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Economic Implications of Rice Production Technology in District Shikarpur, Sindh Province

Moula Bux Peerzado[1*] Altaf Ahmed Jalbani[1] Mumtaz Ali Joyo[1] Tehmina Mangan[1]
Luan Jingdong[2], Qurat Ul Ain Memon[2], Shoaib Ahmed Wagan[2*]
1.Department Of Agriculture Economics, Sindh Agriculture University Tandojam
2.College of Economics and Management, Anhui Agricultural University China

Abstract
The research was carried out to investigate the "economic implications of rice production technology in district Shikarpur, Sindh province", with the main objective to find out the socio-economic factors of the study area, to determine the production practices technology of rice crop in the study area, to identify the marketing channels of crop in the study area and to suggest policy measures for sustainable rice production in the study area. The study was conducted by survey method. A well designed questionnaire was prepared. Average water charges per acre incurred by rice farms was Rs. 2000, Average other charges per acre incurred by rice farms were Rs. 4000. So the Average per acre land inputs cost of Rs.24000 incurred on a rice farm, average per acre cost of Rs.23914.5 incurred as labour costs. The costs further indicates that the labour cost in the study area ranged between Rs.20591.83 to Rs.27237.19. Average per acre cost on rice farm on capital inputs is Rs.23231.36, the capital inputs ranges from Rs.16637.97 to Rs.29804.75. Average per acre cost of Rs.81530.74 as marketing cost including loading, unloading, transportation and commission.
Keywords: Rice, production practices technology, average per acre cost

1. Introduction

Agriculture is central to economic growth and development in Pakistan. Being the dominant sector it contributes 21.4 percent to GDP, employs 45 percent of the country's labor force and contributes in the growth of other sectors of the economy. The healthy expansion in agriculture stimulates domestic demand for industrial goods and other services and supplying raw material to agro-based industry notably cotton textile industry which is the largest subsector of manufacturing sector. The government under paradigm of the new growth strategy envisioned to enhance growth in agriculture sector by facilitating agriculture productivity sustainable environment, increasing competitiveness in agriculture marketing and trade by providing friendly climate for more investment in the sector. However, draft tenth 5 years plan also envisages improving the productivity, profitability competitiveness and environmental sustainability of agriculture (economic survey of Pakistan 2013). Rice is an important cash crop of the country. Rice production comprises 40 percent of Basmati (Fine) type and 60 percent of coarse types. Rice ranks as second amongst the staple food grain crop in Pakistan and it has been a major source of foreign exchange earnings in recent years. Pakistan grows a high quality of rice to fulfill the domestic demand and also for exports. Rice accounts 2.7 percent of the value added in agriculture and 0.6 percent of GDP. Rice sowing area is estimated at 2311 thousand hectares, 10.1 percent less than last year's area of 2571 thousand hectares. Production of the crop is estimated at 5541 thousand tones, against the target of 6900 thousand tones shows a weak performance of 19.7 percent and to compare last year production which was 6160 thousand tones shows a decrease of 10.0 percent. The production decreased due to decrease in area and affects of monsoon rain and late receding of water period in rice fields prolonged the sowing. The area, production and yield of rice for the last five years are below. Rice is one of the most important cash crops that play a vital role in uplifting the country's economy. Rice is one of the important food and cash crops in the world and ranks second in terms of area and production. It is the staple food for about 50 per cent of the population in Asia, where 90 per cent of the world's rice is grown and consumed. Asia's food security depends largely on the irrigated rice fields, which account for more than 75 per cent of the total rice production (Virk et al., 2004). Rice is an important food as well as highly valued cash crop that earns substantial foreign exchange for the country. It is also a staple food and cash crop of the people of Shikarpur district. Thus it occupies the majority of cultivated land under rice. Its share in total cropped area was recorded at 61.3%. Despite the relative price having favored the high yielding varieties, farmers traditionally grow the IRRI, and other varieties in district Shikarpur. The area under rice increased by 7.7% from 100.0 thousand acres 107.7 thousand acres in 2011-12 the production of rice increase 1.1% from 320.1 thousand tons to 316.6 thousand tons. Similarly yield per acre also increased by 7.6% from 2939 kg. Per acre to 3181 kg. Per acre over the period of last five year. (SDI, 2012).

Status of rice (Area, production and yield) in Pakistan 2008-13.

