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Economic Analysis of Apple Orchards Production in District Mastung Balochistan Pakistan

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Abstract
Balochistan has the largest area under fruits in Pakistan as nearly one million tons of fruits are annually produced from 0.23 million hectares and production is 32.6 percent. Mastung district of Balochistan province is the centre of apple production on Pakistan's. Mastung has over other apple producing regions is the ability to produce highly colored apples due to the cool evening temperatures in late summer and the fall combined with good light diffusion. Farming experience of Apple growers up to 10 years; they had 41.66%, 11-20 years of apple farming experience had 13.33%, 21-30 years of apple farming experience possessed 25.00% of apple farming. Similarly, farmers with more than 30 years of apple farming experience had 20.00% of apple farming. An average per acre apple growers spent for rent of land Rs. 42800.00 in district Mastung Balochistan during the 2013. the Rs. 19351.50 on an average per/acre area of labour input which includes Rs. 1322.00 on Irrigation, Thinning Rs. 1761.33, Weeding Rs. 700.00, Chemicals /Spray trees Rs. 672.96, soaking Rs.613.58, Machine operating costs Rs. 5600.00, Paint trees Rs. 954.00, Application of FYM, Rs. 689.88, picked fruit/Cutting/ harvesting, Rs. 1897.02 and Miscellaneous Rs. 5140.73 respectively in the study area. that each selected apple grower of Mastung on an average per acre of apple spent a sum of Rs. 34771.00 that included Rs. 4471.42, Rs. 4133.45, and Rs. 5250.00 Rs. 8457.65 Rs.3871.42 Rs. 5239.83 Rs. 2114.45 and Rs. 1233.83 on Irrigate: (water) , F.Y.M, Fertilizer/ Urea, Insecticide/Pesticides, Packing Material, Fuel - Diesel , Spray machine , Machinery repair respectively. the selected apple grower in Mustang Balochistan area on average per acre spent a total cost of production of Rs. 120094.84 during 2013 this included Rs. 42800.00, 21690.58, Rs.34771.00 and Rs. 20834.26 on fixed cost, labour costs marketing costs respectively on capital inputs. Apple growers in Mastung Balochistan area on revenue per acre earned of Rs. 268800.00 that obtained by the grower of apple. An average per acre earned during study, Rs. 148705.00 on net income, Rs. 268800.00 on gross income and Rs. 120094.58 on total expenditure in the Mastung Balochistan. the selected apple growers on an net income per acre earned Rs. 148705.00 and total expenditure Rs. 120094.58 in Mastung Balochistan area therefore they availed input output ratio of 1:1.23 from apple growing in the study area.
Keywords: Apple, cost, fruit yield, labor, net returns, and cost-benefit ratio.

Introdution

Apple (*Malus domestica L.*) fruit of the domesticated tree *Malus domestica* (family Rosaceae) one of the most widely cultivated tree fruits. The apple flower of most varieties requires cross-pollination for fertilization. When harvested, apples are usually roundish, 5–10 cm (2–4 inches) in diameter, and some shade of red, green, or yellow in colour; they vary in size, shape, and acidity depending on the variety. Balochistan has the largest area under fruits in Pakistan as nearly one million tons of fruits are annually produced from 0.23 million hectares. In this way, Balochistan's share in country's fruit area and production is 32.6 per cent and 17.4 per cent, respectively. The production of deciduous fruits (particularly apple) in Baluchistan has a special significance among other fruit growing areas. This is because the environmental conditions are relative far more suitable for the production of apple. Therefore, apple is the first largest planted fruit in Balochistan and it is second most produced fruit after dates in the province. Apple is grown in highlands of Balochistan and it covers 0.101 million hectares with a production of 0.224 million tones having retail value of about Rs6.7 billion. The Tur-Kulu (Red Delicious) and Shin-Kulu (Golden Delicious) are the famous varieties for their very attractive color and taste throughout Pakistan. The apple contains 80 to 85% of water approximately 5% of protein or nitrogenous material and 10 to 15% of acids and salts. A fresh apple is rich in vitamins and is amongst the most valuable of the anti-scorbutic fruits for relieving scurvy. All apples contain a varying amount of the organic acids, malic acid and gallic acid, and an abundance of salts of both potash and soda, as well as salts of lime, magnesium and iron. Apple comes in all shades of reds, greens, and yellows. Apples are fat, sodium and cholesterol free. Apple floats

because 25% of their volume is air. Apples have five seed pockets each with a seed. To get the full value of an apple, it should be eaten unpeeled as the valuable acids and salts of the Apple in and just below the skin. Actually, an apple is good for one's digestion, and also has important vitamins and minerals. Apples also help to clean one's teeth after a meal. No other fruit has so many good qualities. The total world apple production for 2013 was 75,635,283 tonnes and Pakistan apple production for 2013 was 598,804 tonnes world ranking no 22. Therefore, it is not surprising that the apple is regarded as the "King" of all fruits (GOP, 2013).

Mastung district of Balochistan province is the centre of apple production on Pakistan's. Balochistan is one of the most western growing regions in Pakistan, giving gives Baluchistan's commercial apple producing region a relatively short and cool growing season. The annual precipitation for Mastung district of Balochistan is 19 inches of rains were recorded which means that most growers in Mastung do not need to rely on irrigation to produce a crop. The short, cool and moist growing season of the Quetta can provide a competitive advantage to growers with respect to input costs and apple quality. One of the greatest climatic advantages that Mastung has over other apple producing regions is the ability to produce highly colored apples due to the cool evening temperatures in late summer and the fall combined with good light diffusion. The other advantages Mastung growers have with respect to weather are that Quetta orchards are less prone to adverse weather events and frost damage. Mastung apples are also less prone to calcium deficiency which is advantageous to the Mastung growers and contributes to the ability to produce quality fruit. Baluchistan is the key contributor of Apple production in Pakistan while KPK stands on second number with contributing 25 percent of national Apple growth (Abdul Wahid, 2001).

