VALUE CHAIN ANALYSIS OF PEACH FRUIT IN KHYBER PAKHTUNKHWA

BY

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DEPARTMENT OF AGRICULTURAL AND APPLIED ECONOMICS
FACULTY OF RURAL SOCIAL SCIENCES
THE UNIVERSITY OF AGRICULTURE, PESHAWAR
KHYBER PAKHTUNKHWA, PAKISTAN
DECEMBER, 2012
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A thesis submitted to the Department of Agricultural and Applied Economics, The University of Agriculture, Peshawar Khyber Pakhtunkhwa Pakistan in partial fulfillment of the requirements for the degree of DOCTOR OF PHILOSOPHY IN AGRICULTURE (AGRICULTURAL & APPLIED ECONOMICS)

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VALUE CHAIN ANALYSIS OF PEACH FRUIT IN KHYBER PAKHTUNKHWA

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ABSTRACT

The current research study was conducted to examine the value chain of peach fruit in two districts of Khyber Pakhtunkhwa namely Swat and Buner during 2010-11, which are the leading peach producing areas of the country supplying seventy (70%) of the total produce to all the major country markets in the country i.e. Peshawar, Rawalpindi, Lahore Gujranwala, Faisal Abad and Karachi. The main objectives of the study were to estimate the production costs and profitability in Peach Value Chain to point out the key factors affecting peach production, to identify the value chain actors in the study area, to calculate the marketing costs and to identify the efficient marketing channel and to present some recommendations.

The study was confined to six (6) villages from both districts Swat and Buner due to limited resources and time constraint and these were selected due to more peach varieties, sufficient numbers of peach plants, number of actual farmers and fruit plant owners. The data regarding peach fruit value chain for the year 2010-11 was collected through well-planned questioners from three hundred (300) randomly selected peach growers and local traders in these two districts of Khyber Pakhtunkhwa. The analytical tools were used like polynomial regression model, production and marketing costs, CBR and SWOT analysis for peach crop.

In value chain study, production and marketing were important stages among others. The average peach production cost per hectare was Rs. 81,367, where in the factors of production in the chain were green manure, different chemical fertilizers, various pesticides and employing of daily wage labour for application of FYM, fertilizers, pesticides and irrigation. Another important step of the chain was marketing and its average cost was Rs.228,985 per hectare. Some of the elements of marketing cost were purchase of cartons, labour charges of picking and packing fruit, decoration materials, transportation, loading, unloading and market charges or commission fee. The average net profit from peach orchard was Rs. 308,406 per hectare during 2010-11 while the gross income was Rs.618,760 per hectare.

There were some early, mid and late season peach varieties, Carmen and Early grand being the early season peach varieties have fetched highest prices of Rs. 34750 and Rs.33750 per ton in the value chain. The peach fruit was marketed to major markets namely Peshawar, Rawalpindi, Lahore, Gujranwala, Faisal Abad and Karachi. The price of the fruit at Gujranwala was Rs. 36500 per ton being the highest of the markets followed by Rs. 35250 per ton at Faisal Abad. The Sohani peach variety got Rs. 835683 per hectare highest average gross income among all other varieties. The marketing
efficiency was calculated 2.7, which is greater than one and showed the marketing efficiency of peach fruit in the value chain.

In the study, some of the important value chain players were identified like agriculture inputs suppliers, peach producers, brokers, wholesalers, retailers, transporters and exporters.

The study also highlighted the significant relationship between price and quality attributes namely size, colour, varieties, taste and firmness of the fruit. It was identified in the study that the peaches having red colour, big size and firmness received maximum price. There were some big problems like High costs of Agri. Inputs, Lack of financial resources, Perishable nature of Product, High transportation cost, Pests and natural calamity attack problem, Price fluctuation in markets and Lack of market information system.

Some of the recommendations and suggestions for the problems faced by the growers in the study area as well as others supply chains in Pakistan were regulation of agricultural inputs supplier markets for price stabilization, access to loans and market information be supplied, contribution and adoption of technology, post-harvest losses be minimized and crop insurance schemes may be started, capacity building programs for growers should be enhanced, scaling up of successful value chains, institutional and infrastructural facilities to the development of value chains in agriculture should be assessed, preparation of comprehensive policy and strategy for the promotion of export and agro based industries for making peach and other fruit more profitable value chain in the project area as well as in Pakistan.
I. INTRODUCTION

1.1 Background

The idea of value chain was first suggested by Michal Porter in 1985. A value chain is a series of activities performed by the operating firm in a specific industry, in order to produce or deliver a valuable product or service for the consumer market. In the mid-1980s, Porter evolved the idea of the value chain during his study of competitive advantage (Porter 1985). He explained his idea about the value chain by analyzing different target activities in some firms or companies which can create or increase the worth of any product by arranging their activities or steps into value-added. Porter characterized two significant activities leading to value-addition of an organization, which were primary activities (inbound logistics, operations, outbound logistics, marketing, and sales) and secondary support activities (strategic planning, human resource management, technology development, and procurement) (Porter 1985). However, the value chain approach of Porter is confined to the firm level overlooking the investigation of up-or downstream activities beyond the company.

Most areas of Pakistan are gifted with environmentally suitable for agricultural activities and have great favorable condition for cultivation of approximately thirty kinds of various fresh fruits which includes Citrus, Mango, Apple, Peaches Dates, Melons, Banana and Guava etc. which are relatively more common.
The Peach value chain analysis may be considered is series of actions during fruit production and marketing, passing through the steps of the chain, due which the product receive some additional worth.

Peaches are one of the most significant deciduous fruit grown in Khyber Pakhtunkhwa, considering the total fruit production, fetching income to the growers, employment creation in the growing area and most importantly boosting and linkage development with the related agro based industries.

The low level of growth in fruit production in general and peach fruit production in particular shows that the benefits for the growers to increase produce which is less. Peach fruit export and processing industries (i.e. fresh fruit processing and juice making) must to be stimulated addressing this domestic incentive issue. Second, the fresh peach fruit is available at very low- prices in Pakistan and this shows a potential for attracting huge investment in the fruit/ peach export industry. Third, good and efficient management of the post-harvest losses can also make possible the use of fruit damaged due to mishandling in picking, packing, and transportation losses. Hence, there is great opportunity for income and employment generation both at farm and industry levels as well as for the supply of human nutrition.

Aggregate exports of agricultural products i.e. fruits, vegetables and other crops and Pakistan’s agricultural policy has one of the main objectives to reduce the import bill of agro- based products. There are many openings and challenges for farmers and farming communities in Pakistan who can take benefits from World Trade Organization (WTO) and its Agreement on Agriculture. Quality fruit production and then its marketing under some criteria and prerequisites have become very difficult in the world trade. Pakistan’s all stack holder including farmers, traders, exporters and policy makers should look in to account the conditions and prepare themselves for coming challenges and competition in world agriculture markets and bring major changes for developments and enhancement of all relevant agriculture sub sectors. Therefore serious and doable struggles are required to compete in world markets by adopting rationalize cost of production of horticultural
products and their marketing strategies for achieving the desirable goals and income.

The Pakistan region varied land structures, climates and soil textures, which are favorable for the extended list of various fruits and vegetables. There is a reasonable change noticed in export revenue from fruits and vegetables in few years. Horticultural sectors have the ability to absorb large population, improve their income, reduce poverty and stable the economy condition of the country (Alam and Mujtaba 2002).

The Peach farms need sufficient funds at initial time and up to the last and well taught considerations may make the business more profitable and prosperous in the coming days (Marini, 1997).

1.2 Categorization of priority constraints in Peach Value chain

There are many constraints in the peach value chain in the study area, which are given below.
1. Input supply
2. Production in field
3. Processing
4. Marketing
5. Finance

Among the above, the most important two peach value chain constraints Production and Marketing were identified and selected for further investigations in the study area.

1.3 Worldwide Peach Fruit Production Scenario

World Peach and Nectarines production is about 15,561,206 MT or 34 billion pounds. Peaches and nectarines are grown and produced on large scale in 71 Countries worldwide on about 1.4 million Hectares. China is the leading Asian country producing 44% of world Peach Fruit Production, followed by Italy 13%, USA 10%, Spain 8%, and Greece 7%.(Appendix A1). Fruit production of thousand Fruit plant varieties and species are grown all
over the world. Peach and Nectarine are among these most vital fruit group both area and production wise.

World production has rose sixty percent (60%) for the last ten years. It is estimated in the year 2011-12 that world peaches and nectarines production will be more than ten percent as compared to the year 2010-11. This increase is mainly due to the additional number of peach trees as well as quality and quantity of peach production. Currently China the leading peach production followed by European Union and the United States. Russia Republic is the leading market for peaches and nectarines for the last five years. (Appendix-8)

1.4 National and Provincial Scenario of Peach Fruit Production

Pakistan has significant benefits for cultivating fruit and vegetable, being an agrarian country based on purely agriculture and related sectors. Different kinds of fruits, vegetables, flowers and many ornamental plants are grown in our country. The horticultural sector has showed outstanding growth in the last few years (Pakistan Horticultural Export Development Board).

Agriculture plays an important role in Pakistan economy, which may be measured the second mainstay of the country’s economy, with support of around 21 percent to GDP. This sector gives employment to nearly 45 percent labour force. Nearly 62 percent of population is said to be residing in rural areas and get their livelihood from farming and its linked enterprises. The information so far collected shows that the agriculture sector was not exploited up to its maximum level. The agriculture sector in Pakistan is a major contributor of raw resources to other important sectors of the economy and hence leading to enhanced exports, foreign exchange. Industrial sector like manufacturing of pesticides, chemical fertilizers, card boards, agricultural machinery etc are getting support from agriculture sector.(Economic Survey of Pakistan, 2010).

Peaches and Nectarines in Pakistan are grown on 15800 Hectares and the share of provinces is 9500 hectares in Baluchistan, 6200 Hectares in
Khyber Pakhtunkhwa and 100 Hectares in Punjab respectively, while the Peach production in tons is 83700 tons and the share of provinces is 25400 tons, 57800 tons, 500 tons respectively. The yield (9.3 Tons) per Hectare in Khyber Pakhtunkhwa is the highest among all provinces which is followed by Punjab (5 Tons) and Baluchistan (2.6 Tons) respectively. (Appendix A-4)

The total fruit production in Pakistan was 6633210 tons in 2004-05. In Khyber Pakhtunkhwa, it was 509690 tons 2004-05 which made up about 7.68 % of total fruit production in Pakistan. The average yield per hectare of fruits at National Level in 2004-05 was 8.33 tons/hectare whereas in 2004-5 Khyber Pakhtunkhwa yield was 11.05 tones/hectare which were the highest among the provinces. The farmers in Pakistan have the potential for enough production of all types of fruits and vegetables for their own consumption but can supply abundant quantity to the local market as well. The Government may start some sound initiatives for sending abroad these excessive amounts of horticultural products and get maximum revenue for the country.(Hasan, 1994)

Khyber Pakhtunkhwa has also a unique distinction of highly diversified agro-climatic zones comprising of plains, hills and mix, capable of producing varieties of crops, fruit and vegetables, floriculture and medicinal herbs, which is quite rare in other parts of the country: There is a great scope for value addition of fruit and vegetables crops and their products i.e. Jams, Marmalade and Squashes etc., and this may fetch large amount of foreign exchange in old and new explored international markets compare to the current position of getting less. This objective may be achieved by adopting best cultural practices in the orchards/ fields, highlighting of agricultural yields and byproduct industry through value addition, processing, careful picking, packing, grading, new and latest packaging and marketing practices.

Khyber Pakhtunkhwa has wide and different agro-climatic conditions i.e. tropical, subtropical, warm temperate and temperate regions and the province is famous for different and wide range of fruits. The prominent fruit crops among all are Apple, Peaches, Apricot, Plum, Persimmon, Pears, Citrus, Guava and Dates etc. having vast production and local consumption
as well as exports. The region has equally geographically and strategically significant to increase its different fresh fruit produce distributes to old markets like Gulf states, Afghanistan, Iran, and the new and developing markets like China, Central Asian states together with the extremely viable but profitable markets of Europe and Far East. The fruit production’s sector due to its cash crop nature and value addition with the purpose to produce, improve labour engagement and enhance earnings level particularly in remote and poor areas that will ultimately lead to poverty decrease.

There are many fruits produced in Khyber Pakhtunkhwa, peaches are among the few. It has been observed that the area and production of this fruit is enhancing for the last some years. The only reason behind its more area and production is cash crop value, planting of new and best quality peach varieties, long fruit period, adaptation with the season, sufficient water available resources, technical manpower and experts etc in the districts. Area under peach was enhanced from 1300 hectares in 1999-2000 to 6200 hectares in 2008-09.

Swat and Buner districts are bestowed with varied natural resource and have the ability to grow and produce diversely early and perennial fruit crops. There is one river named river Swat and canal in Buner, besides sufficient land and water resources which suggest great scope for the construction and development of irrigation channels etc. in Swat and Buner. Various fruit production in the study area is mostly for local and national markets. The fruit production is much split and uncoordinated and large number of producers have one or similar kind of fruit crop causing surplus supply in harvest time mainly mid-season peach varieties.

As evident from the statistics of Khyber Pakhtunkhwa Table 1.1, there are different varieties of Peaches are grown and have 6200 Hectares area under cultivation. District Swat has 3750 hectares area under Peaches followed by Mardan 374 hectares, Haripur 119 hectares and Buner 110 hectares respectively. Similarly District Swat is the highest leading Peach producing district in the Province with total production 17625 Tones.
Major Peach orchards are situated in the Northern part of the Province particularly District Swat, Buner and Malakand etc. The central parts of the province namely Mardan, Charsadda and Peshawar have also some peach orchards. There are also some limiting factors in respect to some known fruits of the province.

The large area spread has made many issues in production, transportation and post-harvest losses, marketing costs, making many farmers to sell their orchards prior fruit set to avoid any further loss in case of some diseases or any natural calamity occurrence.

### 1.5 Contributions to Diet and human health

The significance of fruits in human diets is famous and needed. They are giving basic nutrients to the human which are needed for our body. These crops provide various mineral and vitamins, jobs creations, food insurance to
the people of the country. These crops also decorate the table but also enrich our health. The intake of fruits may help in minimizing nutrient deficiency and other under nutrient issues like night blindness, anemia, goiter and scabies etc. of poor and resource less communities. Peaches and Nectarines have important dietary value per 100 gram of edible portion; the content materials contain Water 89%, Calories 38%, Protein 0.6%, Carbohydrates 10%, Vitamin A 27% and Vitamin C 15.6%. (Appendix A-6)

Peaches and Nectarines can be used fresh and in many juices, cakes etc. They are also for various kinds of jams, jelly, marmalades and with combination of different fruits. Fresh fruits give sufficient number of vitamins. Nectarines having double vitamin A, little more vitamin C and high amount of Potassium as compare to peaches (Gao, 1998). The fruit plants growers normally think of the prices of initial materials for carrying the successful cultural practices in the orchard management. The price of these materials may be divided into varying and fixed costs.

The first category which is variable cost contain of fertilizers, pesticides, daily wage persons, agricultural equipments, FYM, markup ratio, card boards, transportation, commission at markets etc. The second category fixed costs measure markup rate on investment, losses in resources value, clearing the routine bills, store for stocks and tools, buying and taking care of farm machinery and other assets including portable and non-portable.

In successful fruit orchard farming, it is believed that the production and marketing activities need to be performed efficiently. Efficient marketing satisfies the producers and consumers alike and both the parties fetch a good deal of income. According to Lashari et.al (1995) production is first half of the job and marketing is the other half of any economic activity. Often increased production is upset by poor marketing system i.e., production and marketing go hand in hand. In addition, farmers always hesitate in spending additional finances involved in the adoption of modern production technology unless they are assured of stable market prices.
Selling in Pakistan of agricultural yields and fruits changes from time to
time, venue to venue and item to item and these have been categorized by
the availability of large number of middlemen acting at many supply stages,
and in this way increasing selling expenditures and rightly influence the price
obtained by the fruit growers and compensated by the end user. (Hamid and
Walter, 1990). A usual marketing chain has different kind contact buyers
(including harvesting contractors in fruits and local traders), commission
agents, wholesalers and retailers. Marketing of peach fruit is carried out
exclusively by farmers themselves, private organizations like commission
agents in various parts of study area and individuals. It is generally fact that
the peach fruit is extremely fragile in its nature. The distinction of peach fruit
starts spoiling at the time of picking to last shifting to markets and selling to
consumers.

The overall supply and marketing process needs to be speed up
towards quickly disposal. Normally, the farmer's share in consumers’
expenditure is not only low, but also varies according to the product
perishability and the level of middlemen understanding among them. (Iqbal,
1989). In fact, the government is considering the sole responsibility of private
sector supply, distribution and export of horticultural products. The distribution
channel is very much different from straight sale to end-users to difficult
selling place comprising growers, seasonal purchasers, institutional rate at
market, big sellers, small sellers and exporters.

The supply network is often additional complex when the big sellers
sell to second big sellers or a graders and small seller to second small seller
and hence making less competition in the marketing system. In general, a
farmer has either no or very less negotiating powers and thus his part in small
scale price is less as well as changing to the products, their softness and the
level of agreement amongst the middlemen in market. (Khushk and Smith,
1996).

1.6 Problem statement
Value Chain of Peach fruit explain the production at farm gate or field this is distributed in local market and down country markets i.e. Peshawar, Rawal Pindi, Lahore and Karachi etc. These marketed quantities of various Peaches are further distributed through commission agent in these markets to whole sellers and retailers. The retailers are mostly forward major portion of these quantities to the end users. Some quantities of these fruits are also exported to Gulf and other countries through either whole sellers or big commission agents present in central or big markets like Rawalpindi, Lahore and Peshawar etc. From down country markets, some quantities are going to the processing plants for Juices, Jams Marmalade etc. in the last these products from all sources either direct or indirect are marketed to the end user/ consumer.

Peach producer are suffered due to weak after picking management practices, exposing to major damages, and loses significant share in coming income to the producers as well as to other players including exporters in the markets. Moreover, producers have either no or very capacity of fruit storage at their field level and area, and in this way they are compelled to sell their peach fruit directly after harvest. There is no system of jointly bargaining for price increase, and each producer links himself with the commission agents or trader and other buyers, and thus often receiving prices very less of the optimal market prices. Secondly at the marketing stage, there is a main problem of weakly poorly established carrying arrangements, like bumpy and weak farm to markets roads serving the fruit orchards growers where more post-harvest losses occurred and leading to deterioration of quality fruit and fetching less selling prices.

Peach value chain has some problems which have limited the potential gains from the current openings. Peach value chain has been not studied in the study area being an interesting and important process tool. Usually the producer and seller do not play any collective role in the study. Also there are no processing activities. Keeping in mind the current scenario, a study which could focus the production, marketing chain and the responsibilities of
important actors and put forward some concrete recommendations for improvement in current system as well as in future.

1.7 Scope and Limitations of the Study

It is generally believed that researcher starts research or study on some basic problems which need further exploration. For this purpose all researcher keep in mind the objectives of the study and starts efforts for the solution of the problems through framing theory. In the research work, the scientist explains all those observations, data or information which are left with no explanation and conclusions. Similarly first the issue or problem in hand is elaborated and concept about the problem is cleared. This section starts with the significance of the research issue accordance to the objectives of the study. It is general concept of the peach farmers that the yield per unit hectare is comparatively low to the advance, economically sound countries. Some constraining forces can affect the income generation opportunities of these orchards growers. These may be the farm produce, income and profits of the fruit farmers. Similarly some of key indicators like acreage of orchard, seasonal suitability, and place of marketing can influence the income of producing peaches. (Khuda Bakhsh, 2006).

Research on studying the production system of the enterprise are very common and popular while very few studies are under taken to study the marketing system in Pakistan in general and in Khyber Pakhtunkhwa in particular. It is now become increasingly accepted that for farmers to enhance peach production, and to fetch highest returns by the farmers, suitable attention is needed by the key players. To study the several marketing functions performed by various agencies regarding selected fruits (citrus, apple, peaches, persimmon, plum, guava and dates) produce in Khyber Pakhtunkhwa, the project in hand is developed. Though, the study is restricted only to two districts mainly to the financial and time constraints.

1.8 Significance of the Study

The current study has produced and highlighted some useful and important information in order to frame fruit production and marketing
development projects and recommendations for future interventions particularly Peaches and Apple that will improve the socio economic condition of the orchard growers and efficiency of fruit production and marketing system. The possible users of the study findings may be orchard growers (producers), researchers, businessmen, government line departments and non-government organizations, which might have interest in improving the fruit production and marketing system. Anyone who wants to explore the fruit production, marketing, their costs, and key players in value chain can benefit from the findings of this study.

1.9 Objectives of the Study

1. To calculate the production costs and profitability in Peach Value Chain
2. To estimate the marketing costs and to identify the efficient marketing channel in Peach Value Chain.
3. To identify important value chain players and their role
4. To identify the strengths, weaknesses, opportunities and threats (SWOT) for analysis in peach value chain.
5. To present some recommendations for policy makers and others key players in the value chain.

1.10 Format of the Thesis

The present thesis is further outlined into following five chapters. Chapter- I is allotted to the basic introduction wherein the significance of the research work is summarized. Chapter-II handles with the review of literature. The third Chapter contains universe of the study and research methodology. The results and discussion of the findings are elaborated in chapter- IV. The Summary, Conclusions and Recommendations are presented in chapter-V. Appendices and Interview schedule are annexed at the end.
II. REVIEW OF LITERATURE

This chapter has two major portions. First portion presents the basic theory about the study (i.e. Explanations and ideas used) and second contains the previous work and studies related to fruit production in general and Peach fruit in particular and local costs of marketing of all fruit produce.

2.1. Value Chains in Fruits & Vegetables
Fruits and Vegetables production are considered significant sectors and have gained importance in farming growth in Pakistan. Since ten to fifteen years, the horticultural part of the agriculture has been continuously gaining importance mainly due to multidisciplinary activities. This sector is giving much needed strength to farming part by enhancing the business opportunities, revenue and job creation etc. The main portions are fruit production, vegetable cultivation, flowers rising, ornamental plants, spices cultivation, medicinal and aromatic plants and these are nearly contribute 21per cent to the economy of Pakistan.

Fruits, vegetables, flowers, plantation crops, spice, and medicinal & aromatic plants contribute over 21. Pakistan is considered among the few leading fruit and vegetables producing countries, while very meager part (2-3%) of the produce is converted to quality and preferred shape and the post-harvest damages of fruit and vegetables may exceed upto (25-30%). There are some limiting factors like lower production, huge after picking damages, non-
availability of cool trucks or transportation facility and ineffective marketing channel. Sustainable progress of horticultural farming may be obtained by effective and advance value chain for considerable profit of all key players in chain.

2.2. Agricultural Production Theory

The production analysis of agriculture is an integral part of agricultural development policy because it has an important position in many developing countries (Yotopoulos and Lau, 1979). The policy maker and reviewer require data about farm production, its responses to raw materials and cultural practices so as to initiate measures for the achievements of desired short and long term goals. The purpose of study is to explore how Peach fruit production is responsive to its inputs and to gain knowledge about magnitude or level. When it is established, thus effective agricultural inputs usage in horticultural crops or fruits may be ensured.

Production function in agricultural production concepts is very vital and primary in nature. This describes the association between agricultural inputs and produce keeping in mind that highest produce will be obtained from mixing of these two factors in the presence of available technology, hence realizing a priori technical efficiency. Mathematically, a production function is expressed in various ways such as,

\[ Y = f(X, Z) \]  \hspace{1cm} (2.1)

Where \( f(.) \) exhibits the form of rules of production technology. In these equations, \( Y, X \) and \( Z \) are vectors (or matrices) of non-negative output(s), variable and fixed inputs respectively. The production function or technology restricts the possibility of negative output or input levels.

The Variable agricultural inputs may be increased or decreased according to income increase in the short period while the fixed agricultural inputs may not be adjustable in the long run.
In order to it simple, the mathematical expression can be explained as below.

\[ Y = f(X). \]

There are three approaches to explain the production technology, which are production function, profit function and cost function. They can show us how revenue and profit may be maximized and duality concept gives relationship among the three methods.

The primary method persisted very popular in empirical research until the 1970s. The most regularly used functional form was Cobb-Douglas, elasticity of constant Substitution (ECS) and Leontief. When it was first starts in 1928 to 1950, it was very common condition in both form of analysis. It is very simple and known for its easy calculations and explanations.

The other functional form is known as flexible functional forms and generalizations of the Cobb- Douglas were introduced in 1960s and early 1970s.

2.3 Marketing Theories and Basic Concepts

2.3.1 Marketing and Marketing concepts

**Market:** The place where buying and selling of a product can take place freely and no internal or external influence is applied. The idea of transfer and dealings of any good or service may forward the notion of selling and buying place. This is the combination of current seller and expected buyer of a good. It can be stated a place where modest activities take place to interchange a good for other.(Bain and Howells, 1988).The best apparent characters of selling and buying place are to be price and interchange of products; it may not be physical venue. There is no requirement for meeting in person in place where selling and buying take place during the current technological and informative period.
Marketing theory: In economics, Marketing can be defined in different forms. The Kohls and Uhls (1980) have defined marketing in a very simple and proper context. According to them marketing means the chain of actions or activities necessary in the form of goods and services required for the fulfillment of market needs through good quality production and the pass on of finished item from its initial place to the consumer’s hand. The agricultural markets channel usually presents the transfer of farm products from its original place to the end user or companies.