Year	Area (000) Hectors	Production (000)Tons	Yield (kg) Hectors
2008-09	2963	6952	2346
2009-10	2883	6883	2387
2010-11	2365	4823	2039
2011-12	2571	6160	2396
2012-13	2311	5541	2398
Source: Pakistan Bureau of Statistics P: Provisional (July-March)			

Rice production can be increased either by increasing the area under rice production or by improving the efficiency of existing resources allocated to rice production. If rice farmers are already technically efficient, then increase in productivity requires new inputs and technology to shift the production frontier upward. However, if significant opportunities exist to increase productivity through more efficient use of existing resources and inputs with current technology, a stronger case can be made for institutional investment in input delivery, infrastructure, extension system, farm management services, and farmers' skills in order to promote technical efficiency of resource use at the farm level. Hence, like in other crops it is important to investigate technical efficiency and its determinants in rice production (Ali and Chaudhury, 1990). Agricultural growth is essential for fostering economic development and feeding growing populations in most less developed countries. Area expansion and irrigation have already become a minimal source of output growth at a world scale. Agricultural growth will depend more and more on yield-increasing technological change (Datt and Ravallion, 1996; Hossain, 1989). It is believed the adoption of new agricultural technology, such as the High Yielding Varieties (HYV), that led to the Green Revolution in Asia could lead to significant increases in agricultural productivity in Africa and stimulate the transition from low productivity subsistence agriculture to a high productivity agro-industrial economy (World Bank, 2008). In addition, empirical studies show that gains from new agricultural technology influenced the poor directly, by raising incomes of farm households, and indirectly, by raising employment and wage rates of functionally landless laborers, and by lowering the price of food staples (Pinstrup-Andersen et al. 2001).The main focuses on demonstration of economic implication of rice production technology comprised on production technology, timely transplanting of appropriate age of seedling and maintaining of recommended plant population with standard geometry. The above facts and figures show that the production of rice crop and its marketing issues with related problem. Therefore the need of study have essential and present study was conducted in District Shikarpur, Sindh province of Pakistan. The specific objectives were:

1. To find out the socio-economic factors of the study area.
2. To determine the production practices technology of rice crop in the study area.
3. To identify the marketing channels of crop in the study area.
4. To suggest policy measures for sustainable rice production in the study area.

2. Review of Literature

The available literature was reviewed during the conduct of the study and is being presented here in the following sections.

Anwar (2012) study estimates the impact of major agriculture inputs (credit disbursement, area under cultivation, fertilizer consumption and water availability) on total rice production in Pakistan using a time series ranging from 1988 to 2010. The study uses a log-linear Cobb-Douglas production function to estimate the impact and importance of these inputs. It finds that area under cultivation and water availability had a positive and statistically significant impact on rice production and the other two inputs had a positive but statistically insignificant impact. Estimation reveals that a 1% increase in area under rice cultivation brought a 1.64% increase in total rice production and a 1% increased in water availability increased total rice production by 0.87%. The insignificance of credit disbursement and fertilizer consumption indicates the presence of inefficiencies which begs for some policy attention.

Awan, et al. (2011) the present study was designed to study the effect of different transplanting methods in comparison with the farmer's conventional transplanting methods at farmer's field. Experiments were laid out in randomized complete block design (RCBD) and replicated thrice having a net plot size of 30 m x 40 m. The studies were carried out consecutively for three years during kharif season 2003, 2004 and 2005. For this study fifteen(15) locations viz; Sheikhupura (Mallian Kalan), Nankana Sahib (Warburten), Lahore (Burki), Wazirabad (Manzoorbad), Wazirabad (Rakh Bharokae), Kamonke (Ramey Farm), Noshehra Virkan, Daska, Pindi Bhattian (Sokhakea), Hafizabad (Ahmadpur Chatha), Pasroor (Poorib Klair), Gujranwala (Batala farm), Norowal (Burj). Shakar Garh (Tittarpur) and Ferozwala (Khori) were selected. The highest paddy yield (6.02 t ha-1) was produced by standard line transplanting at Nankana sahib which was statistically at par with that recorded in the same treatment at Sheikhupura and Gujranwala sites. The lowest paddy yield (3.3 t ha-1) was recorded in the treatment where nursery was randomly transplanted by the farmer in Kamoke tehsil. Data averaged across locations and

years showed the highest paddy yield of 5.07 t ha-1were produced by the standard line transplanting which remained significantly different from both the other treatments (open & framer's transplanting). The second highest value of paddy yield (4.33 t/ha) was produced by open transplanting treatment whereas farmer's practice of random transplanting showed lowest paddy yield of 3.97 t/ha.