Apple is the fourth major fruit of Pakistan after citrus, mango and banana and is ranked is" in the world for its production. It is one of the favorite fruits of our people for its pleasant flavor, crispy taste, nutritious and aromatic nature and multiple uses. Besides being a rich source of vitamins A, B, and C, it contains formidable amount of proteins, carbohydrates and minerals. Pakistan is lucky enough to be endowed with wide range of agro-climatic conditions which permit the production of both tropical and temperate fruits. The most suitable soil and climatic conditions for apple cultivation prevail in most of the hilly areas of Balochistan and NWFP provinces. During the year 2011, the total area under apple cultivation in Pakistan was 47.7 thousand hectares with an annual production of 315.4 thousand tones, the average yield of apple being 6.6thousand tones/hac (Ali Muhammad, 2011).

Apple is the pomaceous fruit of the apple tree, species *Malus domestica* in the rose family (Rosaceae). It is one of the most widely cultivated tree fruits, and the most widely known of the many members of genus Malus that are used by humans. Apples grow on small, deciduous trees. The tree originated in Central Asia, where its wild ancestor, Malus sieversii, is still found today. Apples have been grown for thousands of years in Asia and Europe, and were brought to North America by European colonists. Apples have been present in the mythology and religions of many cultures, including Norse, Greek and Christian traditions. In 2010, the fruit's genome was decoded as part of research on disease control and selective breeding in apple production. There are more than 7,500 known cultivars of apples, resulting in a range of desired characteristics. Different cultivars are bred for various tastes and uses, including cooking, fresh eating and cider production. Domestic apples are generally propagated by grafting, although wild apples grow readily from seed. Trees are prone to a number of fungal, bacterial and pest problems, which can be controlled by a number of organic and non-organic means. About 69 million tons of apples were grown worldwide in 2010, and China produced almost half of this total. The United States is the second-leading producer, with more than 6% of world production. Turkey is third, followed by Italy, India and Poland. Apples are often eaten raw, but can also be found in many prepared foods (especially desserts) and drinks. Many beneficial health effects are thought to result from eating apples; however, two forms of allergies are seen to various proteins found in the fruit (Sandor, 2008).

Apple is a fruit of temperate climate and native in many parts of Europe and Asia Worldwide, apple is the fourth most extensively produced deciduous fruit, in 94 countries its production was 69.60 million metric tons fresh-weight yield from 4.85 million hectares of land (Anon., 2010).The global climate is changing and will continue to change in future according to the Fourth Assessment Report of the UN International Panel on Climate Change. Since 1850 eleven years (1995–2006) have been found as the warmest years (Anon., 2007). Due to the change in weather pattern, crop production is affected in addition to the threats to food security as an impact of climate change (Stern, 2007; Miraglia et al., 2009). There is variation from place to place in the production of crop yield as a result of climate change (Supit et al., 2010; Olesen et al., 2011). Impact of climate change on agriculture is getting increasing importance these days. It affects the flowering, blooming time, color, size and shapes of apple (Slingo, 2009). Soils tend to show a strong geographical correlation with climate, especially at the global scale. As time passes, climate tends to be a prime influence on soil properties while the influence of parent material was less (Ritter, 2006). Energy and precipitation strongly influence physical and chemical reactions on parent material. Climate also determines a vegetation cover which in turn influences soil development. Precipitation also affects horizon development factors like the translocation of dissolved ions through the soil (Slingo, 2009).

Apple the outside it is a colorful fruit. It comes in various colors from green to red to gold. In taste an apple is tasty and juicy, and has various tastes from sour to sweet. Apples are very good for one's health. An English saying is: "An apple a day keeps the doctor away."Actually, an apple is good for one's digestion, and also has important vitamins and minerals. Apples also help to clean one's teeth after a meal. No other fruit has so many good qualities. The original home of the apple is considered to be in the countries of Southwest Asia. Apples can grow anywhere, excluding extremely hot or extremely cold climates. In order to ensure that particular apple trees will grow apples according to their origins, their seeds are not sown, but small twigs are implanted in the stems of other apple trees which have good, healthy roots. Apple trees are planted commercially in gardens, in rows, spaced between thirty and forty feet apart, to facilitate their development and, mainly, to allow sufficient room to get near the tree to care for it and gather its fruit. The apple trees are sprayed with chemicals to guard them against pests, such as worms and other harmful insects. An apple tree which is properly cared for can bear fruits for a period of thirty years or even longer (Anon., 2010).

Apples grow on small, deciduous trees. The tree originated in Central Asia, where its wild ancestor, Malus sieversii, is still found today. Apples have been grown for thousands of years in Asia and Europe, and were brought to North America by European colonists. Apples have been present in the mythology and religions of many cultures, including Norse, Greek and Christian traditions. In 2010, the fruit's genome was decoded as part of research on disease control and selective breeding in apple production. There are more than 7,500 known cultivars of apples, resulting in a range of desired characteristics. Different cultivars are bred for various tastes and uses, including cooking, fresh eating and cider production. Domestic apples are generally propagated by grafting, although wild apples grow readily from seed. Trees are prone to a number of fungal, bacterial and pest problems, which can be controlled by a number of organic and non-organic means. About 69 million tons of apples were grown worldwide in 2010, and China produced almost half of this total. The United States is the second-leading producer, with more than 6% of world production. Turkey is third, followed by Italy, India and Poland. Apples are often eaten raw, but can also be found in many prepared foods (especially desserts) and drinks. Many beneficial health effects are thought to result from eating apples; however, two forms of allergies are seen to various proteins found in the fruit (MINFAL, 2013).

