

ECONOMIC IMPLICATIONS OF COTTON PRODUCTION IN NAUSHAHRO FEROZE DISTRICT, SINDH PROVINCE, PAKISTAN

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Abstract

The present study was designed to explore the important factors that affecting cotton production such as socio-economic conditions of cotton growers which affect the yield directly. The data on various cost items including land, labour, and capital inputs, marketing costs and physical and revenue productivity, net return, input-output ratio and cost-benefit ratios and farm sizes during the year 2010-11, were collected from 60 selected cotton farmers for this purpose, from different villages of district N.Feroze by using multi-stages cluster sampling survey method. The poor production implies implications that the, illiteracy, ignorance, inadequate canal water, insect pest and poor extension services soil quality implications of various inputs like cultivation, seed and sowing, irrigation, inter-culturing / hoeing ,fertilizer, plant protection, and labour cost on cotton yield could be the causes to this low production due to lack of marketing facilities at village level, less payment by the marketing agencies, high prices of inputs, lack of timely availability of genuine fertilizers. The practical results indicated that significant increase in output of cotton in the study area could be traced mainly to use of latest technology that plays the vital role in cotton productivity enhancement.

Keywords: Agrieconomics, Cotton, productivity input-output cost-benefit, net returns, Pakistan

INTRODUCTION

Cotton (*Gossypium: Hirsutum*) is known as 'white gold' and important non-food cash crop lifeline for the economy and is playing significantly role in the uplift of the economy is the principle source of raw material for textile sector the largest agro-based industry. Pakistan is the 5th largest producer, 4th largest consumer, 4th largest exporter yarn and 3rd largest exporter of raw cotton, in the world. While cotton provides 45 percent employing of workforce and 60% foreign exchange earnings, and is an occupation of more than 1.5 million farming families which contributes to the exports of country in the form of raw , yarn cotton cloth and other by-products. Cotton contributes 6.9 percent of value added in agriculture and 1.4 percent of GDP. (GOP, 2011).

Cotton cultivation in the province has been recorded on 611,000 acres this year which is 21,000 acres more than the target fixed by the federal government. The Kharif crops suffered a loss of \$4bn in foreign exchange earnings or 2.323 percent of the GDP, agriculture. Cotton received a loss of 1.8 million bales, accounting for 1.8 percent of the GDP, Earlier the cotton production target was set at 14.5 million bales for 2011-12 however almost 50 percent of the cotton crop was intensively and extensively damaged by heavy rains and devastating floods in Sindh and cotton production was reduce to 13 million bales for the year. Cotton growers have

lost heavily as there quality of seed-cotton and the resultant lint have also been badly damaged; seed-cotton was sold as low as Rs 1,500 per maund of 40 Kg ex-gin while lint cotton was sold as low as Rs 3,500 per maund of 37.324 kg ex-gin. These rates are very below from production cost. Due to this, Sindh has large unsold stocks of cotton to 33 percent of total arrivals. The fall in seed-cotton prices were mainly due to lower economic activity caused by massive power load shedding it was further compounded by cash flow problems with the ginners, creating a bottleneck in bulk purchase of seed-cotton from farmers. In view of future forecast of world supply and demand, cotton prices in the international market are likely to be higher than last year. Similarly, the market price of seed-cotton is also expected to follow the same pattern in view of the depressed demand for it (GOP, 2010).

Overall 32 percent cotton sown area of Tharparkar, Umerkot, Mirpurkhas, Sanghar, Tando Allahyar, Badin, Tando Muhammad Khan, Kashmore-Kandhkot, Hyderabad, Matiari, Jamshoro, Dadu, Shikarpur, Naushahro Feroze, Nawabshah, Khairpur, Sukkur and Ghotki districts of Sindh province. The bales from Tando Adam in Sindh reportedly sold at Rs 1890 per maund (37.32 kgs), while another 200 bales from the same station were said to have been sold at Rs 1900 per maund; 400 bales from Benzirabad (Nawabshah) sold at Rs 1900 per maund, 500 bales Naushahro Feroze sold at Rs 1800 per maund; while 1000 bales from the Khairpur district sold at Rs 1950 per maund. During 2009-10, the domestic price of seed-cotton was reported at around Rs 1,900 per 40 kilograms in early season. However, the price started sliding, particularly in November-December, and touched the level of Rs 1,300 per 40 kilograms at some places the (Arshad, 2010).

