

Economic Analysis of Potato Production in Sindh Pakistan

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Abstract

The result each potato grower obtained per acre 183.00 in Mds on an average. Each selected potato growers in Sindh area on revenue per acre earned of Rs. 140390.00 that obtained by the grower of potato. An average per acre earned during study, Rs. 63473.00 on net income, Rs. 140390.00 on gross income and Rs. 76917.13 on total expenditure in the study area. An average per acre gross income Rs. 140390.00 and total expenditure is Rs. 76917.00 in Sindh area therefore they availed input output ratio of 1:1.82 from potato growing in the study area, the selected potato growers on a net income per acre earned Rs. 63473.00 and total expenditure Rs. 76917.00 in Sindh area therefore they availed input output ratio of 1:0.82 from potato growing in the Sindh.

Keywords: Potato, Production, Fertilize, total expenditure, ratio, Sindh

1. Introduction

Potato (*Solanum tuberosum L.*) belonging to family Solanaceae occupies a prominent position among vegetable crops grown in Pakistan. Potato is an important food source. It consists of 80% water, 20% solid matters and has high nutrition value. Starch makes up about 85% of this mass and the rest is protein. Potatoes also provide vitamins including niacin, riboflavin, thiamin and vitamin C. It also contains minerals, calcium, iron, magnesium, phosphorus, sodium, potassium and sulphur. Potato having its origin from Peru and Bolivia (South America), spread to all other parts of the world successfully and became a staple crop. It is generally believed that Portuguese introduced potato in Indo-Pak, subcontinent and the British encouraged its cultivation in this area. In the world it is grown on an area of 18.36 million hectares with total production of 327.62 million tons is obtained (PHDEB, 2010).

Potato's popularly known as 'The king of vegetables', has emerged as fourth most important food crop in Pakistan after rice and wheat. Pakistani vegetable basket is incomplete without Potato. Potato is a nutritionally superior vegetable due to its edible energy and edible protein. It has become an integral part of breakfast, lunch and dinner among the larger population. Being a short duration crop, it produces more quantity of dry matter, edible energy and edible protein in lesser duration of time compared to cereals like rice and wheat. Hence, Potato is considered to be an important crop to achieve nutritional security of the nation (Ahmed *et al.* 2012).

Potato is one of the most important high-nutritive value crop grown in the world. It comes in the forefront of tuber-crops and occupies the fourth position after wheat, sorghum and rice, as an edible and consumed crop in the world. The majority of potato production comes from industrial countries; China, Russia, India, and United States of America with production 72, 63, 23 and 20 million tons/annum, respectively (FAO, 2007).

Pakistan is blessed with vast agricultural resources on account of its fertile land, well-irrigated plains, extremes of weather, and centuries old tradition of farming. It is because of its central importance in the economy that the Government has identified agriculture as one of the four major drivers of growth. According to an estimate, the total value of agriculture crops at current factor cost is estimated at Rs.550.268 billion, divided into major crops Rs.407.623 billion and minor crops including horticulture Rs.142.645 billion. Potato and onion are leading among vegetables and condiments. Fruit and vegetable export trade in Pakistan amounts to US\$ 168.7 million (2005/06), of which fruits account for US\$ 128.7 million (76.3%), vegetables US\$ 25.5 million (15.1%) and fruit & vegetable preparations (mostly juices) US\$ 14.5 million (8.6%). Their share in Pakistan's total exports is slightly over one percent. Pakistan has unique but unsophisticated network of up to six or seven intermediaries between the primary source (producer and growers) and the end user. Because of the presence of so many layers and the lack of adequate marketing infrastructure facilities, 30 to 40% of the perishable produce gets spoiled before reaching the ultimate consumer. Potato is one of the main cash crops for the farmers as well as among the main exportable horticulture commodities from the country. Therefore, development of potato crop will improve farm incomes and foreign exchange earnings (EPB, 2008).

The word "potato" may refer to the plant itself in addition to the edible tuber. In the Andes, where the species is indigenous, there are some other closely related cultivated potato species. Potatoes were introduced outside the Andes region four centuries ago, and have become an integral part of much of the world's food supply. It is the world's fourth-largest food crop, following maize, wheat and rice. While there are close to 4000 different varieties of potato, it has been bred into many standard or well-known varieties, each of which has particular

agricultural or culinary attributes. The United Nations FAO reports that the world production of potatoes in 2010 was about 324 million tonnes. Potatoes are prepared in many ways: skin-on or peeled, whole or cut up, with seasonings or without. The only requirement involves cooking to swell the starch granules. Most potato dishes are served hot, but some are first cooked, and then served cold, notably potato salad and potato chips/crisps. The most popular potato dishes are *aloo ki sabzi*, batata vada, and samosa, which is spicy mashed potato mixed with a small amount of vegetable stuffed in conical dough, and deep fried. Potatoes are also a major ingredient as fast food items, such as aloo chaat, where they are deep fried and served with chutney (FAO, 2012).