The given process contain initial product dealing, proper picking and packing, lowering post-harvest losses, adoption of ideal grading and quality measures to satisfy the end user needs throughout the seasons and made the process of transfer easy. Agricultural raw materials can also be marketed in the said markets.

The responsibilities of agricultural markets are very much important for the steps involved in the betterment of rural and urban economy of any country whether it is poor or rich (Holton, 1953). Ducker (19580 presented that development can be achieved through forming criterions and principals and thus helping business related attitudes. Bartels (1986) reflected the end user behavior and approaches which are to be transformed through marketing skill and practices. Some of fresh market knowledge or information about best produce can be shared with the consumers and thus can increase his expectation, level of demand through improvement and adoption of quality packing and packaging materials. The fruit producers are enforced to ready for the competition in the local as well as in international markets. High quality products have very positive and incremental on the consumers. Previously some of the economist have tried their best to aware the producers and traders about the need of consumers, market mechanism and players involved in the process. The Adam Smith (1976) known as the founder development economics and stated in his book named the “Wealth of Nation” the concept of labour division and taught the ideas of labour competencies development, the strength of large production, and the capability of interchange the produce and thus to formulate the importance of wealth for
easy transfer. The idea has further expanded the scope of economic events like product handling, processing, ideal packing, suitable storage, transport facilities, credits and promotions. Public promotions are the heart of sale and trading.

2.3.2 Role and Responsibility of fruits Markets and Marketing

Agricultural marketing:

Many economists have explained the meaning of marketing in a very diverse ways. Various groups of interaction like growers, businessmen and end users take meaning of agricultural marketing in their own way. (Kohls and Uhl, 1985).

Agricultural Marketing may be defined as the carrying of different actions in moving any agriculture product or services from farm to the end users for consumption purposes. (Kohls and Uhl, 1985; Bain and Howells, 1988). Kotler and Armstrong (2003), explained agricultural marketing actions through group of people where they desire for production, presenting, selling, buying and easily interchanging their goods and services to other fellows. It is combination of various practices like agriculture, industry and infrastructure etc. (Backman and Davidson, 1962).

Markets and Marketing are very vital parts of financial development to incorporate, organize and activate financial events (Drucker, 1958). Galbraith and Holton (1956) have connected some marketing activities with the development instrument, while Abbott (1968) pointed out that proper consideration should be given to buying and sales at an earlier point considering the significance of physical assets in the form of farm machinery, price of agricultural inputs and market information. Bateman (1976) placed much stress on examining the type of market mechanism and activities. New findings have in fruit marketing untied fresh opening mostly for agricultural oriented companies and sectors and this kind of research is recognized as “market base investigation”.

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Bain (1968) devoted greater significance to the market based findings and evaluation. The organization-behavior-presentation procedures have been outlined to observe and examine all types of actions linked to market actions, while Scarborough and Kydd (1992) focused on practical associations between firms. Moreover, they described final work as structure, conduct, and performance in the buying and selling places. There are some fundamentals in the markets which are place for buying and selling, how free and independent trading takes place and how price of a product move around (Bain, 1968). The behavior of any market or firm can be assessed through finding that how price is fixed or the expenditure made on the product publicity and the relationship between buyers and sellers. Hence, these lead to better environment in the form of interface and best harmonization among the people involved in the market.

The governments in the emerging nations and their planners have realized the importance of agricultural products and their marketing as these are necessary for the improvement of living standard of the nation (Kanyak, 1986; Kazgan, 1988). Effective and rationalize utilization of rare means is the leading step towards achievement in holding the local and abroad market places.

Timmer et al. (1993) has defined three marketing characteristics i.e. marketing role, markets place and price establishment and recommended that the appropriate and well time utilization of these would give maximum outcomes. It is very for any entrepreneur to arrive in a place where buying and selling take place without knowing the exact knowledge and data.

2.3.3 Marketing efficiency

This may be defined as the effective provision of all assets to acquire maximum contentment of the end users. (Raymon, 2003). Scarborough and Kydd (1992) have elaborated the term efficiency of all assets employed in agricultural marketing in relation to raw materials and final product. Efficiency of an organization or market can be judged from the more production in relation to raw material used in a specific place and limitations and continuously reduces ratio of input to output. The efficiency of any Agricultural
marketing can be found out through different procedures, where these are prominent among others namely operational efficiency and pricing efficiency (Jesse, 1987).

2.3.4 Marketing Channel

This is an arrangement of linked firms where a good from production stage flows and reaches to the consumer being the end point. (Kotler and Armstrong, 2003). It is examined to exactly know the moving of products from the farm location to the end users. The information may be obtained by investigating the persons involved in the processes who took part in the actual practices for getting maximum revenue (Getachew, 2002). The type and quality of a good which is to sold or bought, the existing facilities in the market, the current societal and surrounding situation may decide the size of this marketing network. (Islam et al., 2001).

2.3.5 Marketing Intelligence

Competitiveness of peach fruit may be explained as the competency of an organization to offer high quality products to its end users and maximum returns to the players in the value chain. The main reason for continuously remaining on reasonable stage in production would be the efficiently use of labour force, assets and natural means. The peach produced in the study area is known in whole Pakistan due to its quality and attributes. Some of the quantity is also exported to Middle East and Afghanistan.

2.3.6 Classification of Fruits Markets

Usually Markets are those places where buyers and sellers enter freely and trade transaction take place and product and services are transferred from person to another. During the process some activities are varied in types, degrees resembling time period, site and organization etc. Markets are divided according to venue and kind of business interventions.

2.3.6.1 Assembly market in fruit industry

Those markets which are located near to farm or field and growers bring excess part of their produce for selling. Shopkeeper, local middlemen,
businessmen and hawkers come to buy the goods in these markets. Maximum of the dealings take place in meager units of farm products. Usually business in such kind of market is allowed by the controlling authority, however trade is carried and some charges are paid by the sellers and buyers. There is no proper book keeping in organized way. Price fixation is normally done through face to face contact and talks between farmers and buyers. The amount of produce is so less, that is why the farmer is not in a position to influence price. But in case of bigger amount of produce, the growers would like to go the large markets or will made efforts to sell the produce not less the bigger market place. Now days the producers are satisfied and happy to transfer their excess produce to bigger markets by roads as the conditions of link roads have been improved.

2.3.6.2 Wholesale Market in fruit industry

These markets are mostly positioned in the central place of either district or tehsil. Excess produce of fruits and vegetables are brought to these for trade as these markets have well equipped storage facility, good transportation carriers, ready and all time communications and best environment than the small and village based markets. There are sitting rooms for farmers and traders and separate auction place allotted by the local authorities. All commission agents have enough places for carrying their marketing activities. Entry and exit from these markets for farmers, business community and transporters is no problem and they can shift their goods very easily.

2.3.6.3 Terminal Markets of Fruits in Pakistan

Terminal markets are mostly located in big cities throughout Pakistan. These include Peshawar, Rawalpindi, Lahore & Karachi which known for its quality services in the country.

Some quantities are shifted to these markets for onward dispatch to world markets of fruit and vegetables. Mostly wholesalers are engaged in these market and deals and forward huge quantities of fruits to the manufacturing units for preparing by products, retailers in big city and covered
and sophisticated markets. Maximum numbers of buyers in these markets are buying their local workers who interact with other wholesalers. Such markets are set prepared with businessmen who are trading relying on the goods provided by farmers of other areas. The managers and workers are enjoying all kind of latest services for approaching each another and fellows in the other markets. Some business fellows have established their goods forwarding companies and all kind of telecommunication services are available for their work.

2.4 Review of Experiential study

The following part tells us the research and experimental results about agricultural production and fruit products marketing. The findings are again divided in the portions mainly focused on emerging nations and Pakistan.

2.4.1 Value Chain Approach in Fruit Production and Marketing.

Value chain analysis may be one of the significant methodologies to examine market varying market structures and to evolve appropriate approaches for private business development in developing countries. Sufficient research work has been carried out on Value Chain (VC) theory. In the 1990s the idea of value added chains developed as methodology to examine and clarify new and improved practices of worldwide business.

Dolan, Humphrey & Pascal (1999) argue that the requirements of the UK supermarkets act as an effective barrier to participation of African small exporters in the chain. The authors argue that, on the one hand, associations who work in the mandatory Contracting environment are those skillful of encouraging quality. While Arm’s-length Contracting may be seen as a price dependent, and quality control initiatives are of no concern. The distinction between Arm’s length Contractual Relations (ACR) and Obligatory Contractual Relations (OCR) used in the literature on buyer-supplier relations.

Cook (2000) examined the suggestions of stakeholders in fresh fruit and vegetables value chain in the US market. She determines that the fruit
production sector is visibly leading to its highest level of supporting of fruit and vegetable marketing sector through supply chain linked models, while the old retailers are losing huge number of businessmen in the process. The fast spread of quality center might force the old retailers for changing their business to the super store format.

Schipmann (2006) analyzed the relationship between the international and local value chain for maximizing returns to the small land holders and their current problems in joining in the Chilli farming of Ghana. She concluded that worldwide value chain will fetch highest returns to the farmers as compared to the local value chain and hence will get additional income. Similarly the small land holders have the capacity to increase their production knowledge and practices and join themselves with the improved value chain by giving them some support. She further expressed that the joining of value chain of small scale land holders will help them in reducing the poverty in their areas.

Ali and Nath (2011) have studied mechanism of postharvest techniques (PHT) like cleaning & washing, sorting & grading, preserving & cooling, dehydrating/ drying, packaging, labelling, and storage for value addition in vegetables value chain in eastern Uttar Pradesh. The acceptance of cleaning & washing, and sorting & grading was noticed remarkably high (50%), other actions were in the range of 3 per cent to 25 per cent. Age, literacy, economic condition, landholding– size, access to loans, and market linkages were noticed the most significant aspects to motivate the farming community for acceptance of new and improved practices modern technology, comprising different after picking actions.

Chandrashekar and Murthy (2011) have studied the functioning of fruit and vegetable grower’s Cooperative Marketing and Processing Societies (HOPCOMS) in the Mysore City of Karnataka. The HOPCOMS mainly work with the fruits and vegetables farmers, and receives from members the fruit and vegetables in good shape, colour and size on receipt/ voucher basis. The organization assembled the fruit and vegetables and trades in the most important three markets namely retail market, processors, and society outlets.
Generally, the farming community has obtained 80 per cent of the price given by the end users. The efforts of HOPCOMS have been appreciated by maximum numbers of growers (71%) and end users (69%).

Hatai and Raju (2011) have investigated the supply chain of pineapple in West Garo Hills of Meghalaya using both production and marketing data. The maximum number of pineapple farmers was of small (50%) and medium (33%) farm-size categories. The less land holder category was willing to sell their harvest to the retailers and the second category medium sold their produce to the end users. The amount obtained by the pineapple growers in the extended market was maximum compared to end user amount. The research findings have recommended farmers associations, availability of agricultural loans, access to market knowledge and crop insurance for enhancing fruit production and maximum returns to the pineapple growers in the study area.

Jadhav et al. (2011) studied on supply chain investigation in raisin making in western Maharashtra, and expressed approximately that 3-4 per cent of grape produce was sold for making raisins while nearly 96 per cent of grape production was traded in the market. Large number of raisin making persons (94%) traded the product in the well-established market like market chain: producer—wholesaler/commission agent—retailer—consumer. The net revenue per kg of raisin (15.92) was more than double than of grapes (7.19). The grape growers got (64%) in trading raisin while (50%) of grapes in end user buying price. Due to restricted trading chances, grape growers are compelled to sell their grapes in the markets.

Kale et al. (2011) have reported the value chain management of Abhinav Drakash Utpadak Sahakari Sanstha Maryadit, Agar in export of grapes from western (Ahmednagar district) Maharashtra. Approximately 66 per cent produce of grapes was sent to foreign countries by the Abhinav. 87 per cent of the total export was sent to Arab Countries by Abhinav, while the rest quantity 13 per cent was imported by the Holland and Great Britain. The large quantity of export to Arab countries was mostly due to by the non-availability of residual measurement facilities. The research showed that the
exported may be doubled to the profitable markets like Holland and Great Britain by producing the demanded varieties, improving the quality, minimizing the residual traces and making the grape fruit safe for the consumers. The grape producers should know the varying policies of the government, prices and market information.

Prasad and Hanumanthaiah (2011) analyzed supply chain in marketing of sweet orange in the Nalgonda district of Andhra Pradesh and shown that the pre picking middlemen might be an important player in the production and marketing of sweet orange. The selling of sweet orange between growers and end users or growers-wholesaler and end user was nominal. It was noticed that the marketing efficiency in the small market chain was greater. Due to greater threats both in production and marketing, the growers were willing to sell their produce to the pre contractor in pre harvest season. Thus the producers were getting less return by averting risks.

Reddy et al. (2011) have explored the emerging retail chains in horticultural crops in Andhra Pradesh. The research has explored that besides the old retail chains, there were some new well planned organized and improved retail chains like Food World, Spencer, Food Bazaar, ITC Choupal, Reliance Fresh, Heritage Fresh, Subhiksha, etc. have been developed near the Hyderabad city. The new well-structured retail chains seems to be smaller than the old chains and producers having contact with the well-structured and planned retail chain received maximum returns for their product. These were all about due to the reasons skillful knowledge, timely provision of agriculture inputs, decrease in marketing expenses and threat in returns and production. The research findings have reported that establishment of new and latest retail chains have appealed the end users attraction simply because of more profit/ return and increasing knowledge of the end user about the best product.

Siddayya and Atteri (2011) have observed the marketing of outside country challenges of new fruits like (mango, grapes and banana) and vegetables (potato, onion and tomato) from India to the old traditional trade in countries. According to the figures of NPC, EPC, ESC and DRC, the
researchers have established that India is suitable and has edge over other countries in growing horticultural crops.

2.4.2 Review of Agricultural Production studies

It reflects that part of studies which are related or based on production cost and function etc. Estimating the incurring expenditures on production is very much vital and all governmental & development players should sit together and make harmony on this needed problem. Presently some departments at federal and provincial level make the assessments about incurring expenditures on producing goods of main agricultural crops. No valid data or detail about fruit crops & orchards is available.

2.4.3 Use of Production function on Fruits orchards

The use of production function method on fruits orchards was highly revealing one. Khushk and Smith (1999) adopted this function for examining the causes affecting mango cultivation in Sindh. Variables used in the study were mango, number of plants per ha, quantity of Farm yard manure extended and dummies for pesticides spraying, inter culturing and hiring of labour for management practices. They established the orchard acreage, number of chemical fertilizer bags & Farm yard manure used two or above pesticides sprays and number of hoeing carried & number of labourers engaged have prominent impact on mango produce (cartons per hectare). Most of agricultural inputs noticed unattractive to the growers. Chemical pesticides were used very rarely.

2.4.4 Review of marketing studies and their findings

This portion contains review about horticultural crops marketing in emerging nations and Pakistan. No or very rare data and studies have been found on marketing of horticultural crop and orchards in domestic or abroad markets, which needs exploration.

Herregods(1976) studied that price is reliant on the availability and claim of a product at a time its selling and buying but sometimes may consider the inner and outer characteristics of the product. All horticultural products
may have some known characteristics standards much desired by the consumer. For apples there exists yet more complete depiction with respect to the optimum characteristics standards. To obtain maximum characteristics standards, selection of cultivar, harvesting in different intervals, setting of refrigerating and more sophisticated controlled atmosphere, situations, wet forced air pre-cooling and refrigerated shifting would be approaches with maximum costs, but also with more returns, to obtain lucrative feature. Applied experiences and models with costs and benefits are narrated.

Timothy (1983) analyzed that interest in producing muscadine grapes (Vitis rotundifolia Michk.) has enhanced in Florida among the actual and developing growers for growing economical crops in their fields. Muscadine grapes are grown on large areas of Florida where suitable environment has enhanced the production and projecting their best attributes of grapes. Sufficient costs would be needed for initiating and developing a muscadine grape plantation. The potential markets must be surveyed before planting in order for the grower to select cultivars best suited for the correct markets and the particular market suited for the location of the orchard. Potential markets for muscadine grapes are direct marketing, processed market, and the commercial fresh market. In this paper enterprise budgets are established, potential markets are discussed, and potential returns are explored to aid the potential producers in their decision making.

Jennie (1990) stated that the peach farmers should look into the most important aspects of farming in their planning, first projected peach produce, second price of the produce and third preliminary cost incurred on inputs purchased. All practices during the production are usually kept in mind for the planning duration of the orchard. Usually life of an orchard varies from first year to the point where maximum yield is obtained. Profit and loss may be considered at the initial of each season

Jennie and Westberry (1990) explained that mean yearly utilization of peach production for Alabama, Arkansas, Georgia, Oklahoma, and South Carolina are averaged 260 million pounds. Average estimates of production in above mentioned areas were more than $79 million. Peach production has
proved to be an economical sound business. Although the approximate gains may be find out prior going to invest in the business. Many factors like various numbers of varieties, size and number various cultural practices and prices for agriculture inputs and received from fruits may suffer the proposed allocation of resources for the orchards. The profit from the orchard may be estimated seeing the expected physical life or maximum fruit production from the plants. The life of peach orchard starts from first year planting to the maximum yield production. Usually an orchard may be established in three years and some costs are involved in the form of varying and fixed in nature.

Russell et al. (1992) analyzed that marketing theories associated with quality, location, and time are integrated into a complete model, illuminating the linkages between market window approaches and hedonic analysis. An integrated hedonic price model for the U.S. apple industry was appraised. Results of the study suggest that size, storage method, grade, and seasonality are the most important factors on the price of apples. Area of apple origin and variety were the least important influences on apple prices, with the exclusion of the Granny Smith variety.

Jayson and George (1993) reflected that quantifies the discounts and premiums connected with various quality factors for processing apples (Malusdomestica Borkh.). Discounts and premiums were assessed using a hedonic price model and quality data from a total of 137 samples representing three processing apple cultivars (45 ‘York Imperial’, 43 ‘Rome Beauty’, and 49 ‘Golden Delicious’). Price discounts in the sample were statistically significant for fruit size, bruising, bitter pit, decay, misshapen apples, and internal breakdown. Usually cited defects, such as insect damage and apple scab, did not cause significant price discounts.

Shank and Govindarajan (1993) elaborated that an organization should recognize product delivery mechanism in whole value chain for achieving and retaining economic benefit. Sellers and end users have received returns which is significant in knowing an organization expenses and profit margins that are important to identify in understanding a firm’s cost/distinction level as consumer has to pay for maximum returns in the whole value chain.
Bruce (1994) elaborated that the grapes farm orchards can be arranged with less operation cost mainly because of less cost for land, farm equipments including machinery while the running expenditures like site preparation, grapes varieties, tree spacing, training of the plants, pest control and any relevant management operations. Some expenditure may increase the cost of new establishment like fencing to the field, installation of improved irrigation system, land leveling, and making drainage system. Growing vine tree cost is also vital and may change relatively to varieties selection, training system of workers, quantity produced. The optimum income may be calculated which is indirect relation to prices and yield. Vine rate is directly related to present market and farmer’s capacity to sell their vine at proper markets. Grape’s farmers should work hard for fetching highest return.

Ali and Laurence (1996) elaborated that Fruits production is one of the significant part of agricultural sector of Pakistan. The study explained the organization and process of the marketing channels and how giving shape to marketing margins of the growers and further trading players or firms. The study further showed that above 90 per cent of the fruit growers have sold their fruit orchards to the contractors. It was revealed that growers got 25 percent as his part in retail price. Among the other players present in the market received 43 percent by contractor, 6 percent by the commission agents, 5 percent by the wholesalers and 21 percent by the retailers. Some of the points indicated in the study were net profit margins, period and kind of agreement, procedure of agreement price calculation, procedure of disbursement, and way of public sale.

Zaheer (1997) studied that spray of unselective chemical insecticides has been practiced so many times in current duration. The enormous usage of these pesticides has endangered the environment, human life, biodiversity and various fruit and vegetable intake. There may be possibilities of cancer and low fertility and slow mental level in human beings by the risk of pesticides use. There were major sprays of these chemicals on vegetables and cotton without any sound knowledge or advice from any expert. There is no instrument which can tell us about the application measurement and the
effects of these on surroundings. Although few research works has reported hazardous quantity of chemical insecticides remains in farmer’s blood, cottonseed and various sold vegetables. Hence growers may be informed of the hazardous nature of chemical insecticides and convince them of rational use of pesticides in the country.

Jeffrey and Michael (1999) reviewed the best entrance and departure limits for Georgia commercial peach production is calculated when both cost and production follow a Brownian motion method. These limits were noticed on no return sunk-cost venture, there by the time of starting peach production can influence the income. The study showed that farmers in Georgia were producing the peaches with greater determination and remained the production process while capable peach producers have delayed their investment in production till they may be able to fetch highest income.

Joyce (2001) examined that in Taiwan, most fruit growers are small-scale, usually not knowing market information and marketing capital, so shippers in the traditional marketing channel normally dominate the terms of the marketing trade. In order to increase produce marketing, the government helped and lead grower’s associations, to run collective marketing programs for forwarding fruits and vegetables to the big markets in major consumption areas after 1973. Therefore, collective marketing was broadly accepted and maintained by the farmer all over the crop areas. The township farmers’ associations, the agricultural producer cooperatives and the Taiwan Fruit Marketing Cooperative are the three main organizations handling fruits cooperative marketing. The three together consist of more than 300 fruit cooperative units. In 1998, the total volume of cooperative fruits marketing was 157,143 M.T., out of 75% was shipped to the Taipei market and 23.5% the Sanchung market. The fruits market share of cooperative marketing in Taipei and Sanchung was 53% and 24%, respectively. The traditional approach to asses these issues are to decompose marketing margins into costs, transportation losses, and gross return based on survey data. Then the retailers’ average net returns are measured in order to determine whether they receive normal or excessive returns.
Gandhi and Namboodiri (2002) indicated that end user price change shows as profit change in Ahmadabad India and the profits are approximately 69 to 94%. And Kolkata this may go to 46 to 73. It is very much needed to improve the selling buying process for fruit and vegetables. The representative of market committee must bring other markets according to the rules and supervision. There is need of another action by the market committee to promote an open auction system. The necessary buildings for market promotion must be upgraded like storage houses, loading, unloading and weigh machines, cool trucks or carrier and farm to market road etc. maximum sharing and involving of all through monitoring lead to best actions or tasks. Market Intelligence, best communication facilities and combination are also helpful in making markets more efficient.

Prakash and Singh (2002) analyzed that the farmer's contribution in marketing cost and profit would be more or less if middlemen from the markets were increased or decreased. It was observed that there some organized markets in Rajasthan where kinnow is mostly produced. The study and Cost-Benefit ratio showed if sufficient amount of investment on cultural practices, post-harvest operation ideal marketing is not made, and the best result could not be achieved (Ali, 2004).

Gandhi et al. (2002) reported that the inefficiency in the in the marketing networks and weak marketing substructure are the main reason for varying end user prices. It was noticed that the farmers are also getting less share in consumer rupees. The study evaluated the planned big trading place of horticultural crops in Ahmedabad being big city of India. Marketing efficiency was enhanced by enabling the farmers in these organized formed trading places. The researcher indicated the structure, process mechanism and position, and the value chain - from producer to wholesaler to retailer to end user. Large numbers of conveniences were given to the farmers in these three organized big markets. Rankings by producers, commission agents and retailers expressed that market place was the major significant important, second by storage capacity, open place, measurement tools, price presentation, and banking services. The information collected about sale
showed that sale operation in front of all players was reasonably small being necessary for trading deals and maximum transaction took place in hidden order or easy exchange. Important damages in marketing competence were noticed. The data further showed the marketing cost floats nearly 8 per cent of the end user price for vegetables and approximately 11 to 15 per cent for fruits. Carriage cost and commission are the most significant of all costs. Investigation of prices at diverse staged reported that generally the average part of the producer in the end user price was only nearly 48 per cent for vegetables and 37 per cent for fruits. The research indicated the profit margins after calculating the marketing cost which was regularly greater as 80 to 90 percent as percentage of the grower-end user price change.

Bashir et al. (2003) applied Cobb-Douglas production method to check the role of numerous parameters in the growing of bitter gourd. Those parameters were soil preparation by applying tractors services duration, amount of seed, amount of Farm yard manure and chemical fertilizers given, irrigation time, number of pesticides spray, weeding removal time and dummy for disease attack. It was observed that soil preparation, irrigation, pesticide spray and diseases have added negative effect on the cultivation of bitter gourd while the left over parameters added positive effect on the crop. Only weeds among the parameters were significant on 10% significance level.

Bashir et al. (2003) calculated different Douglas production method for implying numerous parameters in the cultivation of muskmelon. All those varying factors were tractor applying time, amount of seed and chemical fertilizers, water application time, pesticide spray amount, farmers involved, varieties and districts. Besides these, varietal response with water application, fertilizer and pesticides were also found out. Those factors who have positively added to production are cultivars, involvement of farmer number, chemical fertilizers applied and the response to pesticides.

Bashir et al. (2003) measured Quadratic production procedure in order to calculate parameter's response in the cultivation sponge gourd. Those raw material which were taken for analysis, were an amount of seed, farm yard manure, chemical fertilizers used, water application numbers, pesticides price
and dummy for disease spread. Those parameters who have surely added to the yield were amount of seed, fertilizer application, and water application number while at some point the coefficients were not positive. It implies that after a certain point the repeated usage would affect production. Farm yard manure along with pesticides has not positive effect on the production, while their coefficients were not negative.

