	3.92	191	748.72	
1.2 Labour	PDs	2.15	80	172	
1. Land preparation	**Rs.**			**920.72**	8.56
2.1 Seed	Kg	42.24	17	718.08	
2.2 Labour	PDs	0.62	63	39.06	
2 Seed & sowing	**Rs.**			**757.14**	7.03
3.1 Urea	Bags	1.04	443.75	461.5	
3.2 DAP	Bags	0.75	838	629.25	
3.3 Nitrophos	Bags	0.03	350	10.5	
3.4 Transportation (labour)	Rs.	1.74	22.80	39.67	
3.5 Application (labour)	PDs	1.02	62.76	64.02	
3.6 FYM	Trolley	0.4	800	320	
Application (labour)	PDs	0.58	61.51	35.67	
Transportation (labour)	Rs./PDs	0.03	62.50	1.875	
3 Farm inputs	**Rs.**			**1562.48**	14.52
4.1 Tubewell	Rs/hour	1.52	180	273.6	
4.2 Canal	Seasonal	1	300	300	
4.3 Labour	PDs	2.06	63.3	130.39	
4 Irrigation	**Rs.**			**703.99**	6.54
5.1 Hoeing	PDs	0.86	60.82	52.31	
5.2 Pesticide & weedicides	Bottles	0.66	432.82	285.66	
5.3 Spray pump	Rs.	0.44	22.12	9.73	
5.4 Labour	PDs	0.46	62.06	28.55	
5 Weedicides/ fungicides	**Rs.**			**376.25**	3.49
6.3 Harvesting	Per acre	1.01	201.91	203.92	
6.2 Threshing	Mounds	2.168	427.85	927.57	
6.1 Empty bags	Per bag	17.94	22.6	405.86	
6 Harvesting/ threshing				**1536.93**	14.28
7 Rent of hired land	Per acre	0.18	5000	900	
8 Opportunity cost of owned land	Per acre	0.8	5000	4000	
9 Total land rent	**Rs.**			**4900**	45.54
10 Total cost	**Rs.**			**10757.51**	

Source: *Survey data, 2006-07*

Note: PDs Person Days

ii) Seed and sowing

Sowing cost is the cost incurred on seed and labor used in the application of seeds. The average cost of seed and sowing came to be Rs.718.08 per acre whereas average cost of labor application per acre remained Rs.39.06. Therefore, sowing cost was Rs.757.14 per acre showing 7.03 percent share in the total cost of wheat production per acre.

iii) Farm inputs:

Chemical fertilizer and farmyard manure (FYM) are both important inputs. Both makes the soil more fertile and have direct impact on the yield. Fertilizers like Urea, DAP and Nitrophos were commonly used by farmers in wheat production. The cost incurred on farm inputs including transportation and application was Rs.1562.48 showing 14.52 percent share in the total cost.

iv) Irrigation

Water is considered lifeblood for farming and agriculture. Irrigation water is the limiting factor of agricultural production. Haider et al. (1977) recorded maximum and minimum grain yield of 3100, 4300, 4500 and 4600 kg/ha for zero, one, two and three irrigation treatments, respectively. This shows that irrigation plays important role in higher wheat yield obtained. Tubewell and canal were the main sources of irrigation. Abiana was charged for canal-irrigated system, which was Rs.300.00 per season while in case of tube wells water charges were on per hour basis charged by the owner of the tube well. Average cost of tube well irrigation was Rs.273.6 per acre. Labour charges in application of irrigation water came to be Rs.130.39 per acre. Therefore, the average cost of irrigation stood at Rs.703.99 per acre showing 6.54 percent share in the total cost of wheat production.

v) Weedicides and fungicides

Important weeds of wheat are; Phalaris minor and wild oats. Rajaram et al. (1998) estimated that 10 percent increase in wheat yield can be achieved by effectively controlling weeds. The average cost of weeding and application of fungicides was Rs.376.25 showing 3.49 percent share in the total cost of wheat production.