Abedullah, et al. (2007) reported that the study employed a Stochastic Frontier Production approach to determine the future investment strategies that can enhance the production of rice in Punjab, Pakistan. The data is collected from 200 farmers in the year of 2005 from two Tehsils of Sheikhupura district which is one of the major rice growing districts of Punjab province. The results of stochastic production function indicate that coefficient of pesticide is non-significant probably due to heavy pest infestation while fertilizer is found to have negative impact on rice production mainly because of improper combination of N, P, and K nutrients. The improper combination of input use indicates poor dissemination of extension services. Therefore, the role of extension department should be strengthened to enhance the productivity of rice and to protect the major natural resource, ground water for future generations. The results of inefficiency model suggest that investment on tractor (mechanization) could significantly contribute to improve farmer's technical efficiency, implying that the role of agricultural credit supply institutes (such as banks) needs to be redefined. Rice farmers are 9 percent technically inefficient, implying that little potential exists that can be explored through improvement in resource use efficiency. As a long run strategy, the investment on research related activities should be increased to shift the production technology.

Waqar et al. 2007 observed that the Policy Analysis Matrix (PAM) methodology was used to determine the level of economic efficiency and competitiveness in the production of rice crops in Pakistan's Punjab. The methodology was also used to assess the effect of policy intervention on the production of Basmati and IRRI rice crops. The results indicate that an expansion of the production of Basmati rice can lead to an increase in exports. The production of IRRI in Pakistan's Punjab is characterized by a lack of economic efficiency implying inefficient use of resources to produce the commodity. On the other hand, both Basmati and IRRI rice production in the Punjab demonstrate a lack of competitiveness at the farm level for the period under analysis. The analysis shows that the prevailing incentive structure affected farmers negatively. A negative divergence between private and social profits implies that the net effect of policy intervention is to reduce the farm level profitability of both rice production systems in Punjab. The results highlight the need for removing existing policy distortions in the structure of economic incentives to enhance economic efficiency and to attain farm level competitiveness in rice production.

Mahabub, et al. (2006) reported that the technological progress has helped Bangladesh to achieve self-sufficiency in rice production in 2001 from a heavy import-dependence, despite doubling of population and a reduction in arable land since its independence in 1971. As the adoption of modern varieties (MV) of rice is reaching a plateau, particularly for the irrigated ecosystem, an important issue is whether the research system will be able to sustain the growth of production. The present paper addresses the following questions: (i) to what extent farmers have been replacing the old MV with the new MV, and (ii) what has been the impact of the variety replacement on productivity and profitability. How crucial is the continuous research and release of improved rice varieties toward improving farm production and income for farmers comes out as a clear message to policymakers from the current paper.

Jamlai (2004) observed that the study was conducted to investigate the grow level of awareness, effectiveness of the sources regarding adoption of selected recommended technologies of rice crop in Tehsil Usta Mohammad, District Jaffarabad, Balochistan, during the year 2003-04. The objectives of study were to determine the awareness of farmers about improved agricultural practices for rice crop; to know the extent of adoption of improved practices by the rice growers; to know the opinion of rice growers regarding the recent technology package recommended by the agriculture Extension Department; and to determine effective sources of information for awareness and adoption of rice technology. The respondents were selected at randomly in each of the four randomly selected Dehs of Teshsil Usta Mohammad, 60 farmers (15 from each Dehs) were interviewed personally. Data on the general characteristics of the farmers revealed that (33%), grower illiterate. (55%) the respondents had middle landholder i.e., from 12- 40 acres of land. Distribution of the respondents according to Tenancy status snowed that (58.3%) respondent had land lord. Most of the farmers were aware about recommended practices of rice, (certified paddy seed, proper land preparation, proper time of nursery, proper irrigation, proper varieties of sowing, fertilizer application etc.). Majority of farmers were growing Basmati variety followed by Russi (Russian) and Sarshar, whereas IRRI-9 and IRRI-6 variety of rice are growing oil small area or land, (98.3% farmers adopted Basmati variety, 95%) farmers adopted Russi variety, 36.7% farmers adopted Sarshar variety of rice). All farmers were "always" adopted tractor plow for land preparation, only 28.3% farmers "some times" adopted animal plow on their field. Majority's (70%) of the farmers usually adopted recommended time of transplanting. Recommended irrigation application usually adopted by 30% farmers and 20% were always adopted. 48.3% growers knew recommended weed control. 38.3% respondents knew recommended fertilizer application. Majority of the farmers was not aware about threshing machine. Majority of the farmers suggested media and spot visit of extension worker are useful. Some farmers suggested that one Agro TV channel should be started for the improvement or agriculture.

Neighboring farmers were perceived as excellent source of information followed by radio by majority of farmers.

