



# **Needs and Challenges of Apple Value Chain in Balochistan**

## Acknowledgements

The author is thankful to all the individuals and institutions for their help and cooperation during this endeavor. Without their help this research study would not have been possible. Special thanks to the Japan International Cooperation Agency (JICA) for financing and facilitating this important study aimed to analyze the needs and challenges of apple value chain in the selected districts of Balochistan. I would like to acknowledge Mr Gabor Monlar, Associate Industrial Development Expert at UNIDO for his continuous support, guidance and encouragement from the start of the study till its completion. I would also like to thank Mr Omar Khan, Research Analyst UNIDO Islamabad for the logistic and other arrangements for the conduct of the Focus Group Discussions in various districts of Balochistan. Special thanks are extended to the officials of various government departments representing the governments of Balochistan; especially the Balochistan Agriculture and Cooperatives Department, Balochistan Food Safety Authority, Director Market Committee Quetta who welcomed us into their offices and shared invaluable information. I am also grateful to the Deputy Directors Agriculture Extension of district Quetta, Killa Abdullah, Pishin, Killa Saifullah and Kalat for their support in the conduct of Focus Group Discussions. I am highly indebted to various stakeholders such as Apple farmers, politicians, NGOs, and various marketing actors such as input dealers, preharvest constructors, commission agents, wholesalers, retailers, exporters, cold storage owners, transporters, packaging material sellers for sparing their precious time and sharing useful information.

## Table of Contents

Table of Contents .....	3
List of Tables .....	4
List of Figures .....	4
Abbreviations .....	5
1. Introduction.....	14
<b>1.1 Description of the project</b> .....	14
<b>1.2 Objective of this assignment</b> .....	14
<b>1.3 Background</b> .....	14
2. Methodology of the assessment.....	17
<b>2.1 A glimpse of UNIDO value chain approach</b> .....	17
<b>2.2 Data collection mechanism</b> .....	19
3. Value chain analysis .....	26
<b>3.1 Overview of the value chain in Pakistan</b> .....	26
<b>3.2 Overview of the value chain in the province</b> .....	36
<b>3.3 Enabling environment</b> .....	49
<b>3.4 Socioeconomic characteristics of farmers</b> .....	68
<b>3.5 Challenges of apple value chain and solution</b> .....	70
References.....	75
Appendix- A: Focus Group Discussion.....	79
Appendix-B Survey for Apple Value Chain Actors in Balochistan .....	88
Appendix C: Primary products in Balochistan (2017-18) .....	90
Appendix D: Primary products in district Quetta.....	91
Appendix E: Primary products in district Killa Abdullah.....	92
Appendix F: Primary products in district Pishin .....	92
Appendix G: Primary products in district Killa Saifullah.....	93
Appendix H: Primary products in district Kalat .....	94
Appendix I: District and Tehsil-wise distribution of apple value chain actors .....	94
Appendix J: List of stakeholders interviewed.....	97

## List of Tables

Table 1: District wise distribution of sampled apple farmers and cold storage owners .....	23
Table 2: District wise distribution of sampled apple farmers based on farm size .....	24
Table 3: Distribution of sampled marketing middlemen .....	24
Table 4: Apple area, production and trade during the period 2012-13 to 2016-17 .....	26
Table 5: Value of agriculture produce in the province during 2017-18 (PKR Million) .....	36
Table 6: Gross margins analysis of apple (per acre).....	65
Table 7: Marketing costs and margins for apple (per kg) .....	66
Table 8: Challenges of apple value chain, solutions and roadmap .....	71

## List of Figures

Figure 1: District wise share (%) of apple production in Balochistan.....	15
Figure 3: Stakeholders survey in Balochistan.....	20
Figure 4: Focus Group Discussion in Quetta, Killa Abdullah and Pishin districts .....	22
Figure 5: Focus Group Discussion Killa Saifullah and Kalat districts .....	23
Figure 6: Apple production in Pakistan (2016-17) .....	27
Figure 7: Apple exports and imports (tones) during 2017 .....	28
Figure 8: Apple storage in Killa Abdullah .....	53
Figure 9: Map of apple value chain .....	64
Figure 10: Socioeconomic characteristics of FGD participants .....	68
Figure 11: Dependence on agriculture and access to mobile phone, television and newspaper .....	69

## **Disclaimer**

This report was written by Dr. Syed Mohammad Khair, apple value chain expert, PAFAID in collaboration with the UNIDO Experts.

This report is prepared under Japan International Cooperation Agency (JICA) funded Project for Agri-food and Agro-industry Development Assistance in Pakistan (PAFAID), implemented by UNIDO. Readers are encouraged to quote and use this study for educational, non-profit purposes, provided the source is acknowledged. The information presented does not reflect the position of United Nations Industrial Development Organization (UNIDO) Secretariat or JICA.

## Abbreviations

ACIAR	Australian Centre for International Agricultural Research
BAC	Balochistan Agriculture College
BFSA	Balochistan Food Safety Authority
BUIITEMS	Balochistan University of IT, Engg. and Management Sciences
CPEC	China Pakistan Economic Corridor
DDAE	Deputy Director Agriculture Extension
DFAT	Department of Foreign Affairs and Trade
FAO	United Nations Food and Agriculture Organization
FATA	Federally Administered Tribal Areas
FGD	Focus Group Discussion
GDP	Gross domestic product
GoB	Government of Balochistan
GoP	Government of Pakistan
JICA	Japan International Cooperation Agency
MC	Ministry of Commerce
MPDR	Ministry of Planning, Development and Research
MNFSR	Ministry of National Food Security and Research
MoC	Ministry of Commerce
NGO	Non Government Organization
PACCD	Pakistan Agriculture Cold Chain Development
PFAID	Agri-food and Agro-industry Development Assistance
PHDEC	Pakistan Horticultural Development and Export Company
SMEs	Small & Medium Enterprises
SPS	Sanitary and Phytosanitary measures
TDP	Temporarily Displaced Persons
UNIDO	United Nations Industrial Development Organization
VC	Value chain

## Measurement Table

<b>1 US Dollar</b>	<b>160.38 Pakistani Rupees</b>
<b>1 Square Yard</b>	9 Square foot
<b>1 Ton</b>	1000 Kilograms
<b>1 acre</b>	43560 square foot
<b>1 Hectare</b>	2.4711 Acres
<b>1 Moud</b>	40 Kilograms

## Executive Summary

Balochistan is blessed by having a wide variety of climatic and agro-ecological zones, thus being ideal for raising various fruits and vegetables. Horticultural crops make an important contribution to the agricultural sector, especially the fruit and vegetable sector. In addition, this sector offers sufficient job opportunities and economic potential for increasing farming community incomes as well as contributing to local food security.

Apple is the major fruit of Balochistan and ranks first in terms of area and production. Among other fruits, has significant role in terms of the number of people employed, revenue generation and returns. Therefore, based on the quantitative assessment of preliminary selection, apple value chain was selected for further interventions in Balochistan. The apple production districts of Quetta, Killa Abdullah, Pishin, Killa Saifullah, and Kalat were selected for this project through stakeholders' consultation, also serving as the main production areas of the province.

This study aims to highlight the current needs and challenges of the apple value chain in Balochistan and suggest measures for the uplifting of the value chain. This study also provides an opportunity to inform the policy makers and involve them for the resolution of the sector's current challenges and needs. It also aims to identify the governance issues with focus on institutional capacities and practices within the enabling environment, including the private sector and individual farmers.

Both primary and secondary data were used for this study. As part of this, focus group discussions were held in all the five districts. Stakeholders' survey was also conducted with some 18 stakeholders including transporters, packaging material producers and sellers, researchers, government officials etc. Moreover, individual survey was also conducted for data visualization purpose and some 676 apple farmers, 110 contractors and 27 cold store owners were interviewed in different districts. Among the marketing middlemen, 25 commission agents/*Arthi*, 33 wholesalers, and 100 retailers were interviewed in Quetta wholesale market.

For data analysis, gross margins analysis, marketing costs and marketing margins analysis were undertaken to examine the production and marketing efficiencies through the value chain. While SWOT analysis was used to systematically identify the external and internal factors influencing apple value chain in the selected districts. Following are the results drawn from FGD survey conducted:

The survey results show that the average education level of FGD respondents was around ten years, showing sufficient literacy level to understand the purpose and importance of



the survey. The average family size was quite high with the overall average of 30 due to the joint family system.

The apple area owned by farmers in terms of the percent of total farm area ranged between 45 to 75 % in different districts. On average, when all the districts were taken together, it was more than 60 % of the farm area, with the highest ratio in Killa Abdullah district (more than 75%), followed by Kalat, Killa Saifullah, Quetta and Pishin. This is showing the importance of apple in the cropping pattern which on average occupies more than 50 % of farm area.

The majority of respondents had agriculture as primary profession and source of livelihood in all the districts. The highest proportion of dependency on agriculture was reported in district Killa Abdullah, followed by Pishin, Kalat, Quetta and Killa Saifullah. The other sources of livelihoods included trade and business, government Jobs, and labour Jobs. The results further show that majority of respondents own mobile phones which shows the access of apple farmers to the information source.

During the FGD survey (2020), the apple farmers reported the negative impact of large-scale apple import from Iran and Afghanistan to the local market. Further, the data analysis showed that during 2017, Pakistan was the net importer of apple as it imported 78,112 tones with major quantities from Afghanistan, Iran and China while exported only 361 tons of apple. The reasons for low apple exports were insufficient packaging facilities and non-adoption of international standards and certifications. Additionally, the prevalent production and marketing system of food is not well-matched with the sanitary and phytosanitary (SPS) requirements given the weak and fragmented SPS controls measures taken by Pakistan with its neighbouring countries.

On the marketing side, apple grading, packing and marketing standards are not followed and low and good quality apple is very often mixed. The produce is marketed in a traditional manner and cold storage facilities are poor leading to high post-harvest losses. Moreover, Balochistan does not have adequate apple processing, grading and packing facilities, and a very small proportion of apple is processed into value-added products such as apple pulp, jam, jelly, juice, squashes, drinks, clear concentrate and apple preserves. At the moment such industry is not present in Balochistan.

Agriculture has become a provincial subject after the adoption of 18<sup>th</sup> amendment in the constitution of Pakistan which requires the provinces to make necessary arrangements for the development of the sector. However, many federal policies and strategies are set to prioritize and incentivize the horticulture industry through support on the imports of agro processing machinery, measures for boosting exports etc.

Over the past few years, dozens of projects have been completed in various parts of Pakistan on various value chains improvement such as livestock and wool, fruits and vegetables, furniture and other products. This project is a unique project targeting apple value chain in Balochistan and cattle meat value chain in Khyber Pakhtunkhwa.

Producers as well as local contractors' trade apples across the country to various markets, often to other provinces of the country. The two most popular marketing networks, such as producer-led and local pre-harvest contractor led, are prevailing in the province. According to the FGD survey (2020), pre-harvest contractors mostly sell apples in Lahore and Karachi markets being the largest markets, while apple farmers sell their produce in Gujranwala, Faisalabad, Karachi, Islamabad, Peshawar, Lahore, Quetta and other wholesale markets.

The fruit and vegetable cold storage capacity in Balochistan province has improved over the last few years due to other capacity building investments, but still its capacity is far below the requirements. To store apple, there are some 12 cold storage facilities in Quetta, 14 in Kill Abdullah, and 1 in Pishin. However, a lot more work needs to be done as there are no cold storage facilities in Killa Saifullah, Ziarat and many other districts.

Due to financial constraints, lack of technical personnel and lack of training, currently the Agriculture Extension Department is struggling to deliver its functions. Moreover, the farming community it serves is sparsely distributed throughout the province which makes the dissemination of best practices more difficult.