Carlo et al. (2003) studied price and return investigation with respect to organic and integrated fruit production in Italy. Both cultural practices were noted relation in the farm activities. The prices and returns of production were evaluated in two research studies, the first one is about apple production and the second one belongs to the peach and nectarine production. The current study is mainly related to prices and returns and hence gives guidelines for the investment chances to producers and other players involved in production, in relation to the natural fruit production. This input which has attracted the most is published in Italian (Canavari et al., 2004). This study was conducted in Northeast Italy in relation to the natural and integrated apple and peach production in 2002–2003. The main purpose of was to investigate the returns in natural production except the EU benefits and support, which would not be admissible in fruit production in Italy.

Timothy and Wojciech (2003) stated that timely acceptance of improved cultivars may lead to more economical peach produce, and peach characteristics are prime reasons for fully acceptance. An applicable technique for peach varieties is projected, incorporating grower evaluations of peach quality. The model recognizes the impact of farm characteristics such as the farmer’s quality preferences, on-farm agronomic and orchard conditions, as well as geographic effects in Georgia peach growing regions. The relative impact of the key external and internal peach quality attributes on adoption is considered. Decisions making on new varieties are influenced by the age distribution of the orchard, information about new varieties to growers.

Bakhsh et al. (2004) explained that the standards of mango may be affected by the deteriorating conditions and buying and selling place characteristics and thus fetch less income and resultantly the mango farmers
experience great loss of their hard earned money (Sabir, 2003). Sufficient numbers of actions influence the profitability of cultivation of mango, which are farm produce, income and profit of cultivation. The noted parameters like farm produce and profit may also be affected the land utilized, environment the location of buying and selling. Prices may be divided in three different parts. That is why the revenue and prices are calculated through discounting favour and prices and they are defined simultaneously discounted favour and discounted prices. Economical calculations were applied to depict the profits of growing mango plants. Two important profitability measuring procedures namely NPV and are taken in to account and also mentioned by Gupta and George (1974), Vaidya et al. (1991) and Ahmad et al. (1993). NPV may be regarded is the discounted number spending incurred on incoming and outgoing amount. It is usually considered that any organization want to increase its income, the NPV may be the most suitable tool to calculate spending preferences (Tauer, 2002). NPV May be the total of present value of future revenue and cost of any activity (Castle et al., 1987). Furthermore NPV shows the calculation of actions value along spending and revenue in the proposed time (Swinton et al., 1997).

Jane and Joyce (2004) explained that Taiwan market is more competitive for American fruit products ac compare to Taiwanese products in the local markets as reflected by the response of end users and businessmen. Local traders prefer to sell the American fruit products due their good quality attributes. End users have no concern with the important quality as relative to businessmen. Planning may be made to educate both for the reinforcement of American fruits. Organized publicity may change the profit of local traders by selling more fruits while the end users may be influenced through giving them know how about the cost and quality of American fruit.

Sait et al. (2004) have elaborated the cultural and financial constraints of farmers in getting best condition peaches. The peach farmer can manage their orchard well in time for successful achievements. The farmers have the power to keep in mind some important parameters to gain profit from their produce. Sometimes peaches and their farmers face high risk in production
and selling. Farmers should surely observe whether they are gaining something from the selling of their produce or not. It was noted that peach cultivation or farming lead to profit but must gathered prior information about selling and buying conditions. The farmers must explore the means that how it could be made more economical. Peach farming proved very common in areas where farmers are small particularly farmers have scarce resources. Farmers usually face so many issues in production and marketing. There should be need of specific studies to resolve the issues in cultural practices.

Dejong et al. (2005) addressed the cost of hired labor for pruning, thinning and harvesting trees is mostly relying on the expenditure on growing fruit tree of peaches and these costs may be reduced if farmers select dwarf varieties for cultivation. The result shows that two scions on five improved rootstocks give promising outcomes. They attained less size in 8 years and can be equated with best rootstock. As dwarf varieties are sown dense in population that is, why three new cultivars have been introduced for profitable fruit production in California. The one dwarf rootstock has been ready in the big fruit nurseries while the rest have been given permission for commercial use.

Yasar and Meral (2005) stated that the fruit plants needs more money for longer time from starts to the fruit maturity as compared to other crops. Wise and timely thinking are prerequisite to fetch high returns. (Marini, 1997). The current study was carried to find out to investigate the peach and cherry fruit cultivation and see how this business is profitable, economically feasible and have further expansion opportunities in Turkey. The economic parameters like NPV and Benefit Cost Ratio (BCR) and Rate of Internal Return (RIR) were elaborated for capital spending analysis. Varied discount rates of (10%, 8%, and 5%) were applied to obtain NPV and BCR for two fruits. NPVs for Peach fruit was received (573.0 $/da, 793.47 $/da, and 1248.6 $/da) while the second NPVs were again obtained convincing. Along with this the BCRs for peach and cherry fruits came higher than 1 (1.18, 1.21, and 1.27)&(1.81, 1.87, and 1.94) respectively. There were RIRs for both fruits 19.81%&45.31% respectively. It was assessed that money spending in fruit
production and attached practices is highly profitable and particularly cherry production is the best livelihood source of the area growers in Turkey.

Hakeem et. al. (2005) revealed in his findings that ninety percent of Mandarin farmers sell their citrus orchards to intermediaries in the growing areas. Estimates from markets have shown that local market dealers have received three times more than the farmers where is the cash difference depicted that middlemen got 89% of profit and have met the maximum marketing cost as compared to big dealers. The study indicated that by market analysis based on price information on weekly basis Sargodha proved more combined than Faisalabad.

Burma and Saranark (2006) explained the necessary precautionary steps in food for nearby market and formulation best quality standards for international markets, there is a TOP local firm having 50 big marker places in Bankok and Caiangmai. They started to present their firm certified one in food safety measures so that no one could come for competition due to their selling in standard food products. This motivated other food chain suppliers also and they have to get certificate from the concerned authority. Thus the number of un-certified food chain reduced reasonably due to the in the project time. There is a firm who is sending the fresh vegetables from Thailand to Europe with high standard. The firm started a combination of standard food chains to meet the growing demands of the Europe and Japan. Similarly the business expanded due to high demands for organic vegetables in European countries and export and number of small farmers were increased with great speed.

Cadilhon et al. (2006) described the expansion of different vegetable marketing in Vietnam, and in these big markets the old businessmen are attracting the big seller and small buyers. The researcher has gathered this information through interview schedule from different supply chain players. The researcher has applied different techniques to investigate the two types of system. The findings were part of that market, supply in quantity and place, preferences of end users, prices of products at various points for calculating the benefit to the growers and marketing people, labour index (ratio between person hired for working in the supply chain to the number of goods sold)and
price consistency through evaluating the competency of supply chain, responsiveness in elasticity of the end user’ demand, handing time and characteristics practices.

Dahiya et al. (2006) explored an attempt to make analysis orange marketing in uttarakand India. There were six marketing channels identified and approximately 57% of the product was offered for sale in these to the local businessmen. It was observed that cost of marketing varied from 278 per quintal to 894.16 per quintal in channel second and farmers gained 100 percent more profit in second and third channel. The farmers got only 9.38% and 8.60% in second and first simultaneously. It was also observed that farmers received 1.27 in the fourth and considered to be the highest efficient among all while the sixth proved less effective (1.00) for the orange farmers. Farmers got only 9% of end user price. The difference between nearby and faraway markets was observed above 2000 per quintal. It is also cleared that farmers major share in cost are hiring usual labour and shifting produce from one place to another. The farmers must be linked to the best and suitable markets by better roads farmer’s organizations.

Engindeniz et al. (2006) stated the profitability of peach farming in Kemalpasa, Izmir and to find out it’s profitable for small farms. Data were collected by survey from 63 farmers by using random sampling. In profit and loss examination, prices and profit of peach production were examined. As reported in this research, average size of the peach orchards was 1.09 ha. Average peach production ha⁻¹ and tree⁻¹ were calculated, 16,848 kg & 37.7 kg. 63% of sum peach fruit production was marketed in big markets place. Though, 17% & 2% of peaches was disposed up as straight on trees and in local market places. The remaining of peach produce was sold to commission agents (8%), local dealers (8%), fresh fruit juice preparation plants (1%), and exporters (1%). Average peach price that obtained by farmers being determined to be 0.25 $ kg⁻¹. Aggregate cost ha⁻¹ of peach production was calculated to be $ 3,373. Net profit obtained ha⁻¹ and tree⁻¹ from peaches were examined to be $ 839 and $ 1.88, respectively.
John Humphrey (2006) analyzed that increased in productivity may reduce poverty reduction in remote areas and this can be achieved through exporting the farm products from less developed countries to developed countries. Worldwide agricultural markets are becoming very difficult as attention at maximum spot in the value chain is done, the growing opportunity and difficulty of foodstuff principles, especially those linking to food safety. Hence recognizing the importance of farm products export in reducing the poverty, careful evaluation of the worldwide markets may be done for reaching economic goals and stability. The researcher has investigated the policies for the reducing economic in stability in worldwide by enhancing the export of farm products through applying global value chain viewpoint. The stand point expresses relationship between organizations in worldwide agriculture related business, keeping farm production and processing in third world countries in the situation of the dynamics of the wider world wide agriculture related business and agriculture food structures. The value chain may explain the categorization of information, trader ability, the prices of authority and awareness.

Katica (2006) examined the business of farm fresh fruit and frozen seem complicated and patchy. Currently the farmers are working I different markets. It is important to for make coordination among the players like farmers, factory owners, big businessmen, and local traders for the promotion and enhancing produce, profits and exports. Some markets need direct relationship between farmers and end users and there is no need of middlemen. The joint efforts can make play the role in good quality, more farm produce and healthy competition among the stockholders. Orchard produce are mainly rely on land types, growing seasons, irrigation, insects, diseases and natural calamities while the fresh fruit quality are very easily and instantly deteriorated.

Sarfaraz et al. (2006) explained that the current study was carried out in Multan District to find the profitability of the cultivating date trees. Financial analysis was carried out for this purpose. Results showed that the total revenue per may be Rs. 74788 for five to ten years & Rs. 57766 for eleven to
fifteen years, while the costs for the corresponding would be Rs. 24823 and 12196. The study shows that revenue of the date growers in Pakistan is high and could get increase their earnings, if they start work on economically sound steps and also could boost the country economy through earnings from abroad. NPV for 15 years date plants would be considered very economical and it may be Rs. 50527, and this expresses that date production is giving high income. BCR is more than one and more profitable to make spending in date farming.

Uzunoz and Akcay (2006) examined the income viability of fruit orchard by economic analysis in Tokat Turkey. Economic analysis was done through NPV, CBR techniques and IRR. Various discount rates were considered to calculate NPV, CBR for peach and apple. NPV for peach (1113.6 $/da; 1454.7 $/da; and 2156.2 $/da) and apple (574.2 $/da; 805.4 $/da; and 1342.9 $/da) were estimated and remained non negative. Besides these CBR for peach and apple were greater than one. It was observed that fruits orchards are economical and proved main source of livelihood of growers in Turkey.

Khalid et al. (2007) expressed major difficulties which have delayed the optimum fruit production and their export to the potential markets. The research was confined to investigate the developments in fruit production, their consumption and marketing and find out the present fruit selling mechanism, investigate the major constraints in selling mechanism, enhancing the exports and give recommendations in procedures and methods for increasing the global export to other countries. Knowledge from market obtained by the grower’s was constantly incomplete and vague. The growers are always using less quantity of various agricultural inputs like chemical pesticides and fertilizers, which results in less production and weaker quality products. Pre-season selling of fruit orchards is one the main reason of the grower’s weak financial position. The nominal facilities in the form of cold storages and weak farm to roads are causing 25-40 percent damages to the fruits and hence reduce the stock and increase the prices. Increasing the fruit exports and making competition in global markets, these damages could be reduced. The fruit orchard growers are getting one-
fourth of end users’ price, while major part is taken by the businessmen in the markets. The part of intermediaries in end user's price may be reduced by awareness about the agricultural loans and market information, lowering the post-harvest losses, making ideal and suitable conditions of the market structures, provision of transportation facilities in peak time on reasonable rate and ideal packaging material. It was also noticed that the fruit selling places were not open for all sellers and buyers.

Linus et al. (2007) examined that knowing consumer observations and approaches may lead to vital standards conditions for buying and selling and also give fruitful guidance for studying further improving features and steps about post picking operation of fruits. It is evident from the research the intake of fresh fruit is more among than the men and people with more money. People eat banana and dates more than the apple as because of its dominant characteristics like colour, flavor and sweetness. Mango, Apple and orange are also liked due to the flavour, sweetness, and firmness of these fruits. The well-known fruit attributes which are not liked in the markets by end user may be full ripening in banana, staining and yellowing in apple and deterioration in mango and ill flavour in date. Maximum numbers of end users are willing to give 25 percent extra on unit price for best quality orchards produce but 94 percent end users refused to pay to 50 percent for fresh fruits.

Lusine et al. (2007) applied the Dutch-German tomato supply chain in their research work. The intensive lead dialogues were carried out with chain executive of a breeding company, framers of tomato producing firms, wholesalers, leader of a distribution center, and leaders of supermarkets. Therefore, the current research work analyzed the chain from field to the consumers as related to Pakistan research studies mainly concentrated on marketing sides. Different Vegetable seed were brought in by the breeding company and certification mechanisms of the best quality these seed were made. The researchers questioned seven out of 12 tomato producers. Big sellers handed fifty percent of their products to delicate markets in Germany. The Big sellers applied the world wide (International) food Standard (IFS) certification. The retail distribution used HACCP for food quality control.
Snelder et al. (2007) reviewed the causes of why farmers preferred the income of fruits production in relation to other cash crops for the last 10 years. Fruit have common markets situated nearly and supermarkets while are there are numerous issues and unforeseen risks attached to the fruit orchards. Usually growers think fruit orchards have low income as compare to other cash crops against the studies conducted for the last year on fruit crop cultivation. It was noticed that the NPV for Citrus group is double the NPV of irrigated paddy crop and four timed the maize crop. Grower's knowledge for fruit orchards and cultivar selection was wrong, which resulted less fruit yield and less income. Markets were also not explored up to its maximum for selling of their produce, less knowledge in selling and having no idea about the markets requirements, place etc.

Sreenivasa et al. (2007) examined for clear assessment of the post-harvest losses at diverse points of marketing and the effects of net price, marketing costs; margins and efficiency on producers were forwarded. It was revealed that the current procedures may incline the exaggeration of producer's net price and marketing margins of middlemen. It was reported that the margins of retailers was negative while considering the actual damage, while this may be positive in the old calculation method. Likewise, the grower’ net part and wholesalers’ margins also were decreasing largely. It was noticed that marketing efficiency was inversely proportional to the marketing losses. The joint selling and buying was observed extra efficient mechanism in terms of both operations and price. The marketing cost was observed to be the main problem in the wholesale marketing channel and lowering these mostly the commission charges as established in the joint marketing channel, would assist in decreasing the growers’ margin. It was emphasized that particular carriage transport would be beneficial for highly perishable fruits.

Gangwar et al. (2008) examined the growing problems and profitability of peach crop in Punjab and uttarakhand. It was notice that there are great chances for investment in peach crop cultivation being the most gainful and feasible enterprise. It was further noticed that internal rate of return (IRR) has
been increased based on the number of peach fruit plants. The net present value, benefit-cost ratio and IRR at 12 per cent discount rate have been reported as Rs 44,807, 1.681 and 22.20, correspondingly for each and every type of fruit orchards. It is proved in study that the average and economically viable life of peach fruit orchards reaches up to 24 years. The recommended orchard size should be more than 2 hectares. The peach orchard can be retained whenever it amount gives excess of Rs 5,713 above the yearly running costs. The exportable peach fruit production can be achieved if apply accurate post-harvest management practices, establish mechanized grading, packing and plant processing, suitable storage facilities and facilitation in export markets.

Mukhtar and Javed (2008) studied four local markets in Pakistan through two step mechanisms which have been presented by price set for market integration. The information collected from 1995-2005 about maize crop price in local market being utilized. The collected prices were combined in order one.

Frederico et al. (2008) stated that production costs and fruit yield profitability in the initial harvests of custard apple trees. The aim of this study was to guess the production cost and economic gauges associated with the production and sales of fruits from 20 custard apple progenies during the initial five harvests, in order to recognize the harvest season from which custard apple utilization becomes profitable, as well as the most promising progenies from an economic point of view. The fruit yield data upon which the present work was based were obtained during the period from 2001 to 2005, in an experiment that calculated 20 custard apple half-sibling progenies, under sprinkler irrigation. The progenies were assessed in a random block design with five replicates and plots consisting of four plants each. The exploitation of custard apple progenies only showed to be a profitable agribusiness after the fourth year. Before that, only A3 and A4 progenies in the second year, and P3 and P11 in the third year provided profitable incomes. Since the methodological rules imposed concerning the time period analysis and the prices as of July 2007, the most important profitability indicators (operating
profit, return index and equilibrium price) showed that the A4 progeny is the most acclaimed, although other progenies are also highlighted, such as FJ1 and FJ2. As already argued, the progenies showing the highest average yields of five harvests are not always the most economically recommendable ones.

Laajimi et al. (2008) reported that peach fruit is one the important of all kind of fresh fruits. It is noticed that the orchards are increasing for the last few years mainly due to the water availability, better application techniques, and high yield cultivars introduction. Therefore it is notice that the yield and export of peach fruit have been increased. Supply of fruit due its limited duration may cause fluctuation in big markets as well as on consumer’s side. Econometric procedures were applied to study the peach production. There were two parts of the model, first expressed the change in new plants and removal in peach area while the second approach targeted the features and requirement of the peach crop. Poor supply response to prices were obtained. Supply price elasticity was reported about 0.13 proposing a high degree of inelasticity.

Bertazzoli et al. (2009) analyzed the forms of value system distribution along food chains, in order to search agro-food business capability to be open for all and maintainable. The writer has expressed his three food chain namely potato, fruit, and Grana cheese of Emilia Romagna region. The research was focused on the value system approach. The approach was designed to join the financial statement for each food chain in order to find out the working income and calculate how this was distributed among the different food chain steps. The calculation was done for 189 businesses for the potato chain, 187 for the fruit chain and 203 for the cheese chain. Businesses in number were changing for five years since 2003-2007 reference to 2900 monetary record which were analyzed. Some variation was also witnessed during analysis. There was approximately thirty five percent worth generated of Potato and fruit in chains while cheese got exactly thirteen and half percent. In last 5 years, there was five percent reduction in potato & fruit and nine percent in cheese. Due to the absence of proper planned food chain
collaboration, the small scale buying has got control of entire chain at the cost of main part causing reduction in continuity for all chain players.

Blandon et al. (2009) studied the importance of dealing costs and joint steps needed for the involvement of small level growers in horticultural supply chain in Honduras. The researcher has noted in old fixed selling and buying place, where growers are selling their products without the help for internal or external support of buyers while with divergence to big posh markets supply chain, organized actions were visible and superiority of the product, care and transportation were organized and done. Here the dealing cost of the product may be enhanced. The information was collected from 325 low level farmers for the research.

Blandon et al. (2009) elaborated the involvement and non-involvement of low level producers in big posh markets supply chain for analyzing the comparative relationship between prices and dealing costs. The result obtained was extremely important for low level producer’ involvement for comparative price in big posh market against the small scale market. Same price obtained in the major market in relation to other markets may minimize the revenue by the involvement in the supply chain to big posh market. The study indicated that producer’s involvement in the supply chain of big posh market may have maximum confidence in their clients than the producers carrying to the fixed venue market.

Loannis et al. (2009) suggested that the peaches obtained under ICM having 23 commonly applied pesticides’ residue may be checked and analyzed by applying watching mode GC/MS. Protection related research have been carried out for various deliberations for different kind of peaches which are change in attributes like look, form, taste etc. It was noticed in the study that various peaches have not been affected by the products. In order to examine the procedure to calculate the MRL in peaches, the international procedure was effectively applied for analysis in fruit sample obtained in production time. Residues noticed in sample were less than the accepted
levels of legislation for the chemical, excluding diazinon for one sample positive result.

Narrod et al. (2009) explained the value chain of Kenyan green beans and Indian grapes exports. The green beans were sent to abroad markets by farmer own and managed cooperatives and grapes by grower cooperatives while both the products were grown by the farmers. The big posh markets are mainly responsible for the export of Kenyan beans to England and local markets. Marketing opportunities are defined for optimum food care measures and any symptom of chemicals. The England main posh market may need the neutral forum certification like Eurep GAP, British Retail Consortium (BRC) and in major instances, small scale seller’s own food security measures. The responsible people delivered a phyto sanitary authority which is to be supplemented with the beans. That is why the beans value chain adopts the best featured raw materials in the growing of beans and there should not be any chemical residuals. The small farmers use the chemicals and they are mostly providing the foreign big markets and local end user comprising of hotels, restaurant etc. The standard of beans are checked through screening before sending abroad in order to meet the criteria of other consumers. Only few growers are producing the beans for selling in the Cannes and the quality of the product is checked for the chemical residual level. Mostly of the people who were involved in the sending of this product to abroad be analyzing the product themselves for confirming the traceability.

Stephen and Jeff (2009) presented the economics of apple supply response which can be recognized for adopting plantings of the trees, eliminations of old, and produce. The vital parameters are revenue for apple, cherry, climate and spending on the orchards. These factors seem very important under consideration of new sowing choices while the replacement have estimated income in short duration for apples and peaches. The frit produce is directly dependent on cost and climate of the area.

Clare et al. (2009) explained that how the rich countries regulate their food markets places. Food businessmen take care of the chemicals residues in the field as well in packing. To safe guard and make the small farmers
present in the markets, latest and necessary arrangement should be made. Here the public and private association can bring the change by playing its part in forming relationships among players for the promotion and demand of the consumers in the supply line. Moreover, the big farmers can make their association to follow the food safety standards through collectively and making the fruits product attractive for the consumers and making the costs and residue less. Here comparison has been made between Kenyan and Indian farmers of fruits and vegetables who have responded positively with more demand for their produce in the international markets. The current research relates methods where low level farmers of horticultural products in Kenya and India have managed with enhanced needs for product care in their major export markets.

De Felipe et al. (2010) expressed a comparative analysis of how to supply domestic fruit and vegetables to resorts tourist areas in Cuba and Dominican Republic. As Caribbean developing countries they have a dynamic tourist attraction. Although they have the possibility to produce tropical products, the tourist consumption is covered by imports with high quality standards. The challenge is how to organize an efficient supply network. Due to political differences with State planed and market economies, the solution has to be customized, although there are some points in common. Empirical analysis within the framework of two research project gave the basic data for the studies with face to face interviews to the key economic players. SWOT matrix and proposal are included in both cases, with incentives for rural development, consumer satisfaction and efficient food supply.

Edward et al. (2010) elaborated the expected price of starting Pitaya fruit farm to be approximately $37386 per hectare. Starting year for orchards require greater costs and which is to be $73307 per hectare, for carrying operation like soil preparation, raising fencing around the farm and other management operations. Income can be obtained in the second year after harvesting of Pitaya for markets. The operational costs are decreasing from $73307.13 to $63447 and then $37386 per hectare in the starting, second and then third year. Cacti cultivar needs three years for gain full size tree.
Therefore 2.5 Hectares farm of Pitaya may require an amount of approximate $75,680 which would not contained the purchase of any principal things by the farmer.

Sabir and Zakir (2010) pointed out in his that our country Pakistan has been included in list of first ten world countries that have the maximum acreage under citrus plants. There was good quality citrus mandarin produced in Punjab Pakistan, while district Sargodha having more area and kinnow production. Basic information was gathered from these two districts and value chain was analyzed for market in efficiency of kinnow business. The study revealed that by minimizing the number of middlemen, the farmers have high income and end users have less expenditure

Ascard et al. (2010) stated that the growers estimated the cost benefit of apple cultivation. Cost of production was estimated for organic and traditional farms having sizes of 5 & 20 hectares. Four new and latest farms with promising yields were tested. It was reported that the estimated price of 5 hectares organic apple was €1.14 per kg that might be the double of traditional orchard mainly due to less production inorganic orchards. The orchard growing cost for 20 hectares orchards is 20 percent less than the 5 hectares. Minor unit handling 200 tons annually will receive €0.38 per kg for keeping the produce in storage, packing and shifting to other markets. Organic apple production expenditures in the form of production, storing, packing are more than the 60 percent and less than 85 percent for organic orchards.

Reddy et al. (2010) studied retailing has been carried out to examine expansion and activities of latest retailing and its effect on old retail markets. This research shows that there are more small businessmen in latest marketing as compare to old marketing. Vertical supply study showed that both chains have equal outcomes. The growers have more share than the intermediaries and big shopkeepers, while the supermarkets got 38% of all produce. It is revealed in research that there are demand and supply factors in old and new retailing. Therefore, operational value chain operators would definitely increase the importance to push to market. This study expressed
that both supply and demand have significantly contributed to the traditional and new retailing markets. Effective value chains would increase profit and help to the growers to shift their produce to the potential markets.