3. Materials and Methods

The economic implications of rice production technology in district Shikarpur, Sindh province was studied during the year 2013 using empirical model for the total production of rice on farms

3.1. Source of data and sampling

Data used for the study were obtained from cross-sectional survey of rice framers in district Shikarpur of Sindh province that jointly accounted for a considerable quantity of the total rice produced in Sindh province with upland ecology. A multi stage random sampling technique was adopted in selecting a total of 60 farmers. Information obtained with of well structured interview schedule include resource inputs and output in rice production; cultural practices of the farmers and their socio-economic characteristics like age, education, household size etc. District Shikarpur was selected as the representative areas for rice production in the study area. Analysis is carried out by using primary data on input-output quantities and prices from 60 farm households' belongings to Shikarpur, Sindh. The data was collected from 05 villages from Shikarpur the extension department of the Sindh Government. Ten farmers from each village are randomly selected. The research in the beginning had insight into the study area, discussed the selection of the study crop, sampling techniques applied and sample size, questionnaire development and its pre-testing, variables in the analysis study, difficulties faced by the researcher during data collection and the limitations of the study were are discussed at length. For managing the last stage sampling unit i.e. farmers, a list of farmers in each selected village was prepared and necessary information was obtained regarding, name of the farmer, area owned, area rented in/out, area share cropped in/out, ultimate operational farms holding and their location on the water course. The list of farms respondents in each selected village served as frame for sampling. Sample was stratified according to farms size and classified as different farms sizes. In all 60 traditional farmers were selected from the five villages, 06 farmers from each village, keeping in view the composition of farms size in the selected villages and their location on the water course.

3.2. The Questionnaire and Pre-Testing

The questionnaire for the survey was designed to select for details about field operations for rice cultivation on the farms in the study area. Information concerning, farms size (acres), source of irrigation, age, education etc. were collected. The output and input data were obtained on per farms and per acre basis in the survey. A newly developed questionnaire was pre-tested on a few pilot respondents in order to identify weaknesses, ambiguities and omissions before it is finalized for the survey itself as suggested by (Casley and Kumar, 1988). Pre-testing provides an opportunity for the researcher to improve the questionnaire by adding something which they feel is missing or by deleting something which is unwanted or changing something that is not clear to the respondents. In this study, a comprehensive questionnaire was established and pre-tested in sample areas. As a result of the pre-testing some minor changes were made. The interviews were conducted in the local language. In some cases, the farmers were not available at the first visit; therefore, the interviewer had to pay a second visit to these respondents.

3.3. The Questionnaire

The questionnaire for the survey was designed to select for details about field operations for rice cultivation on the farms in the study area. Information concerning, farms size (acre), source of irrigation, age, education etc. were collected. The output and input data were obtained on per farms and per acre basis in the survey.

Percentage was derived from sample size as below.

Total observed no /total no *100

Total revenue = Price * Physical Productivity

Total cost is sum of the fix cost and total variable costs for any given level of production.

Total cost (TC) = Fixed cost (FC) +Variable cost (VC)

Profit (P) = Gross Income (GI) – Expensive (E)

Net return (NR) = Total revenue (TR) – Total cost (TC)

4. Results

The study was carried out to measure the economic Implications of rice production technology in district Shikarpur, of Sindh province during the year 2013, using empirical model for the total production of rice farms, likely to be approximated by production function involving various production associated factors including land inputs, labor and capital costs. The results of the study have been presented in the following sections which include descriptive statistics of socio-economic indicators of rice farms, costs incurred, and physical and revenue productivity realized by the rice farms. The socio-economic indicators include educational level, farm size, age of farmers, and its distance from market. The results are presented in the following section.

4.1. Age and education of the Respondent:

Studies show that age always considers an important factor in determining the adoption behavior, which helps in decision making and adopting each diffused technology with appropriate thinking. Following numbers present the age of the respondent. That mostly 50% rice growers belonged 41 years and above age group, while 30% growers were in the age of 31-40 years group and 20 % growers were up to 30 years of age. It shows that majority (30.00%) of the growers were primary, 20.00% respondents were illiterate and 10% were intermediate respectively, 15% respondents were high school, while 16.67% respondents were middle and 8.33% respondents were graduate school education.

4.2. Size of Land Holding (Farm Size):

The size of land holding is considered to be one of the important factors, which affects the adoption behavior of the growers. The information about the size of land holding of the respondent is presented below.