Objectives

1. To review present status of apple production in Balochistan Pakistan.
2. To study the profile of apple growers in the study area.
3. To compute input, output and cost benefit ratio availability of apple growers in study area.
4. To identify issues and suggest policy measures for promoting on apple production.

Material and Methods

This study was to investigate the existing apple marketing and production in district Mastung Balochistan. Planned strategy was used to study the area, 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 and objective.

Research Design

Study Area

The study was restricted generally to gather primary data from district Mastung Balochistan. It was selected as the universe of the study because it represents study apple production activities. The district is gifted naturally with fertile soil.

Sample Size

The sample was supposed to contain apple farmers. A sample size of 60 respondents was selected through random sampling.

Data Collection

As described above, the data was collected from district Mastung Balochistan, Villages and respondents from this area were randomly selected.

Questionnaire Development

Interview schedule was based on a well designed questionnaire. Comprehensive information was obtained face to face from the farmers involved in apple farming and the apple business and documented by the interviewer. Questionnaire was prepared in English language while the interview with respondents was done in local language i.e. Broui and Balouchi. Different features were covered in the questionnaire.

Data Analysis

Collected data had both quantitative and qualitative information. For data analysis Microsoft Office Excel software package and SPSS package were used.

Descriptive Statistics

The data was categorized according to the study objectives, analyzed statistically and represented in tabular form. Statistical techniques that were used during data analysis are given below:

Averages

Percentages

Averages

Averages were calculated by applying following formula:

Average = $\sum Xi / n$

Where,

$\sum Xi$ = sum of independent variables

n = number of observation in data

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

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:

Estimation of Land Inputs

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

Lit =(As x Cr) + As x Rie) / As.

Where

Lit =Land input per unit of apple.

As =Area sown under apple.

Cr =Contract rent per unit / acre.

Rie =Rate of irrigation expenditures.

Estimation of Labour Cost

The extent of labour inputs for various cultural operations involved in apple production was estimated by applying the following formula:

Lit = (Mn x Hc) + (Mwd xWr) + (Bwd x Hc) / As.

Where

Lit =Labour input per unit of apple.

Hc =Hiring charges.

Mn =Machine work hour.

Mwd=Man work day.

Wr =Wage rate

As =Area sown.

Estimation of Capital Inputs

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

Cipu = (Qs x Pr) + (Of x Pr) + Qi x Pr) / As.

Where

Cipu =Capital inputs per unit of apple.

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 following formula:

Mc = Qm (Rl + Tr + Oc + Rui / As)

Where

Mc = Marketing cost.

Qm = Quantity of produce marketed.

Rl = Rate of loading.

Tr = Transportation rate.

Rut = Rate of unloading of apple.

As = Area sown

Estimation of Returns

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

VP = (Qs x Pr) / As

Where

VP = Value of Product.

QS = Quantity Sold.

Pr = Price per unit.

As = Area

Total Cost of Production

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

TC=TFC+TVC

Where

TC = Total Costs of Production

Net Returns

Net returns were estimated by using the following formula:

NR = TI- TC

Where

NR = Net Returns

TI = Total Income

TC = Total Cost

Input-Output Ratio

The input-output was estimated by using the following formula:

$$IO_R = \frac{T1}{TC}$$

Where IO_R = Input-Output Ratio

Cost-Benefit Ratio

Cost-Benefit Ratio was estimated by using the following formula:

$$CBR = \frac{NR}{TC}$$

Where

CBR = Cost Benefit Ratio

Results

This study is based on primary data, which was collected from apple orchard growers in district Mastung Balochistan.

Current Status of Apple Sub-Sector

The area, production and average yield of apple in Pakistan is given in Table-1. Since 2000-01 to 2012-13, the area under apple fruit has increased from 58.2 to 112.8 thousand hectares and production has increased from 438.9 to 522.6 thousand tons. To obtain a potential yield, high yielding varieties and improved production technology have to be adopted.

Table 1: Area production and average yield of apple in Pakistan (2000 to 2013)

Year	Area(000, ha)	Production(000, tonnes)	Yield(tonnes/ha)
2000-01	58.2	438.9	7.54
2001-02	48.9	367.1	7.50
2002-03	47.5	315.4	6.64
2003-04	110.8	333.8	3.01
2004-05	111.6	348.3	3.12
2005-06	112.0	351.3	3.13
2006-07	112.6	348.3	3.10
2007-08	113.0	441.6	3.90
2008-09	113.0	441.0	3.90
2009-10	111.6	336.4	3.01
2010-11	110.6	525.9	4.75
2011-12	111.6	515.0	4.61
2012-13	112.8	522.6	4.63

Source: Agricultural Statistics of Pakistan, Government of Pakistan, Islamabad (2012-13)

Socio-Economic Characteristics

Age

Age is very important demographic factor which influences the efficient allocation of resources' it shows the ability to do work, efficiency, willingness to make progress and attitude towards various social and economic aspects of life.

Table 2: Distributions of the apple farmers 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 apple farmer age group. In age group of 21-30 years, 21.66%, 31-40 years, 25.00%, 41-50 years, 31.66% of apple farmer age group. With more than 50 years old farmers, the percentage of apple farmer age group 21.66%.

Education

Education in its general sense is a form of learning in which the knowledge, skills, and habits. The education system in Pakistan is generally divided into five levels: primary (grades one through five); middle (grades six through eight); high (grades nine and ten, leading to the Secondary School Certificate or SSC); intermediate (grades eleven and twelve, leading to a Higher Secondary (School) Certificate or HSC); and university programs leading to undergraduate and graduate degrees.