The institutional sources of credit that includes commercial banks and other public institutions are availed only by some 20-30 % apple producers due to collateral requirements, lengthy procedures, less accessibility and high interest rates. However, the remaining 70-80 % relies on non-institutional sources of credit to meet production, marketing and other expenses. These sources include crop inputs dealers, Arthis (commission agents) and other marketing middlemen such as pre-harvest contractors and cold store owners. The role of inputs dealers, commission agents and cold store owners is very important as they provide necessary capital at the time of need to fuel the apple economy. However, this makes apple farmers a bit disadvantaged due to the compromised prices.

Climate change related challenges are more severe in Balochistan due to poor resilience and adaptive capacity with frequent climate shocks in the forms of droughts. There are various factors responsible for low adapting capacity against the adversaries of climate change such as lack of provincial climate change related policy, less awareness about climate change, poor governance and insufficient focus on climate change in education and research.

In case of Balochistan, where mostly traditional varieties such as Tor Kulu, Shin Kulu, Kaja, Amri, Mashadi etc are grown, require 7-10 years to start fruit bearing and have high chilling requirement.

Transporters are mostly local people who use ordinary goods trucks to supply apple to different markets. Some 500 to 600 crates are loaded into a small truck, while 850-1000 crates are loaded into a large truck. This mode of transportation causes breakage of apple crates.

Packaging material is not produced locally rather ready-made packaging material is imported from Karachi, Lahore, Faisalabad etc. Two types of packaging material are used most often, wooden crates and carton boxes. For wooden crates the wood sheets are imported from Punjab along with skilled labour to nail the wooden sheets to prepare wooden crates. Cartons are ready to use and available with many packaging material sellers.

Around 10 % of apple produced in Balochistan is marketed to Quetta wholesale market while the remaining 90 % is marketed to the distant wholesale markets such as Lahore, Karachi, Islamabad, Dera Ghazi Khan, Rawalpindi, Multan, Haiderabad, Gujranwala, Kohat, Peshawar and other markets and also stored over there due to less storage capacity in Balochistan.

Gross Margin analysis is a very important tool for determining the level of farm profitability and efficiency. The per kg gross margin at farm gate was Rs. 11.30 at lower altitudes and 39.21 at higher altitudes, showing three times larger returns from apple. The analysis of various cost components in the variable/direct costs shows that largest cost incurred was on irrigation followed by pesticides, labour and fertilizer and farm-yard manure (FYM) due to the use of inefficient production practices.

The share of apple farmers in consumer price was 44 % and 32 % of the consumer paid price at high and low altitudes implying that 56 % and 68 % of the consumer prices goes to different market middlemen and spent on marketing costs. This is questioning the efficiency of the marketing system, because the ultimate producer gets a smaller share and the actual value addition of the middlemen limited to transportation and marketing with buyers.

Pre harvest losses and post harvest losses were 5% and 20% of total production. Preharvest losses mainly occurs during the production stage due to fruit dropping, pest and diseases attack, drought like conditions, high temperature, inappropriate variety selection. While post harvest losses include the fruit losses during harvesting, fruit picking, handling, packaging, transportation and processing. According to estimates, the preharvest and post harvest losses both together worth PKR 7816 million at 2018-19 prices.

Based on the above findings, following main recommendations are made for the improvement of apple value chain:

- As shown by the gross margin and marketing costs and margins analysis, apple grown at high altitudes gives double returns when compared to returns from apple produced at low altitudes due to its better quality amid favourable climatic conditions, less pre- and post-harvest losses, less diseases attack etc. For this reason, it is suggested that the project interventions may be made keeping in mind the elevation of the area and the type of apple produced;
- To face drought and depleting water, high density apple with high efficiency irrigation system are recommended;
- Introduction of high density modern cultivars with less chilling requirement and less water requirement such as dwarf cultivars and M9 root stock on drip irrigation.
- Establishment of nurseries with certified rootstocks based on market and consumer preferences.
- To improve quality and safety compliance of fresh apple, farmers and extension agents are suggested to be further trained on tree pruning, thinning and other production practices and inputs use in the form of a structured and developed Good Agriculture Practice (GAP<sup>1</sup>)
- Training of apple farmers and extension agents on the selection of cultivars suitable for a particular area based on climatic conditions
- Training of relevant stakeholders on total soluble solids (TSS), firmness test, and maturity index etc. of apple to enable them to choose right harvesting time
- Establishment of apple value addition facilities such as apple processing line and apple juice, jam etc. near the main production areas
- Provision of apple harvesting and collecting ladder and bags
- Training of fruit pickers and handlers on proper fruit picking, packaging and handling
- Provision of modern packaging material, pre-cooling facilities, refrigerated transport and mobile graders
- Improvement of compliant cold storages facilities and supporting additional grading practices
- Establishment of a mechanism for the provision of real-time market price and other information from the other value chain actors to apple producers
- Establishment of product testing practices in the form of an accredited laboratory to reduce costs for the farmers;

---

<sup>1</sup> Those principles applied on-farm production and postproduction processes for safe and healthy food and non-food agricultural products, while taking care of economic, social and environmental sustainability (FAO, 2016)

- Linking local universities with the industry to conduct research and introduce new solutions for the sector;
- Initiatives for the drafting of Balochistan horticulture policy and value chain strategy, specifically for apple
- Improved control on imported apple
- Training on cottage industry for women and youth empowerment
- Training for women on product value adding practices for local markets and income generation.

## **1. Introduction**

### **1.1 Description of the project**

The aim of this project is to enhance the productive and compliance capacities of relevant actors in the apple value chain in Quetta, Killa Abdullah, Pishin, Killa Saifullah, and Kalat districts of Balochistan. The project will provide support to the relevant governmental bodies to increase their capacity to offer suitable services to the industry in a sustainable way and to introduce pilot application in collaboration with the industry on best practices in value addition and compliance for improved livelihoods of participants in the value chains, including food manufacturers and processors. This project is funded by the Government of Japan through the Japan International Cooperation Agency (JICA). UNIDO provides technical support to improve the quality and safety, value addition and productivity, which in turn can contribute to better marketability, higher profit, and access to high-end markets. The project will work on reducing food losses and add more value to the products through improvement of the value chain management which will lead to enhanced livelihoods, socioeconomic uplift and stability in the targeted provinces. The long-term goal of this project in Balochistan is to rejuvenate the livelihood of apple value chain actors through the introduction of best practices in terms of compliance and value addition.

### **1.2 Objective of this assignment**

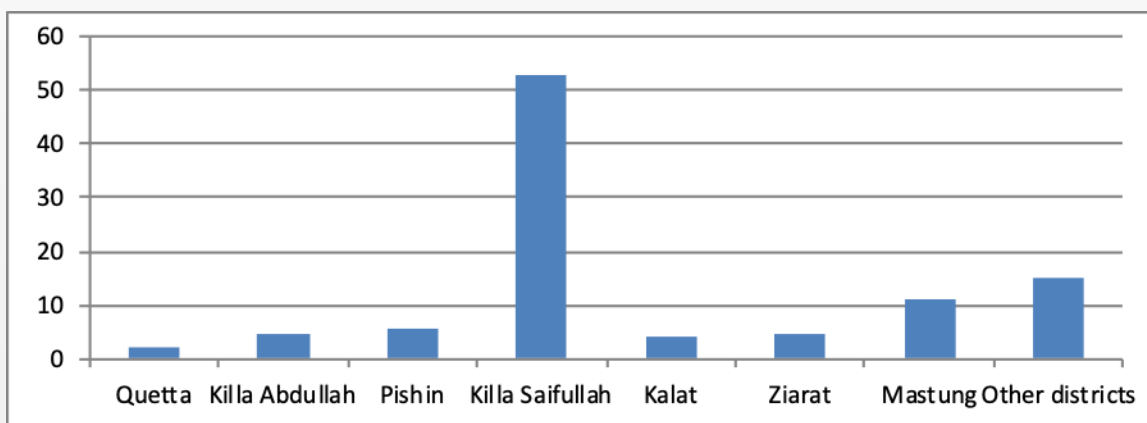
This study aims to highlight the current needs and challenges of the apple value chain and suggest measures to operate in an economically and socially more inclusive manner to be able to contribute to the economic uplifting of selected target districts in particular and Balochistan province in general.

### **1.3 Background**

Agriculture sector provides livelihood to more than half of the population of Balochistan by contributing one-third of the provincial GDP and 40 of the labor force. Balochistan's favourable climatic conditions and geography enables it to produce fruits of high quality, therefore named as fruit basket of Pakistan. The important fruits produced are apple, dates, apricot, grapes, pomegranate, almond etc and exported in large volumes to other provinces and abroad. Apple is the major fruit of Balochistan and some 87% of the total production comes from Balochistan (GoB, 2016-17). Apple is grown in Balochistan on 87171 hectares (39 % of the total fruit area) with a production of 576,376 tonnes (52 % of total fruits production) in Balochistan, thus ranks first in terms of area and production among fruits (GoB, 2016-17) and have significant role in terms of the number of people employed, revenue generation and returns (GoB, 2016-17). Within Balochistan, Killa Saifullah district is the major producer of apple in terms of production, followed by Mastung, Pishin, Ziarat, Killa Abdullah and Kalat respectively as shown by Figure 1. Apple

value chain is the largest value chain in terms of employment and revenue generation in Balochistan.

**Figure 1: District wise share (%) of apple production in Balochistan**



Source: GoB (2016-17)

Value chain refers to all the activities essential to bring a product or service from the start through the different phases of production to delivery to final consumers and after use disposal (Kaplinsky 1999; Kaplinsky and Morris 2001). The value chain analysis is superior in terms of incorporating and analyzing all factors/stages starting from the sowing of a crop to when it reaches the hand of ultimate consumer.

Balochistan produces fruits of high quality but the supply chains of fruits are faced with constraints such as use of traditional production and marketing technology, climate change issues (reduction in precipitation, rise in temperature, scarcity of irrigation water), low quality crop inputs, energy shortage to run irrigation tube wells, inappropriate cropping patterns, poor road infrastructure, obsolete packaging material, low market prices and rising marketing costs, negligible amount of value addition and fruit processing in Balochistan, lack of cold storage and modern transportation facilities, high pre- and post-harvest losses, expensive refrigerated transportation and low margins of fruits producers. As stated above, apple capture very important place in the rural economy of Balochistan for providing livelihood. The apple value chain is no exception in terms of problems faced which are eroding the incomes of various actors in the chain specially the apple producers.

Although Balochistan has comparative advantage in the production of many high quality fruits but the sector which is dominated by private sector is least developed in terms of pre- and post-harvest handling of fruits. From the harvest of produce to its grading, packaging, processing etc., near to no modern practices or technology use can be seen.



Thus post-harvest losses in fruits and vegetables are great about 15-30% (Aujla et al., 2011; Shahzad et al., 2013), and a huge proportion of the produce is wasted, cost millions of rupees every year. Some 10-15% of fruit and vegetables get wasted due to lack of processing facilities. The apple exports of Pakistan had been minimal and on an average less than half a percent of its total production. The main reason for low export has been the inability of our apple producers to supply the produce as per the international market requirements due to lack of grading, standardization, treatment, and packaging as per international standards (GoB, 2018-19).

In addition, the institutional support from the various government and non-government organizations is insufficient in the production and marketing stage, leaving the fruit producers at the mercy of vagaries of weather, middlemen, and production gluts resulting low prices across the value chain (GoB, 2020).

To understand the apple value chain's problems, a well-coordinated research approach has been lacking. This study will provide an opportunity to understand and pinpoint the constraints faced by the various stakeholders and will provide an opportunity to inform the policy-makers and involve them for the resolution of the sector's current challenges and needs. The end result will be increased productivity, reduction in the pre- and post-harvest loss of fruits, more value addition and the resulting increased share of various functionaries involved in the value chain as a result of actions taken by the project based on the study findings.