Wang Chuan (2010) described the price instability and threat to the farm goods which has made the farmers more on risks. The idea of applying market threat dealing may be to assess and find the level and extent of threats to the agriculture producers. The current study examines and calculates price risk involved in different fruit categories like Fuji apple, orange, banana, pear, grape, watermelon and strawberry by apply the VaR method. The statistical calculations reflect that standard distribution may not be ideal procedure which can be useful in judging the fruit market threats. It is mainly due to various fruits have other levels of market threat (i.e., strawberries and watermelons were fruits with maximum threat stages while apples, bananas and pears were comparatively having small threat stages; and grapes and oranges were having middle threat stages). Agreeing to the findings, those fruit are belonging to the identical market place may have same appearances. Whenever the threat linked to the market is calculated, all fruits may be considered is one category by arranging them in order. It guarantees competence, precision and decreases considerably the expense of market threats practices.

Saleem et al. (2010) explained that various fruits are known to be the crucial source of food for human being and fruit gardening can play an important role in the economic development of any country. The actual yield of mango fruit in Pakistan produced at the farmers’ fields is considerably less than its potential yields. One of the major factors causing this massive yield gap is the lack of awareness of fruit growers regarding the modern production technology. This deficiency on the part of the mango growers can be overcome by comprehensive training and extension program for farmers concerning modern mango production techniques. It was establish that the most crucial experiences where farmers need training are intercropping in Kharif and in Rabi season in selected mango fruit gardens, insect/pests and diseases and their control measures, time of fertilizer application to mango
fruit plants and application of irrigation water in summer and in winter to mango fruit plants, pollination of mango fruit plants, marketing of mango fruits and adoption of recent improved varieties of mango fruits need more training. The Chi square values for association between age groups, education level, tenancy status, size of land holding and knowledge level, skill, attitude, adoption level presented highly significant positive relationship between the age group, education level, tenancy status, size of land holding of mango growers and knowledge, skill, attitude and adoption level of recommended practices regarding mango production, protection and marketing.

Adejo et al. (2011) studied examined the marketing channel and pricing system of cashew nut in the eastern part of Kogi state. A total of 180 respondents were randomly selected from 3 market zones of the area. Data collected were analyzed using descriptive statistics. The result from the study indicated a unidirectional movement of cashew nut from the producers to the final consumers. 14.67% of the marketers were involved in retailing and small scale business, 38.33% were bulk assemblers and 20.00% of them engaged in wholesales. This signifies the dominance of the middlemen in the marketing activities of the study area. An average peak price of N60000.00k/ton was recorded in the months of September-October, while the least prices were recorded before and at the beginning of cashew nut production period. The marketing of cashew nut is mostly affected by price instability due to seasonality nature of its production and lack of storage and processing facilities. However, a controllable pricing system for efficient and effective marketing can be ensured by proper storage and consistent supply of cashew nut in order to keep the market active all through the year.

Amao et al. (2011) investigated that pineapple, the third most important tropical fruit in the world after banana and citrus is a delicious fruit with fine flavour and high nutritive value. Its marketing is as essential as its production because increases in production without a well-developed marketing system lead to postharvest losses of all possible gains. The study analyzed marketing channels and efficiency of the marketing system for pineapples in Edo and Delta States. A multistage sampling technique was used in selecting
respondents within the study area. Data were analyzed using descriptive statistics and gini coefficient. The major market channel for pineapple was from the farmers to wholesalers to retailers. Market margin obtained per week in October, 2010 was N47, 491.30 with marketing efficiency value of 1.33. A major constraint to pineapple marketing is the perishable nature of the fruit. The study suggests that the constraint of perishability can be controlled if the marketers have access to storage facilities such as plastic trays. This will go a long way in reducing the problem of damage during transportation of the fruits.

Subodh et al. (2011) illustrated that India may be considered the second highest fresh fruits provider among the rest of countries and its contribution to the international market is around 9 percent. It is observed that damages during picking, packing, grading etc. are around 19.32%, 14.48% and 26% of the peach, ear and plum correspondingly. It is also noticed that the cost of marketing activities is high as compared to the farmer’s return obtained. The farmer got relatively less in end user ‘share in comparison with market price and middlemen. The pear got more income as compare to peach & plum as the efficiency ratio 1.31 was higher and less shifting etc. cost. This study show more efforts should be made to reduce the losses in fruits, operational cost and enhancing the steps for suitable picking, watchful packing, appropriate storage, best marketing.

Divya et al. (2011) carried study about the sweet orange market in uttarakhand India and gathered information from numerous players like farmers, market middlemen working in different location. Among many six marketing channels were noted and approximately 57% of the product was offered for sale in these to the local businessmen. It was observed that cost of marketing varied from 278 per quintal to 894.16 per quintal in channel second and farmers gained 100 percent more profit in second and third channel. The farmers got only 9.38 % and 8.60 % in second and first simultaneously. It was also observed that farmers received 1.27 in the fourth and considered to be the highest efficient among all while the sixth proved less effective (1.00) for the orange farmers. Farmers got only 9 % of end user price. The difference
between nearby and faraway markets was observed above 2000 per quintal. It is also cleared that farmers major share in cost are hiring usual labour and shifting produce from one place to another. The farmers must be linked to the best and suitable markets by better roads farmer’s organizations.

Samina et al. (2012) elaborated that young 'Kinnow' mandarin (Citrus nobilis Lour × C. deliciosa Tenora) trees often create inferior quality fruit with less juice and more rind and rag contents. However, less is known about the role of PGRs on the fruit quality of young 'Kinnow' mandarin trees. Therefore in the present investigation PGRs viz benzyl adenine (BA) and kinetin (20 mg L-1) were used at flowering (FL) stage and, BA, kinetin (10, 20 & 30 mg L-1) and gibberelic acid (GA3) 10 mg L-1 were applied at fruit setting (FS) stage to citrus plants and their role on fruit attributes were assessed and nearly after picking (D1) and after 7 days of shelf (D7) at ambient status (20±2ºC; 60-65% RH). The PGRs alone had significant impact on juice mass (%), rag mass (%), ascorbic acid (AA mg 100 mL-1) and decreasing sugars (%) whereas, rind mass (%), TSS, titratable acidity (TA), TSS:TA and total sugars (%) were not affected by PGRs applications. Regardless of storage life of the product picked from earlier plants treated with 10 mg L-1 GA3, 30 mg L-1 BA and kinetin at FS presented importantly maximum juice ingredients (50.53%, 49.8% &51.64%) and lower raw ingredients (26.5, 26.6 & 25.83%), correspondingly in relation with untreated. Extreme less sugars (1.62%) was obtained with 20 mg L-1 kinetin at bloom and extreme AA contents (58.45 mg 100 mL-1) of juice were recorded with un-treated. Maximum fruit attributes excluding non-decreasing sugars (%) may be important during storage life. It is noted that the citrus attributes except AA may be improved through using kinetin.

Aparna (2012) studied on modern retail marketing of high-value agricultural commodities is of inevitable importance in the developing countries like India. The supply of vegetables by farmers to modern retail outlets has brought in a new form of organized marketing based on consumer demand. The study has assessed the marketing system by comparing marketing cost, marketing margins, price spread, producer’s share
in consumer's rupee, marketing efficiency and marketing constraints of supermarket channels and two traditional marketing channels in the Rangareddy district of Andhra Pradesh. Two vegetables, viz. brinjal and bhendi, have been selected for the study. It has been revealed that the net price received by the farmers and producer's share in consumer's rupee are higher in supermarket channel than in traditional channels. The supermarket channel has been found more efficient than the traditional channels. Rejections of low grade produce, procurement according to indent and lack of knowledge of grading have been identified as the major constraints of supermarket supply farmers. The major constraints expressed by the traditional market supply farmers include middlemen menace, higher distance to the market and high market charges. The study has observed that government intervention is required to create a policy environment that may ensure a mutually beneficial relationship between the farmers and the organized sector. Investment in infrastructure, development of extension activities and linkages with farmers is the important areas where government should give due attention to strengthen vegetable supply channels in the state.
III. MATERIALS AND METHODS

The methodology followed in this study consists of the initial information gathering, both formal and informal with the main objective to indicate the mechanism of the study and to produce both valid and reliable information from the data. In particular this chapter is comprised of the information about research area, data collection procedure, data source, determination of sample size and analysis of the data. The main purpose of this research is value chain analysis of Peach Fruit in Khyber Pakhtunkhwa.

3.1 Description of the Study Area

Swat District Lies towards the north of Khyber Pakhtunkhwa having high mountain ranges, steep valleys and plains of fertile land. The total population is 1.743 million people with 174705 numbers farm families. The District is inhabited by poor and small scale farmers with average land holding below one hectare per farm family. The total geographical Area is 506528 hectares, with 98054 hectares (Approximately 19%) cultivated. The irrigated area is 92285 hectares (Kharif 56436 & Rabi 35840), while the rest of the area is subject to the provision of rainfall. The altitude range is from 800 to 2500 meters above sea level with the main agro-ecological zones from warm humid to dry cold. The annual precipitation is from 1000 to 1200 mm per Annum and the temperature range is variable in different agro-ecological zones with highest maximum 40°C (Barikot, Mingora) and lowest minimum 1°C to -10°C (Kalam) of the District. In the north there are vallies where the climatic conditions are conducive for growing off-season vegetables thus fetching high prices to the growers.

The major cereal crops grown are maize, wheat and paddy followed by Kharif, Rabi and other vegetables, oil seed and pulses as minor crops. The favorable climatic conditions and availability of wide range of agro-ecological pocket permits the production of different kinds of fruits and vegetables. The major fruits grown are apples, peaches, persimmon followed by citrus’s, plums, apricots, pears and nuts while major vegetables are onion and tomatoes followed by potato, okra, turnip, cabbage, radish and cauliflower.
The total area under fruits is 12830 hectares with a production of 138836 tons whereas the total area under vegetable (excluding onion and potato) stands at 8507 hectares with a production of 96708 tons respectively. 60% of the Provincial production of major fruits and vegetables is produced in the district.

Fruits and vegetables are significant source of cash income derived mainly from apples, peaches, persimmon, onion and tomato, maximum quantity of which is marketed in down country markets with the main market in Lahore, Rawalpindi and Peshawar. The total volume of fruits exported to the above national markets, annually is aprox.113000 tons with a revenue of 1430 million rupees whereas the total export of vegetables including onion and potato stand at 200000 tons with a revenue of 1385 million rupees respectively.

3.2 Survey structures & data collection

The noted section depicts information about how the project villages and union councils were selected, the conduction of preliminary data collection in the selected area, design for sampling, target group numbers, interview schedule formation and ensuring how best result or work can be carried out in the study area. This section includes the information on the selection of study area, informal survey, sampling design, sample size, interview schedule development and quality control of field work.

3.2.1 Criteria for Selection of project area

In order to collect information/data about Peaches, Districts Swat and Buner are intentionally selected as these are the most populous growing areas/ districts of Khyber Pakhtunkhwa. (Government of Khyber Pakhtunkhwa 2007-08). According to Statistics in Khyber Pakhtunkhwa, there are different varieties of Peaches which are grown and have 5047 Hectares area under cultivation. District Swat has 3750 Hectares area under Peaches followed by Buner 110 Hectares respectively. Similarly District Swat and Buner are the leading peach producing districts in Khyber Pakhtunkhwa with production 42997 and 739 Tonnes respectively. Both these Districts are known for Peach
cultivation of different varieties due their climatic and favourable conditions that is why these have been selected for the research/ study.

3.2.2 Preliminary data collection

In order to collect data from the target group peach farmers, seven days were given for trial and preliminary data collection in the project area so that the interviewer may go through the process and get sufficient experience in filling the questioners in the coming days and also remove the deficiencies if any in the questioners. This information proved very fruitful in finalizing of the questioner. The assigned task was done in few villages of peach growers. Going through the collected data, the interview schedule was designed and modified for detail formal survey.

3.2.3 Peach Producers in the study area

Large number Peach farmers in the study area have mostly small holdings, while very few farmers have big peach fruit orchards and they all have some basic know how about the cultural practices as pit preparation time, varieties selection, all costs involved in activities, peach bearing period, ideal picking and packing, storing, transportation and marketing to the potential markets. There are also some peach growers who sell their orchards at the time either flowering and or late to the middlemen and reduce their efforts but also get less income. Besides their own land, some peach growers have rented in land for fifteen years lease. Only those peach farmers were consulted for data collections who were fully involved in management of their orchards through the year so that no basic information is missed.

3.2.4. Sampling plan

Every study has some pre-determined objectives and to achieve these, well planned and well-designed actions are needed keeping in mind the time period for survey, how many trained technical staff is required along with other resources provided to them for dealing with diversified group of farmers and area. It is also very much important to draw statistically representative sample, so that the data could represent the entire group equally. The
researcher should also note that this data is convenient in mathematical handling and calculation. The plan and researcher who make the sample data collection successful and according to the objectives set prior. Random sampling method for collection of data from peach growers in the study is applied.

Among the Peach growing districts in Khyber Pakhtunkhwa, Swat and Buner are the largest who were selected for the study and data collection. (Government of Khyber Pakhtunkhwa, 2009-10). Following the same criteria, Kabal, Barikot, Charbagh, Khwaza Khela and Matta union councils/ villages in Swat were further chosen for formal survey while Pacha Kalay union council was selected from Buner district. Table 1.1 shows that Swat having 3750 hectares and Buner have110 hectares area under peach respectively during 2009-10. Similarly, these districts produced 17626 tons and 410 tons of peach respectively during 2009-10.

In the second stage, six union council/ villages namely Kabal, Barikot, Charbagh, Khwaza Khela, Matta from Swat and Pacha Kalay Buner were randomly selected from both districts keeping in the peach plant population and farmer involvement.

3.2.5 Sample Population

The main purpose of the research was to assess the current peach fruit production in the study area and how effectively local and national markets play their contribution in our country. Two lists are used for determining the sample size of the target group. A pilot survey was carried out for collection of data on produce of Peach (Kilogram per hectare) from 60 respondents from each village. Then the sample size for this study was estimated by using the formula as follows (Cochran, 1977).

\[
n = \left( \frac{S \times Z_{\alpha/2}}{e} \right)^2
\]

3.1
Where

\[ n = \text{Total sample size} \]
\[ S = 443 \text{ Standard deviation of Peach yield (kilograms per hectare)} \]
\[ Z_{(a/2)} = 1.96; \text{ the value of standard normal variate at 95\% confidence level} \]
\[ e = 50 \text{ Error (sampling error)} \]
\[ n = (443 \times 1.96/50)^2 \]
\[ n = 300 \text{ number of peach respondents in the area.} \]

Out of this estimated 300 sample size, 272 respondents from Swat and 28 from Buner are selected through proportional sampling technique. Preliminary Primary data about the target group i.e. peach farmers was obtained from the local revenue offices and was then verified from Agriculture Extension Departments Swat & Buner. From this list of Peach growers sample size in each village was selected as follows (Cochran, 1977).

\[ ni = \frac{n}{N} \times Ni \]  \hspace{1cm} 3.2

where

\[ n_i = \text{Number of sample respondents in } i_{th} \text{ village of each district} \]
\[ n = \text{Total sample size} \]
\[ N_i = \text{Total number of Peach growers in } i_{th} \text{ village} \]
\[ N = \text{Total number of Peach growers in both District} \]

3.2.6 Distribution of Sample size in the study area

The following distribution of sample size was made according to the Cochran formula in both district i.e. Swat and Buner. The selected villages/union councils are having greater number of peach farmers as well as peach orchards.
Table 3.1  Sample size and number of villages in study area.

<table>
<thead>
<tr>
<th>District</th>
<th>Name of Villages</th>
<th>Total No in each village per district</th>
<th>Respondents per Village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swat</td>
<td>Kabal</td>
<td>1750/9500</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Matta</td>
<td>2075/9500</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Charbagh</td>
<td>1408/9500</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Khwaza Khela</td>
<td>1520/9500</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Barikot</td>
<td>1910/9500</td>
<td>60</td>
</tr>
<tr>
<td>Buner</td>
<td>Pacha Kalay</td>
<td>130/1400</td>
<td>28</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>300 Nos</strong></td>
<td></td>
</tr>
</tbody>
</table>

3.2.7 Interview Schedule Development

Collection of information through interview schedule has great benefits as quickly followed, well organized, can be kept for long time, cost effective and trustworthy and also be verified after some time or mistakes. It has only one short coming that it is pre fixed and other data or information may not be recorded on the time of interaction or discussion (Lipton and Moore, 1972).

Hagues (1992) has mentioned four (4) characteristics of ideal questioner:

1. This gives the exact data which was asked by the interviewer.
2. Questions can be arranged in reasonable order for efficiently time management and avoiding repetition and confusion.
3. It provides very less changes in quality responses.
4. These can be handled very conveniently during data calculation.

The above mentioned features have been noted when the data structure was in planning form. Primary data for the current study was collected through well-structured questionnaire while secondary data was taken from various published and un- published sources. Interview schedule was prepared in the light of study objectives. The primary data regarding Peach produce, agriculture inputs used in the production process, prices of Peach output, and other factors involved in the production and similarly all
cost of marketing including picking, packing empty carton and transportation etc. were collected from the Peach growers. The survey was pertained to the Peach production period 2010-11. The Interview Schedule so designed was pre tested before finalization.

3.3 Model Specification and Estimation:

3.3.1 Production Theory:

The production methodology is the core idea in the principle of economics. This describes that how physically agriculture inputs and their yield relate one another. Inputs and outputs are always assumed to be homogenous so that no quality differentials for different levels of a particulars input or output exist) expecting highest yield may be obtained from the association of all these agriculture inputs in the presence of available skill, know-how and machinery.

Polynomial regression model was used in the analysis of data. The collected data was analyzed by regressing the value added on the Peach fruit production for each stage against the value of investment in the value chain.

The model used for the analysis is written explicitly, is as stated below:

\[ Y_i = b_0 + b_1 x_i + b_2 x_i^2 + b_3 x_i^3 + \cdots + b_k x_i^k + e_i \]

Where,

\[ Y_i = \text{value added on the peach fruit production} \]
\[ X_i = \text{value of investment in stage (t = 1, 2, ..., k stage i.e. investment/cost of the stages of value addition).} \]
\[ b_0 = \text{Constant term} \]
\[ b_i = \text{Investment coefficients} \]
\[ e_i = \text{Error term}. \]

Generally, the objective of using a polynomial model is, to construct composite variables, which are linear combination of exogenous variables to capture the effect of each stage of the value chain on the value been added. This model is regarded as a fairly sophisticated model, which has been widely used in the estimation of polynomial relationships.
In order to estimate the determinants of participation in the value chain, the following probit regression

The model is implicitly stated as

\[ Y^*i = (x_1, x_2, x_3, x_4, x_5) + e_i \]

\[ Y^*i = 1 \text{ if } y^*>0, \quad 0 \text{ if } Y^*i = 0 \]

The explicit form of the model is stated as

\[ Y^*i = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + e_i \] \hspace{1cm} 4.1

Where

\( Y^*i \) = probability to participate (participating=1, non-participating=0)

\( X_1 \) = per hectare use of farm yard manure

\( X_2 \) = per hectare use of labour for fym application

\( X_3 \) = per hectare use of labour for hoeing in the peach orchards

\( X_4 \) = per hectare use of labour for pruning in the peach orchards

\( X_5 \) = per hectare quantity of fertilizers used in peach orchards

\( X_6 \) = per hectare use of labour for fertilizers application

\( X_7 \) = number of pesticides sprays per hectare

\( X_8 \) = per hectare use of labours for pesticide sprays

\( X_9 \) = per hectare use of labours for irrigations

\( B_i \) is the parameter

\( E_i \) is the error term

3.3.2 Estimation of Profitability and Investment Return

Cost Benefit Ratio can be estimated if current sum of value is divided by the current sum of prices (Gittinger, 1982) and this can be mathematically expressed as given (Erku & Rehber, 1998):

\[ CBR = \frac{\sum R_i}{\sum C_i} \] \hspace{1cm} 3.2

Here \( R \) means sum of return, \( C \) means sum of cost, \( i \) means interest rate, and \( n \) is period and \( q_t = (1+i)^t \). When the CBR is greater than 1, the
sum of return is $> \text{the sum of cost}$; when the CBR is equal to 1, then the sum of return $= \text{the sum of cost}$; and when the CBR is less than the sum of cost, then the return $< \text{the sum of cost}$.

### 3.3.3 Analytical Framework for Production and Marketing Cost

**(i). Production Cost:**

$$P_c = \sum_{i=1}^{n} C_i \quad \text{------------------------------------------3.3}$$

Here,

$P_c = \text{Sum of Peach Production Costs of the different activities.}$

$C_i = \text{Prices of the activities carried out in peach fruit orchards including farm yard manure, labour used for application of FYM, hoeing, pruning, pesticides sprays, labour used for pesticides application, fertilizers, labour used for fertilizer application and labour charges for irrigation.}$

**(ii). Marketing Cost:**

$$M_c = \sum_{i=1}^{n} C_i \quad \text{------------------------------------------3.4}$$

Here,

$C = \text{Sum Cost of shifting of the peach produce.}$

$C_i = \text{Price of the commodities given by peach growers during the marketing of peach product up to the end user which are costs of empty cartons, picking & grading, decoration materials, transportation, loading & unloading and market charges.}$

### 3.3.4 Strengths, Weaknesses, Opportunities and Threats Analysis

The SWOT analysis is required to identify the potential and weak points of peach fruit value chain in the study area as a base for future planning based on strength, opportunities and overcoming the weaknesses.
3.3.5 The Effect of Quality on Peach Price.

The parameters can be estimated through regression where the Peach price is a function of attributes of the product (be it Colour, Sizes, Varieties, Taste or Firmness characteristics). A simple model of the following form can then be estimated:

\[ P_i = \beta_0 + \beta_1 Rc + \beta_2 Gc + \beta_3 Wc \]

\[ P_i = \beta_0 + \beta_1 Bs + \beta_2 Ms + \beta_3 Ss \]

\[ P_i = \beta_0 + \beta_1 E var + \beta_2 M var + \beta_3 L var \]

\[ P_i = \beta_0 + \beta_1 Swt + \beta_2 Srt \]

\[ P_i = \beta_0 + \beta_1 fHa + \beta_2 fSo \]

Where \( P_i \) is the price of the peach product \( i \) and

\( \beta_0, \beta_1, \beta_2, \beta_3 \) are the parameters.

Rc, Gc, Wc represent red, green and white colours of peach fruit.

Bs, Ms, Ss are big, medium and small sizes of the peach fruit.

Evar, Mvar, Lvar are early, medium and late peach varieties.

Swt and Srt stand for sweet and sour tastes while fHa and fSo mean firmness in shape of hardness and softness of the peach fruit. Error term is explained by \( e_i \).
IV. RESULTS AND DISCUSSION

This chapter contains results of the study, explains these results and gives interpretation of these research findings. The chapter is divided into seven sections. First section gives description of the socio economic characteristics of the samples Peach growers, second section elaborates significance of agricultural inputs in the peach production, third section Peach production by different varieties, fourth section marketing cost and efficient markets, fifth section profitability of the peach growers in the study area, the six section the relationship between quality attributes, prices and seventh section interprets econometric models.

4. 1 Socio- economic Characteristics of sampled Peach growers

In this section different characteristics of target group farmers are presented like age, education, tenure status, no of family’s members involved in agriculture, size of land holdings.

4.1.1 Age and Education level of the Respondents in the study area

As reflected in Table 4.1, total sample of respondents in both districts was 300, where minimum age was 22 years and maximum 85 years with mean 53 years. This means that the respondents group has young and old peach growers having rich experienced in peach farming. Education in particular plays an important role in behavior building, enhancing specific skill, techniques, there by developing attitude which is required for profitable fruit production. The results depicted that the literacy rate is (87%) among the sampled respondents in the study area. It is evident from the result that primary level, Middle , SSC, HSC, Graduate and Post graduate were 15%, 12%, 22%, 20%, 11, and 7% respectively while there was 13% illiterate in the sampled farmers in the area.
Table 4.1 Distribution of the respondents based on the Literacy level.

<table>
<thead>
<tr>
<th>Education level</th>
<th>No of Respondents</th>
<th>Percentage (%) of the Total</th>
<th>Age of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>45</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>Middle</td>
<td>36</td>
<td>12</td>
<td>85</td>
</tr>
<tr>
<td>SSC</td>
<td>67</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>HSC</td>
<td>60</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Graduate</td>
<td>34</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Post Graduate</td>
<td>19</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>39</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field survey by author in 2010-11

4.1.2 Prominent Peach varieties in the study area

There are various peach varieties grown in the study areas, which are given below. They have divided in three main categories depending upon their characteristics, response to the climate and fruit maturity duration. Early varieties are those whose fruit are ready earlier for sale and include Spring Crest, Early Grand and Carmen. The middle varieties those whose fruits are ready in the middle of the season and comprising of NJC-84, Elberta and Sohanee while the late varieties are those whose fruit are available in the market in late day of the season and are included Maria Delezia and Indian Blood.