Table 1: Size of land holding (experience)

Farm size	Frequency	Percent
Up to 30 acres(10)	4 (17)	6.67(28.33)
31-60 acres (20)	27(19)	45.0(31.67)
61-90 acres (30)	8(11)	13.3(18.33)
91 and (40)above	21(13)	35.0(21.67)
Total	60(60)	100(100)

Table-1 shows that majority 45.00% of the growers had 31-60 acres of land while 35.00% respondents had above 91 acres, 13.33% respondents had 61-90 acres and 6.67% respondents had only up to 30 acres of land and generally it is observed that adoption of innovation is directly proportional to the experience. The greater the experience, the greater will be the rate of adoption. Experience of the respondent & Average per acre cost of land inputs incurred by rice farmers. It shows that majority 31.67% of the growers had experience of 11-20 years, 28.33% respondents had up to 10 years of experience, 18.33% respondents had 21-30 years of experience and 21.67% respondents had above 31 years of experience. It presents the results of land inputs incurred by the rice farms in the study area.

Table: 3 revealed that average rent of land on per acre was 20000 whereas minimum and maximum cost was incurred 18000 and 22000 respectively. Average other crops per acre incurred by rice farms were 4000 whereas minimum and maximum per acre cost on other agricultural costs were 3000 and 5000 respectively. Average per acre cost incurred on land inputs were 2400, whereas minimum and maximum per acre cost on land inputs were 22400 to 28600 respectively. It presents the results of labor inputs incurred by the rice farms in the study area. Table revealed that average cost of plowing on per acre was Rs. 13481.12), where as minimum and maximum cost on average plowing was incurred as Rs. 12470 and Rs. 14492 respectively. Cost on labor for sowing average per acre by rice farmers 3202.77.

Table 2. Average per acre labor and input cost.

Items	Mean	Minimum	Maximum
Rent of land	20,000	18000	22000
Water Charge	2000	1400	1600
Other	4000	3000	5000
Overall taxes	25458	22400	28600
Sowing Labor Cost	3202.77	2181.83	4223.7
Other	5197.29	4013.75	6380.83
Fertilizer Labor Cost	2033.46	1926.25	2140.66
Total Labor Cost	23914.5	20591.83	27237.19

Whereas minimum and maximum cost on sowing were Rs. 2181.83 and Rs. 4223 respectively. Other cost on per acre incurred by rice farms was Rs. 5197.29 where as minimum and maximum cost on harvesting labor per acre were Rs. 4013.75 and Rs. 6380.83 respectively. The labor cost per application of fertilizer on per acre incurred by rice farms was Rs. 2033.46 where as minimum and maximum per acre cost on fertilizer labor 1926.25 and 2140.66 respectively. Average per acre total cost incurred on labor inputs was 23914.5 whereas, minimum and maximum cost on capital inputs were 20591.83 and 27237.19 respectively.

Table 3. Average per acre input cost by rice farmers.

Variables	Mean	Minimum	Maximum
Seed	1898	1976	1820
Other	4235	1000	5470
DAP	4556.5	3950	5163
Fertilizer	3754.4	2173.6	5335.2
Zinc	2651.05	2264	3038.1
FYM	2478.75	1870	3087.5
Pesticide	2655.25	1086.8	4223.7
Weedicide	992.41	317.57	1667.25
Total	23231.36	16637.97	29804.75

Table: 3. the results of capital inputs incurred by the rice farms in the study area. Table revealed that average per acre seed cost was Rs. 1898 where as minimum and maximum per acre cost on seed was incurred Rs. 1976 and Rs. 1820 respectively. The average per acre cost on other costs incurred by rice farms was Rs. 4235, whereas minimum and maximum per acre cost on other costs was Rs. 3000 and Rs. 5470 respectively. Average per acre cost on DAP fertilizer incurred by rice farms was Rs. 4556.5 where as minimum and maximum per acre cost on DAP fertilizer were Rs. 3950 and Rs. 5163 respectively. Average per acre cost on Urea incurred by rice farms was Rs. 3754.4, whereas minimum and maximum per acre cost on Urea fertilizer was Rs. 2173.6 and Rs. 5335.2 respectively. Average per acre cost on Zinc incurred by rice farms was Rs. 2651 where as minimum and maximum on per acre cost on zinc were Rs. 2264 and Rs. 3038.1 respectively. Average per acre cost on FYM incurred by rice farms was Rs. 2478.75, whereas minimum and maximum per acre cost on FYM were Rs.1870 and Rs.3087.5 respectively. Average per acre cost on pesticide incurred by rice farms was Rs. 2655 where as minimum and maximum per acre cost on pesticide were Rs. 1086.8 and Rs. 4223.7 respectively. Average per acre cost on weedicide incurred by rice farms was Rs. 992 where as minimum and maximum per acre cost on weedicides were Rs. 317.57 and Rs. 1667.25 respectively. Average per acre total cost on capital inputs was Rs. 23231.36 where as minimum and maximum per acre cost capital inputs were Rs. 16637.97 and Rs. 2984.75 respectively.