The fall in the prices cotton was mostly due to lower economic activity caused by massive power load shedding. It was further compounded by cash flow problems with the ginners, creating a bottleneck in bulk purchase of cotton from farmers. In view of future forecast of world supply and demand, cotton prices in the international market are likely to be higher than last year. Similarly, the market price of seed-cotton is also expected to follow the same pattern in view of the depressed demand for it (GOP, 2010).

Looking at the above facts and economic importance of cotton crop in our country the study was designed to achieve following objectives.

- To examine the status and growth of cotton production in Sindh and Pakistan.
- To analyze the production cost of cotton crop in the study area.
- To identify the production, marketing constraints in the study area.
- To suggest policy measures & program initiatives for efficient cotton production.

REVIEW OF LITERATURE

Dagistan *et al.* (2009) determined that the input and output involved in cotton production in the Hatay province of Turkey. The cost of cotton production per acre is found to be 2 246 \$ha⁻¹ in the region, with 79.87% of this being variable costs. It can be concluded that intensive cotton farms are being operated in the area since the variable cost ratio is quite high. As a result of benefit-cost ratio (1.24) analysis, cotton production is found to be economically efficient.

Javed *et al.* (2009) estimated that the technical, allocative and economic efficiency and subsequently to investigate the determinants of technical, allocative and economic inefficiency of cotton-wheat and rice-wheat farming systems in Pakistan. Technical, allocative and economic production efficiency scores were estimated by a non-parametric data envelopment analysis procedure. Technical, allocative and economic production inefficiency scores were separately regressed on socio-economic and farm specific variables to identify the sources of technical, allocative and economic production inefficiency using a Tobit regression model. The mean technical, allocative and economic production efficiency calculated for the cotton wheat system was 0.75, 0.44 and 0.37, respectively. Results of the study revealed that if sample farms in cotton-wheat system operated at full efficiency level they could reduce their input use by 25% and cost of production by 56 % without reducing the level of output and with the same technology.

Khan and Chaudhry (2009) examined the factors affecting cotton production in Multan region using primary source of data. The Cobb-Douglas Production Function is employed to assess the effects of various inputs like cultivation, seed and sowing, irrigation, fertilizer, plant protection, inter-culturing / hoeing and labour cost on cotton yield. The results depicted that seed, fertilizer and irrigation were found scarce commodity for all category of farmers in district Multan. The Cobb-Douglas Production Function results revealed that the coefficients for cultivation (0.113) and seed (0.103) were found statistically significant at 1 percent level. The Cost-Benefit Ratio for the large farmers was found higher (1.41) than that of small (1.22) and medium (1.24) farmers. There is a dire need to ensure the availability of these scarce inputs by both public and private sectors as these inputs were major requirement of the cotton crop.

Daniel *et al.* (2010) reported that the study examined the Net Income and efficiency of resource use among cotton farmers. Analysis of the sampled farmers showed that 86% of them were youth which suggest that if proper attention is given to cotton cultivation, a lot of youth would be gainfully employed. The results also revealed that 40% of the farmers did not attend any formal school while 14% attended tertiary level of education. About 59% of the respondents reported. The average cost and returns per acre of the cotton farmers was N46, 046.25 and N56, 224.90 respectively. Land, labour and seed have positive influence on farmers income and

the first two significant at 1% and 10% levels respectively. Fertilizer, chemical and transportation had negative influence on farmers' income probably due to their escalating prices. The marginal physical product analysis revealed that an extra acre of land acquired for cotton will result to an increase of over one ton of cotton.

Khan and Akhtar (2011) studied provides cost-benefit analysis of cotton production and processing by different stakeholders in Pakistan. In order to analyze the cost-benefit analysis, Multan and Bahawalpur regions were selected as study area since majority of the cotton producers are living herein. It has been identified that spinners and ginners have an incentive in the shape of profit to raise their production. Basing on the study, it is recommended that the Government of Pakistan should support the cotton producer by giving subsidies in the inputs and with the help of support price system. By promoting productive capacities of grower, the poverty can be reduced in the study areas.

METHODOLOGY

Planned strategy was used to study the area (Cotton production in district Naushahro Feroze Sindh, Pakistan), type and number of respondents without which it would be an ineffective effort. Therefore, it is essential to define variables included in the research to make it more scientific.