2. Objectives

1. To review present status of potato production in Sindh province.
2. To study the economics of potato production and marketing in Khairpur Sindh.
3. To identify issues and suggest policy measures for promoting on Potato production in the study area.

3. Methodology

The aim of research was to examine economic analysis of potato production in Khairpur district Sindh. In order to achieve objectives of the study planned strategy was undertaken considering the specific area type and number of respondents. It is therefore imperative to define these variables to make the study more scientific and purposeful.

3.1. Data collection

Primary data was collected through a well structured questionnaire to get the information related to the potato production for the selection of respondents random sampling procedure was used the respondent selection from the study area in Sindh from the sample of 60 potato growers which equally distributed among different area of farms in Sindh.

3.2. Estimation of land inputs

For estimation of land inputs for potato on the sample farms, the following formula was used.

$$Fip = (As \times Cr) + As + Rui / As.$$

Where

Fip = farm input per unit of potato

Af = area farm under potato farming

Cr = contract rent per farm.

3.3. Estimation of labour cost

The extent of labour inputs, for various cultural operations involved in potato production was estimated by applying the following formula.

$$Fiw = (Mn) + Mwd + Wr + (Bwd) / As.$$

Where

Fiw = farm input per unit of potato

Mwd = man work day.

Wr = wage rate

Af = area farming under potato

3.4. Estimation of capital inputs

The following formula was used to compute per unit cost of the capital inputs.

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

Where;

Cipu = Capital inputs per unit of potato farming.

Qs = Quantity of seed used.

Pr = Price per unit of input.

Qf = Quantity of fertilizer.

Qp = Quantity of pesticides.

3.5. Marketing cost

The marketing cost was estimated by using the following formula:

$$Mc = Qm (RL + Tr + RuL) / As$$

Where;

Mc = Marketing cost

Qm = Quantity of produce marketed

RL = Rate of loading

Tr = Transportation rate
 RuL = Rate of unloading of potato
 Af = Area farm

3.6. Estimation of returns

The estimation of returns was developed by using the following formula:

$$VP = (Qs \times Pr) / As$$

Where;

VP = Value of product

QS = Quantity Sold

Pr = Price per unit.

3.7. Total cost of production

Total cost of production was estimated by using the following formula:

$$TC = TFC + TV$$

Where;

TC = Total cost of production

3.8. Net returns

The net returns were estimated by using the following formula

$$NR = TI - TC$$

Where;

NR = Net returns

TI = Total income

TC = Total cost

4. Results

This chapter provides results of the study including current status of potato production practices and issues of potato farmers. Analysis and interpretation of data are the most important step in scientific research. Without these steps generalization and prediction cannot be achieved which is the target of scientific research. Generalization and conclusion are drawn on the basis of characteristics and attitudes of the respondents.

4.1. Current Status of Potato Sub-Sector

Table 1: Area production and average yield of potato in Pakistan (2001 to 2013)

Year	Area(000, ha)	Production(000, tonnes)	Yield(tonnes/ha)
2001	27.9	268.8	9.6
2002	29.4	294.1	10.0
2003	31.0	306.3	9.9
2004	276.76	2024.90	182.91
2005	290.11	1567.90	135.11
2006	329.64	2581.60	195.79
2007	381.29	2539.00	166.47
2008	358.31	2941.30	205.22
2009	359.56	3141.40	218.41
2010	329.64	2581.60	195.79
2012	353.82	2611.50	220.87
2013	354.19	2636.80	224.93

Source: *Agricultural Statistics of Pakistan, Government of Pakistan, Islamabad(2013-14).*

4.2. Age

Table 2: Distributions of the respondents according to their age

Age	No. of farmers	Percentage
21-30 years	13	21.66
31-40 years	15	25.00
41-50 years	19	31.66
More than 50 years	13	21.66
Total	60	100

Table-2 shows the association of the age of the respondents with the percent of potato farmer age group. In age group of 21-30 years, 21.66%, 31-40 years, 25.00%, 41-50 years, 31.66% of potato farmer age group. With more than 50 years old farmers, the percentage of potato farmer age group 21.66%.

4.3. Education

Table 3: Distribution of the respondent according to their education level

Education level	No. of farmers	Percentage
Illiterate	13	21.66
Primary	15	25.00
Middle	20	33.33
Matriculation	10	16.66
Collage/University	02	3.33
Total	60	100.00

Table-3 shows education level 21.66% farmers were illiterate, 25.00% potato farmers were Primary level of education; the 33.33% were middle, 16.66% of matriculation and 3.33% potato,

4.4. Farming experience

Table 4: Distributions of the respondents according to their farming experience

Farming Experience	No. of farmers	Percentage
Up to 10 years	25	41.66
11-20 years	08	13.33
21- 30 years	15	25.00
Above 30 years	12	20.00
Total	60	100.00

Table-4 shows the respondents having farming experience of up to 10 years; they had 41.66%, 11-20 years of potato farming experience had 13.33%, 21-30 years of farming experience possessed 25.00% of potato farming. Similarly, farmers with more than 30 years of farming experience had 20.00% of potato farming.