Post harvesting cost:

Table 4. Average per acre marketing cost by rice farmers.

Items	Mean	Minimum	Maximum
Load & unloading	1898.11	1262.71	2533.52
Transportation	2280.52	1350.74	3210.3
Other	2408.96	1414.96	2402.96
Total Marketing Cost	6587.59	4028.41	8146.78
Main Product (mounds)	154.76	118.68	190.84
By Product	32	30.25	33.75
Yields/mounds	154.76	118.68	190.84
Price/40 kg	1020	990	1050
Revenue/acres	158937	117493	198216
Gross Revenue	157855.00	117493.00	198216.00
Variable costs	76324.26	61147.16	89508.38
Marketing Cost	2002.89	1028.41	3146.78
Production Costs	78327.15	62175.57	92655.16
Net Return	79527.85	55317.43	105560.84
Gross Margin	81530.74	56345.84	108707.62

Table: 5. it presents the results of marketing cost incurred by the rice farms in the study area. Table revealed that average per acre cost on loading and unloading incurred by rice farms was Rs. 1898.1.whereas minimum and maximum per acre cost on marketing incurred by rice farms was Rs. 1262.71 and Rs. 2533 respectively. Average per acre cost on transportation incurred by rice farms was Rs. 780.5, whereas minimum and maximum per acre cost on transportation by rice farms were Rs. 350.74 and Rs. 1210.3 respectively. Average per acre cost on brokerage incurred by rice farms was Rs. 908.9, whereas minimum and maximum per acre cost on brokerage incurred by rice farms were Rs. 414.96 and Rs. 1402.96 respectively. Average per acre cost on marketing inputs incurred by rice farms was Rs. 2087.6, whereas minimum and maximum per acre cost on marketing inputs by rice farms were Rs. 1028.41 and Rs. 3146.78 respectively and presents the results of physical productivity realized by the rice farms in the study area. Table revealed that main product of rice farms on average per acre was 154.76, whereas minimum and maximum physical productivity from per acre average was 118.68 and 190.84 mounds. By product on average per acre was 32.09, whereas minimum and maximum by product average per acre was 30.25 and 33.75 bundles of hay respectively. It also gives the results of total revenue realized by the rice farms in the study area. Table revealed that average per acre yield was 154.76 mounds, whereas minimum and maximum average per acre yield were 118.68 and 190.84 mounds respectively. Average price of per 40 kg was Rs. 1020, whereas minimum and maximum average price were recorded as Rs. 990 and Rs. 1050 respectively. Average revenue generated per acre of rice farms was Rs. 158937, whereas minimum and maximum revenue on average per acre was Rs. 117493 and Rs. 198216 respectively. So the findings of total costs incurred by the rice farms in the study area. Analysis shows that growers received higher average gross margin Rs.81530.74/acre. Whereas, the variable cost analyzed 76324.26/acre. Gross margin and net return of rice production were analyzed and presented in (table 12). Result shows that farmers received Rs.79527.85/acre of gross margin and Rs. 81530.74/acre net return from rice production in the study area.

5. Discussion

The chapter discusses the results of the study and compares them with previous studies. The aim of this study was to examine the economic implications of rice production technology in district Shikarpur, of Sindh province. For this purpose primary data were collected on rice farms including cost of production, physical and revenue productivity on rice farms in the study area. Educational background of rice farms in study area showed that 46 percent farmers had education level of primary, 24 percent middle and 20 percent had education intermediate, the remaining about 14 percent farmers were recorded illiterate in the study area. These results are constant with the study conducted by Laghari (2008). The location of farms has significance as the distance from market matters in price setting of production. Distance of sampled farms on average from market were noted as 4.63 kilometer, where as minimum and maximum distance was 3 and 7 kilometers respectively. Studies show that age always considers an important factor in determining the adoption behavior, which helps in decision-making and adopting each diffused technology with appropriate thinking. Following table present the age of the respondent. Results showed that mostly 50% rice growers belonged 41 years and above age group, while 30% growers were in the age of 31-40 years group and 20 % growers were up to 30 years of age. Educational adoption has been found positively associated with educational level of farmer. A well-educated farmer can easily connected and accept the new ideas then illiterate farmer. Results showed that majority (30.00%) of the growers was primary, 20.00% respondents were illiterate and 10% were intermediate respectively, 15% respondents were high school, while 16.67% respondents were middle and 8.33% respondents were graduate school education.