Table 4.2 List of prominent Peach growing varieties in the study area

<table>
<thead>
<tr>
<th>Early Varieties</th>
<th>Mid Varieties</th>
<th>Late Varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Crest</td>
<td>NJC 84 (No 5)</td>
<td>Maria Delezia (No 7)</td>
</tr>
<tr>
<td>Early Grand</td>
<td>Elberta (No 6)</td>
<td>Indian Blood (No 8)</td>
</tr>
<tr>
<td>Carmen (No 4)</td>
<td>Sohani</td>
<td>-</td>
</tr>
</tbody>
</table>
4.1.3 The effect of education level on peach productivity per hectare in value chain during 2010-11

H10: Education has statistically significant effect on productivity and income

H11: Education has no effect on productivity and income

Education plays an important role in farming and specially fruit orchard growing. The study was tested for the above hypothesis using F-statistics and conclusions were drawn and explained as follow. As evident from the table 4.3, the peach productivity of post graduate, primary level and illiterate peach orchard growers are 21.104Tons, 19.513Tons and 18.631Tons per hectare respectively. This clearly shows positive correlation between education and productivity. It is concluded from the study that there is statistically significant effect of education level on peach production and the hypothesis is accepted on the basis of F. statistics 2.04 (0.02).

The study examined the hypothesis for orchard income and showed in the Table 4.3 that the highest return per hectare of Rs.649,761 has been obtained by the primary level peach grower, followed by post graduate and illiterate peach orchard growers with the average income per hectare of Rs. 649,178 and Rs.618,671 respectively. The F- statistics 0.183 (0.981) showed that the null hypothesis is rejected for income based on the values obtained and verified that there is no effect of higher education level on the peach orchard income.
Table 4.3  The effect of education level on average productivity per hectare by in the study area during 2010-11

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Number of Respondents</th>
<th>Mean Production in (Tons)</th>
<th>Gross Income (Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary*</td>
<td>45</td>
<td>19.513</td>
<td>649,761</td>
</tr>
<tr>
<td>Middle</td>
<td>36</td>
<td>17.465</td>
<td>610,381</td>
</tr>
<tr>
<td>SSC</td>
<td>67</td>
<td>17.932</td>
<td>606,763</td>
</tr>
<tr>
<td>HSC</td>
<td>60</td>
<td>15.904</td>
<td>606,911</td>
</tr>
<tr>
<td>Graduate</td>
<td>34</td>
<td>17.621</td>
<td>614,242</td>
</tr>
<tr>
<td>Post Graduate*</td>
<td>19</td>
<td>21.104</td>
<td>649,178</td>
</tr>
<tr>
<td>Illiterate</td>
<td>39</td>
<td>18.631</td>
<td>618,671</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>17.964</td>
<td>618,760</td>
</tr>
</tbody>
</table>

F- value  2.04 (0.02)  0.183 (0.981)

Source: Field survey by author in 2010-11

4.1.4 The effect of land holdings on average peach productivity per hectare in the study area

H20: Medium peach growers have more productivity than small or big peach orchard growers.

H21: Medium peach growers have not more productivity than small or big peach orchard growers.

The study showed that how many peach varieties have been planted by respondents in the study area. 131 numbers of peach growers have established single peach variety orchard with 44 percent major share of the total numbers. 73 numbers of farmers have grown 2 different types of peach varieties with 25 percent share of total numbers while 96 numbers of farmers have planted 3 different types of peach varieties in the study area with 31 percent shares of the total numbers of respondents.

It is depicted in Table 4.4 that big peach orchard owners having three number of fruit peach orchards have got only 18.95 tons per hectare which is less than the growers having one or two peach orchards and their mean productions
are 16.61 tons and 19.10 tons respectively, so the hypothesis is rejected on the basis of F-statistics 3.158 (.044) values and is concluded that the medium peach orchard growers have more production per hectare than small or big peach orchard growers in the area.

Table 4.4 peach productions per hectare in Tons of different levels of growers in the study area during 2010-11

<table>
<thead>
<tr>
<th>Categories of Farmers</th>
<th>Number of Peach varieties sown</th>
<th>Number of Peach growers</th>
<th>Mean Production in Tons</th>
<th>Percentage of the Peach growers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small growers</td>
<td>1</td>
<td>131</td>
<td>16.61</td>
<td>44</td>
</tr>
<tr>
<td>Medium growers*</td>
<td>2</td>
<td>76</td>
<td>19.10</td>
<td>25</td>
</tr>
<tr>
<td>Big growers</td>
<td>3</td>
<td>93</td>
<td>18.95</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>300</td>
<td>17.96</td>
<td>100</td>
</tr>
</tbody>
</table>

F-Statistics 3.158 (.044)

Source: Field survey by the author 2010-11

4.1.5 Peach orchard size, its frequency distribution and mean productivity per hectare in peach value chain in the study area

H30: Orchard size in hectare has statistically significant effect on peach productivity

H31: Orchard size in hectare has no statistically significant effect on peach productivity

The given table 4.5 depicts peach orchard size in hectare, its distribution and mean peach production of the respondents in the study. It is generally known that big orchard growers, who have more orchards area or land holding in hectares will be having more production. But the F-Statistics 1.009 (.449) after testing the hypothesis revealed that the orchard size in hectare has no effect on the per hectare peach production as the farmer having 4.4 hectare has produced 23.35 tons per hectare more than the farmers of 11.2 hectares of peach orchard growers who has got 17.64 tons. There is no correlation
between more orchard size in hectare and peach production per hectare. Thus the hypothesis is rejected on the basis of peach orchard area in hectare will give more production per hectare.

**Table 4.5 Peach orchard sizes, its frequency and mean production per hectare of Peach growers**

<table>
<thead>
<tr>
<th>Land holdings of Peach growers</th>
<th>No of Respondents</th>
<th>Mean Peach Production per hectare in Tons</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.40 Hectares</td>
<td>50</td>
<td>22.81</td>
<td>2837.15</td>
</tr>
<tr>
<td>0.80 Hectares</td>
<td>102</td>
<td>17.07</td>
<td>3192.42</td>
</tr>
<tr>
<td>1.2 Hectares</td>
<td>26</td>
<td>18.29</td>
<td>3157.42</td>
</tr>
<tr>
<td>1.6 Hectares</td>
<td>31</td>
<td>15.33</td>
<td>4254.02</td>
</tr>
<tr>
<td>2 Hectares</td>
<td>25</td>
<td>18.46</td>
<td>2773.72</td>
</tr>
<tr>
<td>2.4 Hectares</td>
<td>20</td>
<td>18.68</td>
<td>4237.86</td>
</tr>
<tr>
<td>2.8 Hectares</td>
<td>10</td>
<td>18.45</td>
<td>2540.13</td>
</tr>
<tr>
<td>3.2 Hectares</td>
<td>14</td>
<td>17.56</td>
<td>4634.33</td>
</tr>
<tr>
<td>3.6 Hectares</td>
<td>3</td>
<td>18.29</td>
<td>4384.78</td>
</tr>
<tr>
<td>4.0 Hectares</td>
<td>7</td>
<td>18.97</td>
<td>4166.14</td>
</tr>
<tr>
<td>4.4 Hectares</td>
<td>1</td>
<td>23.35</td>
<td>4537.86</td>
</tr>
<tr>
<td>4.8 Hectares</td>
<td>4</td>
<td>20.58</td>
<td>4698.30</td>
</tr>
<tr>
<td>5.2 Hectares</td>
<td>2</td>
<td>20.52</td>
<td>4346.66</td>
</tr>
<tr>
<td>6.4 Hectares</td>
<td>2</td>
<td>18.52</td>
<td>2121.32</td>
</tr>
<tr>
<td>6.8 Hectares</td>
<td>1</td>
<td>11.51</td>
<td>2575.55</td>
</tr>
<tr>
<td>9.2 Hectares</td>
<td>1</td>
<td>12.88</td>
<td>3673.75</td>
</tr>
<tr>
<td>11.2 Hectares</td>
<td>1</td>
<td>17.64</td>
<td>3164.37</td>
</tr>
<tr>
<td>Total</td>
<td>300 Nos</td>
<td>17.97</td>
<td>3371.15</td>
</tr>
</tbody>
</table>

F- Statistic 1.009 (.449)

Source: Field survey by author in 2010-11
4.3.1 Variety wise average peach production per hectare in the study area

H\(_{0}\): Late peach varieties have statistically significant relationship with peach production

H\(_{1}\): Late peach varieties have no statistically significant relationship with peach production

It is generally understood that late peach varieties namely Maria Delezia and Indian Blood gave more fruit production as compared to early and mid-season peach varieties due to long season and more cultural practices. This hypothesis was tested in the study and some conclusion was drawn from the table 4.7. It is evident from the table that the mean fruit production 23.05 tons of Sohani variety per hectare is the highest of all, followed by 20.12 tons of Elberta and 18.50 tons of Spring crest being the high yielding peach varieties which are mid and early season peach varieties while the average fruit production of Maria Delezia and Indian Blood being late varieties are 16.82 tons and 16.64 tons respectively. The f- statistics .556(.792) shows that the late peach varieties have no statistically significance relationship with peach fruit production and thus the hypothesis is rejected on the basis of f-statistics.
Table 4.7 Variety wise average peach production per hectare in the study area during 2010-11

<table>
<thead>
<tr>
<th>Name of Peach Variety sown</th>
<th>Number of Respondents</th>
<th>Production per hectare in Tons</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Grand</td>
<td>67 Nos</td>
<td>17.75</td>
<td>39661.497</td>
</tr>
<tr>
<td>Spring Crest</td>
<td>28 Nos</td>
<td>18.50</td>
<td>52567.282</td>
</tr>
<tr>
<td>Carmen</td>
<td>05 Nos</td>
<td>17.35</td>
<td>9666.288</td>
</tr>
<tr>
<td>NJC 84</td>
<td>103 Nos</td>
<td>18.11</td>
<td>28987.507</td>
</tr>
<tr>
<td>Elberta</td>
<td>24 Nos</td>
<td>20.12</td>
<td>22309.91</td>
</tr>
<tr>
<td>Maria Delezia</td>
<td>27 Nos</td>
<td>16.82</td>
<td>16154.967</td>
</tr>
<tr>
<td>Indian Blood</td>
<td>34 Nos</td>
<td>16.64</td>
<td>15363.845</td>
</tr>
<tr>
<td>Sohani</td>
<td>02 Nos</td>
<td>23.05</td>
<td>11313.708</td>
</tr>
<tr>
<td>Total</td>
<td>300 Nos</td>
<td>17.97</td>
<td>32555.923</td>
</tr>
</tbody>
</table>

F- Statistics: .556 (.792)

Source: Field survey by author in 2010-11

Table 4.8 Comparison between Pakistan and World Peach production in 2001-2010 (Metric Ton)

<table>
<thead>
<tr>
<th>Countries</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>4596157</td>
<td>5259906</td>
<td>6179365</td>
<td>7040472</td>
<td>8243298</td>
<td>9080215</td>
<td>9563679</td>
<td>10170038</td>
<td>10718048</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>1679100</td>
<td>1586590</td>
<td>1175860</td>
<td>1710010</td>
<td>1693150</td>
<td>1664810</td>
<td>1630440</td>
<td>1589120</td>
<td>1691790</td>
<td>1590660</td>
</tr>
<tr>
<td>USA</td>
<td>1341640</td>
<td>1422020</td>
<td>1341000</td>
<td>1429810</td>
<td>1301900</td>
<td>1132530</td>
<td>1279310</td>
<td>1304350</td>
<td>1197670</td>
<td>1044440</td>
</tr>
<tr>
<td>Spain</td>
<td>1082290</td>
<td>1275860</td>
<td>987574</td>
<td>1260880</td>
<td>1245530</td>
<td>1222070</td>
<td>1244290</td>
<td>1191300</td>
<td>1134750</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>943336</td>
<td>687000</td>
<td>875544</td>
<td>864406</td>
<td>767938</td>
<td>816009</td>
<td>734100</td>
<td>749000</td>
<td>639400</td>
<td></td>
</tr>
<tr>
<td>Turkey</td>
<td>460000</td>
<td>455000</td>
<td>470000</td>
<td>372000</td>
<td>510000</td>
<td>552775</td>
<td>539435</td>
<td>551906</td>
<td>547219</td>
<td>534903</td>
</tr>
<tr>
<td>Iran</td>
<td>380000</td>
<td>385000</td>
<td>390000</td>
<td>400770</td>
<td>439770</td>
<td>371000</td>
<td>421304</td>
<td>574858</td>
<td>496130</td>
<td>500000</td>
</tr>
<tr>
<td>France</td>
<td>438784</td>
<td>445675</td>
<td>338800</td>
<td>386511</td>
<td>390554</td>
<td>384166</td>
<td>352030</td>
<td>292490</td>
<td>341715</td>
<td>314721</td>
</tr>
<tr>
<td>Egypt</td>
<td>247300</td>
<td>339266</td>
<td>302667</td>
<td>360397</td>
<td>360000</td>
<td>427639</td>
<td>452273</td>
<td>399416</td>
<td>363209</td>
<td>273256</td>
</tr>
<tr>
<td>Chile</td>
<td>290000</td>
<td>293000</td>
<td>304000</td>
<td>311000</td>
<td>311000</td>
<td>345000</td>
<td>370000</td>
<td>372000</td>
<td>388000</td>
<td>357000</td>
</tr>
<tr>
<td>Argentina</td>
<td>257768</td>
<td>211922</td>
<td>255785</td>
<td>272442</td>
<td>272500</td>
<td>260000</td>
<td>270000</td>
<td>308731</td>
<td>290774</td>
<td>318000</td>
</tr>
<tr>
<td>Brazil</td>
<td>222616</td>
<td>218292</td>
<td>220364</td>
<td>235720</td>
<td>235471</td>
<td>199719</td>
<td>185959</td>
<td>239149</td>
<td>216236</td>
<td>220739</td>
</tr>
<tr>
<td>Mexico</td>
<td>175752</td>
<td>197946</td>
<td>223883</td>
<td>201957</td>
<td>208185</td>
<td>220063</td>
<td>192261</td>
<td>202066</td>
<td>198085</td>
<td>227401</td>
</tr>
<tr>
<td>Pakistan</td>
<td>33000</td>
<td>33000</td>
<td>37600</td>
<td>76300</td>
<td>76300</td>
<td>69500</td>
<td>70300</td>
<td>71200</td>
<td>82300</td>
<td>83700</td>
</tr>
</tbody>
</table>

Source: FAO 2011

The comparison of different peach producing countries with Pakistan is under scored from 2001 to 2010 in the Table 4.8. The comparison has been given among the top fourteen peach production countries globally. As indicated in
the Table 4.8, Pakistan was the lowest in peach production in 2001, and the same decreasing trend for peach production was observed for the onward period up to 2010. The top producing countries have worked very hard on their peach production processes in the production chain for getting maximum production while Pakistan has still to do more for reaching the optimum production capacity. This means that there is high potential for increasing the fruit production and dire needs for continuous efforts by all the stakeholders in the production chain. Studies about peach or other fruits have been conducted like other regional countries where peach is growing in abundance. The previous research studies Clare et al. (2009) had also illustrated such comparison between Indian and Kenyan fruit production to encourage the policy and value chain players to overhaul and improve the value chain strategies.

4.3.2. Relationship between average price per ton and peach late varieties in the marketing value chain

H50: Late peach varieties fetch highest price and have statistically significant on effect peach marketing

H51: Late peach varieties fetch no highest price and have no statistically significant on effect peach marketing

It is farmer’s perception that late peach varieties namely Maria Delezia and Indian Blood fetch highest price per carton as compare to early and mid-season peach varieties due to prolong marketing season. This hypothesis was tested in the study and conclusion was drawn from the table 4.8. It is reflected from the table 4.9 that the average price Rs. 34750 per ton of Carmen peach variety is the highest of all, followed by Rs. 33750 per ton of Early grand which are early season peach varieties while the average price per carton of Maria Delezia and Indian Blood being late varieties are Rs. 33625 and Rs. 31635 respectively, while the peach price per ton was R 7503 in South Africa. The f- statistics 1.770 (.093) shows that the late peach varieties fetch no highest price and have no statistically significance effect on
peach fruit in marketing chain and thus the hypothesis is rejected on the basis of f-statistics. It has revealed from the studies that in Turkey and India, late peach varieties are fetching maximum returns to the producer.

**Table 4.9 Average peach price per ton and peach late varieties in the marketing value chain during 2010-11**

<table>
<thead>
<tr>
<th>Name of Peach Variety</th>
<th>No of Respondents</th>
<th>Mean Price per Ton</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Grand*</td>
<td>67</td>
<td>Rs. 33750</td>
<td>53.06</td>
</tr>
<tr>
<td>Spring Crest</td>
<td>28</td>
<td>Rs. 30500</td>
<td>30.824</td>
</tr>
<tr>
<td>Carmen*</td>
<td>05</td>
<td>Rs. 34750</td>
<td>54.498</td>
</tr>
<tr>
<td>NJC 84</td>
<td>113</td>
<td>Rs. 33000</td>
<td>48.361</td>
</tr>
<tr>
<td>Elberta</td>
<td>24</td>
<td>Rs. 30875</td>
<td>39.727</td>
</tr>
<tr>
<td>Maria Delezia*</td>
<td>27</td>
<td>Rs. 33625</td>
<td>44.154</td>
</tr>
<tr>
<td>Indian Blood</td>
<td>34</td>
<td>Rs. 31625</td>
<td>43.309</td>
</tr>
<tr>
<td>F- statistics</td>
<td></td>
<td>1.770 (.093)</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field survey by author in 2010-11

### 4.4.1 Average sale price of peach per ton at different national level markets in marketing chain

H60: High sale price per ton has statistically significant relationship with big fruit markets in marketing chain.

H61: High sale price per ton has no statistically significant relationship with big fruit markets in marketing chain.

It was pointed out in the study of Mango marketing in Sindh by Khuskh and Smith (1999) that major markets at national level play an important role in the marketing of mango and these big and vital markets give maximum income to the producers due to more demand and supply to all over the country. Similarly it is usually believed that big fruit markets like Rawalpindi, Lahore and Peshawar have high prices per ton for all varieties of the peach or other fruit. This hypothesis was tested in the study and it was concluded from the table 4.10 that average price of ton for peach fruit at Gujranwala was Rs.
36625 and was followed by Faisal Abad Rs. 35375 per ton. These are two small national level fruit markets as compare to Rawalpindi, Lahore Peshawar and Karachi. The f- statistics 1.169(.320) shows that sale price has no statistically significant in relationship with big fruit markets in marketing chain and even small scale fruit markets can fetch high price and thus the hypothesis is rejected on the basis of f- statistics. It is confirmed in the study that some timed the relatively small scale market can give highest returns to the producers due to various factors like timely supply and more demands etc.

Table 4.10 Average sale price of peach per ton at different national level markets in marketing chain

<table>
<thead>
<tr>
<th>Name of National Market</th>
<th>No of Respondents</th>
<th>Mean Price per Ton</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rawal Pindi*</td>
<td>114</td>
<td>Rs. 35000</td>
<td>46.544</td>
</tr>
<tr>
<td>Lahore</td>
<td>102</td>
<td>Rs. 29625</td>
<td>39.787</td>
</tr>
<tr>
<td>Peshawar</td>
<td>42</td>
<td>Rs. 31875</td>
<td>43.124</td>
</tr>
<tr>
<td>Mingora</td>
<td>02</td>
<td>Rs. 32500</td>
<td>1</td>
</tr>
<tr>
<td>Faisal Abad*</td>
<td>35</td>
<td>Rs. 35375</td>
<td>40.737</td>
</tr>
<tr>
<td>Gujranwala*</td>
<td>04</td>
<td>Rs. 36625</td>
<td>28.723</td>
</tr>
<tr>
<td>Karachi</td>
<td>01</td>
<td>Rs. 35000</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>Rs. 32750</td>
<td>47.111</td>
</tr>
</tbody>
</table>

Source: Field survey by author in 2010-11

4.4.2 Relationship between marketing cost per hectare and late peach varieties in marketing chain in the study

H7₀: Late peach varieties have statistically significant effect on marketing costs in the value chain.

H7₁: Late peach varieties have no statistically significant effect on marketing costs in the value chain.
It is evident from studies in the peach growing countries like Turkey and India that marketing costs of late peach varieties are more than the other varieties and thus have less income and economically viable. Peach growers in the study area have general idea that late peach varieties have more marketing cost per hectare as compared to early and mid-season varieties and relatively less income. There might be more number of empty cartons, number of picking, grading, transportation cost and Maundi commission based on long and late season. The hypothesis was tested in the study and it was concluded from the table 4.11 that the highest marketing cost Rs. 321101 per hectare was noticed of Sohani peach variety, followed by Carmen of Rs. 248269 which is mid-season peach varieties. Spring crest has also high marketing cost Rs. 95284.29 per hectare among the all other varieties. The f-statistics .586 (.767) shows that late peach varieties have no statistically significant on the marketing cost and early and mid-season peach varieties have more marketing costs per hectare in the study area and thus the hypothesis is rejected on the basis of f-statistics.

Table 4.11 Relationship between marketing cost per hectare and late peach varieties in marketing chain in the study

<table>
<thead>
<tr>
<th>Name of Peach Varieties sown</th>
<th>No of Respondents</th>
<th>Mean Marketing Cost per hectare</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Grand</td>
<td>67</td>
<td>Rs. 227411</td>
<td>39175</td>
</tr>
<tr>
<td>Spring Crest*</td>
<td>28</td>
<td>Rs. 235352</td>
<td>37730.54</td>
</tr>
<tr>
<td>Carmen</td>
<td>05</td>
<td>Rs. 248269</td>
<td>44505.04</td>
</tr>
<tr>
<td>NJC 84</td>
<td>113</td>
<td>Rs. 226309</td>
<td>41983.79</td>
</tr>
<tr>
<td>Elberta*</td>
<td>24</td>
<td>Rs. 245449</td>
<td>37072.63</td>
</tr>
<tr>
<td>Maria Delezia</td>
<td>27</td>
<td>Rs. 211037</td>
<td>32434.37</td>
</tr>
<tr>
<td>Indian Blood</td>
<td>34</td>
<td>Rs. 223655</td>
<td>28221.19</td>
</tr>
<tr>
<td>Sohini*</td>
<td>02</td>
<td>Rs. 321101</td>
<td>22627.41</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>Rs. 228253</td>
<td>38224.7</td>
</tr>
</tbody>
</table>

F-statistics .586 (.767)

Source: Field survey by author in 2010-11
4.4.3 Average sale share of peach fruit in different national level markets in the marketing chain during 2010-11

Various studies of fruit and vegetables have described that there are some major and important fruit and vegetable markets in the country namely Rawalpindi, Lahore, Peshawar, Karachi, Faisal Abad in Pakistan etc. Large quantity of various fruit and vegetable are coming to these markets and which are further supplied to other markets and parts of the country while some part is also exported to Gulf and other countries. The table 4.12 represents that how much of the peach fruit was sold to each national level market by the respondents during 2010-11. It was showed that out of three hundred (300) respondents, 102, 90, 42, 35, 10, 7, 5, and 9 numbers have sold their produce to Rawal Pindi, Lahore, Peshawar, Faisal Abad, Mingora, Gujranwala, Karachi and others national level markets at different times with 36, 41, 9, 6, 3, 1, 1 and 3 percent respectively. It was revealed from the table 4.11 that there were three main peach fruit markets namely Rawal Pindi, Lahore and Peshawar where maximum numbers of respondents have sold their peach fruit 2864 tons, 3261 tons and 716 tons respectively in the marketing chain with highest percentage of the total fruit produce during 2010-11

Table 4.12 Average sale share in tons of peach fruit in different national level markets in the marketing chain during 2010-11

<table>
<thead>
<tr>
<th>Name of national markets</th>
<th>Number of Respondents</th>
<th>Average market Sale share in tons</th>
<th>Percentage (%) of the total sale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rawal Pindi</td>
<td>102</td>
<td>2864</td>
<td>36</td>
</tr>
<tr>
<td>Lahore</td>
<td>90</td>
<td>3261</td>
<td>41</td>
</tr>
<tr>
<td>Peshawar</td>
<td>42</td>
<td>716</td>
<td>9</td>
</tr>
<tr>
<td>Faisal Abad</td>
<td>35</td>
<td>477</td>
<td>6</td>
</tr>
<tr>
<td>Mingora</td>
<td>10</td>
<td>239</td>
<td>3</td>
</tr>
<tr>
<td>Gujranwala</td>
<td>7</td>
<td>80</td>
<td>1</td>
</tr>
<tr>
<td>Karachi</td>
<td>5</td>
<td>80</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>9</td>
<td>239</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>7955</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field survey by author in 2010-11
4.4.4 Average total costs of Peach Production per hectare in the study area during 2010-11

Hewitt 2000 has mentioned various factors of production and their costs in his study of costs of peach production in Florida. He has estimated the cost of cultural practices like pruning, Chemical sprays, Fertilizer application, irrigation application and other costs per hectare which were more than the costs in the study area. The low cost of peach production in the study area was mainly due to the cheap labour and less investment on the orchards. Similarly different farming practices were taken place in peach production chain and Table 4.13 showed peach cultivation management practices and the expenses made on these practices mainly were purchase of chemical application, daily wage labor for the application of chemicals, purchase of green manure, hiring of daily wage labor for the application of manure, hiring of labor for hoeing, pruning, purchase of different fertilizers, hiring of labor for application of these fertilizers and labor for irrigation application

The average total costs per hectare of these practices were Rs.19905; Rs.5411, Rs.12919, Rs.3036, Rs.4454, Rs.3458, Rs.27208, Rs.1938 and Rs.3040 respectively were spent. In the management practices, large amount of Rs. 27208 per hectare was spent on fertilizers followed by pesticides spray cost of Rs. 19905. The total average peach production cost per hectare was Rs. 81369
Table 4.1 Average total costs per hectare of Peach in Production chain in the study area during 2010-11

<table>
<thead>
<tr>
<th>Name of Activities Per hectare</th>
<th>Pre harvest farmers</th>
<th>Mean Cost in Rs.</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Pesticides</td>
<td>300</td>
<td>19905</td>
<td>4120.80</td>
</tr>
<tr>
<td>Labour Cost for Pesticides application</td>
<td>300</td>
<td>5411</td>
<td>893.97</td>
</tr>
<tr>
<td>Cost of FYM</td>
<td>300</td>
<td>12919</td>
<td>3073.94</td>
</tr>
<tr>
<td>Labour Cost for FYM application</td>
<td>300</td>
<td>3036</td>
<td>880.85</td>
</tr>
<tr>
<td>Labour Cost for hoeing</td>
<td>300</td>
<td>4454</td>
<td>861.85</td>
</tr>
<tr>
<td>Labour Cost for pruning</td>
<td>300</td>
<td>3458</td>
<td>493.92</td>
</tr>
<tr>
<td>Cost of different Fertilizers</td>
<td>300</td>
<td>27208</td>
<td>3389.99</td>
</tr>
<tr>
<td>Labour Cost for Fertilizer application</td>
<td>300</td>
<td>1938</td>
<td>430.18</td>
</tr>
<tr>
<td>Labour Cost for Irrigation</td>
<td>300</td>
<td>3040</td>
<td>631.01</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>81369</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Field survey by author in 2010-11

4.4.5 Total average marketing costs per hectare of Peach in the study area during 2010-11

Ghandi et al (2002), Prakash and Singh (2002) have studied marketing channel, farmer's share in consumer price and various factors involved in the marketing of fruits in India. They pointed out the exploitative role of middle men, commission agents and transporters in shifting the fruits from farm to markets. They further showed that the marketing cost floats nearly eight per cent of the end user price for vegetables and approximately 11 to 15 per cent for fruits. Carriage cost and commission are the most significant of all costs.