Table 3: Distributions of the apple farmers 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% apple farmers were illiterate, 25.00% apple farmers were Primary level of education; the 33.33% were middle, 16.66% of matriculation and 3.33% farmers of the bachelor/master education in the study area.

Farming experience

Farmer are also responsible for maintaining the site, ensuring it is kept clean and tidy at all times and that it complies with the relevant health and safety regulations.

Table 4: Distributions of the apple farmers 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 apple farming experience had 13.33%, 21-30 years of apple farming experience possessed 25.00% of apple farming. Similarly, farmers with more than 30 years of apple farming experience had 20.00% of apple farming.

Family size

A fundamental social group in society / typically consisting of one or two parents and their children. Two or more people who share goals and values, have long-term commitments to one another, and reside usually in the same dwelling place.

Table 5: Distributions of the apple farmers according to their family size

Family size	No. of farmers	Percentage
5-10 Members	25	41.66
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 41.66% of the apple farming, 11-15 Members and they had 45.66% of the apple farming and More than 15 Members they had 11.66% of the apple farming.

Farm Size

A farm is an area of land. It is the basic production facility in food production. Farms may be owned and operated by a single individual, family, community, corporation or a company.

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

Farm size	No. of farmers	Percentage
Up to10 acres(small)	17	28.33
11-30 acres(medium)	29	48.33
Above 30 acres(large)	14	23.33
Total	60	100.00

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

Farmer Status

A farmer is a person engaged in agriculture, raising living organisms for food or raw materials. A farmer might own the farmed land or might work as a laborer on land owned by others, but in advanced economies, a farmer is usually a farm owner.

Table 7: Distributions of apple farmers 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% apple farmers who have owner ship and the remaining 68.4% are those, who have hired their apple farms on rent.

Health Status

When used in this guide, refers to your medical condition (both physical and mental illnesses), claims experience, receipt of health care, medical history, genetic information, evidence of insurability (including conditions arising out of acts of domestic violence), and disability.

Table 8: Distributions of apple farmer's health status of dependent in the study area

Health Status	No. of farmers	Percentage
Good	12	20.00
Better	22	36.66
Poor	15	25.00
Very Poor	11	18.33
Total	60	100.00

Table-8 shows that apple farmer there were 20.00% were health condition is good of respondents,

36.66% were health condition is better, 25.00% were poor health.

Working time

Working time is the period of time that an individual spends at paid occupational labor. Working time may vary from person to person often depending on location, culture, lifestyle choice, and the profitability of the individual's livelihood.

Table 9: Distributions of apple farmer's Working time in the study area

Working time	No. of farmers	Percentage
Up to 5 hrs	07	11.66
6-10 yrs	44	73.33
11-15 hrs	09	15.00
Total	60	100.00

Table-9 shows about the number of working hours spent in fields by the apple farmers. 6-10 hours in their fields and they had 73.33%, the apple farmers spent up to 5 hours in their farming activities and had 11.66%. While only 09 of the apple farmers were spending 11-15 hours in their fields having 15.00% of the apple farmer's.

Fixed Cost

Fixed costs are expenses that are not dependent on the level of goods or services produced. They tend to be time-related, such as tax, rents being paid per month/year, and are often referred to as overhead costs. This is in contrast to variable costs, which are volume-related.

Table 10: Per acre expenditure incurred on fixed costs in the study area

Particulars	Mean	S.D Error
Apple orchard land tax	00.00	0.00
Rent of apple orchard	42800.00	540.00
Total	42800.00	540.00

Table-10 indicated that on an average per acre apple growers spent for rent of land Rs. 42800.00 in district Mastung Balochistan during the 2013.

Labour Inputs

A labour input refers to all outlays incurred to engage labour for production. Labour inputs were employed for all cultural operations during the period of apple cultivation in study area. These operations are, leveling, sowing and inter-culturing, application of fertilizer harvesting, weeding and picking.

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

Particulars	Mean	S.D Error
Irrigation	1322.00	33.12
Thinning	1761.33	22.17
Weeding	700.00	24.99
Chemicals /Spray trees	672.96	9.44
Soaking dose	613.58	7.54
Machine operating costs	5600.00	11.93
Paint trees	954.00	10.35
Application of FYM,	689.88	9.43
picked fruit/Cutting/ harvesting	1897.02	33.21
Miscellaneous	5140.73	58.00
Total	19351.50	220.18

Table-11 depicted that the Rs. 19351.50 on an average per/acre area of of labour input which includes Rs. 1322.00 on Irrigation, Thinning Rs. 1761.33, Weeding Rs. 700.00, Chemicals /Spray trees Rs. 672.96, soaking Rs.613.58, Machine operating costs Rs. 5600.00, Paint trees Rs. 954.00, Application of FYM, Rs. 689.88, picked fruit/Cutting/ harvesting, Rs. 1897.02 and Miscellaneous Rs. 5140.73 respectively in the study area.

Capital Inputs

Capital input measures the services derived from the stock of physical assets and software used in production. The assets included are fixed business equipment, structures, inventories and land.