vi) Harvesting and threshing

Harvesting and threshing are the final and very important activities in the production process of wheat. Swati *et al.,* (1997) claims that harvesting/ threshing cost of wheat was the major problem in NWFP because of shortage of tractors relative to their demand. Harvesting includes cutting of the crop and also heaping of bales. Harvesting is carried out either by family labour, hired labour or Asher. Mostly, the respondents carried out harvesting by Asher. The average cost of harvesting is Rs.203.92 per acre. Mechanical thresher was used for threshing of the crop. Threshing charges were paid in kind and were converted to monetary unit on per acre basis. The per acre cost of harvesting/ threshing was Rs.1536.93 showing 14.28 percent share in the total cost of production of wheat.

vi) Rent of Land

Rent of land was calculated on two basis; rent of rented in land on seasonal basis and rent for owned land rent (opportunity cost). The total land rent was Rs.4900.00 showing 45.54 percent share in the total cost of wheat production.

Marketing cost

Table 2 shows marketing cost that includes transportation cost of wheat transported to home for home use and or to a godown, storage and other disposal point like terminal market. The marketing cost was Rs.273.05 on per acre basis.

Table 2. Marketing cost of wheat in Peshawar Valley (rupees/ acre)

Items	unit	quantity	rate/ unit (Rs)	Cost (Rs)
1.1 labour	man days	1.17	62.46	73.07
1.2 other type (e.g. donkey cart, vehicle)	No.	0.42	34	14.28
1Transportation to home/ godown				**87.35**
2.1 rent of hired place	Month	0.51	86	43.86
2.2 opportunity rent of own land	Month	1.85	33.24	61.49
2.3 pesticides used in storage	Bottles	17.72	1.98	35.08
2 Storage				**140.43**
3.1 transportation to market		2.66	14.15	37.63
3.2 loading/ unloading		5.26	1	5.26
3.3 commission		0.34	7	2.38
3 Transportation to other markets				**45.27**
4 Marketing cost				**273.05**

Source: *Survey data, 2006-07*

Total Cost

Total cost of production of wheat per acre included production cost and marketing cost on per acre basis. The cost of production (Table 1) was Rs.10757.51 per acre and marketing cost (Table 2) was Rs.273.05 per acre. Therefore, the total cost of production of wheat came to be Rs.11030.56 per acre.

B. Gross returns from wheat production

Gross returns depend on; 1) wheat grain and 2) wheat bhusa from wheat production. The returns from wheat also depend on prices of these products

received by the farmers. The gross returns are shown in Table 3 and are discussed below:

i) Wheat grain

Higher grain yield depends on various factors i.e. availability of improved seed, adequate irrigation water, proper doses of fertilizer, use of pesticides, weedicides; etc,. On an average wheat yield of 27.30 mounds per acre (50 Kgs) was obtained. Large quantity of the wheat was stored at home for home consumption and few farmers sold the surplus wheat grain in the market. The returns from wheat grain came to be Rs. 11680.30.

ii) Wheat bhusa

Wheat bhusa is the by-product of wheat production that enhance the returns from wheat grain sold in the market. Farmers used wheat bhusa as a ration for animals. Most of the farmers stored wheat bhusa on the farm in the form of Bhussara and later transferred to home godown for feeding to livestock. The returns from bhusa came to be Rs.4576.00 per acre.

Gross returns from both wheat grain and bhusa worked to be Rs.16256.00 (Table 3).