Many studies have been undertaken in the past encompassing the production, marketing and export aspects of many fruits and vegetables in Balochistan. But no integrated approach has been used so far to analyze the whole apple value chain. This value chain analysis will provide an opportunity to study the issues of the sector in depth and suggest measures to improve the situation on ground that has been almost unchanged in the near past, resulting in intact issues with the same severity as used to be a decade ago. One of the reasons for the issues may be the non-comprehensive strategies focused mostly only one certain aspect of value chain i.e., either production, marketing, processing or export instead of the whole value chain.

This study seeks to undertake the VC analysis of Apple in Balochistan to highlight the bottlenecks in the entire value chain and suggest appropriate measures for the improvement. Keeping in view the importance of fruits sector in Balochistan, this study is first of its type covering all the aspects of important fruits enterprises from the farm gate to the consumption. This study will also identify the governance issues with focus on institutional capacities and practices from agriculture extension service providers, the private sector and the individual farmer. At the end of the document, a vision along with a roadmap for the apple value chain will be introduced as part of which PAFAID will



prioritize the most essential investments in consultation with the Government of Pakistan, Government of Balochistan and the local apple sector.

## **2. Methodology of the assessment**

In order to understand the overall trends of industrial reorganization and identify change agents and leverage points for policy and technical interventions, UNIDO value chain analysis is used as an overall analytical tool (UNIDO, 2009). This methodology was complemented with additional data science tools to identify current socio-economic *status quo*, including the situation of youth and women in the local value chain, and compliance practices among actors.

### **2.1 A glimpse of UNIDO value chain approach**

The UNIDOS's systematic value chain approach is used to analyze apple value chain aimed to shed light on the needs and challenges of the apple value chain and suggest measures to improve its performance using the following steps:

- i. Selecting and prioritizing of the value chain that offers the most promising prospects for economic growth and poverty reduction
- ii. Mapping value chains to obtain a clear understanding of the sequence of activities and the key actors and relationships involve
- iii. Analyzing the value chain technological capacities to assess the value chain production system and tools
- iv. Analyze the value chain economic performance and competitiveness
- v. Formulating an upgrading strategy for the selected value chain
- vi. Implementing the upgrading strategy, monitoring and impact assessment for the selected value chain

#### **2.1.1 Selection and prioritization of apple value chain**

Value chains uniquely integrate natural sources of food and fiber supply with the dynamics of their demand. For expanding the leading role played by agriculture in the economic growth and poverty reduction, effective agro-value chains are used as a means of the development of agro-industries by many policy makers. The agro-value chains development often have positive impact on jobs creation through off-farm processing and income diversification in rural and urban areas. Smallholder farmers get benefited through value chains in the form of improved market access and formation of linkage to small and medium enterprises (SMEs) (UNIDO, 2019). Through reducing post-harvest losses and prolonging the shelf life of food and fibers, value chains helps build up responsible and sustainable relationships among value chain actors (UNIDO, 2019).

The focus of this value chain analysis is on selected districts of Balochistan which are still considered as the center of apple production as shown by the agriculture statistics data

(GoB, 2018). An early rapid appraisal of value chains was undertaken by involving a broad range of stakeholders including government officials, private sector service providers and associations etc. by UNIDO. The apple value chain was selected for Balochistan based on its relative importance from socio-economic perspective. The selection process of the value chains was divided into two phases: (1) shortlisting the most potential value chains based on the criteria of production volume and concentration of sectorial production etc. and (2) analyzing the shortlisted value chains as per the selection criteria.

Embracing the above methodology, a mix of social and economic indicators was used to identify the most potential value chain for PAFAID intervention. These are given as follows:

- Production level: The selected commodity is produced in enough quantity to comply with the requirements of domestic and international buyers, avoiding any food security issue due to sales or trade.
- Export potential: In the value chain, adequate practices be followed in terms of sanitary and phytosanitary (SPS) and technical-barriers to trade (TBT) measures;
- Existence of required enabling environment: The existing enabling environment which includes soft infrastructure, such as supporting services (certification and agricultural extension services), laws, standards, human resources and availability of proper financial or loan schemes for farmer) and also hard infrastructure, such as controlled atmosphere storage and transportation, road systems etc.
- Number of female and male farmers involved in the value chain to ensure the gender balance
- Potential involvement of both genders to ensure the social inclusiveness of the intervention, and supporting more vulnerable groups, such as youth and women.
- Relevance to country priorities and highlighted as strategic goods in governmental policies and strategies.
- Learning from previous practices and recommendations and building on a development status acquired in the past for the impact of the project.

### 2.1.2 Selection of districts

Based on the criteria presented in section 2.1.1 and the quantitative assessment of preliminary selection, apple value chain was selected for interventions in Balochistan. The apple production districts of Quetta, Killa Abdullah, Pishin, Killa Saifullah, and Kalat were selected for this project through a stakeholder consultation with the officials from the Department of Agriculture and the Japan International Cooperation Agency (JICA). In each district, main apple production *tehsils*<sup>2</sup> and the number of apple producers were identified

---

<sup>2</sup>Tehsil is an administrative unit comprised of union councils, while a union council is made of many villages. Tehsils may contain villages or towns and cities.

with the help of relevant Deputy Directors Agriculture Extension (DDAE). Based on their relative share, the sample of apple producers was selected for interview.

## **2.2 Data collection mechanism**

Primary and secondary data are used for this study. The primary data were obtained from the interviews with apple producers and other related stakeholders, which are explained in more detail in this section. Afterwards, group interview were conducted jointly by a consulting company called Impetus Advisory Service, which was selected by UNIDO for this service and the Department of Agriculture Extension. The stakeholders survey was conducted by the UNIDO apple value chain expert, while the individual value chain actor level survey was conducted by Impetus Advisory Group. The stakeholders survey and FGD results are used in this report while the individual value chain actor survey results are used for data visualization purpose.

For collecting secondary data, various technical reports were reviewed to complement the primary data. The reports were obtained from government offices as well as other international institutions and agencies, websites, libraries etc. The details can be seen in the reference list.

### **2.2.1 Questionnaires design**

To collect the required information for the Focus Group Discussion (FGD) and visualization purpose from different actors involve in apple value chain (apple farmers, transporters, packaging material producers and sellers, commission agents, wholesalers, retailers, cold storage owners, pre-harvest contractors, exporters, semi structured questionnaires were designed by the National Apple Value Chain Expert and the Impetus Advisory Group. The aim was to explore the value chain links between all major actors and the existing level of compliance/regulation at each step (Appendix B). The questionnaires were also shared with a gender expert to ensure the adequate language and capture of the data as much as possible. The questionnaires were pretested prior to data collection.

### **2.2.2 Stakeholders survey**

The stakeholders survey was conducted December, 2019 and January, 2020 (list of stakeholders attached as Appendix-J). An interview schedule was used to interview the important stakeholders/key informants involve in apple value chain to obtain information about the challenges of the apple value chain. These included progressive farmers, exporters, packaging material sellers, NGOs people, government officials, gender experts, members of farmers organizations and transporters (Photographs of the interview are

given as Figure 2) and contributed the framing of the value chain problems as well as the design of detailed questionnaires.



**Figure 2: Stakeholders survey in Balochistan**

### **2.2.3 Focus group discussion (FGD)**

A detailed semi-structured questionnaire was prepared and translated into Urdu to collect the data from the apple farmers groups. Before the use, the questionnaire was pretested for validity test. Focus group interviews comprised of groups of some 10-15 apple



growers conducted in Quetta, Pishin, Killa Abdullah, Killa Saifullah and Kalat district. Selection criteria for the FGD respondents included the farm size, apple farming, Apple area as % of total farm area, education, and the Department of Agriculture was requested to pay attention to those during extending the invitation to these sessions. The deputy directors of agriculture extension (DDAE) of the respective districts helped select the apple growers for the focus group interview (to ensure diversity and have a representative group) and they did the necessary arrangements for the FGD. However, it must be mentioned that due to the cultural sensitivity, the involvement of women was not possible in the FGD along with men. To overcome this limitation, the gender analysis must be read in conjunction with this analysis.

The FGD questionnaire included questions on demographic and socioeconomic characteristics, cropping pattern, apple value chain related information, role and involvement of gender and youth in apple value chain and issues of apple value chain etc. (Appendix-A). The survey was conducted by the UNIDO apple value chain expert, Department of Agriculture Extension and UNIDO subcontractor in February, 2020 (Photographs are given as Figure 3 & Figure 4). Voice recorders were used with the prior permission of the FGD members so that any important information would not be missed. This report is primarily based on the information collected through stakeholders survey and FGD.



FGD Quetta held on 24/02/2020



FGD Killa Abdullah held on 25/02/2020



FGD Pishin held on 26/02/2020

**Figure 3: Focus Group Discussion in Quetta, Killa Abdullah and Pishin districts**



FGD Killa Saifullah held on 27/02/2020



FGD Kalat held on 28/02/2020

**Figure 4: Focus Group Discussion Killa Saifullah and Kalat districts**

#### **2.2.4 Sampling frame and sampling method used for the survey of apple growers and other actors**

The complete list of apple growers with farm details, or population size using statistical terminology, was not available with the district agriculture department due to which the use of probability sampling technique was not possible. However, an approximate number of apple growers in different districts were obtained from the office of agriculture extension department (Table 1). Non-probability sampling was used and the sample size was kept as 5% of the approximate number of total apple farmers in each district, keeping in view the time limitation. In total some 676 apple farmers were selected for interview in the selected districts (Table 1). There are 30 cold storages in the selected districts and all are interviewed. Further, to ensure the participation of each category of farmers, the sample was distributed based on the size of land holding in each tehsil of the selected districts (Table 2 & Appendix-I) based on the information obtained from Agriculture census (2010). The information obtained through the above mentioned apple growers and other actors survey are used for visualization purpose only.

**Table 1: District wise distribution of sampled apple farmers and cold storage owners**

Respondent		District Quetta	District Killah Abdullah	District Pishin	District Killa Saifullah	District Kalat	Total/ Category
Farmer	Population	700	2914	3250	3840	2756	
	Sample	35	146	163	193	138	675
Cold Storage	Population	12	14	1	0	0	
	Sample	12	14	1	0	0	27

Survey tools for each population category were designed using preliminary findings from Focus Group Discussions and input from various technical and field experts. Each questionnaire had a maximum of 12 questions to ensure not to overwhelm the



participants and collect maximum possible relevant data. The field survey work was done during March-May, 2020.

**Table 2: District wise distribution of sampled apple farmers based on farm size**

Sample	Quetta	Killah Abdullah	Pishin	Killah Saifullah	Kalat	Total
<b>Large Farmer (&gt; 25 acres)</b>	3	12	9	36	6	66
<b>Medium Farmer (5-25 acres)</b>	11	79	51	65	123	329
<b>Small Farmer (&lt; 5 acres)</b>	21	55	104	92	10	281
<b>Total sample</b>						676

Similarly, the information about the number of commission agents, wholesalers, retailers, and cold storage owners was obtained from the secretary market committee Quetta. 110 contractors and 27 cold store owners were interviewed in different districts. While 25 commission agents/*Arthi*, 33 wholesalers, and 100 retailers were interviewed in Quetta wholesale market. Only Quetta market was surveyed for the above actors interviews because of being the only wholesale markets exist among all the selected districts. The support of personnel from market committee was sought to access different respondents in the Quetta wholesale market. The sample was purposively selected using snow ball sampling technique. The data obtained through the above mentioned Apple farmers and other middlemen survey detailed in Table 3.