Here may be few significant after harvesting and marketing practices in the value chain and were reflected in Table 4.14. Among the main marketing practices of peach fruit in the value chain, some were buying of carton for packing, expenses on hiring labour for picking, making grading, expenses incurred on the purchase of various decoration items, shifting of fruit from farm to down country markets and charges in the main markets.
The marketing costs per hectare of these activities were Rs. 71848, Rs. 21898, Rs. 25785, Rs. 59417, Rs. 6746 and Rs. 43291 respectively. The maximum expenses per hectare among the marketing practices was Rs. 71848 of buying of cartons for packing and next by Rs. 59417 of shifting expenses of various peach cultivars to several down country markets. The total average peach marketing cost per hectare was Rs, 228985 for all the marketing interventions. Hence the increased costs of carriage of peach fruit and commission agents’ charges were more due to the exploitative role of these in the markets.

Table 4.14 Total average costs per hectare of Peach in marketing value chain in the study area during 2010-11

<table>
<thead>
<tr>
<th>Name of Activities/items Per hectare</th>
<th>Producers</th>
<th>Mean Cost in Rs</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Empty cartons</td>
<td>300</td>
<td>71848</td>
<td>12571.15</td>
</tr>
<tr>
<td>Labour of picking/ grading</td>
<td>300</td>
<td>21898</td>
<td>5342.01</td>
</tr>
<tr>
<td>Cost of decoration materials</td>
<td>300</td>
<td>25785</td>
<td>6209.38</td>
</tr>
<tr>
<td>Cost of transportation</td>
<td>300</td>
<td>59417</td>
<td>12911.29</td>
</tr>
<tr>
<td>Cost of loading &amp; un loading</td>
<td>300</td>
<td>6746</td>
<td>2268.76</td>
</tr>
<tr>
<td>Commission agents charges</td>
<td>300</td>
<td>43291</td>
<td>7831.50</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>228985</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field survey by author in 2010-11

4.5.1 Relationship between averages Revenue per hectare and different Peach varieties in the value chain in the study area

H8:\(0\): Late Peach varieties fetch more revenue than the early and mid-season varieties in the value chain.

H8:\(1\): Late Peach varieties do not fetch more revenue than the early and mid-season varieties in the value chain.

Stephen and Jeff (2009) presented the economics of apple supply response which can be recognized for adopting plantings of the different trees, eliminations of old. The vital parameters are revenue for apple, cherry, climate and spending on the orchards. These factors seem very important under consideration of new sowing choices of different varieties while the
replacement have estimated income in short duration for apples and peaches. The fruit produce is directly dependent on cost and climate of the area. They have concluded that arte of investment and type of fruit varieties would fetch maximum returns to the producers of an orchard. It has noticed that Peach orchards were increased in the research districts as economical and well learned farmers have brought more land under cash crops like orchards. Different Peach varieties are growing on commercial level in the research area and peaches with good attributes are produced due to favourable environment in the area. Sufficient amount may be needed for planting new orchards, and carrying management activities in the established orchards.

The research tested the above hypothesis for relationship between revenue and different early, mid and late season peach varieties. It was noticed in table 4.15 that the total average income per hectare of mid-season peach cultivar (Sohani) was the maximum Rs. 835,683, next by early season peach varieties Carmen and Early grand with Rs. 658,288 and Rs. 657,290 correspondingly. The F-statistics .525 (.816) reject the hypothesis and shows that the late peach varieties do not fetch highest revenue per hectare.

<table>
<thead>
<tr>
<th>Name of Peach Varieties sown</th>
<th>No of Respondents</th>
<th>Mean Revenue per hectare in Rs.</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Grand*</td>
<td>67</td>
<td>657,290</td>
<td>134556.03.</td>
</tr>
<tr>
<td>Spring Crest</td>
<td>28</td>
<td>591,297</td>
<td>101245.37</td>
</tr>
<tr>
<td>Carmen*</td>
<td>05</td>
<td>658,288</td>
<td>115769.19</td>
</tr>
<tr>
<td>NJC 84</td>
<td>113</td>
<td>614,793</td>
<td>111480.74</td>
</tr>
<tr>
<td>Elberta</td>
<td>24</td>
<td>601,222</td>
<td>90707.32</td>
</tr>
<tr>
<td>Sohani*</td>
<td>02</td>
<td>835,683</td>
<td>124922.19</td>
</tr>
<tr>
<td>Maria Delezia</td>
<td>27</td>
<td>588,988</td>
<td>87693.37</td>
</tr>
<tr>
<td>Indian Blood</td>
<td>34</td>
<td>596,080</td>
<td>85582.30</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>618,760</td>
<td>109857.21</td>
</tr>
</tbody>
</table>

F-statistic .525 (.816)

Source: Field survey by author in 2010-11
4.6 Value Chain Analysis

4.6.1 Value chain map of Peach fruit in Study area

According to McCormick and Schmitz (2002), value chain mapping enables to visualize the flow of the product from conception to end consumer through various actors. It also helps to identify the different actors involved in the peach value chain, and to understand their roles and linkages. Consequently, the current value chain map of peach fruit in the study area is shown in Figure 1.

Figure 1.

Source: Own sketch from survey result, 2010

4.6.2 Key Players and their role in the Peach Value Chain

Various key players in the figure were presented who were involved directly or indirectly in the value chain. According to KIT et al. (2006), those who are directly participating in the value chain may be also profitable practices like (raw material suppliers, orchard growers, businessmen and end users etc) and indirect players are those who provide monetary or non-monetary linked facilities, like banks, entrepreneurs, government, Non-
governmental organizations, cooperatives, research experts and agriculture extension workers.

**Primary actors**

The key players in peach value chain in study area were pesticides, various fertilizers, cartons and decoration materials etc. suppliers, peach producer, businessmen and end users. Every player makes some value addition while the product moves further. There are different players who have their own work and they perform either one or more in the value chain.

**Input Suppliers**

There are several key players who are supplying raw material directly or indirectly in the chain in the research districts. Presently the raw material supplies are made by the individual trader and they have working throughout the study area. All such actors are responsible to supply agricultural inputs like fertilizers, herbicides, pesticides, empty carton, decoration materials and other farm implements which are essential inputs at the production and marketing stages. (Table 4.6 & 4.13). Regarding fertilizers, some farmers used both inorganic (chemical fertilizers) and organic fertilizers (manure and compost) while some farmers used only inorganic fertilizer depending on the land size, resource allocation to, peach varieties and the soil fertility status as perceived by the farmers. It was revealed in the study that all agriculture inputs including pesticides, fertilizers, FYM, empty cartons, farm machinery and other necessary items are 100% supplied by private vendors in the study area.

**Peach Producers**

Different Peaches varieties are generally produced by small, medium and big farmers in the study area who grow peach as major fruit orchards. Peach orchards growers usually sell their orchards to those traders who have best price for the orchards. Orchard farmers may rely on the businessmen for shifting their products to down country markets and some times selling rate may be fixed by the commission agents or businessmen. (Koenig, 2008). Peach growers are mostly not aware of the markets price on the daily
basis, therefore have no or very less negotiating authority in the markets. As the peach fruit can be stored for longer period and that is why the farmers are compelled to sell their fruit immediately. Similarly the growers have also not too much information about the end users choices and best quality grading procedures of known and posh markets. The low graded fruit are mostly used by either the farmers themselves or sell to the nearby markets (Mingora and Swari etc.). In such way the growers who have no or very weak linkages with the commission agents and are remote from the markets are mostly suffered.

**Broker**

Broker is a man who is neither middleman nor big seller but he is also not owner of the products any stage of the value chain. (Koenig et al. 2008). He is only the mediator between the farmer and buyer and fixes the rate of product for one of the side. They are rewarded for their services rendered to either side for making the deal among them. They are making connection between farmers and middlemen at field stage and middlemen to big seller at buying selling place. Large quantity of peach fruit is bought and sold by these brokers who are also called intermediary. Rate of peach fruit is largely influenced by them.

**Traders**

Various entrepreneurs are participating in different part of the value chain, which may include middleman businessman, brokers and big sellers. The fruit mostly reaches the end user after passing many entrepreneurs but sometimes the peach fruit is sold directly to the end uses and small seller. The retailer is not a businessman, rather transfer the products to the end users and receive the payment. The horticulture sector mainly production and marketing thus provide job chances and the young generation can take benefit of it. The study showed that usually the routine trade facilities are not very public and there are also less numbers of support and relation in their organizations. It was realized that there are businesses for a long period with less routine office buildings which shows the mode of work and their non-formal associations. The middleman usually buys some products from one or few growers sort them and then sell the whole quantity to big seller who then
sells the products in a big market. The middleman largely buys fruit products from farmers, other middleman or small scale seller at collection point and then sells to large scale seller or sometimes to organizational end users but mostly sells to the best known wholesaler.

**Wholesaler**

A wholesaler is one trades of peach other fruit in entirely in an organized big market. Mostly he is buying from middleman or producers and sells to small scale seller or another bid seller. Opening and setting and controlling the price of a particular fruit category in big market are usually done by him. He is in regular touch with the middlemen so that to regularize the inflow of products and ask for additional quantity if needed or avoid extra supplies. Due to the lack of funds, storing area for fruits and cold storages, the wholesaler is compelled to sell out whole quantity of peach and other fruits bought on the same day leading to the uncertainty of rates in the markets. Mostly the cold storages are considered greater problem in developing countries by the producers and specially value chain players. Peaches are not stored for long period but can be stored for shorter period. Businessmen who have their cold storage installations may be able to gain maximum benefits at the time of larger fruit supplies. Maximum numbers of farmers brings peach product to the buying and selling place by trucks early in the morning and expects to trade all the produce on the same daytime.

Market entry can be difficult for wholesalers because business relationships are so informal. Interviews with key informants indicate that to successfully enter into the market, a wholesaler must purchase goods at a loss until he builds trust with intermediaries and/or brokers along the supply chain. Thus, a trader must have the capacity to invest a considerable amount of capital upfront to successfully enter the market as he will likely suffer losses for several weeks before he will successfully find produce at realistic, market prices. According to the study the main whole sale markets namely Lahore, Rawalpindi, Peshawar and Faisalabad marketed the 407684 Nos, 357967 Nos, 89492 Nos and 59661 Nos cartons respectively.
Retailers
Retailers purchase produce from wholesalers or other retailers and sell to consumers. Many retailers operate in the same wholesale markets from which they purchase the fruit. The retailer are mostly shop keepers and hut owners. According to the study, the most significant constraints faced by retailers were included: poor market infrastructure, seasonality of fruit supply, highly perishability and wholesale price fluctuation / volatility.

Transporters
Many transporters and few traders have their own trucks, which are usually rented from transporters, which are available during the marketing time of peach fruit from the study area to the down country markets like Peshawar, Rawal Pindi, Lahore and Karachi etc. The rate varies during the peak time subject to the diesel prices and distances. The main constraints expressed by transporters interviewed were: the excessive number of police checkpoints and road blocks along trade routes, and inadequate parking space and congestion in wholesale markets.

Cooperation
Cooperation between all actors along the value chain is low. Most operate individually without the support of farmer or business organizations or contractual agreements (Koenig, 2008). Farmers association or groups are uncommon in the Study area. Agreements and informal contracts between market participants are characterized and even dependent upon, very high levels of trust (Koenig, 2008). Retailers often pay the wholesaler progressively throughout the day as they sell goods to consumers. Wholesalers generally set buying prices with retailers but retailers are in a strong bargaining position when setting price to sell to consumers. The bargaining power of retailers, however, differs considerably between high and low seasons as peach supply fluctuates.

Exporters
Different exporters of peach fruits are identified in main wholesale markets and they are exporting their peach fruit to Gulf, China and Afghanistan etc. Almost all peach varieties were exported to these markets.
Due to its highly perishable nature of peach fruit, very little quantity of peach fruit was exported during the study year.

4.6.3 Supporting actors

Such actors are those who provide supportive services including training, extension, information, financial and research services. According to Martin et al. (2007), access to information or knowledge, technology and finance determines the state of success of value chain actors. Agriculture Extension Department, Agriculture Research system, Commercial banks and micro finance, local and INGOs and private sector were main supporting actors who play a central role in the provision of such services.

4.6.4 Marketing Channel in the study area:

Farmers→Middlemen→Wholesalers→Retailers/Supermarkets→Consumers

This is the main marketing channel, peach farmers send their produce to aggregator/ local area or village commission agent, who is in touch with wholesalers at major national markets like Peshawar, Rawal Pindi, Lahore, Gujranwala and Karachi etc. and sends the produce to them. The peach fruit is then sold and transported to retailers/ other wholesale markets near the wholesale markets and finally to consumers throughout the country.

4.7 Market Margins and Marketing efficiency

Prasad and Hanumanthaiah(2011) analyzed supply chain in marketing of sweet orange in the Nalgonda district of Andhra Pradesh India. It was noticed that the marketing efficiency in the small market chain was greater than 1. Due to greater threats both in production and marketing, the growers were willing to sell their produce to the pre- contractor in pre- harvest season. Thus the producers were getting less return by averting risks.
Amao et al. (2011) investigated marketing channels and efficiency of the marketing system for pineapples in Edo and Delta States. The major market channel for pineapple was from the farmers to wholesalers to retailers. Market margin obtained per week in October, 2010 was N47, 491.30 with marketing efficiency value of 1.33. A major constraint to pineapple marketing is the perishable nature of the fruit. The study suggests that the constraint of perishability can be controlled if the marketers have access to storage facilities such as plastic trays. This will go a long way in reducing the problem of damage during transportation of the fruits.

There are two ways to estimate marketing performances which are marketing margins and marketing efficiency. Marketing margin is generally stated the difference between producer and consumer prices of an equivalent quantity and quality of a peach fruit while marketing efficiency means the degree of market performance.

Marketing margin was calculated as follows:

\[ MM = TR - TMC \]

Where;

\[ TR = \text{Total revenue} \]
\[ TMC = \text{Total Marketing Cost (Costs of empty carton, picking, packing, loading, un-loading, transportation and market charges)} \]
\[ MM = \text{Marketing Margin} \]

Marketing efficiency was calculated as below;

\[ ME = \frac{TR}{TMC} \]

Where;

\[ ME = \text{Marketing efficiency} \]
In Table 4.16, the marketing margin received for Peach marketing in the study area is Rs. 389775 for 7.274Tons per hectare Peaches marketed during the season while the efficiency of Peach marketing was 2.70. The marketing efficiency obtained in this study is greater than one (1). Despite the fact that the marketing efficiency of Peach from the study was efficient (as reflected in the table 4.16, the efficiency value was greater than 1). This can be further improved and can bring more margins to the Peach producers in the study area. The major constraint to peach marketing is the perishable nature of the fruit. The study suggests that the constraint of perishability can be controlled if the marketers have access to refrigerated trucks or vans for shifting the fruit in sound condition to the national level markets. This will go a long way in reducing the problem of damage during transportation and timely supply of the fruits in the markets.

Table 4.16 Average Marketing Cost and Marketing Efficiency of Peach fruit in the study area during 2010-11.

<table>
<thead>
<tr>
<th>Name of Costs</th>
<th>Quantity/Value in Pak Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of Peach fruit marketed</td>
<td>7.274Tons</td>
</tr>
<tr>
<td>Average Total Marketing Cost (ATMC)</td>
<td>228,985</td>
</tr>
<tr>
<td>Average Total Revenue (ATR)</td>
<td>618,760</td>
</tr>
<tr>
<td>Marketing Margin (ATR- ATMC)</td>
<td>389775</td>
</tr>
<tr>
<td>Marketing margin Percentage (%)</td>
<td>62.99%</td>
</tr>
<tr>
<td>Marketing efficiency (ATR/ATMC)</td>
<td>2.70</td>
</tr>
</tbody>
</table>

Source: Field survey by author in 2010-11

4.8 Constraints in Peach Production and Marketing

Sait *et al.* (2004) have elaborated the cultural and financial constraints of farmers in getting best condition peaches in Turkey. Sometimes peaches and their farmers face high risk in production and selling. It was noted that peach cultivation or farming lead to profit but must gathered prior information about selling and buying conditions. Peach farming proved very common in areas where farmers are small particularly farmers have scarce resources. Farmers usually face so many issues in production and marketing.
Khalid et al. (2007) expressed major difficulties which have delayed the optimum fruit production in Pakistan and their export to the potential markets. The research was confined to investigate the major constraints in selling mechanism and give recommendations in procedures and methods for increasing the global export to other countries. Pre-season selling of fruit orchards is one the main reason of the grower’s weak financial position. The nominal facilities in the form of cold storages and weak farm to roads are causing 25-40 percent damages to the fruits and hence reduce the stock and increase the prices. The fruit orchard growers are getting one-fourth of end users’ price, while major part is taken by the businessmen in the markets. The part of intermediaries in end user’s price may be reduced by awareness about the agricultural loans and market information, lowering the post-harvest losses, making ideal and suitable conditions of the market structures, provision of transportation facilities in peak time on reasonable rate and ideal packaging material. It was also noticed that the fruit selling places were not open for all sellers and buyers.

Aparna (2012) studied marketing constraints of supermarket channels and two traditional marketing channels in the Rangareddy district of Andhra Pradesh in India. Rejections of low grade produce, procurement according to indent and lack of knowledge of grading have been identified as the major constraints of supermarket supply farmers. The major constraints expressed by the traditional market supply farmers include middlemen menace, higher distance to the market and high market charges.

There were several major constraints in peach production and marketing which were reported by the respondents in the study area during 2010-11 and were shown in the table 4.17. These constraints have made peach production and revenue less of the growers. Comparing with other peach growing areas, the nature of our farmers constraints were similar to those areas which were reflected by other researchers. It was noticed in the research as reflected in table 4.17 that forty five percent farmers have said that they have less of resources for carrying management practices and hence borrow money market commission agents.50% respondents in the
research districts have pointed out the soaring expenses of all types of farming raw materials like chemical fertilizers, chemical pesticides, cartons and other decoration items needed for marketing of the product. Thirty three percent farmers have pointed out main issues in cultural practices which are insects, diseases and hailstorm, torrential rains and sometimes wind etc and these are mostly due to the favourable climatic condition of the area. Twenty five percent farmers have shown ignorance of the buying, selling and market intelligence, rates of the fruit per carton and supply sources etc and mostly got information from the market person in the whole sale markets. Forty percent of the respondents in the research districts were of the opinion that major expense are incurred on the shifting of fruit from farm to down country markets mainly Peshawar, Rawalpindi and Lahore. Forty five percent of respondents have noted that softness characteristics of the peach were huge constraint and could not be kept for extended time in cold store. Similarly thirty percent farmers were also of the opinion that major rate fluctuation of their produce in all down country main markets was changing very frequently.

Table 4.17 Key Problems in Peach Production and Marketing chains

<table>
<thead>
<tr>
<th>Name of Problem</th>
<th>No of Farmers</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing rates of Agriculture raw materials</td>
<td>150</td>
<td>50</td>
</tr>
<tr>
<td>Lack of financial resources</td>
<td>135</td>
<td>45</td>
</tr>
<tr>
<td>Perishable nature of Product</td>
<td>135</td>
<td>45</td>
</tr>
<tr>
<td>Highest shifting expenses</td>
<td>120</td>
<td>40</td>
</tr>
<tr>
<td>Insect, Diseases occurrence and hailstorm, torrential rains etc attack issues</td>
<td>99</td>
<td>33</td>
</tr>
<tr>
<td>Frequent changing of rates of final product in markets</td>
<td>90</td>
<td>30</td>
</tr>
<tr>
<td>No or less knowledge about market intelligence</td>
<td>75</td>
<td>25</td>
</tr>
</tbody>
</table>
4.9 Relationship between fruit quality attributes and price

The findings of some renowned researchers have been elaborated about quality of fruit and its relation to price and acceptance in the markets.

Herregods (1976) studied that Price level is dependent on the external and internal quality of the product. Each and every commodity of fruits and vegetables has specific quality criteria much desired by the consumer. For apples there exists yet more complete depiction with respect to the optimum quality aspects. To reach the optimum quality the choice of the variety, picking in different time, Setter refrigerating and more sophisticated C.A. circumstances, wet forced air pre-cooling and refrigerated transport are strategies with higher costs, but also with higher benefits, to arrive at a profitable quality.

Timothy (1983) analyzed muscadine grapes that were grown on greater area of Florida mainly due to the climatic favourable condition needed for greater quality grapes production. Potential markets for muscadine grapes are direct marketing, processed market, and the commercial fresh market. In this paper enterprise budgets are established, potential markets are discussed, and potential returns are explored to aid the potential producers in their decision making.

Russell et al. (1992) analyzed that marketing theories associated with quality, location, and time for the U.S. apple industry. Results of the study suggest that size, storage method, grade, and seasonality are the most important factors on the price of apples. Area of apple origin and variety were the least important influences on apple prices.

Dolan, Humphrey & Pascal (1999) argue that the requirements of the UK supermarkets on the one hand, associations who work in the mandatory Contracting environment are those skillful of encouraging quality.

Cook (2000) examined the suggestions of stake holders in fresh fruit and vegetables value chain in the US market. The fast spread of quality
center might force the old retailers for changing their business to the super store format.

Timothy and Wojciech (2003) stated that timely acceptance of new varieties is critical to profitable peach production, and peach quality is a primary factor driving adoption in Georgia peach growing regions. The relative impact of the key external and internal peach quality attributes on adoption is considered. Decisions making on new varieties are influenced by the age distribution of the orchard, information about new varieties to growers.

Linus et al. (2007) examined that knowing consumer observations and approaches may lead to vital standards conditions for buying and selling. People eat banana and dates more than the apple as because of its dominant characteristics like colour, flavor and sweetness. Mango, Apple and orange are also liked due to the flavour, sweetness, and firmness of these fruits. Maximum numbers of end users are willing to give 25 percent extra on unit price for best quality orchards produce but 94 percent end users refused to pay to 50 percent for fresh fruits.

Sabir and Zakir (2010) pointed out good quality citrus mandarin produced in Punjab Pakistan, while district Sargodha having more area and kinnnow production. The study revealed that by enhancing the quality fruit, the farmers have high income while the end users have best quality fruit.

Samina et al. (2012) elaborated that young 'Kinnow' mandarin trees often create inferior quality fruit with less juice and more rind and rag contents. However, less is known about the role of PGRs on the fruit quality of young 'Kinnow' mandarin trees. Maximum fruit attributes excluding non-decreasing sugars (%) may be important during storage life. It is noted that the citrus attributes except AA may be improved through using kinetin.
Relationship between fruit quality attributes and price per in the study area during 2010-11

Quality attributes and price have close relationship. Consumer perception and attitude towards fruit quality is important in setting quality specification for marketing as well as providing a useful guide for post-harvest research aimed at quality improvement of fresh produce. Fruit quality has several interpretations and perception among producers, marketers and consumers. Quality is often defined from the product or consumer orientation and that the combinations of product attributes constitute quality while the consumer’s perception and response to those attributes be referred to as acceptability.