Table 12: Per acre expenditure incurred on capital inputs in the study area

Particulars	Mean	S.D Error
Irrigate: (water)	4471.42	52.13
F.Y.M	4133.45	22.00
Fertilizer/ Urea	5250.00	32.80
Insecticide/Pesticides	8457.65	54.44
Packing Material	3871.42	62.19
Fuel - Diesel	5239.83	45.00
Spray machine	2114.45	52.30
Machinery repair	1233.83	70.00
Total	34771.00	389.34

Table-12 shows that each selected apple grower of Mastung on an average per acre of apple spent a sum of Rs. 34771.00 that included Rs. 4471.42, Rs. 4133.45, and Rs. 5250.00 Rs. 8457.65 Rs.3871.42 Rs. 5239.83 Rs. 2114.45 and Rs. 1233.83 on Irrigate: (water) , F.Y.M, Fertilizer/ Urea, Insecticide/Pesticides, Packing Material, Fuel - Diesel , Spray machine , Machinery repair respectively.

Marketing Costs

The total cost associated with delivering goods or services to customers. The marketing cost may include expenses associated with transferring title of goods to a customer, storing goods in warehouses pending delivery, promoting the goods or services.

Table 13: Per acre expenditure incurred on marketing cost in the study area

Particulars	Mean	S.D Error
Loading	4500.00	18.00
Transportation	12334.26	112.92
Unloading	4000.00	22.00
Total	20834.26	152.92

Table-13 it is clear from result that each selected apple grower in Mastung Balochistan area on average per acre spent a sum of Rs. 20834.26, this included Rs. 4500.00 for loading, Rs. 12334.26 for transportation and Rs. 4000.00 of unloading.

Total Cost of Production

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

Table 14: Per acre total cost of production in the study area

Particulars	Mean	S.D Error
Fixed Cost	42800.00	367.64
Labour Cost	19351.50	220.18
Capital Inputs	34771.00	211.34
Marketing Cost	20834.26	114.70
Total	120094.84	966.44

Table-14 the results showed in this table that the selected apple grower in Mustang Balochistan area on average per acre spent a total cost of production of Rs. 120094.84 during 2013 this included Rs. 42800.00, 21690.58, Rs.34771.00 and Rs. 20834.26 on fixed cost, labour costs marketing costs respectively on capital inputs.

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. In other words physical productivity of apple farm is the same as the total yield obtained of other crop by farmers.

Table 15: Per acre physical productivity in the study area

Particulars	Mean	S.D Error
Apple fruit	112 maunds	7
Total	112 maunds	7

Table-15 it is clear form the result each apple grower in Mastung Balochistan area obtained per acre112 in maunds on an average.

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 16: Per acre revenue productivity in the study area

Particulars	Mean	S.D Error
Apple fruit	268800.00	344.00
Total	268800.00	344.00

Table-16 depicted that each selected apple growers in Mastung Balochistan area on revenue per acre

earned of Rs. 268800.00 that obtained by the grower of apple.

Net - Farm Income

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

Table 17: Per acre net income in the study area

Particulars	Mean
Gross Income (Rs) A	268800.00
Total Expenditure (Rs) B	120094.58
Net Income (Rs) A-B=C	148705.00

Table-17 the apple growers on an average per acre earned during study, Rs. 148705.00 on net income, Rs. 268800.00 on gross income and Rs. 120094.58 on total expenditure in the Mastung Balochistan.

Input – Output ratio

The input-output ratio is calculated by dividing total income with the total cost of production.

Table 18: 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	268800.00	120095.58	1:2.23

Table-18 showed that the selected apple growers on an average per acre gross income Rs. 268800.00 and total expenditure is Rs. 120095.58 in Mastung Baluchistan area therefore they availed input output ratio of 1:2.23 from apple growing in the study area.

Cost Benefit ratio

The cost benefit ratio refers to net returns as compared to the cost of production. It is calculated by dividing net returns with cost of production.

Table 19: 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	148705.00	120094.58	1:1.23

Table-19 showed that the selected apple growers on an net income per acre earned Rs. 148705.00 and total expenditure Rs. 120094.58 in Mastung Balochistan area therefore they availed input output ratio of 1:1.23 from apple growing in the study area.

Discussion

In this study, identified a number of factors that believed would be influential in determining the apple farming area of in district Mastung Balochistan sustainability. The results indicate that proposed model provides an acceptable fit on the data.

The economic analysis describes the methods used in analyzing economic behavior and the application of the results obtained to solve economic problems. Economic analysis became sterile as did mere logic-consistency theorems dealing with general equilibrium, aggregate production functions and social welfare functions, devoid of any empirical content “OR” relevance (Marshal,1999).

The object of economic analysis is to verify the use of various inputs of production and income incurred. There are many economic measures to determine the profitability of farm business. Yet, none of them is perfectly suitable for all the time and for all purposes, some criteria are most suitable to derive certain conclusions. The most important criteria which are commonly used to analyze efficiency of agricultural enterprise are consumption of net returns and determination of input-output ratio. These criteria were used to determine the input-output analysis of apple production around in district Mastung Balochistan.

The results of present study conducted to determine the economic implications of apple production and marketing in district Mustang Balochistan indicated that the farmers on average the spent Rs. 42800.00 rent of apple orchard per acre.

Thus the apple growers in district Mastung Balochistan are incurred total fixed cost of Rs. 42800.00 per farm per acre, respectively. However, the selected apple growers paid labour cost paid by the selected apple growers was Rs. 21690.58 per farm. As far as marketing expenses are concerned the selected apple growers incurred Rs. 20834.26 per farm. Capital input by the selected growers was Rs: 34771.00 per farm.

Thus the selected apple growers in district Mastung Balochistan incurred a total average cost of production of Rs. 120094.58 per farm. It was also observed that the selected apple growers in the Mastung Balochistan area earned a total physical productivity of per acre (112 in maunds) and earned a gross income of Rs. 268800.00 per farm per acre from. It was further estimated that the selected apple grower after incurring all expenditure and sale of produce earned net income of Rs. 148705.00 per farm at a benefit cost ratio of 1:1.23.