## 2.2.6 Data analysis

The questionnaires were properly coded and numbered and then data was entered into the Excel for analysis. The data were then cleaned for missing values or outliers, both the qualitative and quantitative data were analyzed by using descriptive statistics tools.

**Table 3: Distribution of sampled marketing middlemen**

Respondent		Quetta	Killa Abdullah	Pishin	Killa Saifullah	Kalat	Total
<b>Contractor</b>	Population	100	725	425	21	550	
	Sample	20	30	20	20	20	110
<b>Commission Agent</b>	Population	258	-	-	-	-	
	Sample	25	-	-	-	-	25
<b>Wholesalers</b>	Population	866	-	-	-	-	
	Sample	33	-	-	-	-	100
<b>Retailers</b>	Population	2000	-	-	-	-	
	Sample	100	-	-	-	-	33

## 2.2.7 Estimation of gross margins and net returns from apple

Gross margins of farm enterprises provide a simple method for comparing the performance of different enterprises that have similar requirements for labour and



capital. The gross margin of an enterprise refers to the total income less the variable costs incurred in the enterprise. Gross margin analysis of apple produced in different districts was done. Gross margins and net returns from apple were computed in different districts/elevations using the following formula:

$$\text{Gross margin (GM)} = \text{Total Revenue (TR)} - \text{Total Variable Costs (TVC)}$$

Further, due to variations in climatic conditions amid elevation of the surveyed areas, the analysis of apple margins in different districts has been done based on altitude above the sea level. These are low altitude areas (1,400-1,900 metres) and high altitude areas (1,901 metres and above). With variation in altitudes, the climatic conditions changes which affect the apple quality because the chilling hours required for good apple growth, temperature, cultivars choice, quality of the produce etc. also changes (Saeed, 2016). Table 5 (page 60) demonstrates the marketing margins of apple for low- and high-altitude areas.

### **2.2.8 Calculation of marketing margins and costs**

The difference between the price paid by the ultimate consumer and the price received by the producer is called marketing margin. It is also calculated by taking the percent share received by each marketing functionary in the consumer price (Table 6, page 61). The below given formula was used to compute percentage marketing margins earned by each market intermediary at different stages of marketing process. Marketing margin (MM) =  $(PS/SP) \times 100$ , where PS is the price availed by different functionaries and SP is the sale price of the same functionary.

Marketing costs are those costs incurred by different marketing functionaries at various levels of the marketing process. These costs have greater impact on the margins of the different market functionaries. Major items include picking, sorting, packing, loading, unloading, transportation, cold storage etc. These costs were computed using the following formula: Marketing costs (MC) =  $AS \times QH$ , where MC is marketing cost, AS is the amount spent per unit, and QH is the quantity handled.

The net margin is the net earnings left after paying for all marketing costs. Net marketing margins were computed using the following formula: Net marketing margin (NM) =  $PS - MC$ , where PS is the price spread earned by a specific market functionary and MC is the marketing cost per unit.

### **2.2.9 SWOT analysis of apple value chain**

The SWOT (Strengths, Weaknesses, Opportunities, and Threats) of apple value chain in different districts is computed from different perspectives to consequently elaborate the cost-benefit analysis of apple. It is one of the known methodologies to systematically

identify the external and internal factors influencing apple value chain. It also makes combinations of S-O (strengths and opportunities) as positive factors and W-T (weaknesses and threats) as negative factors to systematically evaluate the cost-benefit analysis of any value chain (Arsi et al., 2017). The SWOT analysis is done separately for Quetta, Killa Abdullah, Pishin, Killa Saifullah, Kalat districts in section 3.2.1.

#### 2.2.10 Shortcomings and limitations of the study

- The survey data are based on farmers' recalls and estimates; as written records were not maintained by majority of the farmers.
- Due to lack of the population lists of value chain actors required for the sampling purpose, non-probability sampling technique was used for the selection of respondents.
- Time period for survey work was short given the sparsely distributed population in Balochistan, therefore sample size was kept restricted.
- The survey was undertaken in five districts (main apple production area) of Balochistan. The findings can be generalized to the rest of the apple producing provincial districts having similar agro-ecological conditions.

### 3. Value chain analysis

#### 3.1 Overview of the value chain in Pakistan

Description of production volume, domestic, export and import markets, possible federal strategies and projects from the past specifically targeting the value chain are presented in this section.

##### 3.1.1 Production volume, export and import of apple

The average production, area, yield, import and export of apple over the period 2012-13 to 2016-17 was 595708 tones, 103305 hectares, 5.79 tones, 43024 tones and 416 tones respectively as shown by table 4.

**Table 4: Apple area, production and trade during the period 2012-13 to 2016-17**

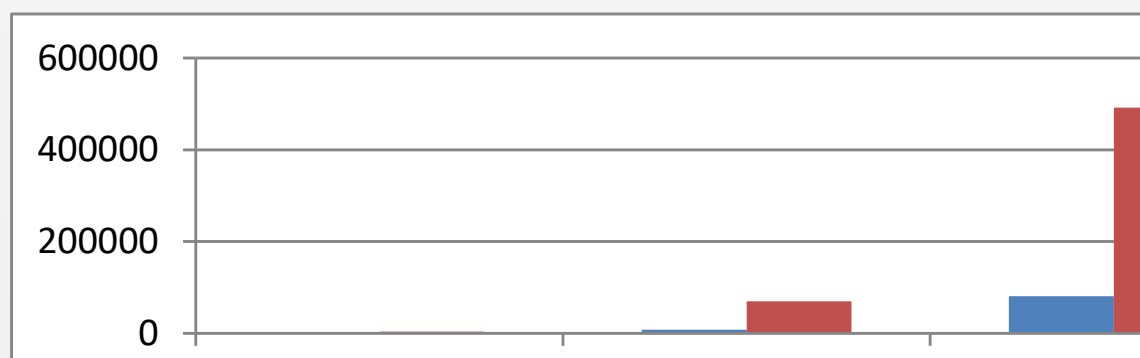
Year	2012-13	2013-14	2014-15	2015-16	2016-17	Average 2012-13 to 2016-17
Production (tones)	556,307	515,092	616,748	620,481	669,912	595,708
Area (hectare)	110,411	103,943	104,998	100,246	96,928	103,305
Yield per hectare	5.04	4.96	5.87	6.19	6.91	5.79
Import (tones)	23,917	35,359	26,276	51,447	78,122	43,024
Export (tones)	864	287	405	163	361	416

Source: Various issues of Agriculture Statistics Balochistan, Government of Pakistan (2018)

The data shows that there has been an increasing trend in the production and yield of apple while a decreasing trend in area over time. The import and export related data shows that there has been a rising trend in the later while a decreasing trend for the former.

The province wise distribution of apple production shows that out of 669,912 tons of apple produced in Pakistan during 2016-17, some 87 % was produced in Balochistan, 12.3 % in KPK and 0.67 % in Punjab as shown by Figure 5.

**Figure 5: Apple production in Pakistan (2016-17)**



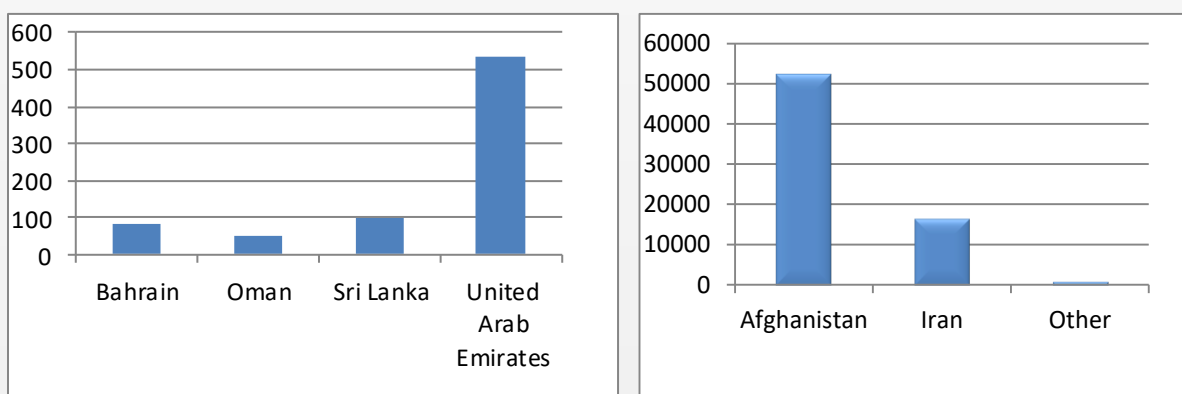
Source: Bureau of Statistics (2017)

To boost output and export, improvement in farming practices is needed to penetrate deeper into conventional markets and also explore new ones (Aazim, 2016). The export of fresh fruits, increased from USD 292 million in 2011 to USD 438.5 million in 2015 and then taking a dip to USD 427 million in 2016. In the four months of 2016, the country earned USD 122 million through exports of fresh fruits. However, given the size of horticulture sector in terms of production and area, the exports are not up to the potential. There are few issues being faced by the fruits and vegetable exporters on the value chains. Aazim (2016) shared the fruit and vegetable exporters views on the current situation of exports. According to the exporters, a lot needs to be done in terms of setting up inland transportation, though as compared to the past years, the value chain of fruits has slightly improved. They further narrated that Pakistan is far behind China and India in tapping the export opportunities, because the foreign trade missions often inform the value chain actors about the opportunities when they are gone. Moreover, the structural issue such as lack of cold chain facilities and high postharvest losses of fruits continues to affect the export potential. Furthermore, private sector is also not very active in Balochistan (Aazim, 2016). Further to these issues, limited numbers of exporters are able to hold the required licenses and certificates by complying with market requirements in terms of food safety and quality standards and selling their products to foreign markets.

### 3.1.2 Domestic and import markets

Pakistan is the net importer of apple and during the five years from 2012-12 to 2016-17 and imported 43,024 tones with major quantities from Afghanistan, Iran and China, and exported an average amount of 416 tones of Apple with major exports to UAE, Sri Lanka, and Oman (Figure 6).

**Figure 6: Apple exports and imports (tones) during 2017**



Source: Bureau of Statistics (2016-17)

As per the FGD (2020), conducted for this analysis, apple farmers in all the districts reported the import of large quantities of apple from Iran and Afghanistan which according to them was going on for decades. An apple farmer and member of Zamindar Association showed their concerns and mentioned that *“apple imports from other countries specially Iran and Afghanistan causes depressed prices for our local apple. Irani apples are superior quality and lower price than our apple. We have shown our concerns through media and asked to ban import of apple from other countries as we have large quantities of apple produced locally. But no action has been taken so far in this regard”*. The echoes have been also heard in the upper and lower houses of parliament where the lawmakers from Balochistan stressed the need to block the illegal import of fruits and vegetables from Afghanistan, Iran and India as it was affecting the local farmers especially in Balochistan (Khan, 2018). However, various ministries of the government could not agree on the actual origin of illegal imports of fruits and vegetables.

### 3.1.3 Federal strategies targeting value chain

The Ministry of Planning, Development and Reform revealed that Pakistan is largely left out of global value chains, because of export of relatively low value products instead of adding value to its primary products at home and participating in the increasingly connected world economy (MDPR, 2018). However, it must be also mentioned that local products are very often not complying with the SPS and TBT requirements, which are related to obsolete compliance practices from the food industry, puzzled food control functions and lack of food safety related public and private services to the industry. The

following sections present some of the federal government strategies on the development of value chains in Pakistan:

#### ***3.1.3.1 Changed role of federal government on agriculture and rural development after 18th amendment***

The role of federal and provincial governments has changed after the adoption of 18<sup>th</sup> amendment in the constitution of Pakistan in which the provinces have been given the responsibility for looking into agriculture and rural development. This shift of responsibility also reflects the need to address the key challenges such as food insecurity, technology gaps, and poor nutritional levels. Afterwards, the institutional setup for agriculture and food security has undergone significant changes. The ministry of Food, Agriculture and Livestock was replaced by the Ministry of National Food Security and Research (MNFSR) in 2011. After the 18<sup>th</sup> amendment, the role and responsibilities of the provincial governments have changed. For the development of agriculture and livestock sectors, they are liable to increase resources considerably to be able to implement activities under the provincial Annual Development Plans. However, the federal Government needs to lead in consultation with the provinces on the activities of national significance such as national priority setting, trade policies, national and trans-boundary pest and disease surveillance, the certification of agriculture products at international standards, and strategic and basic research (MNFSR, 2018).