Table 3. Gross returns of wheat in Peshawar Valley (rupees/ acre)

Item	units	yield	price/ md (Rs)	value (Rs)	gross income (Rs)
wheat grain	Mound	27.30	427.85	11680.31	16256.30
wheat bhusa			-	4576.00	

Source: *Survey data, 2006-07*

C. Net returns of wheat production

Net returns were calculated using the following relationship:

Net returns = gross income – total cost

Net returns = 16256.30 – 11030.56 = Rs. 5225.75 per acre

The net returns from wheat production are determined by the quantity of wheat produced (Q), price of wheat (marketed) received by farmers (P) and the total cost (C) incurred on the production of wheat. We estimated the wheat profit function (Eq 3) to examine the significance of the aforementioned determinants. The model (Eq 3) was run and the estimated model is given below:

$$\Pi = -6641.343 + 1070.804\,P + 7.217\,Q - 51.929\,C$$

standard error = [1227.511] [71.839] [0.545] [47.608]

t– ratio = [–5.410] [14.906] [13.245] [–3.191]

$R^2 = 0.706$, R^2 (adjusted) = 0.700, F = 105.796

F-test determines the overall goodness of fit/significance of the model. In our case as $F_{Calculated} = 105.796$ which is greater than $F_{Tabulated} = 2.12$. Therefore, the model shows the overall significance. The coefficient of determination, R^2, indicates that (70.6) percent variation in the dependent variable has been explained by the independent variables. The sign of the explanatory variables are in line with the economic theory. As $t_{calculated} > t_{tabulated} = 1.970$, therefore, the t-ratios of the model confirm that, profit (Π) is significantly determined by the price (P) total production (Q) and the per unit cost (C), keeping all the other inputs constant, a one rupee increase in per kg price (P) of wheat will increase the profit by Rs.1070.804, producing another kg of Q will increase net revenue by Rs.7.217 while each additional unit of per kg cost (C), will decrease net revenue by Rs.51.929. The estimation of the revenue function revealed that revenue is significantly affected by respective prices, total quantity produced and per unit cost of wheat grain. However increase in price significantly contributes towards higher revenue for the farmers.

Conclusions and Recommendations

From the preceding discussion it is found that land rent (Rs. 4900.00) proved to be the highest component in the cost of production of wheat per acre. It constitutes about 46% of the total cost. Similarly, farm inputs (Rs.1462.48) and harvesting/ threshing (Rs. 1536.93) constitute about 15% and 14% of the total cost per acre, respectively. All of the above components together accounts for about 75% of the total cost that is on the higher side. Land rent is taxing farmers to a high tune. Similarly, farm inputs are also costly. The remaining 25% cost is distributed among land preparation, seed and its application, farm yard manure, chemical fertilizers, irrigation, hoeing and weeding; etc. Cost of seed/ sowing is Rs.757.14 per acre including seed cost Rs.718.08 per acre and labour cost Rs.39.06 per acre. Cost of farm yard manure is Rs.357.55 per acre including application and transportation. The cost of irrigation was recorded for both tube well and canal irrigated farms and that accounts for Rs.273.6 and Rs.300.00 per acre, respectively. The total cost of wheat production is Rs. 11030.56.

The average grain yield of wheat per acre is calculated as 27.30 mounds. The price received by farmers was Rs 427.85 per mound. Thus, giving a return of Rs.11680.31 per acre from wheat grain sold in the market. The market value of wheat bhusa is Rs. 4576.00 per acre. Therefore, gross returns of wheat production are Rs. 16256.31 per acre. Net returns (gross margins) per acre of wheat production are Rs.5225.75.

Recommendations

It is recommended that:

1. Canal irrigated system should be properly managed and the government should concentrate on rainfed areas by water harvesting and small dams. The farmers unable to install tube wells on their own resources, therefore, to ensure timely availability of credit on low interest rate can play vital role.
2. Policy should be devised for stable input prices with timely supply of inputs that is necessary for sustaining higher wheat productivity.
3. Research and extension system should be reinvigorated to inform/train wheat grower in both price and non-price factors (Crop Management and Agronomic Prices).
4. As rent of hired land or opportunity cost of land is very high in the study area, therefore, the government may compensate farmers by reducing the prices of other inputs like fertilizer, quality seed; etc.

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