Jönsson, (2007) in his study the major apple growing is situated in the Southern Sweden especially

around the village Kivik in 10-50 ha orchards and Vånga in the north-east of Kristianstad (pers. comm., Swiergiel, 2011). Out of the total fruits produced in Sweden, apples constitute 85 % (Ascard et al., 2010). In 2005, the total apple yield was 17,683 tonnes from 1440 hectares of land. In 2010, the total production (both conventional and organic) of apples was 23,500 tonnes. The production has increased in a span of five years. It is also an increment of 12 % as compared to 2009. The area of organic apple is increasing and there is an approximately 130 hectares of organic apple production. But the overall yield of organic apples is not satisfactory.

Conclusion

The research study on Economic Analysis of apple Production District Mastung Balochistan was concluded for the findings during 2013 were the most efficient to cultivate the apple 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 Mustang district is fertile in agricultural production. Thus, the district can have a potential to produce more fruits for demand of growing population, there is also need for study the efficient apple fruits production practices and issues in the production process for policy making.

It is important to note that economics analysis can only be estimated if the inefficiency effects are stochastic and has a particular distribution specification (Battese and Coelli, 1996). Technical efficiency is estimated using Limdep (Green, 2002). In the specification of the stochastic frontier production function, the model allow for specification of two equations on the right hand side. One equation specifies the main factors of production such as seed, fertilizer and labor and the other equation specifies the variables that are assumed to cause inefficiency such as access to credit and the gender of the household head. This is done in a one-stage process.

Suggestions

Based on the findings of the study the following policy implications were made. The information such as total holding, area under apple, physical and revenue productivity obtained from apple enterprises were enquired from the respondents. Data so collected was processed, tabulated, analyzed and interpreted in the previous chapters. Investigate the quantitative and qualitative aspect of various inputs as incurred by the producer to cultivate per unit (acre) of apple in the area. The present study has been carried out the means to increase per acre yield and consequently the income of farm; therefore the following suggestions are put forwarded as under;

1. Apple fruits, covering pomes and stone fruits contribute significantly to the horticulture economy of Pakistan.
2. Apple production dominates the scene and systematic cultivation and marketing of apple can change the rural economy in the Mastung Balochistan.
3. New vision and concerted efforts are required for change in variety mix, supply of quality planting material from elite clones on indexed colonel rootstocks.
4. Since the land is fixed, the government of Balochistan should be encourage the use of fertilizer, and it can do this by providing incentives in order to provide fertilizers to households at an affordable price, so as to increase the level of production.
5. Growers may be educated about soil status market conditions to get better profit of apple fruit.
6. The current scenario surrounding the low apple production in Balochistan requires the government to provide credit facilities that will enable households to access such credit at a reasonable cost.
7. The government should encourage private sector to invest in credit facilities like small–scale banks to offer credit to farmers at affordable rates. This should be through legislation to facilitate credit creation.
8. High density planting, water management including micro-irrigation, integrated plant nutrient management and IPM strategy for plant protection is some of the areas which need greater R&D focus.
9. Adoption of post-harvest management practices and infrastructure development for grading, packaging, pre-cooling and storage of the produce needs focused developmental attention.
10. Value addition and export promotion, particularly of apple are drawing due attention of the developmental agencies in Pakistan.

LITERATURE CITED

Asif, A., 2002. Apple the sweet gold of Pakistan. Export Promotion Bureau of Pakistan.

Anonymous, 2010. Statistical year book of Pakistan, Statistics Division, Federal Bureau of Statistics 5-SLIC Building, F-6/4, Blue Area, Islamabad, Pakistan. Chaudhary,

Abdul wahid, Jasar, Sabiar and Manzoor KasI, 2001. Apple Pollination Problems in Balochistan. Pak. Int. J.