#### ***3.1.3.2 Incentivizing horticulture industry***

As per the 2030 vision of the Ministry of Planning, Development and Research (MPDR), the horticulture related processing industry will be incentivized to harness the export potential of quality processed food. There is great potential for exports of Pakistan fruits internationally due to their richness in flavor, bulk production and varietal diversity (MPDR, 2018). These fruits include mangos, citrus, grapes, dates, apples, peaches, cherries, plums, pears, guava and loquat. MPDR, MNFSR and MoC of the federal government in consultation with provincial governments to devise a strategy in this regard.

#### ***3.1.3.3 Strategic trade policy framework (STPF)***

This policy of the Ministry of Commerce's Strategic Trade Policy Framework (STPF) included support on new plant and machinery imports for Agro Processing. Agricultural produce can get higher values if exported in processed form. But, due to lack of the necessary processing facilities, a large quantity of the produce is wasted which restricts the farmers' incomes. Following measures will be undertaken under the STPF in the selected agriculture sectors in order to reduce the wastage of produce and increase the incomes of the farmers. These included some 50 % support on the cost of imported new plant and machinery for specified under-developed regions (Rural Sindh, KPK, FATA,

Balochistan, Southern Punjab and Gilgit Baltistan) and 100% mark-up support on the cost of imported new plant and machinery on all Pakistan basis (MoC, 2016).

#### ***3.1.3.4 Short-term export enhancement measures for the horticulture products***

According to the Ministry of Commerce due to the high quality of some Pakistani horticulture products, a place is being created in the international markets. The Middle East and South East Asia are the most feasible markets for horticulture products keeping in view the short shelf life and manageable delivery time. The targeted products in horticulture sector will be kinnow, mango, potato, onion and fresh vegetables. To boost their exports, the short term strategy will be the institutional strengthening of Pakistan Horticulture Development and Export Company (PHDEC) under the MoC, supporting the acquisition of international certifications, improved and modern packaging, development of common facility or processing and treatment centers and market linkages development with the passages of international chain stores in Pakistan (MoC, 2016).

#### ***3.1.3.5 Cluster based development approach to enhance value chains***

The 2030 vision of the MPDR aims to promote the competitiveness of value chains, strategies such as development of supply chains, market intelligence, incubation centres, foreign direct investment magnetism, management training, joint research and development projects, and the approaches of marketing of the region and setting technical standards. For the purpose of the economic development, cluster based approach will be used for improving the competitiveness of chosen business sectors. The clusters will be prearranged as organizations between private sector firms, the government, and research institutions (MDPR, 2013).

#### ***3.1.3.6 Value chain support***

The National Food Security Policy of MNFSR (2018) describes that value chains in Pakistan are characterized by poor standard agricultural markets which are lacking basic hygiene and traceability. Moreover, inconsistent grading practices and inefficient transportation services are common. The other key issues of value chains are lack of market information, lack of cold storages, inadequate and poor roads, high post-harvest losses of fruits and vegetables, traditional and poor packaging materials, lack of accessibility of smallholder farmers to the high end markets and lack of value addition in agro based products. Moreover, among others, marketing middlemen is exploiting the small farmers because of their high dependency upon middlemen to sell their produce. On the other hand, the poor consumers also suffer in terms of paying higher prices, which have negative effects on household food security.

Keeping in view the above situation of the agricultural value chain, the MNFSR will facilitate provinces in improving market intelligence and Information and Telecommunication Technology (ICT) for informed decision making, regulation of markets for better transparency and access, providing policy support for enhancing modern cold



storage facilities, improved post-harvest handling practices to reduce post-harvest losses and improved quality for exports, developing standard grading, processing and packaging entrepreneurship etc. (MNSR, 2018).

#### **3.1.3.7 Food Losses and Wastage**

According to the National Food Security Policy (2018) of the MNFSR, food losses are estimated at 1/3<sup>rd</sup> of the food produced. The cost of annual harvest and post-harvest losses is estimated around Rs. 228.8 billion for grains, fruits and vegetables only. The losses happens at harvest, threshing, storage and transportation stages. According to estimates the available storage facilities are three time less than the requirements. Food losses happen at various stages of value chain i.e. production, marketing and processing. The main causes of food losses reported in the literature are imbalanced use of crop inputs, defective irrigation systems, pests and diseases damages, unsuitable and outdated crop harvesting practices, gluts or excessive supplies in the markets, poor grading and packaging, poor handling during transportation and poor storage etc. To improve the situation and reduce food losses and wastage, public sector can contribute in research and development; whereas private sector's role will be capacity building in harvest and post-harvest techniques (MNFSR, 2018).

#### **3.1.3.8 Food safety and environment**

The National Food Security Policy (2018) of the MNFSR adds that due to the absurd use of agrochemicals (fertilizers and pesticides) production systems of food and the environment are being polluted. In some places, sewage water is used to irrigate vegetables and fodders. To improve the situation, appropriate policy measures have to be taken and technologies have to be adopted. Balochistan Food Authority (BFA) has taken steps and destroyed vegetables and crops grown on toxic sewerage water in Quetta and discarded thousands of tonnes of such vegetables and crops. BFA has warned a strict legal action against the violators under section 273 of Pakistan Penal Code and Pure Food Ordinance 1960, supplying food or drinks that is poisonous and unfit for human consumption is a punishable offence (Balochistan Express, 2019). Moreover, reduction in the use of agro chemicals is recommended and the use of bio-fertilizers and bio-pesticides may be encouraged. Encourage the use of farm-yard manure for the organic production of fruits, vegetables and nurseries It is also recommended that with the collaboration of the local governments, towns and city administrations, the use of bio-remediation for treating sewerage and industrial waste water for safe food production may be promoted. Moreover, according to MNFSR (2018), the enhancement of the institutional capacity of the concerned institutions to regulate and monitor the food safety and promoting scientific evidence-based preventive approach in food safety instead of corrective approach in food supply chains is also recommended (MNFSR, 2018).

Pakistan Standards and Quality Control Authority (PSQCA) is responsible for product certification and to foster and promote standards and conformity assessment in order to advance the national economy, promote the development and efficiency of the industries, ensure the health and safety of the masses, and protect the consumers. Specifically, PSQCA looks after the certification of mandatory articles products and process under Certification Marks Scheme of PSQCA Pakistan Standards, and stop manufacturing, storage and sale of those products which do not confirm these standards. PSQCA is also responsible for the inspection and testing of products for their quality specification and characteristics for manufacturing and import & export purpose, the registration of inspection agencies and facilitate the trade through National Enquiry Point (NEP) to minimize or remove Technical Barriers to Trade (WTO).<sup>3</sup>

### **3.1.3.9 Boosting exports**

The Planning Commission, document titled “Agricultural Marketing Infrastructure and Post-Harvest Management for the 10th Five Year People’s Plan, 2010-15” highlighted that in the absence of a single ministry, Pakistan Horticulture Development & Export Board (PHDEB) was set up to meet the challenges arising due to impact of globalization and WTO. PHDEB, later on was renamed as Pakistan Horticulture Development and Export Company (PHDEC) was established by the federal government under Ministry of Commerce to solve domestic and export marketing issues of horticulture in Pakistan. To boost the export of various fruits such as Kinnow, Mango, Dates, Apples and other fruits and important vegetables, the Board has been playing pivotal role in approaching the developed countries markets (Planning commission, 2009).

The China Pakistan Economic Corridor (CPEC) concentrates on infrastructure and energy sectors. Balochistan has been lagging behind in terms of development in the areas of connectivity, energy access and industrial development. CPEC could play an active role in the socio-economic development of the province, as the Western Route passes through the most poor regions of Pakistan and Balochistan. CPEC can generate significant results if it connects the most deprived districts and regions to markets and social services.

CPEC is creating a new window of opportunity whereby Pakistan can explore new markets for raw apple and in value added form in different types of products such as juices, jam, jelly etc in the world. Under CPEC developments, the export of fruits is likely to increase from Balochistan due to the improvement of the road infrastructure, energy supply and the establishment of economic zones. Exporters foresee (FGD, 2020) that new export markets for Pakistani fruits in China and in the Far Eastern countries.

In the above context, there is need from both the federal and provincial governments to prioritize enhancing the output of fruit production, marketing and managing their quality for exports. Moreover, there is not sufficiently done to manage the fruits orchards

---

<sup>3</sup> psqca.com.pk



management. Although some efforts are underway in Balochistan for setting up apple and dates farming practices, grading and packaging facilities. But more efforts are needed to be taken to setting up inland transportation, plant nurseries, government support in marketing through improving the trade missions to tap export opportunities, provision of cold chain facilities to reduce high post-harvest losses in fruits to increase export potential to be able to reap the fruits from CPEC.

#### **3.1.4 Projects from the past specifically targeting value chain**

Description of the past projects targeting value chain improvement in Pakistan is given below:

##### ***3.1.4.1 Fruit and Vegetable Development Project (FVDP)***

Australian Centre for International Agricultural Research (ACIAR) funded project (2005-2013) was initiated in collaboration with the Government of Pakistan. In order to ensure sustainable supply in the markets, the project tried to increase the production of quality vegetables and fruits. The main beneficiaries were the fruit and vegetable cultivators. Field schools were arranged for farmers to educate them to ensure value addition along chain, reduce the existing high post-harvest losses, adopt Integrated Pest Management (IPM), and enhance the development of market linkages between producers and processors.

##### ***3.1.4.2 The Agribusiness Project (TAP)***

The Agribusiness Project (2011-2015) was initiated on horticulture and livestock value chains.<sup>4</sup> Project aimed to strengthen local capacity of stakeholders within important value chains to increase sales both locally and internationally. The project worked on the technical assistance and capacity building training to fruits and livestock farmers, associations, and agribusiness enterprises, presented customized cost-sharing grant products, delivered international support for agricultural marketing and brand development to identify and capitalize on high-price market opportunities and develop market linkage and established platforms to promote the development of explicit subsectors and create connections between the value chains stakeholders.

##### ***3.1.4.3 Australia Balochistan Agri-business Programme-Phase Two (AusABBA II)***

The six years (2018-2023) Australian government (DFAT) funded (USD 16.9 million) programmes implemented by FAO in Balochistan is a partnership between the provincial government, the Australian Government and FAO. The objective is to help households engaged in agriculture. The project aims to adopt sustainable, profitable and diversified strategies in an enabling environment that increases farmers' incomes, improve food security and nutritional status. The project includes training to male and female farmers to

---

<sup>4</sup> [www.cnfa.org](http://www.cnfa.org)

strengthen supply chains and eventually connect farmers with markets for Balochistani commodities such as onions, fruit trees, goat and sheep meat, seed, wool and dates.

#### ***3.1.4.4 Reform Value Chain Approach and Horticultural Farmers***

The USAID funded Project titled “Food Security and Poverty Alleviation in Arid Agriculture Balochistan between 2004 and 2008, was initiated by FAO in three districts of Balochistan namely Killa Saifullah, Loralai and Mastung. The “Balochistan Agriculture Project”, emphasized on capacity building of farmers, and value chain development. The project had great impact on production and income as show by Iqbal (2016).