The size of land holding is considered to be one of the important factors, which affects the adoption behavior of the growers. The information about the size of land holding of the respondent was that the majority 45.00% of the growers had 31-60 acres of land while 35.00% respondents had above 91 acres, 13.33% respondents had 61-90 acres and 6.67% respondents had only up to 30 acres of land. Generally it is observed that adoption of innovation is directly proportional to the experience. The greater the experience, the greater will be the rate of adoption. Experience of the respondent showed that majority 31.67% of the growers had experience of 11-20 years, 28.33% respondents had up to 10 years of experience, 18.33% respondents had 21-30 years of experience and 21.67% respondents had above 31 years of experience. Land inputs include rent of land, water charges, usher charges, local taxes and agricultural taxes. The results of land inputs incurred by the rice farms in the study area revealed that average rent of land on per acre was Rs. 20,000 where as minimum and maximum cost was incurred at Rs. 18000 and Rs. 22,000 respectively. Average other crops per acre incurred by rice farms were Rs. 4000 where as minimum and maximum per acre cost on other agricultural costs were Rs 3000 and Rs 5000 respectively. Average per acre cost incurred on land inputs were Rs 2400, whereas minimum and maximum per acre cost on land inputs were Rs 22400 to 28600 respectively. Labor inputs include plowing, sowing labor, harvesting labor and fertilizer labor cost labor. The results of labor inputs incurred by the rice farms in the study area revealed that average cost of plowing on per acre was Rs. 13481.12. Whereas minimum and maximum cost on average plowing was incurred as Rs. 12470 and Rs. 14492 respectively. Cost on labor for sowing average per acre incurred by rice farms was Rs. 3202.77 where as minimum and maximum cost on sowing were Rs. 2181.83 and Rs. 4223 respectively. Other cost on per acre incurred by rice farms was Rs. 5197.29 where as minimum and maximum cost on harvesting labor per acre were Rs. 4013.75 and Rs. 6380.83 respectively. The labor cost per application of fertilizer on per acre incurred by rice farms was Rs. 2033.46 where as minimum and maximum per acre cost on fertilizer labor Rs. 1926.25 and Rs. 2140.66 respectively. Average per acre total cost incurred on labor inputs was Rs. 23914.5 whereas, minimum and maximum cost on capital inputs were Rs. 20591.83 and Rs.27237.19 respectively. Capital inputs include seed, seedling, fertilizer DAP, Urea, zinc, organic manure, pesticide and weedicide. The results of capital inputs incurred by the rice farms in the study area revealed that average per acre seed cost was Rs. 1898 where as minimum and maximum per acre cost on seed was incurred Rs. 1976 and Rs. 1820 respectively. The average per acre cost on other costs incurred by rice farms was Rs. 4235, whereas minimum and maximum per acre cost on other costs was Rs. 3000 and Rs. 5470 respectively. Average per acre cost on DAP fertilizer incurred by rice farms was Rs. 4556.5 where as minimum and maximum per acre cost on DAP fertilizer were Rs. 3950 and Rs. 5163 respectively. Average per acre cost on Urea incurred by rice farms was Rs. 3754.4, whereas minimum and maximum per acre cost on Urea fertilizer was Rs. 2173.6 and Rs. 5335.2 respectively. Average per acre cost on Zinc incurred by rice farms was Rs. 2651 where as minimum and maximum on per acre cost on zinc were Rs. 2264 and Rs. 3038.1 respectively. Average per acre cost on FYM incurred by rice farms was Rs. 2478.75, whereas minimum and maximum per acre cost on FYM were Rs.1870 and Rs.3087.5 respectively. Average per acre cost on pesticide incurred by rice farms was Rs. 2655 where as minimum and maximum per acre cost on pesticide were Rs. 1086.8 and Rs. 4223.7 respectively. Average per acre cost on weedicide incurred by rice farms was Rs. 992 where as minimum and maximum per acre cost on weedicides were Rs. 317.57 and Rs. 1667.25 respectively. Average per acre total cost on capital inputs was Rs. 23231.36 where as minimum and maximum per acre cost capital inputs were Rs. 16637.97 and Rs. 2984.75 respectively. Post harvesting cost includes threshing and weighing cost. The results of post harvesting inputs incurred by the rice farms in the study area revealed that average per acre cost on threshing was Rs. 6335.2 where as minimum and maximum per acre

cost on threshing were Rs. 5912.48 and Rs. 6757.92 respectively. Average per acre cost on weighting incurred by rice farms was Rs. 1895.2 where as minimum and maximum per acre cost on weighting were Rs. 1256.88 and Rs. 2533.52 respectively. Average per acre cost on total post harvesting incurred was Rs. 8230 where as minimum and maximum per acre cost on post harvesting were Rs. 7169.36 and Rs. 9291.44 respectively.