4.9.1 Average price of Red, Green, White colour Peaches

The relationship between the price and quality of red, green, white peaches was tested in this study and it was concluded from table 4.18 that the consumer has highest preferences for red peaches and pay average price of Rs. 337.55 per carton and red quality has statistically significant effect on the price as evident from the f- statistics 2.83 (.007). The average price of green quality peach was Rs. 214.98 per carton and it shows that consumers were willing to pay less prices for this category of peaches than the red and as revealed in the table 4.18 from f- value 2.45 (.018), the green quality peaches have statistically significant effect on the price while there is less preference for white quality of peach and have average price of Rs. 146.70 per carton and as shown by f- statistics 1.61 (.131) in table 4.17, there was no statistically significant effect of white quality on price.

4.9.2 Average price of Big, Medium and Small sizes Peach

The relationship between the price and different sizes of peaches was tested in this study and it was concluded that the consumers were highly sensitive to the prices of big and small sizes peaches and paid average maximum price of Rs. 356.20 per carton for big and minimum for small sizes of Rs. 174.82 per carton as compare to medium sizes as evident from the f- statistics 2.765 (009) and 3.070 (.004) respectively for both categories.
Hence these two sizes of peaches have also statistically significant effect on prices. Medium sizes peaches have price of Rs. 256.50 per carton and f-statistics shows that there was no statistically significant effect on price of medium sizes.

4.9.3 Average price of Early, Medium, and Late Peach varieties

The relationship between the price and different peaches varieties based on growing season namely early, mid and late season varieties was tested in this study and it was concluded that the average price of early peach varieties have average price of Rs.363.55 per carton and according to the f-value 2.542 (.015) in table 4.18, there is statistically significant effect on the price of early peach variety. The mid and late season peach varieties have average prices of Rs.255.76 and Rs. 265.95 per carton and their f-statistics 1.074 (.380) and 1.517 (.161) depict that there were no significant effect of mid and late season peach varieties have on their prices.

4.9.4 Average price of Sweet, and Sour quality Peaches

In this study, the prices were tested against sweet and sour quality of peaches and results showed that the average price of sweet quality peaches received Rs. 319.52 per carton and f-value 2.006 (.054) in table 4.18 shows that the sweet quality has no statistically significant effect on price as the consumer will pay whatever the price of sweet quality peaches have. The sour quality peaches have mean price of Rs.162.57 per carton with f-statistics 4.430 (.000), which shows that there is significant effect of sour quality on prices.

4.9.5 Average price of Hard, and Soft quality Peaches

The relationship between the price and hard, soft quality peaches have been tested in the study and it was concluded that the average price of hard quality peach have average price of Rs. 301.23 per carton and according to the f-value 2.958 (.005) in table 4.18, there is statistically significant effect on the price of hard quality peaches. The soft quality peach has average price of
Rs. 142.32 per carton and its f- statistics .379 (.914) shows that there was no significant effect of soft quality peach on the price.

Table 4.18  Quality attributes and price per carton relationship of peach fruit in the study area during 2010-11

<table>
<thead>
<tr>
<th>Quality Attributes</th>
<th>Average Price per carton Rs.</th>
<th>Std. Deviation</th>
<th>F- statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red colour peach</td>
<td>337.55</td>
<td>68.462</td>
<td>2.833 (.007)</td>
</tr>
<tr>
<td>Green colour peach</td>
<td>214.98</td>
<td>53.560</td>
<td>2.455 (.018)</td>
</tr>
<tr>
<td>White colour peach</td>
<td>146.70</td>
<td>38.284</td>
<td>1.619 (.130)</td>
</tr>
<tr>
<td>Big size peach</td>
<td>356.20</td>
<td>63.932</td>
<td>2.765 (.009)</td>
</tr>
<tr>
<td>Medium size peach</td>
<td>256.50</td>
<td>49.441</td>
<td>1.582 (.140)</td>
</tr>
<tr>
<td>Small size peach</td>
<td>174.82</td>
<td>42.326</td>
<td>3.070 (.004)</td>
</tr>
<tr>
<td>Early peach variety</td>
<td>363.55</td>
<td>83.574</td>
<td>2.542 (.015)</td>
</tr>
<tr>
<td>Medium peach variety</td>
<td>255.76</td>
<td>55.013</td>
<td>1.074 (.380)</td>
</tr>
<tr>
<td>Late peach variety</td>
<td>265.95</td>
<td>64.353</td>
<td>1.517 (.161)</td>
</tr>
<tr>
<td>Sweet peach</td>
<td>319.52</td>
<td>60.008</td>
<td>2.006 (.054)</td>
</tr>
<tr>
<td>Sour peach</td>
<td>162.57</td>
<td>37.502</td>
<td>4.430 (.000)</td>
</tr>
<tr>
<td>Hard peach</td>
<td>301.23</td>
<td>60.153</td>
<td>2.958 (.005)</td>
</tr>
<tr>
<td>Soft peach</td>
<td>142.32</td>
<td>28.220</td>
<td>.379 (.914)</td>
</tr>
</tbody>
</table>

Source: Field survey by author in 2010-11

4.10 Estimation of Econometric Models

To analyze the effect of independent variables on dependent variable, to study the relative share of independent variables in the dependent variables and to make predictions, econometric models are used. The theoretical view of various development economists about fruit production and their marketing has been expressed in the review of literature chapter.
4.10.1 Variables used in Econometrics Model

Based upon the review of literature and preliminary group discussion with peach growers in the study area, major factors of peach productions are farm yard manure, various chemical fertilizers, number of pesticides sprays, number of skilled and un-skilled labours for farm yard manure application, hoeing, pruning, chemical fertilizers applications, application of pesticides spray and irrigation.

Polynomial regression model was used in the analysis of data. The collected data was analyzed by regressing the value added on the Peach fruit production for each stage against the value of investment in the value chain.

The model used for the analysis is written explicitly, is as stated below:  
\[ Y_i = b_0 + b_1 x_i^1 + b_2 x_i^2 + b_3 x_i^3 + \ldots + b_k x_i^k + e_i \]

Where,  
\( Y_i = \) value added on the peach fruit production  
\( X_i = \) value of investment in stage \( (t = 1, 2, \ldots, k \) stage i.e. investment/cost of the stages of value addition).  
\( b_0 = \) Constant term  
\( b_i = \) Investment coefficients  
\( e = \) Error term.

Generally, the objective of using a polynomial model is, to construct composite variables, which are linear combination of exogenous variables to capture the effect of each stage of the value chain on the value been added. This model is regarded as a fairly sophisticated model, which has been widely used in the estimation of polynomial relationships.

In order to estimate the determinants of participation in the value chain, the following probit regression

The model is implicitly stated as  
\[ Y^* = (x_1, x_2, x_3, x_4, x_5) + e_i \]
$Y^*_{i}= 1$ if $y^*_{i}>0$, 0 if $Y^*_{i} = 0$

The explicit form of the model is stated as

$$Y^*_{i}= b_0+b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5 +e_i$$

Where

$Y^*_{i}$ = probability to participate (participating=1, non-participating=0)

$X_1$ = per hectare use of farm yard manure

$X_2$ = per hectare use of labour for fym application

$X_3$ = per hectare use of labour for hoeing in the peach orchards

$X_4$ = per hectare use of labour for pruning in the peach orchards

$X_5$ = per hectare quantity of fertilizers used in peach orchards

$X_6$ = per hectare use of labour for fertilizers application

$X_7$ = number of pesticides sprays per hectare

$X_8$ = per hectare use of labours for pesticide sprays

$X_9$ = per hectare use of labours for irrigations

$Bi$ is the parameter

$E_i$ is the error term

**Farm Yard Manure (FYM):** Farm yard manure is an important agricultural input in peach fruit production and orchards and farmers apply it regularly for soil condition, moisture retention and microbial activities etc. in their orchards.

**Chemical Fertilizers (CF):** Various chemical fertilizers are very regularly used in all kind of fruit orchards especially peach for quality and quantity of this fruit throughout the growing season despite of their high prices. It directly affects the quantity and quality of fruit in form of size, colour, taste and shape etc.

**Chemical Pesticides Sprays (PS):** Chemical pesticides and their timely sprays have an important role in the control of insects and diseases which can directly affect the fruit quality and quantity. If the pests are not controlled on proper time, they can give maximum losses to the growers in the form of less and low quality peach fruit.
Skilled and unskilled labours (L): various types of labour are used in fruit orchards throughout the growing season for different activities which include labour timely and proper application of farm yard manure, hoeing, suitable pruning, efficient and proper application of chemical fertilizers, ideally pesticides spray application and timely provision of irrigation to the fruit orchards.

Table 4.19  Estimates of Peach Production in cartons per hectare

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>St. Error</th>
<th>t-statistics</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1024.170</td>
<td>110.549</td>
<td>9.264</td>
<td>0.00</td>
</tr>
<tr>
<td>FYM*</td>
<td>0.099</td>
<td>25.314</td>
<td>1.464</td>
<td>0.014</td>
</tr>
<tr>
<td>FYML</td>
<td>0.048</td>
<td>13.447</td>
<td>0.680</td>
<td>0.49</td>
</tr>
<tr>
<td>HL</td>
<td>0.031</td>
<td>15.364</td>
<td>0.410</td>
<td>0.68</td>
</tr>
<tr>
<td>PL</td>
<td>0.036</td>
<td>34.473</td>
<td>0.379</td>
<td>0.70</td>
</tr>
<tr>
<td>FT*</td>
<td>0.204</td>
<td>26.400</td>
<td>2.173</td>
<td>0.03</td>
</tr>
<tr>
<td>FTL</td>
<td>0.120</td>
<td>35.669</td>
<td>1.1388</td>
<td>0.25</td>
</tr>
<tr>
<td>PS*</td>
<td>0.67</td>
<td>28.466</td>
<td>0.5892</td>
<td>0.045</td>
</tr>
<tr>
<td>PSL</td>
<td>0.64</td>
<td>18.331</td>
<td>0.689</td>
<td>0.49</td>
</tr>
<tr>
<td>IRRIL</td>
<td>0.22</td>
<td>18.086</td>
<td>0.275</td>
<td>0.78</td>
</tr>
</tbody>
</table>

Durbin- Watson = 1.67, $R^2=0.67$, $F$- statistics = 1.248, *Significant (p<0.05)

FYM= Number trollies of farm yard manure
FYML= Number of labour used for farm yard manure application
HL= Number of labour used for hoeing in the peach orchards
PL= Number of labour used for pruning in the peach orchards
FT= Number of bags of fertilizers used in peach orchards
FTL= Number of labour used for fertilizers application
PS= per use and number of pesticides sprays
PSL= Number of labour used for pesticide sprays
IRRIL= Number of labour used for irrigations in peach orchards
Table 4.1 shows estimates of peach production in the study area for the year 2010-11. The $R^2$ value of 0.67 can be regarded as quite good fit in view of the cross sectional data involved in this data. This reflects that 67% variation in the peach production is explained by the independent variables included in the model.

**Farm Yard Manure (FYM):**

The results showed that the coefficient of FYM was positive and statistically significant at 5% as evident from the $p$-value 0.014. These results indicated that one trolley of FYM per hectare could increase 24 numbers of cartons of peach production per hectare in the area. Hence the FYM and Peach production has positive correlation in the study area.

**Labour used for Farm Yard Manure hectare application**

The result showed in table 4.19 that the coefficient (0.048) was positive and non-significant at 5% probability level as the $p$-value was 0.49. It expressed that one labour hiring per hectare for FYM application would increase 12 numbers of cartons per hectare in the area.

**Labour used for Hoeing**

The table 4.19 showed that the coefficient (0.031) of labour for hoeing was positive and non-significant ($p$-value 0.68) at 5% probability level. The coefficient reflected that by hiring one labour for doing hoeing in peach orchard could give 8 cartons per hectare.

**Labour used for timely and proper Pruning in Peach orchards**

The results revealed in table 4.19 that the coefficient (0.036) of labour for doing pruning in peach fruit orchard was positive and non-significant ($p$-value 0.70) at 5% probability level. The coefficient showed that by hiring one labour for doing pruning in peach fruit orchards could give 9 cartons per hectare in the study area.
Use of various Chemical Fertilizers in Peach fruit orchards

It is evident from the table 4.19 that the coefficient (0.204) of using various chemical fertilizers in peach fruit orchard was positive and statistically significant (p-value 0.03) at 5% probability level. The coefficient pointed out that the use of one bag of chemical fertilizer in peach fruit orchards would give 50 cartons per hectare in the study area.

Labour used for efficiently applying Chemical fertilizers in Peach orchards

The results in table 4.19 pointed out that the coefficient (0.120) of labour for efficiently applying various chemical fertilizers in peach fruit orchard was positive and non-significant (p-value 0.25) at 5% probability level. The coefficient showed that by hiring one labour for applying chemical fertilizers in peach fruit orchards could give 30 cartons per hectare in the study area.

Spray of Chemical Pesticides in Peach orchards

The results in table 4.19 pointed out that the coefficient (0.120) of labour for efficiently spraying chemical pesticides in peach fruit orchard was positive and non-significant (p-value 0.25) at 5% probability level. The coefficient showed that by hiring one labour for applying chemical fertilizers in peach fruit orchards could give 30 cartons per hectare in the study area.

Labour used for efficiently spraying Chemical pesticides in Peach orchards

The results in table 4.19 revealed that the coefficient (0.64) of labour for efficiently spraying chemical pesticides in peach fruit orchard was positive and non-significant (p-value 0.49) at 5% probability level. The coefficient showed that by hiring one labour for spraying chemical pesticides in peach fruit orchards could give 16 cartons per hectare in the study area.
Labour used for applying irrigation in Peach orchards

The results in table 4.19 revealed that the coefficient (0.64) of labour for efficiently spraying chemical pesticides in peach fruit orchard was positive and non-significant (p-value 0.49) at 5% probability level. The coefficient showed that by hiring one labour for spraying chemical pesticides in peach fruit orchards could give 16 cartons per hectare in the study area.

4.10.2 The effect of quality attributes on Peach Price through Dummy Variable Multiple Regression Model

In regression analysis, the dependent variable is mostly influenced not only by quantitative variables but also by variables that are qualitative in nature. Since such variables usually present the presence and absence of an attribute. One way to quantify such attribute is by constructing artificial variables that take on values of 1 and 0 indicating presence and absence of that attribute. Variables that assume such 0 and 1 values are called dummy variables. Dummy variables can be incorporated in regression models as quantitative variables. Such models are called analysis of variance (ANOVA) models. Analysis of variance models are used to assess the statistical significance of the relationship between quantitative regressand qualitative or dummy repressors. They are often used to compare the differences in the mean values of two or more groups or categories (Gujarati, 2004). To compare the price of peach fruit across quality attributes, dummy variables multiple regression models were used in which dummy repressors taking the value of 1 if the observation belongs to a particular quality attribute group and 0 if it does not belong to that group. The results of dummy variables multiple regression models to compare the peach price and various groups of quality attributes namely, colour, sizes, varieties, taste and firmness are as follow.

4.10.2.1 Dummy Variable Multiple Regression Model Estimates according to different categories

To compare the quality attributes and price of peach fruit, dummy variable multiple regression models was used in which dummy regressors
taking the value of 1 if the observation belongs to a particular category and 0 if it does not belong to that category. Dummy variables Dc, Ds, Dv, Dt and Df were used for different categories of quality attributes. The dummy variable regression model to compare the peach price and five different attributes categories is as under.

**Table 4.20  Dummy Variable Multiple Regression Model Estimates according to Peach Colour**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>St. Error</th>
<th>t-statistics</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>337.713</td>
<td>3.155</td>
<td>107.007</td>
<td>0.00</td>
</tr>
<tr>
<td>Green</td>
<td>-122.483</td>
<td>4.463</td>
<td>-27.442</td>
<td>0.00</td>
</tr>
<tr>
<td>White</td>
<td>-190.796</td>
<td>4.463</td>
<td>-42.748</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Durbin-Watson = 0.95, $R^2=0.677$, $F$-statistics = 938.27, *Significant (p<0.05)

\[ P = \beta_0 + \beta_1 D_r + \beta_2 D_g + \beta_3 D_w + \epsilon_i \]

Where

$\beta_0, \beta_1, \beta_2, \beta_3$ are the parameters.

P= Price of Peach fruit

Dr (dummy red) = 1 if variety is red, 0 otherwise

Dg (dummy green) = 1 if variety is green, 0 otherwise

Dw (dummy white) = 1 if variety is white, 0 otherwise

$\epsilon_i$= error term

Table 4.20 depicts the results of dummy variable multiple regression model of three colours namely red, green and white. C was the benchmark of red colour and showed average price of Rs. 337.713 per carton in Pak rupees which were statistically significant as evident from the p-value 0.00. The coefficient of green colour was -122.483 and can be compared with the price of red colour, which means that Rs. 122.483 was less than the red colour and the price per carton of green colour was Rs. 215.23 and was also statistically significant from p-value 0.00. The coefficient of white colour -190.796
indicated that the price per carton of white colour peach was Rs. 190.796 less than the price of red colour and its original price was Rs. 146.917 white the green colour was also statistically significant as reflected by p-value 0.00. The R-square showed that 67% variation in peach price was explained by the different colours i.e. red, white and green attributes.

Table 4.21  Dummy Variable Multiple Regression Model Estimates according to Peach Sizes

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>St. Error</th>
<th>t-statistics</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>355.53</td>
<td>3.0412</td>
<td>116.902</td>
<td>0.00</td>
</tr>
<tr>
<td>Medium</td>
<td>-99.03</td>
<td>4.3010</td>
<td>-23.025</td>
<td>0.00</td>
</tr>
<tr>
<td>Small</td>
<td>-180.71</td>
<td>4.3010</td>
<td>-42.017</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Durbin-Watson=1.001, R²=0.663, F- statistics = 885.43, *Significant (p<0.05)

\[ P = \beta_0 + \beta_1 D_{sl} + \beta_2 D_{sm} + \beta_3 D_{ss} + e_i \]

Where

\( \beta_0, \beta_1, \beta_2 \) and \( \beta_3 \) are the parameters.

P= Price of Peach fruit

Dsl (dummy size large) = 1 if size is large, 0 otherwise

Dsm (dummy size medium) = 1 if size is medium, 0 otherwise

Dss (dummy size size) = 1 if size is small, 0 otherwise

ei = error term

Table 4.21 shows the results of dummy variable multiple regression model of three sizes namely large, medium and small. C was the benchmark of large size and showed average price of Rs. 355.53 per carton in Pak rupees, which was statistically significant as evident from the p-value 0.00. The coefficient of medium size was -99.03 and can be compared with the price of large size, which means that the medium size peach received Rs. 99.033 less than the large size peach and its exact price per carton was Rs. 256.49 and was also statistically significant as verified from p-value 0.00. The
coefficient of small size was -180.71 which indicated that Rs. 180.71 was received by small size less than the price of large and thus small size peaches fetched Rs. 174.82 per carton and was also statistically significant as expressed from p-value 0.00. The R-square value explained 66.3% changes in peach price due to the different sizes (large, medium and small) attributes of peach fruit.

**Table 4.22** Dummy Variable Multiple Regression Model Estimates according to Peach Varieties

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>St. Error</th>
<th>t-statistics</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>363.91</td>
<td>3.93</td>
<td>92.54</td>
<td>0.00</td>
</tr>
<tr>
<td>Medium</td>
<td>-107.53</td>
<td>5.56</td>
<td>-19.33</td>
<td>0.00</td>
</tr>
<tr>
<td>Late</td>
<td>-97.93</td>
<td>5.56</td>
<td>-17.609</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Durbin-Watson=1.41, R²=0.338, F- statistics = 228.98, *Significant (p<0.05)

\[ P = \beta_0 + \beta_1 \text{Dev} + \beta_2 \text{Dmv} + \beta_3 \text{Dlv} + e_i - - - - - - - - - - - - 4.4 \]

Where

\( \beta_0, \beta_1, \beta_2 \text{and} \beta_3 \) are the parameters.

P= Price of Peach fruit

Dev (dummy early variety) = 1 if variety is early, 0 otherwise

Dem (dummy medium variety) = 1 if variety is medium, 0 otherwise

Del (dummy late variety) = 1 if variety is late, 0 otherwise

ei= error term

Table 4.22 pointed out the results of dummy variable multiple regression models of types of peach varieties based on three seasons namely early, medium and late. C was the benchmark of early peach variety and showed average price of Rs. 363.91 per carton in Pak rupees, which was statistically significant as evident from the p-value 0.00. The coefficient of medium peach variety was -107.53 and can be compared with the price of early peach variety, which means that the medium peach variety received Rs.
256.38 and medium variety was also statistically significant from p-value 0.00. The coefficient of late peach variety was -97.93 which indicated that the late peach variety fetched Rs. 265.98 as compared to early variety and thus late variety was also statistically significant from p-value 0.00. The R-square value explained 33.8% changes in peach price mainly due to the different seasonal varieties attributes of peach fruit.

Table 4.23 Dummy Variable Multiple Regression Model Estimates according to Peach Taste

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>St. Error</th>
<th>t-statistics</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>320.10</td>
<td>2.807</td>
<td>114.027</td>
<td>0.00</td>
</tr>
<tr>
<td>Sour</td>
<td>-147.96</td>
<td>3.970</td>
<td>-37.269</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Durbin-Watson=1.324, R²=0.699, F-statistics = 1388.99, *Significant (p<0.05)

P = β₀ + β₁Dsw + β₂Dsr + ei --------------------------------------------- (4.5)

Where

β₀, β₁ and β₂ are the parameters.

P= Price of Peach fruit

Dsw (dummy sweet) = 1 if taste is sweet, 0 otherwise

Dsr (dummy sour) = 1 if taste is sour, 0 otherwise

ei=error term

Table 4.23 reflected the results of dummy variable multiple regression models of two taste types of peach varieties namely sweet and sour. C was the benchmark of sweet peach variety and showed average price of Rs. 320.10 per carton in Pak rupees received for the sweet taste attribute, which was statistically significant as evident from the p-value 0.00. The coefficient of sour peach variety was -147.96, and can be compared with the price of sweet taste of peach variety, which means that the sour peach variety received Rs. 147.96 less than the sweet peach variety and its exact price per carton was
Rs. 172.14 and sour variety was also statistically significant from p-value 0.00. The R-square value explained that 69.9% changes in peach price were mainly due to different tastes (sweet and sour) of varieties attributes of peach fruit.

**Table 4.24**  Dummy Variable Multiple Regression Model Estimates according to Peach Firmness

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>St. Error</th>
<th>t-statistics</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>301.23</td>
<td>2.666</td>
<td>112.949</td>
<td>0.00</td>
</tr>
<tr>
<td>Soft</td>
<td>-154.12</td>
<td>3.771</td>
<td>-40.862</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Durbin-Watson=1.62, \( R^2=0.736 \), \( F \)-statistics = 1669.74, *Significant (p<0.05)

\[
P = \beta_0 + \beta_1Dha + \beta_2Dso + ei\]

Where

\( \beta_0, \beta_1 \) and \( \beta_2 \) are the parameters.

\( P= Price \) of Peach fruit

Dha (dummy hard) = 1 if firmness is hard, 0 otherwise

Dso (dummy soft) = 1 if firmness is soft, 0 otherwise

\( ei=error \) term

Table 4.24 depicted the results of dummy variable multiple regression models of two firmness types of peach fruit namely hard and soft. Constant was the benchmark of hard peach fruit and reflected average price of Rs. 301.23 per carton in Pak rupees received for the hard attribute of fruit, and has statistically significant as evident from the p-value 0.00. The coefficient of soft peach fruit was -154.120, and can be compared with the price of hard peach fruit, which means that the soft peach fruit received Rs. 147.11 per carton and soft fruit was also statistically significant from p-value 0.00. The R-square value explains 73.6% changes in peach price due to the firmness (hard and soft) attributes of peach fruit.
4.11 Different forms of Value Additions

1. Differentiate the products on the basis of quality or size, and sell the same at different prices to appropriate customers.
2. Minimally process items to a form and shape which is closer to the final consumer product.
3. Process the whole item or its functional components, or lower grade, waste or by-products by converting the short shelf-life product to a storable form (e.g. making of juices, squashes and canned peach fruit).

Modern retailers offer value-added, processed fruit products, spend time on processing activities rather than on produce sourcing and storage, add complementary products and services related to healthy eating and living, and try to understand better and attempt to respond efficiently to wants and needs of its local customer. Certain fruits could be especially promoted due to their health proprieties. In addition, health-related information in the form of books, booklets or leaflets could be distributed, free or at price. Offering of some fresh preparations in the shop such as juices, marmalade and canned peach fruit may result in the impulse purchases. A category may be created after fruit based health link and could even include complementary products which are usually sold (without prescription) in drug stores. Small exclusive retail chain operators would be more agile and responsive in fulfilling these low cost wants and latent needs of their customers than supermarkets. The transaction costs may be reduced to control high fluctuations in the market price. The food chains in Pakistan in general and study area are in full of inefficiencies — a result of inadequate infrastructure, too many middlemen and wholesalers, no proper law and an indifferent attitude of the involved partners.