#### ***3.1.4.5 Balochistan Agriculture Project***

USAID and FAO implemented a \$ 32 million, USAID funded Balochistan Agriculture Project. The project worked on agricultural development activities in eight districts of Balochistan and FATA. The Project aimed to increase the production, sales, and revenues for crops and livestock in order to help individual farmers and communities. New technologies, varieties and livestock breeds and improved practices were introduced. Community organizations were trained to introduce the new approaches. The project provided technical assistance to the communities to make them able to increase their product value through better grading, packaging, and marketing. It also included improving buyers and suppliers’ relationships through establishing better connectivity. The project also worked on the development of policies and regulatory frameworks for market-led and community driven investments for increasing women participation in income earning activities.

#### ***3.1.4.6 Government of Balochistan project for the establishment of apple grading and packaging facilities***

To establish one apple grading and packaging facilities each in Ziarat and Mastung districts, in 2015, the government of Balochistan launched a project worth PKR 50 million to help apple growers export their produce and to help improve their economic condition. Ziarat and Mastung districts are well known for the production of high quality apple. These grading and packaging facilities were under the administrative responsibility of the Directorate of Economics and Marketing. The Director Economics and Marketing informed that unfortunately these two facilities were non-functional due to lack of interest from the farmers side in terms of their use. Despite of the fact thatthe facility was advertised in the newspapers, but farmers did not show interest. According to him, such facilities could be successful only if established on the public-private partnership basis not solely under the government departments' administrative control as has been in this case.

#### ***3.1.4.7 Pakistan agriculture and cold chain development project (PACCD)***

PACCD was a three-year project sponsored by the U.S. Department of Agriculture that links horticultural and fishery production in Balochistan to modern markets in Karachi,

Hyderabad, Lahore, Islamabad, and abroad. PACCD established some 9,400 tons of cold storage capacity to store the produce and increase its shelf life and marketability. The project constructed cold stores were in the range of 25 to 1,500 tons of capacity and provided the refrigerated transportation to complete the cold chain in the region.

#### ***3.1.4.8 Agricultural Policy Reforms- Firms Project***

The tasks to be carried out by the project were as follows: i. Review the agricultural markets of Balochistan and evaluate their performance; ii. Review Balochistan's agricultural marketing policies, laws and regulations and identify and detail the deficiencies and distortions in the provincial policies, laws, and regulations; iii. Estimate the economic impact of such deficiencies/distortions; iv. Draft an international best practice agricultural markets policy including recommended regulatory framework, business processes and institutional set-ups consistent with fair, efficient, growth-oriented agricultural markets; v. Identify the capacity building needs of the provincial agriculture department and other relevant institutions in light of the policy and legal reform agenda proposed and vi. Identify down-stream FIRMS Project actions that will strengthen/support the agricultural markets system of the Province.

#### ***3.1.4.9 Livelihoods Restoration in FATA (Phase II)***

The three years project was from April 2018 to March 2021 with the financial assistance of the Government of Japan (USD 4.9 million) through the Japan International Cooperation Agency (JICA) and implemented by FAO. The project focuses on improving agricultural productivity by adopting innovative practices for farming, value addition in agriculture through the establishment of value chains and the introduction of the functional markets technologies.

#### ***3.1.4.10 The Horticultural Advancement Activity (THAZA)***

THAZA is a five years (July 2018 to June 2023) project funded by USAID amounting to USD 16.2 million. The project implementing partners are FAO, Livestock and Dairy Development Department, Agriculture and the Planning and Development Department. The project aims to enhance income opportunities from both agriculture and other sources that will lead to sustainable growth of national economy. It specially focuses on fruits value chains because of its nature as agribusiness project. The project will work in the selected districts of upland Balochistan located along the Pakistan-Afghanistan border. THAZA project addresses the post-harvest losses, small amount of value addition, and low quality standards adoption. The project also works to enhance the capacity of agricultural extension and building the skills of the fruit and vegetable value chain actors.

#### ***3.1.4.11 Agriculture Rural Development and Poverty Reduction Program***

A fruit preservation unit was launched under UNIDO's Agriculture Rural Development

and Poverty Reduction Program in Kuchlak Balochistan for disabled individuals. The Balochistan Rural Support Organization (BRSP) formed apple production, marketing associations and village organizations in district Killa Saifullah and worked towards development in sectors of agriculture, horticulture and livestock. All these initiatives should be able to catalyze the implementation of much targeted intervention to introduce local value adding practices and ensure appropriate capacities among value chain actors.

### 3.2 Overview of the value chain in the province

In terms of area, Balochistan constitutes the largest share in area i.e. around 44 percent, but in terms of population it constitutes only 6 % of the total population (i.e. 12.34 million). It is comparatively less developed because of its sparsely distributed population. As well, the provincial economy's percentage share in national economy dropped from 3.8 percent in 2000 to 2.9 percent in 2015, and the province's per capita income was estimated at nearly half the national average (Pasha, 2015). Similarly, the Multidimensional Poverty Index (MPI) was 0.394, the incidence of poverty was 71.2 percent. As a result, the province witnessed the slowest poverty reduction of 12.2 percent while the national figures showed a comparatively greater poverty reduction of 16.4 percent from 2005 to 2015 (Planning Commission of Pakistan, 2015).

Agriculture is the main livelihood of Balochistan's population (Pasha, 2015). Within agriculture; horticultural crops, small ruminants and fisheries are the principal sources of livelihoods in the province's rural areas. Horticultural crops make an important contribution to the agricultural sector, especially the fruit and vegetable sector is the most profitable enterprise. It offers sufficient job opportunities and potential for increasing farming community incomes. Balochistan is blessed by having a wide variety of climatic and agro-ecological zones, is thus ideal for raising various fruits and vegetables. Horticultural crops such as apples, dates, apricot, grapes, tomato, and vegetables accounted for some 45 percent of the value added to agriculture in the province and some 12 percent of the country's share during 2015 (Bureau of Statistics, 2015).

**Table 5: Value of agriculture produce in the province during 2017-18 (PKR Million)**

<b>Crops</b>	96,314
<b>Fruits (excluding apple)</b>	56,439
<b>Apple</b>	43,282
<b>Vegetables</b>	17,655
<b>Total value</b>	213,690

Source: Agriculture Statistics Balochistan (2017-18)

Horticulture segment is likely to drive agricultural growth in the years to come, given the increasing share of high-value commodities in the total value of agricultural production and their growth potential (Appendix-C). Through raising rural people's wages, the role of the sector is quite significant in the economy of the area. Within horticulture produce, fruits contribute important share in the provincial economy and are the significant cash crops of rural livelihoods because of their labour intensive nature. Overall crop area of the province was reported as 1056,355 hectares in 2017-18, with 203, 207 hectares of fruit (Balochistan Agriculture Statistics, 2017-18). The Balochistan upland areas which include all the selected districts under this project are suitable for cultivating temperate fruits of good quality.

### **3.2.1 Characteristics of selected districts on the basis of climate, size of population, approximate number and types of farmers**

#### **3.2.1.1 District Quetta**

Quetta is capital city of the province. It is the biggest city in terms of population. The city is situated at 1696 meter above sea level and is influenced by the local steppe climate. There is little rainfall all year round at Quetta. In Quetta the annual average temperature is 15.8 ° C 60.5 ° F. Annual rainfall is 244 mm or 9.6 inches and is one of the high-altitude cities of Pakistan. Population-wise, it is considered as the 6th largest city in Pakistan having 2.27 million population (Bureau of Statistics, Population Census, 2017). According to Agriculture Extension Department, approximately 700 apple producers lie in apple production pockets of the Quetta district. Most of these farmers lie in Hana Urak, Kuchlack, Sra Ghurgai, Chashma Achowzai, Mian Ghundi, and Akhterabad. Hana Urak has the competitive advantage in Apple production over other areas of the district due to its cool climate and higher elevation.

##### **3.2.1.1.1 SWOT Analysis for Apple production in District Quetta**

###### **Strengths:**

- Apple occupies a good amount of the cultivated area in Quetta.
- Henna areas provide the most suited winter and summer temperatures for quality apple production.
- Apple trees blossom late enough to avoid early spring rains.
- Drier weather during summer provide less favorable environment for disease attack.
- Apple possesses an advantage over other fruits grown in the district because of longer storage and shelf life.
- Decades long production, management and marketing experience of the individuals connected with apple production and post-harvest management and marketing.
- Higher employment opportunities in the city help apple farmers to establish, support and sustain production, even under unfavorable conditions.

- A higher number of contractors available.

#### **Weaknesses:**

- Poor production, post-harvest and marketing practices used
- Untrained picking labour cause fruit bruises
- Lack of certified crop inputs
- Higher water requirement of apple compared to other fruits and vegetables.
- Apple stress sensitive and can hardly recover in events of water stress.
- Many years needed from orchard establishment till economical returns start due to the cultivation of late fruiting varieties.
- Higher preharvest and post-harvest losses
- Comparatively lower quality fruit produced in the low land areas such as Kuchlak, Almas and Mianghundi areas, due to irrigation shortages and hot summers.
- Risk and uncertainty on account of price and weather
- Lack of real time weather and price information needed by farmers for on time better decision making.
- High agricultural inputs and capital costs required.
- Absence of post-harvest apple processing units.
- Low level of mechanization.
- Poor irrigation management.
- Financial weakness of farmers, hence often a deficit of vital inputs availability on time.

#### **Opportunities:**

- Possibility of strengthening direct linkage and access of farmers to retailers, supermarkets and processing units.
- Production per unit area still resides at a very low level, hence there exists a potential for an enormous increase in profitability.
- A huge demand of apple in national markets.
- Opportunities for high density orchards with dwarf and semi-dwarf sized apple plants.
- Business opportunities for cold stores and refrigerated transport.
- Opportunities for post-harvest value addition business in Quetta city

#### **Threats:**

- Urbanization is changing cultivated lands into residential and commercial blocks
- Water scarcity and increasing competition for water amongst residential, industrial and agricultural users
- Fragmentation of land holdings making agricultural production non feasible
- Losses of fruits due to dry weather and winds during the ripening season.
- Increased temperatures due to climate change and massive urbanization



- Increased competition from apple imported from neighboring countries
- Increasing pest infestation as a result climate change
- The increasing cost of production.
- Shifting interest of farmers towards seasonal vegetable farming
- Lack of real time price information
- Increased tourist and picnic activities in apple orchards are turning production units into recreational gardens.

### **3.2.1.2 District Killa Abdullah**

Killa Abdullah lies between east longitudes 66 ° 14'23"-67 ° 15'43 "and north latitudes 30 ° 05'7"-31 ° 18'46". The district is situated in Balochistan's northeast sharing its northern and western boundaries with Afghanistan, while district Pishin is to the East and Quetta to the South. District headquarter is the town of Chaman and has an area of 3,293 square kilometers. According to the Pakistan Bureau of Statistics (Population Census, 2017), total population of the district is 757,578 compared to 360,724 in 1998; where 52.48 per cent were male and 47.52 per cent were female in 2017.

The climate of the district is usually dry and temperate. Owing to different elevations, the district has very deviating temperatures. Summer is pleasant, while winters are cold. The district lies beyond the monsoon currents domain, hence the rainfall is erratic and scanty (AASA & GRHO, 2015). The Toba plateau covers its northern portion that is composed of long central ridges and many spurs. These spurs range in height between 1,500 and 3,300 meters. The district's climatic conditions are particularly conducive to horticulture farming. Apple, grapes, apricots, peaches, plums, potatoes, onions, tomatoes, wheat, barley and cumin are the major crops in the district. Tehsil Killa Abdullah, Gulistan and Dobandi are famous for apple production.