Research Design

The study was restricted generally to gather primary data from district Naushahro Feroze Sindh. It was selected as the universe of the study because it represents a good case study for Cotton production activities. The district is naturally gifted with fertile soil

Sample Size

The present study were sampled as multistage clustered sampling so that one taluka Kandiaro from district Naushahro Feroze out of which 2 union councils Mohabat Dero and Kamal Dero were selected in each union council three villages were selected and among each village different number of farmers were randomly. The sample was supposed to contain Cotton farmers. A sample size of 60 respondents was selected through multistage cluster sampling.

Questionnaire Development

Interview schedule was based on a well-designed and pretested questionnaire. Comprehensive information was obtained face to face from the farmers involved in Cotton farming, business and

documented by the interviewer. Questionnaire was prepared in English language while the interview was taken in local language i.e. Siraiki and Sindhi.

Research Approach

Cost of production function

$$Y = f(X_n), \quad Y = (X_1, X_2, X_3, \dots, X_n)$$

Where $X_1 \dots n$ = per hectare input used

Arithmetic Mean

It is defined as value obtained by dividing the sum of all observations by their numbers. Arithmetic mean or average can also be used for tabulated presentation of data.

$$\text{A.M or Average} = \sum X_n / n$$

Where \sum = Total or Sum, X_n = Variables observations used in analysis. n = No. of observations.

Standard Deviation

Deviation of a data from its mean is called the standard deviation. If a deviation of its Mean is squared then the resulting deviation is called standard deviation.

$$\text{S.D} = \sqrt{[(\sum X - X^*) / n]}$$

Where X = Value of Observations, X^* = Mean of a Variable, n = No. of observations.

$\sqrt{\quad}$ = Square Root and \sum = Summation

Standard Error

Square root of standard deviation is called standard error

$$\text{S. Error} = \sqrt{[(\sum X - X^*) / n]}$$

Where X = Value of Observations, X^* = Mean of a Variable & n = No. of observations

$\sqrt{\quad}$ = Square Root and \sum = Summation

Percentages

Percentage is the proportion of fraction articulated in hundredth. It was computed by Percentage = $F / N * 100$

Where, F = Respondents of desired class N^* = Total number of respondents

Minimum & Maximum analysis Model

$$Y = ax + bx + c$$

Data Analysis

Initially the data were arranged and organized in coding system. By using the coding sheet, all the data were tabulated, summarized and analyzed through computer software SPSS. Descriptive statistics were used to calculate, interpret and discuss results and formulate the recommendation. The data were summarized and presented in the form of tables.

Estimation Methods

Data were analyzed by developing equations for estimating fixed costs, variable costs, total cost of production, total revenue, net revenue, Input-Output ratio and benefit cost ratio. A brief description of each term is given as follows:

Land Input Cost

For estimation of land inputs for Cotton on the sample farms, the following formula was used. $Lit = (As \times Cr) + (As \times Rui) / As$.

Where, Lit = Land input per unit of Cotton, As = Area sown under Cotton

Cr = Contract rent per unit / acre. Rui = Rate of usher and irrigation charges

Labour Cost

The extent of labour inputs for various cultural operations involved in Cotton production was estimated by formula: $Lit = (Mn \times Hc) + (Mwd \times Wr) + (Bwd \times Hc) / As$. Where,

Lit = Labour input per unit of Cotton, Hc = Hiring charges., Mn = Machine work hour.

Mwd = Man work day., Wr = Wage rate Bwd = Bullock work day, As = Area sown under Cotton

Capital Inputs cost

following formula was used to compute per unit (acre/ hectare) cost of the capital inputs.

$Cipu = (Qs \times Pr) + (Of \times Pr) + (Qi \times Pr) / As$. Where,

Cipu = Capital inputs per unit of Cotton, Qs = Quantity of used., Pr = Price per unit of input.

Qf = Quantity of fertilizer., Qi = Quantity of insecticides / pesticides & As = Area sown.

Marketing Cost

The marketing cost was estimated by using the formula: $Mc = Qm (RI + Tr + Oc + Rui) / As$

Where, Mc = Marketing cost. Qm = Quantity of produce marketed. RI = Rate of loading.