4.12 Strengths, Weaknesses, Opportunities and Threats Analysis

The SWOT analysis is required to identify the potential and weak points of peach fruit value chain in the study area as a base for future planning based on strength, opportunities and overcoming the weaknesses.
The following strengths, weaknesses, threats and opportunities of the peach value chain in the project area are presented as below.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The study area is known for best quality and highest peach production.</td>
<td>• Quality peach production is mainly dependent on climate.</td>
</tr>
<tr>
<td>• Known peach varieties are grown.</td>
<td>• Low production due to inadequate agri. practices.</td>
</tr>
<tr>
<td>• The peach produce is marketed/ exported to leading national, Afghanistan and gulf counties.</td>
<td>• Illiterate peach growers cannot apply the improved agriculture practices.</td>
</tr>
<tr>
<td>• Well trained and experienced human resource in pre and post-harvest management are available.</td>
<td>• Saturation of few down country markets.</td>
</tr>
<tr>
<td>• Huge investment is made in fruit nurseries, agriculture inputs, packaging materials etc.</td>
<td>• No exploration of new local and export markets.</td>
</tr>
<tr>
<td>• Climatic advantage in the study area.</td>
<td>• Cannot be stored for longer period due to highly perishable in nature.</td>
</tr>
<tr>
<td>• Market access to the national markets has been improved</td>
<td>• Longer supply period for about 4-5 months.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Peach fruit export to Afghanistan, China and central Asia may fetch foreign exchange.</td>
<td>• Increased competition from fruits during the season.</td>
</tr>
<tr>
<td>• Increasing demand through major markets of the country.</td>
<td>• Impact of climate change on peach production.</td>
</tr>
<tr>
<td>• Initiative of canned peach fruit marketing locally and export.</td>
<td>• Occurrence of consistent number of diseases and insects attack.</td>
</tr>
<tr>
<td>• Investment in peach fruit processing and refrigerated vans.</td>
<td>• Increased number of pesticide sprays.</td>
</tr>
<tr>
<td>• Boost for agro based industry in the country.</td>
<td>• Large quantity of fruit loss due to post harvest losses.</td>
</tr>
<tr>
<td>• Employment opportunities for skilled and un-skilled labour.</td>
<td>• Prolong peach marketing season.</td>
</tr>
</tbody>
</table>

Other
• Initiation of agro based industries in the study area.
• Starting of cooperative marketing and price stabilization.

• Inflation rate with reference to costs of agricultural inputs.
• Loan availability on highest markup.
• Continuous peach planting without proper planning.

4.13 Peach growers and Buyers Relationship in the Study Area

There are different marketing chains for peach and other fruits which differ among regions, crops and farmers. An important stage to understand is the first link in the production or marketing chain between the peach farmers and the buyers. According to FAO (1989), some actors who can form this link are shown in Table 4.25.

<table>
<thead>
<tr>
<th>Type of buyers</th>
<th>Characteristics of the buyer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractors</td>
<td>Buy crops in the field and undertake the harvesting.</td>
</tr>
<tr>
<td>Agents, collectors</td>
<td>Buy the harvested crop at the farm.</td>
</tr>
<tr>
<td>wholesalers</td>
<td>Buy produce from farmers at firm prices and sell at the wholesale market for Wholesalers their own account.</td>
</tr>
<tr>
<td>Secondary wholesalers</td>
<td>Buy at the wholesale market and transport the produce either to sell to retailers or at another wholesale market where prices are higher.</td>
</tr>
<tr>
<td>Semi-wholesalers</td>
<td>Are located near the wholesale market and sell produce by the box either to small retail businesses or directly to consumers.</td>
</tr>
<tr>
<td>Commission agents</td>
<td>Auction produce in a wholesale market on a commission basis.</td>
</tr>
<tr>
<td>Retailers</td>
<td>Sell to the final consumer such as street hawkers, stall holders, retailers, greengrocers or supermarkets</td>
</tr>
</tbody>
</table>

Source: Own compilation
V. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This study was conducted to carry value chain analysis of peach fruit to determine important players in the chain, peach production Costs, profitability of established Peach Orchard, the marketing costs, to identify the efficient marketing channel in Peach Value Chain, to do SWOT analysis of the peach value chain, and to put forward some recommendation to the stakeholders in the value chain in the study area.

The data was gathered through pretested questioners from 300 peach orchard farmers in six villages having large number of peach trees available, practically involvement of the farmers in the management practices in the study area villages of two districts namely Swat and Buner of Khyber Pakhtunkhwa during 2010-11 through random sample procedure. The data was also supported by the secondary data of the districts in the province. As District Swat was the largest peach growing area among all the twenty five districts, therefore 272numbers of respondents from Swat and 28 numbers from Buner were selected and interviewed about peach crop practices involved, their costs, agricultural inputs used in peach production and marketing, profitability from peach fruit, factors affecting peach fruit, efficient marketing channel, opportunities, weaknesses and problems in the chain etc. Data about price and quality relationship have also been collected in the study. The data was further analyzed and processed for deriving results and conclusions.

In this study, the effect of literacy, level of education, land holding, orchard size, Peach variety wise production was also assessed. The average cost per hectare of peach production was Rs. 81,367, where in the cost of production include purchase of green natural manure, different chemical fertilizers, various chemical pesticides and involving daily wage labor for application of Farm yard manure, different fertilizers, chemical pesticides sprays and irrigation application during 2010-11. The average cost per hectare of peach marketing was Rs. 228,985 and this cost comprised of
purchase of empty cartons, picking charges, packing and grading charges, paper and items necessary for beautification of product, shifting of fruit to down country markets, loading, un-loading of fruit at local and in the markets and rates charged as service at the main fruit markets. The mean total net profit per hectare from peach orchard was Rs. 308,408.

The mean total marketing cost of peach per hectare was Rs. 228,985 during 2010-11 and maximum quantity of the produce was marketed to Lahore and Rawalpindi with 41 and 36 percent of the total quantity of the respondents marketing efficiency was 2.7 for these markets, which showed that these were most efficient markets as the value was greater than one. Some of the strengths of value chain were identified in study area. The study area is known for best quality and highest peach production. Known peach varieties are grown. The peach produce is marketed/ exported to leading national, Afghanistan and gulf counties. Well trained and experienced human resource in pre and post-harvest management are available. Huge investment is made in fruit nurseries, agriculture inputs, packaging materials etc. Favourable Climatic is advantage for peach fruit production in the study area. Market access to the national markets has been improved

Important primary value chains players were peach producers, middlemen, wholesalers, retailers, transporters and exporter at national level markets. Besides these, banks for loan disbursement, agriculture departments, research system, agriculture inputs supplier were also identified as secondary players.

Key problems highlighted during the study were shortage of non-availability of fund for fruit orchards management, extreme rates of agricultural raw materials, softness characteristic of the fruit, regular Insects and diseases attack occurrence, no pre market intelligence, frequent changing in rates of final fruit and maximum shifting charges.

There is need of potential yield and pest resistance peach cultivars may be presented in the research district. The study also highlighted the significant relationship between price and quality attributes namely sizes, colours, varieties, taste and firmness of the fruit. After picking to market
damages should be minimized by making new products and new, viable foreign markets may be found out for getting maximum revenue to the orchard farmers.

There was an important relationship between price and quality attributes of the peach fruit namely colours, different sizes, and seasonal availability of varieties, taste and firmness of the fruit. The quality attributes namely three different colours (red, green and white), three different sizes (large, medium and small), seasonal availability of varieties (early, medium and late), taste (sweet and sour) and firmness (hard and soft) had statistically significant effect on the price of peach fruit in the market.

5.2 Conclusion

It was observed from the data that there was mix of farmers in the area having age from 22 years to 85 years and education constitute 61 percent of all level staring from primary to post graduate. 31 percent farmers were illiterate. It was also noted that education has significant effect on the peach production and educated farmers have more production as compare to illiterate. Medium size land holding peach growers have more production than the small and big peach growers.

It was also revealed from the results that average market prices per carton were highest (Rs. 292 & Rs. 282) in small markets like Gujranwala and Faisalabad and was followed by largest national level Rawalpindi fruit market with low price of Rs. 280 in comparison.

It has been noticed from the study that there were three major fruit markets in the country namely Rawalpindi, Lahore and Peshawar. Out of three hundred numbers (300 Nos) of respondents, 102 Nos, 92 Nos and 42 Nos of peach growers have sold their produce to these markets with average mean quantity of 357,967 cartons (36%), 407,684 cartons (41%) and 89,492 (9%) cartons respectively.
The study also revealed that the average gross revenue per hectare of Rs. 618,760 with production cost of Rs. 81,367 and marketing cost of Rs. 228,985 respectively was received by the farmers in the study area while average net profit per hectare was Rs. 308,408.

Quality attributes and price of peach fruit have an important relationship. The price has significant effect on red, green colour peaches, big, small size of peaches, early peach variety, sour taste and hard in firmness peaches while there was no significant effect of price on white colour, medium size mid, late season varieties, sweet taste and soft peaches quality attributes.

5.3 Implications/Recommendations of the research to other Peach growing regions and similar supply chains in Pakistan

1. There is a strong need to undertake different capacity building programmes like organization of trainings, demonstrations, awareness generation, exposure visits and farmer-scientist interactions on different aspects of fruit value chains in the study area as well in other regions.

2. The contribution of technology, policy, institutional and infrastructural facilities to the development of value chains in agriculture should be assessed and applied.

3. The substantial linkages development should be established between peach growers and agricultural based developmental organizations.

4. Agriculture inputs markets may be regularized for price stability and timely availability of inputs.

5. Farmer-friendly communication networks like Market information System (MIS) should be established to disseminate timely market and export related information to the growers for knowing the market dynamics in neighboring countries.

6. Currently very meager quantity of peach is exported to Middle East countries, Afghanistan and central Asia. There is great potential for the exports opportunities to these countries, which needs to be explored.
7. Maximum quantities up to 30% are lost due to the mis-management of post-harvest and perishable nature of peach fruit. To overcome these losses and convert these to profit, necessary trainings in post-harvest management of peach fruit growers may be imparted in the peach growing regions.

8. The hilly tracts are very prone to natural calamities like hail storm, drought, floods and disease outbreak, therefore fruit orchards need crop insurance.

9. Peach growers essentially need help and supports from various government departments like Agriculture Extension, Research system and other organizations to prepare a comprehensive strategy of particularly cultivated area, varieties and farm investment.

10. New ways for enhancing of fruitful peach value chain may be find out and implemented as well in the peach growing regions.

11. Strengthening of peach growers linkages with local and foreign buying and selling place may be given top significance by the government and other organizations in the study area as well as in the region.

5.4 Future implication

This study was limited to peach growers of two districts of Khyber Pakhtunkhwa namely Swat and Buner due to financial and time constraints. The value chain study for any fruit category was not carried out neither in the study area nor in Khyber Pakhtunkhwa. Therefore, there is dire need to cascade further research in this area to address the value chain approach of fruits in broader spectrum. In future, more modern and advanced techniques can be used for estimating the peach value chain in particular and other fruits in general. The determined efforts to expand such research at national level will demonstrate the overall impact of value chain on each crop, including fruits, vegetables, inputs supplier and market men. This will provide a paved way to policy makers to assess the policies and constraints about fruit production, marketing, their input supplies, exports and other issue in the value chain fruit in the country.
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## A.1 Top 10 countries producing peaches and nectarines (% of World Production)

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Name of Countries</th>
<th>Percent World Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>44%</td>
</tr>
<tr>
<td>2</td>
<td>Italy</td>
<td>13%</td>
</tr>
<tr>
<td>3</td>
<td>USA</td>
<td>10%</td>
</tr>
<tr>
<td>4</td>
<td>Spain</td>
<td>8%</td>
</tr>
<tr>
<td>5</td>
<td>Greece</td>
<td>7%</td>
</tr>
<tr>
<td>6</td>
<td>France</td>
<td>3%</td>
</tr>
<tr>
<td>7</td>
<td>Turkey</td>
<td>3%</td>
</tr>
<tr>
<td>8</td>
<td>Iran</td>
<td>3%</td>
</tr>
<tr>
<td>9</td>
<td>Chile</td>
<td>2%</td>
</tr>
<tr>
<td>10</td>
<td>Argentina</td>
<td>2%</td>
</tr>
</tbody>
</table>

Source: FAO 2004

## A.2 Total peach area in provinces and Pakistan

<table>
<thead>
<tr>
<th>Year</th>
<th>K. Pakhtunkhwa</th>
<th>Punjab</th>
<th>Baluchistan</th>
<th>Pakistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-00</td>
<td>1.3</td>
<td>0.2</td>
<td>3.3</td>
<td>4.8</td>
</tr>
<tr>
<td>2000-01</td>
<td>1.3</td>
<td>0.2</td>
<td>4</td>
<td>5.5</td>
</tr>
<tr>
<td>2001-02</td>
<td>1.9</td>
<td>0.2</td>
<td>3.7</td>
<td>5.8</td>
</tr>
<tr>
<td>2002-03</td>
<td>5.4</td>
<td>0.2</td>
<td>3.6</td>
<td>9.2</td>
</tr>
<tr>
<td>2003-04</td>
<td>5.2</td>
<td>0.1</td>
<td>9.4</td>
<td>14.7</td>
</tr>
<tr>
<td>2004-05</td>
<td>5.5</td>
<td>0.1</td>
<td>9.5</td>
<td>15.1</td>
</tr>
<tr>
<td>2005-0</td>
<td>5.6</td>
<td>0.1</td>
<td>9.5</td>
<td>15.2</td>
</tr>
<tr>
<td>2006-07</td>
<td>5.7</td>
<td>0.1</td>
<td>9.6</td>
<td>15.4</td>
</tr>
<tr>
<td>2007-08</td>
<td>6</td>
<td>0.1</td>
<td>9.5</td>
<td>15.6</td>
</tr>
<tr>
<td>2008-09</td>
<td>6.2</td>
<td>0.1</td>
<td>9.5</td>
<td>15.8</td>
</tr>
</tbody>
</table>

Source: Government of Pakistan 2010
## A.3 Total peach production in provinces and Pakistan

<table>
<thead>
<tr>
<th>Year</th>
<th>K. Pakhtunkhwa</th>
<th>Punjab</th>
<th>Baluchistan</th>
<th>Pakistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-00</td>
<td>14.5</td>
<td>1.2</td>
<td>17.3</td>
<td>33</td>
</tr>
<tr>
<td>2000-01</td>
<td>14.8</td>
<td>1.3</td>
<td>16.9</td>
<td>33</td>
</tr>
<tr>
<td>2001-02</td>
<td>21</td>
<td>1.2</td>
<td>15.4</td>
<td>37.6</td>
</tr>
<tr>
<td>2002-03</td>
<td>60.2</td>
<td>1.1</td>
<td>15</td>
<td>76.3</td>
</tr>
<tr>
<td>2003-04</td>
<td>56.8</td>
<td>0.9</td>
<td>18.7</td>
<td>76.3</td>
</tr>
<tr>
<td>2004-05</td>
<td>50.9</td>
<td>0.5</td>
<td>18.1</td>
<td>69.5</td>
</tr>
<tr>
<td>2005-06</td>
<td>51.6</td>
<td>0.5</td>
<td>18.2</td>
<td>70.3</td>
</tr>
<tr>
<td>2006-07</td>
<td>53.1</td>
<td>0.4</td>
<td>17.7</td>
<td>71.2</td>
</tr>
<tr>
<td>2007-08</td>
<td>56.6</td>
<td>0.4</td>
<td>25.3</td>
<td>82.3</td>
</tr>
<tr>
<td>2008-09</td>
<td>57.8</td>
<td>0.5</td>
<td>25.4</td>
<td>83.7</td>
</tr>
</tbody>
</table>

Source: Government of Pakistan 2010

## A.4 Peach production per hectare in provinces and Pakistan

<table>
<thead>
<tr>
<th>Year</th>
<th>K. Pakhtunkhwa</th>
<th>Punjab</th>
<th>Baluchistan</th>
<th>Pakistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-00</td>
<td>11.154</td>
<td>6.000</td>
<td>5.242</td>
<td>6.875</td>
</tr>
<tr>
<td>2000-01</td>
<td>11.385</td>
<td>6.500</td>
<td>4.225</td>
<td>6.000</td>
</tr>
<tr>
<td>2001-02</td>
<td>11.053</td>
<td>6.000</td>
<td>4.162</td>
<td>6.483</td>
</tr>
<tr>
<td>2002-03</td>
<td>11.148</td>
<td>5.500</td>
<td>4.167</td>
<td>8.293</td>
</tr>
<tr>
<td>2003-04</td>
<td>10.923</td>
<td>9.000</td>
<td>1.989</td>
<td>5.190</td>
</tr>
<tr>
<td>2004-05</td>
<td>9.255</td>
<td>5.000</td>
<td>1.905</td>
<td>4.603</td>
</tr>
<tr>
<td>2005-06</td>
<td>9.214</td>
<td>5.000</td>
<td>1.916</td>
<td>4.625</td>
</tr>
<tr>
<td>2006-07</td>
<td>9.316</td>
<td>4.000</td>
<td>1.844</td>
<td>4.623</td>
</tr>
<tr>
<td>2007-08</td>
<td>9.433</td>
<td>4.000</td>
<td>2.663</td>
<td>5.276</td>
</tr>
<tr>
<td>2008-09</td>
<td>9.323</td>
<td>5.000</td>
<td>2.674</td>
<td>5.297</td>
</tr>
</tbody>
</table>

Source: Government of Pakistan 2010
A.5  World major fruit production (2000, Million Tons)

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Name of Fruit</th>
<th>2000, Million Tons</th>
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<tr>
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Source: FAO 2000
## A.6 Percent dietary value of peaches and nectarines

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<td>Crude Fiber (%)</td>
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Source: US department of Agriculture
### A. 7 Age-wise cost and returns of peach in different sizes of orchards (Rs / ha) during 2008 in India

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## A. 8 World peach & nectarine production in 2001-2010 (Metric Ton)

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<th>2007</th>
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Source: FAO 2011
## A.9 Agriculture activities in peach production and marketing in peach orchards in study area

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<tr>
<th>Detail of Activities</th>
<th>Early Varieties</th>
<th>Mid Varieties</th>
<th>Late</th>
<th>All</th>
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<td>1.70</td>
<td>1.54</td>
<td>1.97</td>
<td>1.70</td>
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<tr>
<td>No of labour used for FYM application</td>
<td>2.88</td>
<td>3.00</td>
<td>4.50</td>
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<tr>
<td>No of labour used for hoeing</td>
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<td>4.93</td>
<td>6.22</td>
<td>4.50</td>
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<tr>
<td>No of labour used for pruning</td>
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<td>3.76</td>
<td>3.94</td>
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<tr>
<td>No of Fertilizers used in Bags</td>
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<td>5.14</td>
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<td>No of labour used for Fertilizer application</td>
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<td>1.99</td>
<td>2.61</td>
<td>1.96</td>
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<td>No of pesticide sprays</td>
<td>1.99</td>
<td>2.92</td>
<td>3.49</td>
<td>2.32</td>
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<td>No of labour used for pesticide spray</td>
<td>14.22</td>
<td>5.94</td>
<td>6.46</td>
<td>11.93</td>
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<td>No of labour used for irrigation</td>
<td>2.95</td>
<td>3.44</td>
<td>3.90</td>
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<td>Cost of empty Carton Rs.</td>
<td>29220.06</td>
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<td>28687.50</td>
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<tr>
<td>Cost of picking and grading Rs.</td>
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<td>10439.60</td>
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<td>Cost of decoration materials Rs.</td>
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<td>10061.83</td>
<td>8423.08</td>
<td>10439.42</td>
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<td>Cost of transportation Rs.</td>
<td>24724.37</td>
<td>22675.49</td>
<td>21896.32</td>
<td>24055.54</td>
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<td>Cost of loading &amp; un loading Rs.</td>
<td>2780.98</td>
<td>2575.16</td>
<td>2650.73</td>
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<td>Cost of Maundi Commission Rs.</td>
<td>17105.24</td>
<td>16874.25</td>
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<td>Total Marketing Cost in Rs.</td>
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<td>Total Revenue in Rs.</td>
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<td>Household Consumption in Carton</td>
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<td>14.59</td>
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<td>Total Production in Tons</td>
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<td>6.740</td>
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<td>Area under Peach in Hectares</td>
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<td>No of Peach Production in cartons</td>
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<td>Average Price per Carton Rs.</td>
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### A.10 Average peach production per hectare in carton by different varieties in the study area during 2010-11

<table>
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<th>Name of Peach Varieties sown</th>
<th>Average production in Cartons per He</th>
<th>No of Respondents</th>
<th>Std. Deviation</th>
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<td>Maria Delezia</td>
<td>17936</td>
<td>27</td>
<td>347.50448</td>
</tr>
<tr>
<td>Indian Blood</td>
<td>18896</td>
<td>34</td>
<td>261.80047</td>
</tr>
<tr>
<td>Sohani</td>
<td>23056</td>
<td>2</td>
<td>235.70226</td>
</tr>
<tr>
<td>Total</td>
<td>19248</td>
<td>300</td>
<td>422.88794</td>
</tr>
</tbody>
</table>

### A.11 Average marketing cost per hectare of different peach varieties in the study area during 2010-11

<table>
<thead>
<tr>
<th>Name of Peach Varieties</th>
<th>Cost of Packing Rs.</th>
<th>Cost of picking &amp; grading Rs.</th>
<th>Cost of decoration Rs.</th>
<th>Transportation Cost Rs.</th>
<th>Loading &amp; unloading Rs.</th>
<th>Commission fee Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Grand</td>
<td>73032</td>
<td>17684</td>
<td>27641</td>
<td>62347</td>
<td>2678</td>
<td>39964</td>
</tr>
<tr>
<td>Spring Crest</td>
<td>72299</td>
<td>24445</td>
<td>30239</td>
<td>56836</td>
<td>7690</td>
<td>43843</td>
</tr>
<tr>
<td>Carmen</td>
<td>85141</td>
<td>20287</td>
<td>23975</td>
<td>61165</td>
<td>7631</td>
<td>50069</td>
</tr>
<tr>
<td>NJC- 84</td>
<td>70807</td>
<td>20299</td>
<td>25527</td>
<td>60688</td>
<td>6744</td>
<td>42243</td>
</tr>
<tr>
<td>Elberta</td>
<td>75484</td>
<td>28589</td>
<td>31705</td>
<td>61079</td>
<td>7635</td>
<td>40956</td>
</tr>
<tr>
<td>Maria Delezia</td>
<td>67271</td>
<td>25953</td>
<td>18762</td>
<td>51501</td>
<td>5228</td>
<td>42322</td>
</tr>
<tr>
<td>Indian Blood</td>
<td>70858</td>
<td>25786</td>
<td>20805</td>
<td>54084</td>
<td>6547</td>
<td>45575</td>
</tr>
<tr>
<td>Sohani</td>
<td>86450</td>
<td>20583</td>
<td>28817</td>
<td>98800</td>
<td>9057</td>
<td>77393</td>
</tr>
<tr>
<td>Total</td>
<td>71848</td>
<td>21898</td>
<td>25785</td>
<td>59417</td>
<td>6746</td>
<td>42530</td>
</tr>
</tbody>
</table>
QUESTIONNAIRE/ INTERVIEW SCHEDULE
VALUE CHAIN ANALYSIS OF PEACH FRUIT IN KHYBER
PAKHTUNKHWA

District: ---------------------------------  Cell #: ---------------------------------

A. Social Information:
1. Name of Interviewer: ------------------------ Date of interview: ---------------
2. Name of Respondent: ------------------------ Village:---------------------------
3. Age of Respondent: ------------------------ Education:------------------------
4. No of Male Family members involved in Agriculture: ------------------------

B. Land Ownership, Tenancy or Lessee:
5. What is your total cultivated land? --------------6. Rented from others: --------
7. Rented to others: ----------------------------------8. Culturable waste: ---------

C. Cropping Pattern & Farm Income:

<table>
<thead>
<tr>
<th>RABI SEASON</th>
<th>S#</th>
<th>Name of Crop</th>
<th>Area Sown</th>
<th>Total Production</th>
<th>Price per Unit</th>
<th>Household Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Wheat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Onion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Pea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KHARIF SEASON</th>
<th>S#</th>
<th>Name of Crop</th>
<th>Area Sown</th>
<th>Total Production</th>
<th>Price per Unit</th>
<th>Household Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Maize</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Rice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Tomato</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Others</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FRUIT CROPS</th>
<th>S#</th>
<th>Name of Crop</th>
<th>Area Sown</th>
<th>Total Production</th>
<th>Price per Unit</th>
<th>Household Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Apple</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Peach</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Apricot</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Plum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Persimmon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9. What is (are) the Variety (ies): 

10. How old is the Peach Orchard(s)? 

11. What is the source of irrigation? 

**D. Production Cost of Peach: (Rs/hectare)**

<table>
<thead>
<tr>
<th>S#</th>
<th>Name of Activities</th>
<th>No/ Qty of input</th>
<th>Cost per Unit</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>*Farm Yard Manure <em>(No of Labours</em> man days)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Hoeing Charge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. No of Labours/hectare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. No of Man days/ hectare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Pruning Charges</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. No of Labours/ hectare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. No of Man days/ hectare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Fertilizers Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. NPK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Urea</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>3. DAP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Others</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Transportation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Fertilizers Application</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. No of Man days/ hectare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. No of Labours/ hectare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI</td>
<td>Pesticides Costs</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>VII</td>
<td>Pesticides Application</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. No of Labours/ hectare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. No of Man days/ hectare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Spray Machine Charges</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIII</td>
<td>Irrigation Charges (T.Well)</td>
<td></td>
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</tr>
<tr>
<td>IX</td>
<td>Others</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**E. Total Yields and Total Revenue:**

12. What was the carton size? 

13. Where do you sell the produce? 

14. Do you sell your produce directly or to the middleman? 

15. Do you borrow money from the Commission Agents? (Tick) 

16. Do you know the market information in advance?