#### **3.1.2.1.2.1 SWOT Analysis for Apple production in District Killa Abdullah**

##### **Strengths:**

- Apple is the largest grown fruit in Killah Abdullah.
- Cold winters provide enough chilling hours for most of the apple cultivars in districts high land areas.
- Drier weather, hence lesser attack of bacterial and fungal diseases.
- Decades long production, management and marketing experience of the individuals related with apple industry.
- Comparatively less perishable and longer storage and shelf life than other fruits produced in the district.
- Large land holdings and a higher number of apple trees per farmer
- Collective business and farm management by male members of the family.
- Source of employment for a significant proportion of the population.

### **Weaknesses:**

- Usage of old production practices and late fruiting cultivars
- Comparatively water exhaustive crop
- Sensitive and less stress resilience
- Higher fruit fall due to dry weather during summer.
- Pre and Post-harvest losses due to improper pre and post-harvest crop management.
- Comparatively lower quality fruit in low land areas
- Lack of real time price information needed for on time decision making
- Low level of mechanization specify in production and marketing.
- Poor irrigation practices and methods used
- Financial weakness of farmers, hence often deficit of vital input on time.
- Unnecessary and in most cases harmful dependence of farmers on pre-harvest contractors and commission agents.
- High agricultural inputs and capital costs required.
- Absence of post-harvest apple processing (grading, packaging etc)
- Lack of on farm storage facilities
- Fruit dropping due to warm weather causes high preharvest losses
- Poor transportation causes breakage of crates and causes post harvest losses

### **Opportunities:**

- Huge gap between current and potential yields
- There exists a good demand of apple in domestic markets
- There is enough possibility of cultivating suitable high density low delta apple cultivars.
- Business opportunities for cold stores, refrigerated transport, and post-harvest value addition businesses.
- Vast areas available suitable for apple cultivation i.e., mountainous Deobandi tehsil.

### **Threats:**

- Climate change in the form of droughts, rising temperature and increasing water scarcity.
- Increased competition from apple imports from neighboring countries.
- Inadequate, inappropriate and expensive transportation
- Intimidating impact of climate change on growth and quality of apple.
- Pest infestation as a result of continuously accumulating airborne dust on plant leaves and fruits.
- Shifted interest of farmers towards grapes, seasonal cereals crops and vegetables.
- Low quality and adulterated crops inputs
- Lack of certified nurseries to get true to type apple saplings



### **3.2.1.3 District Pishin**

Pishin district lies between north latitudes of 30 ° 04' to 31 ° 17' and east longitudes of 66 ° 13' to 67 ° 50'. The district is bounded to the northeast by Afghanistan, the east by Killa Saifullah, the south by Quetta and Ziarat and the west by Killa Abdullah. Its north-south breadth is nearly 68 km and its east-west width varies from 8 to 38 km. The district's total geographic area is 7,874 Km<sup>2</sup> and according to Population Census (2017) some 736, 481 people live in the district. The district's general characteristic is mountainous and northern portion is covered by Toba Plateau. The mountains are relatively flat, with long central ridges falling down regular spurs from which frequent spurs descend and these spurs range from around 1,500 to 3,300 meters in height (District development profile, 2011).

The Pishin district sits at 1545 meter above sea level and the average annual temperature in Pishin is 16.7 °C or 62.1 °F. Annual precipitation is 256 mm or 10.1 inches. Winter and spring months such as December, January, February, March and April are rainy. The district is beyond the current monsoon range. Climate of Pishin can be described as hot and dry summers, and bitterly cold winters (Climate Data Organization). Twenty percent of the overall geographical area is cultivable land; of which, some 16 percent was net sown during 2017-18 (Agriculture statistics, 2017-18). The hilly areas such as Toba, Barshore, Karezat, and surroundings by Kratu Pass produce comparatively high quality apple than other parts of the district due to cool temperature. While, Malikyar, followed by Shekhalzai, Khanzai, Alizai, Huramzai, Torasha, Bostan, Malezai etc are also main apple producing areas in the district (FGD Survey, 2020).

#### **3.2.1.3.1 SWOT Analysis for Apple production in District Pishin**

##### **Strengths:**

- Apple is the second largest agricultural produce of the district Pishin
- Higher returns compared to other fruits grown in the highlands of district
- Lesser sensitivity to diseases caused by monsoon rains
- Cold winters provide enough chilling hours in many areas of the district including Karezat, Bostan and Toba.
- Toba areas located at high altitudes provide most suited winter and summer temperatures for quality apple production.
- Drier weather during summer provide less favorable environment for disease attack.
- Decades long production, management and marketing experience of the individuals connected with apple production and post-harvest management and marketing.
- Higher rate of education, employment and businesses in urban areas help apple farmers to establish, support and sustain production even under unfavorable conditions.
- Collective business and farm management by male members in the family; helps to spare family members for better management of orchards.

- Apple farming provide good source of earning to a good proportion of district residents.

#### **Weaknesses:**

- Outdated production, post-harvest handling and marketing methods.
- Higher water requirement of apple when compared to other fruits and vegetables.
- Sensitivity to the events of water stress.
- Long maturity time needed for Apple as compared to other fruits
- Higher pre harvest and post-harvest losses.
- Comparatively lower quality fruit produced at low land áreas when compared to high land mountainous areas of Toba.
- Lower financial returns due to lower market value of the apple produced in low altitude areas of district
- Poor irrigation management
- Lack of weather and market related information for better decision making.
- Absence of post-harvest apple processing facilities
- Financial weakness of farmers, hence often deficit of vital inputs at the time of need
- Unnecessary and in most cases harmful dependence of some farmers on pre-harvest contractors and commission agents.

#### **Opportunities:**

- Higher rate of education and awareness provide opportunities for adoption of efficient orchard and irrigation management.
- Opportunities for high density apple orchard establishment and management.
- Enormous potential for increased productivity and increased profitability
- Increasing demand of apple in national markets.
- Possibility of cultivation of more suitable apple cultivars in areas with significantly varying weather conditions and soil types.
- Business opportunities for cold stores, refrigerated transport and Apple processing/ value addition business

#### **Threats:**

- Increasing water scarcity and increasing competition amongst residential, and agricultural users for water.
- Power shortages resulting in higher cost of inputs specially irrigation water.
- Shifting interest of apple growers towards tunnel farming, vegetable and grape production in low land áreas
- Increased competition in the local markets due to the import of Apple from the neighbouring contries
- Inappropriate and expensive transportation facilities during harvesting season.
- Pest infestation as a result of continuously accumulating air born dust on leaves and fruits.
- Lack of market related information and certainty with respect to sale price.

#### **3.2.1.4 District Killa Saifullah**

Area-wise district Killa Saifullah ranks 15th in Balochistan (smallest to largest) and has an area of 6,831 square kilometres, 22.50 percent of which is cultivated (Balochistan Agricultural Statistics, 2017-18). The district lies between 67° 17' 37" to 69° 22' 54" East longitude and 30° 30' 35" to 31° 37' 10" North latitudes usually high at 1500 meter to more than 2500 meter above sea level. This district is surrounded by Afghanistan on the northwest, Zhob on the north and east, Pishin on the west and Loralai on the south. According to Population Census (2107), the district's total population was 342,814, compared to 193,553 in 1998.

The climate of the district is semi-arid (steppe) dry and classified. It can be set in temperature area of "hot summer and cold winter." The summer is dry, with mean temperatures between 21 °C and 32 °C. June is the hottest month when peak high temperatures reach 32 °C but do not climb above 38 °C, but the mean temperature stays below 32 °C, even in the hottest month. While, the annual mean temperature is 17.3 °C 63.1 °F. The rainfall is around 210 mm / 8.3 inches per annum (Sarfraz, 1997; Climate Data Organization).

##### **3.2.1.4.1 SWOT Analysis for Apple production in District Killah Saifullah**

###### **Strengths:**

- Apple grown on a large area of district Killah Saifullah.
- The profits from apple production are significantly higher than the other crops grown in the district.
- Better infrastructure and roads to facilitate farming.
- Kan Mehtarzai, Kanchooghi and Murgha Faqirzai areas have advantage over other apple producing areas in producing high quality apples for being located at high elevation.
- Cold winters and mild summers in areas of higher altitude provide enough chilling hours and suitable temperatures for best quality apple production.
- Well drained soils of the district are most suitable for apple cultivation.
- Comparatively higher rains during monsoon season result in higher air humidity hence better fruit color and decreased fruit loss.
- Large land holdings in Killah Saifullah tehsil and Nasai areas, hence higher number of apple trees per farmer
- Availability of skilled and comparatively cheap labor force.
- Collective business and farm management by male members in the family; helps to better manage orchards.
- Apple farming provide direct and indirect source of earning to a significant proportion of district residents.

### **Weaknesses:**

- Poor production practices, post-harvest handling and marketing methods.
- Apple's higher water requirement when compared to other fruits and vegetables.
- Apple a stress sensitive crop, can hardly recover from the event of water stress.
- High post-harvest fruit losses due to improper post-harvest management.
- Financial weakness of farmers, hence often deficit of vital inputs availability on time.
- Decreasing interest of farmers in apple production after introduction of olive in the vast areas of the district
- Comparatively greater number of years needed for orchard maturity compared to other fruits that start fruit bearing earlier.
- Comparatively lower quality fruit produced in low land areas of district such as Nasai and Killah Saifullah tehsil.
- Lower financial returns due to higher production and marketing costs
- Poor irrigation management and low level of mechanization.
- Absence of vital information related to weather and market prices needed by farmers for better decision making.
- Absence of post-harvest apple processing units and cold storage facilities.
- Unnecessary and in most cases harmful dependence of farmers on pre-harvest contractors

### **Opportunities:**

- Longer shelf life and desirable fruit quality of the apple produced in high altitude areas of Kanchooghi and Murgha area have the potential of export to international markets.
- Better connectivity of Apple producing areas with nationwide markets through highways.
- Opportunities for high density apple orchard establishment and management.
- Production per unit area still resides at very low level; hence there exists enormous potential of increased productivity and profitability.
- Continuously increasing demand of apple in local markets nationwide.
- Possibility of cultivating more suitable apple cultivars in areas with lower chilling hours and hot summers.
- Business opportunities for cold stores and refrigerated transport.
- Opportunities for post-harvest value addition business.
- Vast areas available for apple production in mountainous areas of Muslim Bagh and Loi-band tehsil.

**Threats:**

- Water scarcity, dry spells and continuously depleting ground water.
- Power shortages resulting in shortages of irrigation at critical stages
- Shifting interest of apple growers towards other crops.
- Increased competition generated by the import of apple from neighboring countries.
- Intimidating impact of climate change on growth and quality of apple.
- Increased costs on account of inputs.
- Lack of market related information and certainty with respect to sale price.

**3.2.1.5 District Kalat**

Kalat is located in the middle of Balochistan, shares western borders with district Washuk, Kharan and Nushki, north with district Mastung, east with district Bolan and south with district Khuzdar. According to the 2017 census, the district's total population was 412,232 as compared to 237,834 in 1998. The district consists of high valleys and hills. District land height ranges from 2623 to 2658 meters above sea level. Kalat district occupies 1.91 per cent of the Balochistan province's geographical area (6621.86 Km<sup>2</sup>). The total potential area for cultivation was reported as 114,818 hectares, which is more than 17 percent of the total geographical of the district. Out of which, approximately 14 percent i.e. 15,885 hectares were brought under crop. Irrigation is often achieved by tube wells (99%), and only few by Karezes (1%).

Kalat lies at 2007 meter above sea level and is known to have a desert atmosphere. The average temperature is 14.1 °C or 57.4 °F. The rainfall here is around 163 mm or 6.4 inches per annum. During June the least amount of rainfall occurs, which is recorded on average 1 mm. Most of the precipitation here comes in January, an average of 36 mm or 1.4 inch (Climate Data Organization).