Tr = Transportation rate. Rui = Rate of unloading of Cotton & As = Area sown

Total Cost of Production

Total cost of production was estimated by using formula: $TC = TFC + TVC$

Where, TC = Total Costs of Production

Estimation of Returns

Estimation of returns was developed by using formula: $VP = (Qs \times Pr) / As$

Where, VP = Value of Product QS = Quantity Sold. Pr = Price per unit. & As = Area

Net Returns

Net returns were estimated by using formula: $NR = TI - TC$

Where, NR = Net Returns, TI = Total Income, TC = Total Cost

Input-Output Ratio

Input-output was estimated by using the formula: $IOR = \frac{TI}{TC}$

Where IOR = Input-Output Ratio

Cost-Benefit Ratio

Cost-Benefit Ratio was estimated by using formula: $CBR = \frac{NR}{TC}$

Where, CBR = Cost Benefit Ratio

EMPIRICAL RESULTS**Characteristics of Sample Cotton Growers**

The knowledge of general environments the farmers are working in some selected socio-economic characteristics of sample owner farmers are generally believed to take risk of adoption of new technologies with uncertain outcomes. Others are of the view that owner-cum-tenants are more innovative as they can share the risk with land owners. These arrangements show the importance of information on land tenure system.

Table 1. Socio-Economic profile of cotton growers

Characteristics	Average	Standard Error
Age of respondent (years)	51.28	1.49
Formal education (years)	13.02	0.25
Farming experience (years)	28.6	1.6

The information regarding socio-economic characteristics of the sample cotton grower is presented in table-1. On an overall basis the average age of selected cotton growers was 51.28 years, implying that relatively senior members of farmer's family were operating the farming business and had 28.6 years of farming experience.

Distribution of sample

Table 2. Distribution of sample cotton growers by farm size during 2010-11

Farm Size	No. of Farmers	Percent
Small (<10 acres)	23	38.33
Medium (10-20 acres)	26	43.33
Large (>20 acres)	11	18.33
All	60	100.00

The result shown in table-2 the distribution of cotton growers 38.33% of having less than ten acres of land were small farmers, 18.33 % of having more than 20 acres of land and 43.33% were large cotton growers and having 10-20 acres of land were medium size of growers in the study area.

Educational levels

Education and training make the grower skilled and more efficient, education not only enhance the standard of living but also help in maintenance of farms which can bring prosperity of his family. Therefore, literacy level was asked from the selected cotton growers in the study area.

Table 3. Education levels of cotton growers in study area, during 2010-2011

Education level	No. of respondents	Percentage
Illiterate	15	25.00
Primary	21	35.00
Middle	11	18.30
Matriculate	8	13.30
Intermediate	4	6.70
Graduate	1	1.70
Total	60	100.00

It was observed in table-3 that the education level of selected growers was in order of 35.00% primary (5-years), 18.30% middle (8-years), 13.30% matriculate (10years) 6.70% intermediated (12-years), 1.70% graduate beyond the 25.00% of cotton respondents were illiterate in the study area.

Crop Seasons and Cropping Patterns

There are two main crop seasons; "Kharif" and "Rabi" in the study area. The Kharif season starts from April-May and ends in October-November while the Rabi starts from November-December and ends in April-May. However due to regional variation in temperature, several factors i.e. varieties, availability of water, soil texture etc. determine the crop pattern, sowing and harvesting time. Wheat, Cotton, Rice, Sugar-cane are the major crops of the district; Sorghum, & Mustard, peas, Onion, Millet and Maize fall in the category of minor crops.

Table 4. Cropping patterns of sample cotton growers during 2010-11

Crops	Percent area
Kharif Crops	
Cotton	45.6
Rice	22.4
Sugarcane	15.2
Sorghum	5.6
Vegetables	6.8
Others	4.4
All	100.00
Rabi Crops	
Wheat	74.4
Sugarcane	18.6
Barseem	5.8
Others	1.2
All	100.00

Cropping patterns in study area is shown in table 4. In Kharif season, rice, sugarcane, Sorghum and cotton, were the major predominant crops with 22.4, 15.2, 5.6 and 45.6 % of the total

cropped area, respectively. While wheat vegetables, barseem, maize had 74.4, 18.6, 5.8 percent respectively sizable share in the Rabi cropping pattern of sample cotton growers.