4.5. Family size

Table 5: Distributions of the respondents according to their family size

Family size	No. of farmers	Percentage
5-10 Members	15	25.00
11-15 Members	28	45.66
More than 15 Members	07	11.66
Total	60	100.00

Table-5 shows about the family size of the respondent. Their family size of 5-10 members and they had 25.00% of the potato farming, 11-15 Members and they had 45.66% of the potato farming and More than 15 Members they had 11.66% of the potato farming.

4.6. Farm Size

Table 6: Distributions of respondents according to farm size in the study area

Farm size	No. of farmers	Percentage
Up to 10 acres (small)	17	28.33
11-40 acres (medium)	29	48.33
Above 40 acres (large)	14	23.33
Total	60	100.00

Table-6 shows about the number of small farm were 28.33%, 48.33% and 23.33% were medium and large farm in the study area.

4.7. Farmer Status

Table 7: Distributions of respondents according to farmer status in the study area

Farmer status	No. of farmers	Percentage
Owner	19	31.6
Rent	41	68.4
Total	60	100.00

Table-7 shows that there were 31.6% potato farmers who have owner ship and the remaining 68.4% are those, who have hired their farms on rent.

4.8. Irrigation Source

Table 8: Distributions of respondents' irrigation source in the study area

Irrigation Source	No. of respondents	Percentage
Canal	38	63.33
Tube well	22	36.66
Total	60	100

Table-8 shows that there were 63.33% potato farmers who have canal water, 36.66% farmer who have use tube well.

4.9. Fixed Cost

Table 9: Per acre expenditure incurred on fixed costs in the study area

Particulars	Mean	S.D Error
Land Tax	500.00	0.11
Rent of Land	20487.00	267.53
Total	25487.00	267.64

Table-9 indicated that on an average per acre potato growers spent a sum of Rs. 25487.00 in district Khairpur during the 2013 this included Rs. 500.00 for land tax, Rs. 25487.00 for rent.

4.10. Labour Inputs

Table 10: Per acre expenditure incurred on labour inputs in the study area

Particulars	Mean	S.D Error
Dry Ploughing	2334.23	24.23
Clod crushing	1761.33	22.17
Lay Out	653.46	13.22
Making of bunds and channels	672.96	9.44
Soaking dose	613.58	7.54
Operating	857.62	23.33
Planting	887.27	14.40
Irrigation	966.15	10.35
Weeding	859.13	8.75
Digging pits and planting of suckers	1787.50	5.82
Application of FYM,	689.88	9.43
Watch and ward	665.53	3.39
Tank silt and Chemical fertilizers	1897.02	72.10
Digging fruit/Cutting/ harvesting	5140.73	54.85
Total	19780.75	273.24

Table-10 depicted that the Rs 19780.75 on an average area of 4.19 acres during study year, which includes Rs. 2334.23 on dry ploughing, Clod crushing Rs. 653.46, Lay out Rs. 672.96, making of bunds and channels Rs. 672.96, soaking Rs. 613.58, operating charges Rs. 857.62, sowing Rs. 887.27, irrigation Rs. 859.13, weeding Rs. 559.13, application of FYM Rs. 689.88, Weedicides Rs. 559.13, tank silt and Chemical fertilizers Rs. 1897.02 and harvesting Rs. 5140.73 respectively in the study area.

4.11. Capital Inputs

Table 11: Per acre expenditure incurred on capital inputs in the study area

Particulars	Mean	S.D Error
F.Y.M	4871.42	162.19
Seed /plants	5239.83	65.76
Insecticide/Pesticides	7114.45	52.30
Urea	5233.83	32.80
Total	22457.65	311.34

Table-11 shows that each selected potato grower of Kahairpur on an average per acre of potato spent a sum of Rs. 30457.65, that included Rs. 4871.42, Rs. 5239.83, Rs. 7114.45 and Rs. 5233.83 on FYM, seed, insecticide/pesticide and urea respectively.

4.12. Marketing Costs

Table 12: Per acre expenditure incurred on marketing cost in the study area

Particulars	Mean	S.D Error
Loading	1972.22	0.89
Transportation	5334.26	112.92
Unloading	1885.32	0.89
Total	9191.73	114.70

Table-12 average per acre spent a sum of Rs. 9191.73, this included Rs. 1972.22 for loading, Rs. 5334.26 for transportation and Rs. 1885.32 of unloading.