Marketing cost include loading and unloading, transportation and brokerage. The results of marketing cost incurred by the rice farms in the study area revealed that average per acre cost on loading and unloading incurred by rice farms was Rs. 1898.1 where as minimum and maximum per acre cost on marketing incurred by rice farms was Rs. 1262.71 and Rs. 2533 respectively. Average per acre cost on transportation incurred by rice farms was Rs. 780.5 (21.63), where as minimum and maximum per acre cost on transportation by rice farms were Rs. 350.74 and Rs. 1210.3 respectively. Average per acre cost on brokerage incurred by rice farms was Rs. 908.9 (24.48), where as minimum and maximum per acre cost on brokerage incurred by rice farms were Rs. 414.96 and Rs. 1402.96 respectively. Average per acre cost on marketing inputs incurred by rice farms was Rs. 2087.6 (55.62), where as minimum and maximum per acre cost on marketing inputs by rice farms were Rs. 1028.41 and Rs. 3146.78 respectively. Average per acre physical productivity realized by rice farmers. The results of physical productivity realized by the rice farms in the study area revealed that main product of rice farms on average per acre was 154.76 (8.68), where as minimum and maximum physical productivity from per acre average was 118.68 and 190.84 mounds. By product on average per acre was 32.09 (0.44), where as minimum and maximum by product average per acre was 30.25 and 33.75 bundles of hay respectively. So average revenue realized from per acre has been given in the following the results of total revenue realized by the rice farms in the study area revealed that average per acre yield was 154.76 mounds (8.68), where as minimum and maximum average per acre yield were 118.68 and 190.84 mounds respectively. Average price of per 40 kg was Rs. 1020 (9.24), whereas minimum and maximum average price were recorded as Rs. 990 and Rs. 1050 respectively. Average revenue generated per acre of rice farms was Rs. 158937 (80.20), where as minimum and maximum revenue on average per acre was Rs. 117493 and Rs. 198216 respectively and similarly total cost of land include land cost, labor cost, capital cost, post harvesting cost and marketing cost. The results of total costs incurred by the rice farms in the study area Analysis showed that growers received higher average gross margin Rs.81530.74/acre. Whereas the variable cost on per acre analyze 76324.26/acre. Gross margin and net return of rice production were analyzed and presented. Result shows that farmers received Rs.79527.85/acre of gross margin and Rs. 81530.74/acre net return from rice production in the study area. The benefit cost ratio includes Input output and benefit cost ratio. Benefit cost analysis is used to determine which option is likely to provide the highest return for a proposed investment. This analysis indicated that BCR of rice was 1.02 was received by the farmers. Thus, study concluded that cultivation of rice production as more profitable.

6. Summary, Conclusions And Suggestions

The economic implications of rice production technology in district Shikarpur of Sindh province during the year 2013 by estimating the total costs of returns and studying efficiency on production through static frontier analysis of rice farms. The results revealed moderate production inefficiency for sampled rice farmers in the study area and, hence, significant potential for rice farmers increasing efficiency. A further cost reduction can be obtained by operating with optimal scale, which is medium size farms. Given the importance of rice production for income, contribution to food security, employment and export in Sindh province and Pakistan, the benefits from increasing farms efficiency would be substantial. Results suggested that production is influenced by many factors including lack of education, lack of adoption of new varieties, lack of required fertilizer efficient use of pesticide and one of the major factor non-availability of water at the sowing time. The analysis also indicates that increasing land holding and farms size does not have substantial benefits for efficiency, as results to scale are slightly increasing to medium size farmers which suggest that the benefits of small farmers are distributed across large number of people.

Educational background of rice farms in study area showed that 46 percent farmers had education level of primary, 24 percent middle and 20 percent had education intermediate, the remaining about 14 percent farmers were recorded illiterate in the study area.

On the basis of above results following suggestion have been developed to enhance production as well as income of the farmers in the study area. The suggestion taken from the farmers have been given here:

1. Technology and extension services should be provided so that farmers be made to achieve maximum production.
2. Farmers need to use new varieties to adopt production function upward and change the steady state so to increase the overall production.
3. The returns to scale are increasing which shows that rice is crop of medium size farmers, thus, agricultural extension services need to focus on medium size farmers for rice growers.

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