Status and growth of cotton production in Sindh and Pakistan

The status and growth of cotton production of Sindh province area 547 million acres were grown, 2443 production in million bales and 759 yield per hectares in kilograms (lint) and 2929 million acres area, 10800 million bales production and 627 yield per hectare in kilogram (lint) attributed during 2001-02. During 2011-12 there slight increase area 549 million acres, 2448 million bales production, 761 yield per hectare kilogram (lint) in Sindh and 3200 million acres, 14010 production in million bales and 744 yield per hectare in kilograms (lint) in Pakistan were calculated the details of area, production and yield of cotton in Sindh and Pakistan from 2001-2002 to 2011-12 production and yield of Cotton.

Table-5. Area, production and yield of cotton in Sindh and Pakistan during 2001- 02 to 2011 -12

Year	Sindh			Pakistan		
	Area (in 000 acres)	Production (in 000 bales)*	Yield/ hec in kgs (lint)	Area (in 000 acres)	Production (in 000 bales)*	Yield/ hec in kgs (lint)
2001-02	547	2443	759	2929	10800	627
2002-03	542	2411	756	3114	10900	595
2003-04	561	2242	680	2751	10133	626
2004-05	635	3016	808	2994	10061	571
2005-06	637	2648	707	3210	14600	773
2006-07	570	2398	716	3100	13000	713
2007-08	607	2536	711	3072	13000	719
2008-09	562	2978	901	3035	11665	653
2009-10	634	4270	1144	2850	12060	719
2010-11	650	4282	1098	3120	12698	692
2011-12	547	2443	759	3200	14010	744

* 1 bale = 170 kg

Land Tenure Status

It was apparent from the result in the table-6 that 65.00 % owner, 18.30% owner cum tenant and 16.70% of the respondents were identified as tenant in the study area during 2010-2011

Table 6. Land Tenure Status of cotton growers in study area, during 2010-2011

Land Tenure Status	No. of respondents	Percentage
Owner	39	65.00
Owner cum Tenant	10	16.70
Tenant	11	18.30

Cotton varieties planted on the selected farms in study area

The result shown in the table -7 that most popular commercial cotton were grown by the farmers in the area of study are NIAB-78, CIM-109, Qalandri, Neelam- 121, CIM-111 varieties covered about 30.00, 25.00, 13.30, 13.30, and 10.00 % of land and Ali Akbar-802 variety planted by the selected growers on cotton covered 8.30 percent on the studied farms in study area

Table 7. Cotton varieties planted on the selected farms in study area, during 2010-11

Cotton varieties	No. of respondents	Percentage
Ali Akbar-802	5	8.30
CIM-109	15	25.00
NIAB-78	18	30.00
CIM-111	6	10.00
Neelam- 121	8	13.30
Qalandri	8	13.30

Sources of information about cotton

The most common and acceptable source of information of rural area have always been personal sources like experienced farmers, Newspapers, Neighbors, Electric media and Agriculture department is also significant in the wake of increasing literacy and informational knowledge about recommended technologies of cotton.

Table 8. Sources of technical information to sample cotton growers, during 2010-2011

Sources of information	No. of respondents	Percentage
Friends	12	20.0
Relatives	16	26.7
Neighboring grower	20	33.3
Govt. Agri. Department	7	11.7
Media (Electric/print)	5	8.3

It is observed from above table that majority of the selected cotton farmers i.e. obtained technical information from neighboring farmers that was 33.3% while obtained 26.7% from relatives, 20.0% from friends, 8.3% knowledge about cotton production practices from electric media and newspapers and 11% from government agricultural department that provided technical information was meager about cultural practices and marketing was found minor.

Total Fixed cost

Total fixed cost is simply the summation of the several types of fixed costs (Ronald, 1996). In the present study the total fixed costs include the rent of land (lease) and the land taxes. Fixed costs are those costs, which are incurred irrespective of the level of output.

Table 9. Averages per acre land inputs realized by cotton growers in study area

Item	Minimum	Maximum	Average	Standard Deviation	Standard Error
Rent of land	10250.00	13000.00	11543.36	955.81	30.91
Land tax	202.35	465.40	302.91	83.32	9.13
Irrigation charges	182.11	323.76	238.43	56.01	7.48
Local fund	121.41	323.76	193.24	45.56	6.74
Total	10755.87	14112.91	12277.95	1140.71	54.26

In table-9 the selected cotton growers spend average per acre fixed costs of Rs.12277.95 (\pm 54.26) including rent of land, land tax irrigation charges and local fund an average per acre cost of Rs. 11543.36 (\pm 30.91) as land rent, land tax per acre was Rs. 302.91 (\pm 9.13), while irrigation charges per acre was 238.43 (\pm 7.48) and local fund was 193.24 (\pm 6.74) per acre, land rent ranged between Rs 10755.87 to 14112.91 in the study area.