4.13. Total Cost of Production

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

Table 13: Per acre total cost of production in the study area

Particulars	Mean	S.D Error
Fixed Cost	25487.00	267.64
Labour Cost	19780.75	273.24
Marketing Cost	9191.73	114.70
Capital Inputs	22457.52	311.34
Total	76917.00	965.02

Table-13 the average per acre spent a total cost of production of Rs. 76917.13 during 2013 this included Rs. 25487.00, Rs.19780.75, Rs. 9191.7373 and Rs. 22457.65 on fixed cost, labour costs marketing costs respectively on capital inputs.

4.14. Physical Productivity

Table 14: Per acre physical productivity in the study area

Particulars	Mean	S.D Error
Potato	183.00	2.54
Total	183.00	2.54

Table-14 it is clear from the result each potato grower obtained per acre 183.00 in Mds on an average.

4.15. Revenue productivity

Table 15: Per acre revenue productivity in the study area

Particulars	Mean	S.D Error
Potato	140390.00	238.43
Total	140390.00	238.43

Table-15 depicted that each selected potato growers in Khairpur area on revenue per acre earned of Rs. 140390.00 that obtained by the grower of potato.

4.16. Net - Farm Income

Table 16: Per acre net income in the study area

Particulars	Mean	S.D Error
Gross Income (Rs) A	140390.00	238.43
Total Expenditure (Rs) B	76917.00	965.02
Net Income (Rs) A-B=C	63473.00	--

Table-16 the potato growers on an average per acre earned during study, Rs. 63473.00 on net income, Rs. 140390.00 on gross income and Rs. 76917.13 on total expenditure in the study area

4.17. Input – Output ratio

Table 17: Per acre input-output ratio in the study area

Area sown	Gross Income(Rs.)	Total Expenditure(Rs.)	Input-output ratio
Acre	(A)	(B)	A/B=C
1	140390.00	76917.00	1:1.82

Table-17 showed that the selected potato growers on an average per acre gross income Rs. 140390.00 and total expenditure is Rs. 76917.00 in Khairpur area therefore they availed input output ratio of 1:1.82 from potato growing in the study area,

4.18. Cost Benefit ratio

Table 18: Per acre cost benefit ratio in the study area

Area sown	Net income(Rs.)	Total Expenditure(Rs.)	Input-output ratio
Acre	(A)	(B)	A/B=C
1	63473.00	76917.00	1:0.82

Table-18 showed that the selected potato growers on a net income per acre earned Rs. 63473.00 and total expenditure Rs. 76917.00 in Khairpur area therefore they availed input output ratio of 1:0.82 from potato growing in the study area.

5. Conclusions and suggestions

The research study on Economic Analysis of potato Production in Khairpur district Sindh can well be concluded for the findings during study were the most efficient to cultivate the tomato at remunerative level. The agricultural infrastructure is the web of personal, economic, social and legal relationships that support the production of agricultural commodities. It includes, most visibly, agricultural input suppliers and output processors. However, it also includes the formal and informal business relationships between individual farms. Infrastructure provides access to input and output markets, access to agricultural services ranging from continuing education to consulting, as well as including institutional arrangements, such as the legal and monetary systems.

In Khairpur district Sindh is fertile in agricultural production. Thus, the district can have a potential to produce more wheat for meeting the staple food demand of growing population, there is also need for study the efficient potato production practices and issues in the production process for policy making.

Therefore, it is suggested that to adopt more and more new tech knowledge, through which farmers should be increase the production, gross margin and increase net returns. By increasing potato farmers were improve the living intended. For the promotion of potato following strategy should be adopted.

- Mostly less educated people are involved in this profession, so there is need to improve the abilities of these people.
- Training programs should be offered to potato producers to improve their current abilities.
- Association with members from growers, traders, processors, pesticide and fertilizer companies, exporters, researchers (on production and plant protection), market exports, should be established, to improve the links among themselves, for sorting of problems and seeking viable solutions.
- Processing industry should be established. For this every possible incentive should be provided from public sectors, to encourage its rapid development.
- Development of allied industry to processing industry is also required i.e. packaging industry, transport infrastructure.
- In the marketing channel of potato different player were facing problems of poor transportation, high price fluctuation in open market, and repayment problem.
- Prices of potatoes vary in the open market across location and time there should be proper method to fix the prices of potato.
- Market committees should enhance their role in such activities, so that the price setting mechanism may be improved.
- Price variation should also be avoided by stabilizing marketing demand and supply which may be accomplished through proper storage.
- Current storage houses are not established on scientific bases in sampled area which hampers farmer's intention to bring their produce in storage houses.
- Government should come ahead to help private investors to establish scientific cold storage houses.
- There is need of proper guide to farmers about potato production so government should provide and activate researchers and extension department for proper guideline of farmers.

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