Agri. Biol., 3: 2001-1560-8530/2001/03 -2-210- 213.
Ali Muhammad, Muhammad Ayub, Alam Zeb, Yasser Durrani, Javid Ullah and Shams-UR-Rehman Afridi, 2011. Physicochemical analysis of apple pulp from Mashaday variety during storage. Agric. Biol. J. N. Am., 2: 192-196.
Asghar Rehan, Mohd Nisar and Siraj Kakar, 2004. stuctural and biochemical study of apple bark spiltting discorder in Balochistan. Pak. J. Bio. Sci., 7: 916-920.
Anonymous, 2008. Food and Agricultural Organization. Available online: www.fao.org
Ahmad, S.S., A. Sherazi and M.T.A. Shah. 2010. A preliminary study on the climate change causing decline in forest cover area in Pakistan. Pak. J. Bot., 42(6): 3967-
Anonymous. 2010. Statistical database, Available: http://www.fao.org.
Black, B., R. Hill and G. Cardon. 2008. Orchard Irrigation: Apple. Horticulture/Fruit/2008-01pr. US Department of Agriculture, Utah State University.rady,
BERTSCHINGER, L., ANDERSON, J. D., D E GROOT, N., GRANATSTEIN, D., HABIB, R., MULLLINIX, K., NEILSEN, D., POMARES GARCÍA, F., WEIBEL, F. P. and ZINATI, G. (2004). Conclusions from the First Symposium on Sustainability in Horticulture and a Declaration for the 21st Century. Acta Horticulturae, 638, 509–512.
BRAVIN, E.,WEIBEL, F. and FRICKE, K. (2008). Umstellung auf Bio? Nicht nur eine Frage des Preises. Monatsschrift, 96, 682-684.
BRAVIN, E., ZÜRCHER, M., MOURON, P. and CARINT, D. (2009). Arbokost Apfel. (www.arbokost.info-acw.ch)
BÜCHELE, M. (2007). Spannende Ergebnisse beim Interreg IIIa – Projekt Bogo. Besseres Obst, 5, 14-17. GÖRGENS, M. (2003). Erfolgsfaktoren in der Produktion als Grundlage für die Entwicklung einer Controlling-Konzeption für Obstbaubetriebe. Ph.D. Thesis. Humboldt Universität, Berlin, Germany. 186 pp.
Coart, E., Van Glabeke, S., De Loose, M., Larsen, A.S., Roldán-Ruiz, I. 2006. Chloroplast diversity in the genus *Malus*: new insights into the relationship between the European wild apple (*Malus sylvestris* (L.) Mill.) and the domesticated apple (*Malus domestica* Borkh.). *Mol. Ecol.* 15(8): 2171–82.
Diepen, A.J.W. de Wit, P. Kabat, B. Baruth and F. Ludwig. 2010. Recent changes in the climatic yield potential of various crops in Europe. Agri. Sys., 103: 683-694.
Emanuele, E., R. Roberto, C. Amelia and C. Alfonso. 2009 .Risk of spring frost to apple production under future climate scenarios: the role of phonological acclimation. Int. J. Biometeorol., 53: 273-286.
FAO. 1993. Marketing costs and margins of selected agricultural products in selected Asian countries. Food & Agric. Org. of United Nations, Rome Italy. Bullet. # 76.
FAOSTAT, 2008. World Apple Production, In: Wikipedia, 2011. List of countries by apple production. Wikipedia, Inc. USA.http://en.wikipedia.org/wiki
GoP, 2011. Government Pakistan, Economic Survey of Pakistan, Economic Advisory wing, Finance Division, Islamabad.
GÖRGENS, M. (2007). Betriebsvergleich 2005/2006. Mitteilungen des Obstbauversuchsringes des Alten Landes, 62, 242–250.
Guardiola J.L. and A. García-Luis, 2000. Increasing fruit size in citrus. Thinning and stimulation of fruit growth. Plant Growth Reg., 31: 121-132.
GÖRGENS, M. and BOKELMANN, W. (2000). Identification of critical success factors in German fruit-growing farms. Acta Horticulturae, 536, 187–194.
Government of Pakistan. 2013. Fruit, Vegetables and Condiments of Pakistan 2012-13. Economic Wing, Ministry of Food Agriculture and Livestock, Islamabad
Ilyas, M.B., M.U. Ghazanfar, M.A. Khan, C.A. Khan and M.A.R. Bhatti. 2007. Post harvest losses in apple and banana during transport and storage. Pak. J. Agri. Sci., 44 (3) : 534-541.
Jules Janick, James N. Cummins, Susan K. Brown, and Minou Hemmat (1996). "Chapter 1: Apples" (PDF). In Jules Janick and James N. Moore. *Fruit Breeding, Volume I: Tree and Tropical Fruits*. John Wiley & Sons, Inc. p. 9. ISBN 0-471-31014-X.
Khalid Mushtaq, Abdul Gafoor and Maula Dad. 2008. Apple Market Integration: Implications for Sustainable Agricultural Development. The Lahore Journal of Economics. 13:(1):129-138.
Lauri, Pierre-éric; Karen Maguylo, Catherine Trottier (2006). "Architecture and size relations: an essay on the apple (Malus x domestica, Rosaceae) tree". *American Journal of Botany* (Botanical Society of America, Inc.) 93 (93): 357–368. doi:10.3732/ajb.93.3.357.
LI Yong-Ping 2004. Effect of foliage top-dressing of potassium on the photosynthetic rate of apple trees.
LEUMANN, M. (2009). Produktionskosten im Kernobst: Sortenunterschiede und Sparpotenzial. Generalversammlung Niederstammobstbau Graubünden, Plantahof,Landquart,Switzerland.(http://www.asaagrar.ch/LinkClick.aspx?filetick

Miraglia, M., H.J.P. Marvin, G.A. Kleter, P. Battilani, C. Brera and E. Coni. 2009.Climate change and food safety: An emerging issue with special focus on Europe. Food. Chem. Toxicol., 47(5): 1009-1021.

MINFAL, 2013. http://www.minfal.gov.pk.ipaddress.com/

M. 2009. Effect of climate change on apple production in New Zealand. Ter. Ecosys. Interact .Global. Changes. 2: 673-687. Stern, N. 2007. The economics of climate change: The Stern review. Cambridge, UK: Cambridge University Press.

MENCARELLI HOFMANN, D. (2008a). Für eine nachhaltige Wirtschaftlichkeit der SchweizerApfelproduktion.(http://www.isafruit.org/DocRep/uploads/document/1/2009/1/

MENCARELLI HOFMANN, D. (2008b) Schlüsselfaktoren und Strategien in der Bio-Apfelproduktion. Schweizerische Zeitschrift für die Obst- und Weinbau, 20, 8–

Marwat, Q. and F. Hussain, 1988. Ecological assessment of apple and apricot or chard weeds in Hanna-Urak Valley, Quetta. Pak J. Agric. Res., 9: 179-184.

Miller, G., 1995. Use of dinitro salicylic acid reagent for determination of reducing sugar. Anal. Chem., 31: 426-428.

MENCARELLI HOFMANN, D. and BRAVIN, E. (2008). Farm Economy and Fruit Quality. Selected ISAFRUIT Findings. 3. ISAFRUIT General Assembly, Girona, Italy.

MOURON, P. (2005). Ecological-Economic Life Cycle Management of Perennial Tree Crop Systems: The Swiss Fruit Farms. Ph.D. Thesis. Swiss Federal Institute of Technology, Zurich, Switzerland. 124 pp.