Labour inputs

Labour inputs, average physical and mental effort for the performance of any work. Inputs analyzed in this study include man as well as animal labour.

Table 10. Averages per acre labour cost incurred by the selected cotton growers in study area, during 2010-2011

Item	Minimum	Maximum	Average	Standard Deviation	Standard Error
Leveling	700.00	987.00	867.33	73.68	8.58
Sowing	400.00	900.00	688.90	136.86	11.69
Ploughing	456.00	956.00	790.88	119.90	10.95
Fertilizer	400.00	950.00	700.36	158.11	12.57
Picking	456.00	900.00	739.30	134.79	11.68
Inter-culturing	400.00	823.00	594.51	114.15	10.68
Total	2812.00	5516.00	4381.30	737.53	66.15

The results presented in the table 10 the averages per acres labour cost that revealed the cotton farmers incurred an average per acre cost of Rs 4381.30 (\pm 66.15) including ploughing, fertilizer, picking, inter culturing and leveling as labor costs. The data further indicated that the labour cost in the study area ranged between Rs. 2812.00 to Rs. 5516.00.

Capital inputs

Capital may be defined as that part of wealth, which is used for further production of wealth. It is the capital that yields a farm entrepreneur to determine the type of farming amongst various substitutes.

Table 11. Averages per acre capital inputs applied by the selected cotton growers in study area, during 2010-2011

Item	Minimum	Maximum	Average	Standard Deviation	Standard Error
Seed	800.00	1200.00	1000.00	159.71	12.63
Urea	1800.00	2300.00	1947.5000	137.60	17.76
D.A.P.	2500.00	4000.00	2880.0000	450.16	58.11
Pesticides/Insecticide	500.00	750.00	589.6500	31.53	4.07
Equipment charges	150.00	500.00	290.0000	115.27	14.88
Total	5750.00	8750.00	6707.15	894.27	107.45

The cotton growers spent on capital inputs as average per acre costs is presented in table-11 Total average per acre cost is Rs. 6707.15 (\pm 107.45). The further cost ranges from Rs. 5750.00 to Rs. 8750.00 in the study area.

Marketing costs

Marketing costs are those expenses which are incurred by the growers when agriculture commodities move from the producing field (farm gate) to the final consumers for the disposal of their production.

Table 12. Averages per acre marketing costs incurred by the selected cotton grower in study area during 2010-2011

Item	Minimum	Maximum	Average	Standard Deviation	Standard Error
Loading	140.00	350.00	209.50	85.597	9.25
Transportation	437.00	900.00	482.66	89.11	9.40
Commission	270.00	580.00	498.85	67.04	8.18
Un loading	150.00	500.00	313.76	124.22	7.79
Total	997.00	2330.00	1504.77	365.967	34.62

The result presented in table-12 depicts that the selected cotton growers on average spent Rs. 1504.77 (± 34.62)/ acre marketing charges, these includes Rs.209.50 (± 9.25) loading charges, Rs.482.66(± 9.40) Rs.313.76(± 7.79) on unloading and Rs.498.85(± 8.18) on commission charges. The table further presented in the study area ranged between Rs. 997.00 to Rs. 2330.00 incurred marketing cost.

Total Cost of Production

The total cost is defined as sum of fixed cost plus variable costs make the total cost of production.

Table 13. Averages per acre total costs incurred by the selected cotton growers in study area, during 2010-2011

Item	Minimum	Maximum	Average	Standard Deviation	Standard Error
Total fix cost	10755.87	14112.91	12277.95	1057.39	33.77
Labour cost	2812.00	5516.00	4381.30	737.53	27.15
Capital input	5750.00	8750.00	6707.00	894.00	30.00
Marketing cost	997.00	2330.00	1504.77	365.967	34.62
Total	20314.90	30708.90	24871.00	3054.89	125.54

In table-13 the result revealed that cotton farmers incurred an average per acre cost Rs. 24871.00 (± 125.54) as total cost of production including fixed cost, labour cost, capital inputs and marketing cost. The data further indicates that cotton grower spent in the study area ranged between Rs. 20341.90 to Rs. 30708.90 on total cost in the study area

Physical productivity

The yield when expressed in terms of physical weight is known as physical productivity. It is generally expressed in terms of unit weight of production obtained is determined.

Table 14. Averages per acre physical productivity realized by cotton growers in the study area, during 2010-2011

Item	Minimum	Maximum	Average	Standard Deviation	Standard Error
Physical productivity	20.00	28.00	23.35	2.01	1.41

The results shown in that each cotton grower harvested and average physical productivity presented in table-14. The results revealed that cotton grower realized average per acre physical productivity of 23.3500 (± 1.41). The data further indicates that the total physical productivity in the study area growers harvested between 20.00 to 28.00 maunds per acre yield was recorded.

Revenue productivity

The value of farm production of gross profit it refers to money income accruing to the farmers from the sale of their production. It is calculated by multiplying the physical productivity (yield) obtained with the price, it is sold.

Table 15. Averages per acre revenue productivity realized by selected cotton growers in study, during 2010-2011

Item	Minimum	Maximum	Average	Standard Deviation	Standard Error
Revenue	30400.00	49400.00	41249.16	4705.18	68.59

An average per acre revenue productivity of Rs. 41249.16 (± 68.59) table further indicated that ranged between Rs. 30400.00 to Rs. 49400.00 as revenue productivity.

Net - farm income

Net farm income is gross profits remains cash operating expenses and depreciation cost of machinery and equipment costs could be obtained by subtracting the gross revenue from cash operating expenses.

Table 16. Averages per acre net income realized by the cotton growers in study area, during 2010-2011

Item	Minimum	Maximum	Average	Standard Deviation	Standard Error
Gross income (a)	30400.00	49400.00	41249.16	4705.18	68.59
Total cost of production (b)	20314.90	30708.90	24871.00	3054.89	125.54
Net income a-b=c	10085.1	18691.1	16378.20	1650.29	-56.95

The result showed that in the study area cotton growers received the average per acre net income is presented in table 16. Results reveal that cotton farmers realized an average per acre net returns of Rs. 16378.20 (± 56.95). The table further indicates in the study area ranged between Rs. 10085.10 to Rs. 18691.09.

Input – Output and Cost – Benefit Ratio Relationship

The cost benefit ratio is defined as net returns compared to cost of production. It is calculated by dividing net returns with cost of production was computed.

Table 17. Input-output and cost benefit ratio calculated by the selected cotton growers in study area, during 2010-2011

Item	Minimum	Maximum	Average	Standard Deviation	Standard Error
Input-output Ratio	1:1.49	1:1.60	1:1.65	1.54	0.54
Cost Benefit Ratio	1:0.49	1:0.60	1:0.65	0.54	-0.45

In the above table-17 the results indicated that the input-output ratio was 1: 1.65 and cost benefit ratio ranges 1:0.49 to 1:0.60. It evidently showed that cotton producers obtained benefit of Rs. 1:0.65 an average while spending a rupee in the study area which is meager benefits for the cotton grower it is due to the unfavorable prices of their produce in the study area were examined.

DISCUSSION

In this study, identified a number of implications and constrains were determined from Cotton farming area of taluka Kandiaro district Naushahero Feroze Sindh. The results are indicating that proposed model provides an acceptable fit on the data. GOP (2006) reported that the variations were in yield which suggests that there may be a reliable potential for improving productivity.

The results indicated that cotton farmers incurred an average per acre cost of their production presented in the table the selected cotton growers in the study area paid average per acre fixed costs of Rs.12277.95 including rent of land, land tax irrigation charges and local fund. The results revealed that cotton farmers incurred an average per acre cost of Rs. 11543.36 (± 30.91) as land rent, land tax per acre was Rs. 302.91 (± 9.13), while irrigation charges per acre was 238.43 (± 7.48) and local fund was 193.24 (± 6.74) per acre. It further indicated that the land rent ranged between Rs 10755.87 to 14112.91 in the study area. The results revealed the cotton farmers incurred an average per acre cost of Rs 4381.30 (± 66.15) as labor costs and that t ranged between Rs. 2812.00 to Rs. 5516.00 averages per acres.