M.I., 1994. Fruit crops. In: Horticulture. National Book Foundation, Islamabad, Pakistan, 468.

M.A., A. Akthar, S. Ahmad and H.R.A. Shah, 2006. Performance of some early maturing apple cultivars at high altitude of Murree hills. J. Biol. Sci., 1: 334-335.

MOURON, P. and CARINT, D. (2001). Rendite-Risiko-Profil von Tafelobstanlagen. Teil I: Renditepotential. Obst- und Weinbau, 137, 106–110.

MOURON, P. and SCHOLZ, R. W. (2007). Management influence on income risk in an apple production system on Swiss fruit farms. International Journal of Fruit Science, 7, 47–70.

Neilsen, G. H. and D. Neilson. 2003. Nutritional Requirements of Apple. In: (Ed.): D.C. Ferrere. Apples: Botany, Production, and Uses. Warrington 302. Nikolskii, N.N. 1963. Practical Soil Science. Tech services. U. S. Dept. Commerce. Washington D.C. 240.

Nisar Ali Shah, Muhammad Afzal, Manzoor Ahmed, Qazi Bashir Ahmad, Arshad Farooq and Fasih Ur Rehman. 2011. Marketing of Apple in Northern Balochistan. Sarhad J. Agric. 27(4):617-624.

Ntakyo P.R., J. Mugisha1 and G. Elepu1. 2013. Socio-economic factors affecting apple production in southwestern Uganda. African Crop Science Journal, 21(4):311 – 321.

Black, B., R. Hill and G. Cardon. 2013. Orchard Irrigation: Apple. Horticulture/Fruit/2008-01pr. US Department of Agriculture, Utah State University.rady,

Olesen, J.E., M. Trnkab, K.C. Kersebaumc, A.O. Skjelvågd, B. Seguine, P. Peltonen-Sainiof, F. Rossig, J. Kozyrah and F. Micalei. 2011. Impacts and adaptation of European crop production systems to climate change. Europ. J. Agron., 34: 96-112.

Oren, R. 1996. Nutritional disharmony in plants: soil and weather effects on source – sink interactions. Pl. Resp. Air. Poll., 34: 75-97.

Podsedek, A., J. Wilska-Jeszka, B. Anders and J. Markowski, 2000. Compositional characterisation of some apple varieties. Eur. Food Res. Technol., 201: 268-272.

Pearson Prentice Hall. Emanuele, E., R. Roberto, C. Amelia and C. Alfonso. 2009 .Risk of spring frost to apple production under future climate scenarios: the role of phonological acclimation. Int. J. Biometeorol., 53: 273-286.

Podsedek A., J. Wilska-Jeszka, B. Anders and J. Markowski, 2000. Compositional characterization of some apple varieties. Eur. Food. Res. Technol., 210: 268-272

R.G., J.H. Torrie and D.A. Dickey, 1997. Principles and Procedure of Statistics, McGraw Hill Book Company, New York, USA, pp 672.

Redalen, G., D.K. Gronnero, Hansen and S. Vestrheum, 2006. Fruit quality of early ripening apple cultivars grown in Norway. Norwegian Agri. Sci., 10: 95-100.

Sestras, R., Chidrav. and E. Harsan, 2003. Features of some apple varieties produced at Clug Napaca as compared to Jonathan. Horticultura, 48: 67-74. Steel,

Slingo, M. 2009. Effect of climate change on apple production in New Zealand. Ter. Ecosys. Interact .Global. Changes. 2: 673-687.

Stern, N. 2007. The economics of climate change: The Stern review. Cambridge, UK: Cambridge University Press. Supit,

Siddiqui, B.N., S. Muhammad and N.H. Malik. 2006. Effect of socio-economic aspects on the awareness and adoption of recommended horticultural practices by apple growers in Balochistan, Pakistan. Pak. J. Agri. Sci., 43 (1-2) : 73-76.

Skreli, E., T. Dishnica, A. Jaupi, D. Imami, A. Cela and A. Fortuzi. 2010. "Consumers' preferences for apple fruits in Tirana market using a conjoint analysis". Economics and Agrobusiness, Albania. ishpp@yahoo.com

Sandor, F. 2008. Apple Production. Perennial Crop Support Series Jalalabad, Afghanistan. Manual produced by Roots of Peace, USAID, Afghanistan, California. Alternative Livelihood Program-Eastern Region ALP/E. Publication No. 2008-004-AFG, info@rootsofpeace.org Slingo,

Shengmin Lu, Yaguang Luo, Ellen Turner and Hao Feng, 2007. Efficacy of sodium chlorite as an inhibitor of enzymatic browning in apple slices.

Turan, M., S. Kordali, H. Zengin, A. Dursun and Y. Sezen, 2003. Macro and micro mineral content of some wild edible leaves consumed in Eastern Anatolia. Acta Agric. Scandinavica, Section B, Plant Soil Sci., 53: 129-137.

Van Diepen, A.J.W. de Wit, P. Kabat, B. Baruth and F. Ludwig. 2010. Recent changes in the climatic yield potential of various crops in Europe. Agri. Sys., 103: 683-694.

Wu, J., H. Gao, L. Zhao, X. Liao, F. Chen, Z. Wang and X. Hu, 2006. Chemical compositional characterization of some apple cultivars. Food Chem., 103: 88-93.

Widayat, H.P., M. Schreiner, S. Huyskens and P. Ludders. 2003. Effect of ripening stage and storage temperature on postharvest quality of pepino (*Solanum muricatum* Ait.). Food, Agriculture & Environment. 1 (1): 35- 41.

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