While the cotton farmers spent average per acre cost 1504.77 (± 34.62) marketing charges, these includes Rs.209.50 (± 9.25) loading charges, Rs.482.66 (± 9.40) Rs.313.76(± 7.79) on unloading and Rs.498.85(± 8.18) on commission charges and ranged between Rs. 997.00 to Rs. 2330.00. The growers spent on capital inputs as average per acre costs and total average is Rs. 6707.00 (± 107.00) which ranged from Rs. 5750.00 to Rs. 8750.00.

The result revealed that cotton farmers incurred an average per acre cost Rs. Rs. 24871.00 (± 125.54) as total cost of production including fixed cost, labour cost, capital inputs and marketing cost that ranged between Rs. 20341.90 to Rs. 30708.90 in the study area, while cotton grower realized average per acre physical productivity of 23.3500 (± 1.41). Cotton growers harvested between 20.00 to 28.00 maunds per acre yield. Result interpreted that cotton growers realized an average per acre revenue productivity of Rs. 41249.16 (± 68.59) and ranged between Rs. 30400.00 to Rs. 49400.00. Results revealed that cotton farmers realized an average per acre net returns / income of Rs. 16378.20 (± 56.95). The result further indicates in the study area ranged between Rs. 10085.10 to Rs. 18691.09 which the growers received from the study area the input-output ratio of cotton grower's average was 1: 1.65 and cost benefit ratio was 1:0.60. It evidently examined that cotton producers obtained benefit of Rs. 0.60 average while spending a rupee in the study area. While Sial *et al.* (2004) reported that the cotton growers received Rs. 4235, average per acre returns. In that study area input output and cost benefit ratio were estimated 1: 1.81 and 1: 0.81.

The result discussed in above section clearly indicate that the cost of production as well as returns (physical and revenue) have increased over the time. Normally, the increases in revenue returns take place because of technologically back stopping or technical efficiencies, abundant availability of water in the area, and use of hybrid seed cotton crop.

CONCLUSION AND POLICY IMPLICATIONS

On the basis of present investigation may be summing up, it is concluded that cotton is the main cash crop of Pakistan and plays an important role in the economy of the country. In our country, there are 80 percent of small growers and they face financial constraints at the time of ploughing farms. They purchase their input from the local traders on loan at high interest rates or pay 10 percent to 25 percent more price. The economic analysis review indicates that cost of cotton production is in a continuous change due to inflation. The fast changing scenario in costs on inputs used in cotton, services rates and capital costs demands a regular study on the economic parameters of cotton production. The main problem reported from the selected cotton growers was on farms shortage of irrigation, low quality but high prices of seed and pesticides, far market distance low price of cotton crop received, poor farm market road, costly inputs and exploitation hoarding and speculation of local traders. Yet the growers are confronting with many problems due to which per acre yield is declining.

This production system leads to varying results in the different cotton-producing areas of district Naushahro Feroze, since the results for the changes in productivity and in its components are not homogeneous across them. In light of these research results, and from the point of view of establishing an agricultural policy for the cotton production system in Pakistan, some recommendations can be made:

Policy makers should improve the database of the cotton production sector. Only with a good database it is possible to get to know the productive reality of the cotton production sector appropriately, and a sufficient knowledge of this productive reality is required in order to establish an effective agricultural policy.

Policy makers should aim to improve the total productivity of cotton with the purpose of reducing the production costs and increasing the degree of competitiveness cotton production. It would therefore be useful to identify and to tackle the factors that cause the negative contributions of efficiency and the technical progress components to total productivity growth. However some effective policy measures (such as providing better extension services and farmer training programs) can be proposed to improve the capacity of farmers. If the farmers have greater capacity, they are able to allocate their resources more efficiently and make a better use of the available technology.

Finally, policy makers should take into account that the behavior of productivity and its components is not homogeneous across country. Therefore, it seems reasonable to propose specific measures for each of them and to analyze the possibility of orientating production.

Summary

Fixed cost: Average fixed cost per acre.	Rs.	12277.95
Variable costs: Average labour cost per acre	Rs.	4381.30
Marketing cost: Average per acre marketing costs	Rs.	1504.77
Capital inputs: Average per acre capital inputs	Rs.	6707.00
Total costs: Average per acre total costs	Rs.	24871.00
Revenue products: Average Revenue productivity per acre	Rs.	41249.16
Net Farm income: Average net income per acre	Rs.	16378.20
Input-Output ratio	Rs.	1:1.65
Cost benefit ratio	Rs.	1:0.65
Physical productivity: Average per acre productivity	Mds.	23.35

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