**3.2.1.5.1 SWOT Analysis for Apple production in District Kalat****Strengths:**

- Apple is more than any other fruit in terms of area and production in Kalat.
- The profits from apple production are significantly higher than the other crops grown in the district.
- Better roads to facilitate farming and connectivity to the rest of the country.
- Cold winters and mild summers in areas of higher altitude provide enough chilling hours and suitable temperatures for best quality apple production.
- Apple possesses advantage over other fruits grown in the district because of late blossom and comparatively longer shelf life.

- The areas of union council Johan, Skelko, Pandran and Nechari highly suitable for apple production
- Collective business and farm management by male members in the family; helps to better manage orchards.
- Apple farming provide direct and indirect source of earning to a significant proportion of district residents.

#### **Weaknesses:**

- Outdated production, post-harvest handling and marketing methods followed.
- Apple's higher water requirement when compared to other fruits and vegetables.
- Apple a stress sensitive crop, can hardly recover from the event of water stress.
- Occasional orchard loss due to drought spells and decreased level of ground water.
- Financial weakness of farmers, hence often deficit of vital inputs availability on time.
- Apple trees need comparatively larger number of years to mature than other fruits.
- Poor irrigation management and low level of mechanization.
- Absence of vital information related to weather and market prices
- High post-harvest fruit losses due to improper post-harvest management.
- Absence of cold stores and post-harvest apple processing units.
- Unnecessary and in most cases harmful dependence of farmers on pre-harvest contractors
- Electricity loadshedding and fluctuation

#### **Opportunities:**

- Longer shelf life and desirable fruit quality of the apple produced in high altitude areas of Pandran, Johan, Skelko and Nechari areas have the potential of export to international markets.
- Better connectivity of Apple producing areas with nationwide markets through highways.
- Opportunities and need for high density apple orchard establishment
- Enormous potential of increased productivity and profitability.
- Due to good quality, continuously increasing demand of apple in domestic markets nationwide.
- Possibility of cultivating more suitable apple cultivars in areas with low water requirement
- Business opportunities for cold stores, refrigerated transport and apple processing.
- Vast areas available for apple production in mountainous areas of the district

### **Threats:**

- Water scarcity, dry spells and continuously depleting ground water.
- Power shortages resulting in shortages of irrigation at crop's critical stages
- Increased competition generated by the import of apple from neighboring countries.
- Intimidating impact of climate change on growth and quality of apple.
- Rising costs of production and marketing squeezing profits.
- Lack of real time price information

### **3.2.2 Level of and product types in primary production in the province**

Horticultural farmers in Pakistan suffer from the scarcity of high-quality planting stocks planted worldwide under agro-climatic conditions close to our climate, placing them at a considerable comparative disadvantage compared to others. The cultivars planted here are typically old cultivars in the public domain that catch the lowest world market values and earn just a small fraction of the new cultivars' profit margin (World Bank, 2009).

Most of Pakistan's commercially grown apple cultivars/varieties need cooler atmosphere as compare to the other crops. Apple flourishes well and bear good fruits in a cold season which is usually available at high altitudes. Hence, proper variety collection is of utmost importance. Varieties grown in Balochistan with success are Red Delicious, Golden Delicious, Amree, Sky spur, Kashmiri, Banki, Kulu etc. While varieties with low chilling requirement such as Summer Gold, Anna, Golden Dorset have been successfully tested and providing promising results in the low altitude areas.

### **3.2.3 Types of primary products in the selected districts**

Fruits, vegetables, cereals, onion, potato, melons, fodder, and cumin are the major crops in the selected districts. Major fruits in Quetta district are apple, grapes, plum, apricot, and peach. While, turnip, spinach, cauliflower, cabbage, carrot, radish, broad beans are major Rabi<sup>5</sup> vegetables and tomato, lady fingers, tinda (apple gourd), brinjal etc are Kharif<sup>6</sup> vegetables. Total crop area was reported as 8661 hectares with production of 64, 874 tons in the year (2017-18) as shown by Appendix D. The market value of these products is estimated at PKR 29522.51 million. Out of which, apple share is recorded as almost 2 percent (PKR 517.75 million).

District Pishin and Killa Abdullah are famous for wide variety of table grapes, apple, apricot, plum, peach, pomegranate etc. Wheat is the major winter crop and is staple food. Tomato, lady fingers, brinjal, pumpkin, turnip, radish, carrot etc are the main vegetables in

<sup>5</sup> Rabi crops are sown in autumn or early winter and harvested in spring or early summer

<sup>6</sup> Kharif crops are sown in summer and harvested in late summer or early autumn



these areas. Fruits contributes some 10.5 percent in the agriculture economy of Killa Abdullah district (Appendix E). Apple is the leading fruit and has more than 74 percent share in all fruits and nearly 8 percent share in all agriculture produce in the district. Similarly, apple is also imperative for the livelihoods of Pishin district, which has 31 percent share in all fruit value and some 25.5 percent share in all crops as shown by (Appendix F).

District Killa Saifullah mainly produces apple, followed by wheat, apricot, tomato, peach, pomegranate, almond, carrot, cauliflower, cherry, grapes, maize, peas etc. More than 56 percent apple production of Balochistan takes place in Killa Saifullah. It is the district's most important source of income for livelihoods, contributing almost 64 per cent of the district's total agricultural GDP (Appendix G). Similarly, fruits including apple, peach, plum, apricot, and cherry; wheat, onion, vegetables, potato, barley, cumin etc are grown in Kalat district. Fruits had a share of more than 28 percent in all of the district cropped area during 2017-18 as shown by (Appendix H). Of this, apple contributed almost 42 percent and 12 percent to the fruit and cropped area respectively. The market value of these products was expected to be PKR 6901.84 million, with an apple share of 55% in fruit and 26% in all primary products.

#### **3.2.4 Available processed products in the selected districts**

The selected districts produce variety of horticultural products, which are an important source of income for rural population. Almost all of the produces here are marketed fresh only. However grapes, apricot, plum and tomato drying also takes place using obsolete methods. Even at Quetta, near to no processing industry exist to process horticultural products. There is absence of juice, jams, jellies, vinegar and other processing units for value addition. Post-harvest losses of these horticultural products are high, shipments of perishable products takes place without refrigerated transport, very few proper cold storage facilities available, there is absence of proper warehouses, and lack of skill and proper know how to increase shelf life.

#### **3.2.5 Potential trade routes**

Balochistan has the geo-strategic importance for exporting its produce to the rest of the world. Currently, fruits and vegetables from Pakistan travel to Afghanistan and central Asia mainly through Chaman and Torkham borders. On the other hand, citrus, mango, and other commodities are being exported to Iran and the Persian Gulf via Taftan border. Moreover, Gawader is a port to both the Persian Gulf and Central Asian countries, which after development will effectively link some 64 Asian and European countries. Gawader has all the necessary features to turn into a regional center of trade and transportation.



Gawader has an international seaport, with all its ideal geographical location, economic and geo-strategic importance.

### **3.2.6 Current buyers (local and international) and the level of sales, export with market prices**

Producers as well as local contractors trade apples across the country to various markets, often to other provinces of the country. The two most popular marketing networks, such as producer-led and local pre-harvest contractor-led, are prevailing in the province. According to the FGD survey (2020), Pre-harvest contractors mostly sell apples in Lahore, Rawalpindi, Islamabad and Karachi markets, while apple farmers sell their produce in Gujranwala, Faisalabad, Karachi, Islamabad, Peshawar, Lahore, Quetta and other wholesale markets. The selection of specific commission agents by Apple farmer or preharvest contractor for the selling of apples is largely based on the loan facilities offered by them. According to FGD survey (2020) respondents, there exist close business ties or collusion between contractors and commission agents and cold stores according to which capital is provided to preharvest contractors to buy Apple orchards and in return, they ensure the flow of Apple to those particular market actors.

Pakistan imported some 6.98 million kg of fresh apple with a market value of PKR 356.85 million or PKR 51/Kg during (2017-18), mainly from Afghanistan and Iran. But exported only 0.207 million kg of fresh apple with a market value of PKR 1.29 million or PKR 64/Kg (Government of Pakistan, 2018) due to insufficient grading and packaging facilities and non adoption of international standards and certifications. On the other hand, in terms of production, apple is the third major fruit in Pakistan but not exported as citrus, mango and banana. In Balochistan, the high-altitude regions grow high-quality apples and there is scope for exports through the upgradation of apple industry in Balochistan. Moreover, a good proportion of Pakistani apple consumers are also quality conscious and prefer imported apples than the local apple, improvement in apple quality on modern lines can fetch this market as well.

### **3.3 Enabling environment**

This section aims to describe the enabling or business environment which creates a socio-economic vision for the overall sector and guides it through robust regulatory and policy frameworks. The enabling environment facilitates the competitiveness of value chain operators by having access to required services

#### **3.3.1 Relevant regulatory bodies (inspection body and capacity in the districts)**

Balochistan Food Authority (BFA) is the only competent authority conducting food inspections throughout Balochistan. Currently BFA does not have the proper setup or food testing laboratories in other districts except the headquarter in Quetta. Balochistan Food Authority was created in 2014 through the Act No. VI of 2014 of Balochistan provincial

assembly. The act extends to whole Balochistan except the tribal areas of the province. The function of BFA was to monitor and regulate the food business in order to ensure the provision of safe food. In particular, BFA provide scientific advice and technical support on matters relating to food, collect and analyze food related scientific and technical data, institute a network of food producers and consumers to assist in food safety and quality control measures, organize food safety and standards related training programs and promote awareness about food safety and standards, issue certificate to food exporters for export purpose (BFA, 2014). The technical staff of BFA is being attached from other government departments such as Food, Agriculture, Livestock and Fisheries and attached. These staff are mostly holding degrees in food sciences. There are four deputy directors, Basic Pay Scale (BPS-18), with the support of 2 food inspectors (BPS-17) with each deputy director.

### **3.3.2 Applicable laws, regulations, guiding policies and strategies at provincial and federal level**

The following sections present the policies and sectorial strategies related to the value chain, including aspects of Agriculture, Trade, Standardization, Food Security etc.

#### **3.3.3.1 Agribusinesses Development**

The World Bank (2013) report titled “Balochistan Needs Assessment Development Issues and Prospects” mentioned that there was considerable potential in Balochistan for agribusiness development in horticulture and fruit processing. Priority should be given to small scale interventions that can directly impact rural livelihoods and reduce poverty. Measures have to be taken on moving up the production value chain. Moreover, initiatives for the development of a cool chain for the horticulture industry would also increase the capacity to export grapes, apples, and other fruits. Small scale interventions should be given priority to reduce poverty and enhance rural livelihoods. For the purpose, the main focus should be on boosting production value chain. Specially, in horticulture industry the development of a cool chain would increase the export capacity of grapes, apples and other fruits (World Bank, 2013).

#### **3.3.3.2 Balochistan Agriculture Policy and Strategy 2020-2030 (draft)**

Balochistan Agriculture Policy focuses on primary agricultural production in Balochistan. It also discusses the role of different public sector agencies, businesses, and NGOs provide essential goods and services such as policy, standards, research, information, advocacy, mentoring, inputs, finance, transport, packaging, processing, marketing and promotion to the agriculture sector in the province. For the policy preparation, a comprehensive supply chain approach has been used that helped farmers and other stakeholders point out the issues across the various stages of the supply chains. The policy is being prepared with

collaboration of FAO, provincial and federal agriculture departments and hopefully the draft policy will be soon approved by the provincial government for implementation.

### **3.3.3.3 Balochistan comprehensive development strategy (BCDS, 2018)**

Government of Balochistan plans to promote industry to enable Balochistan to exploit its natural resource potential of fruits, fish, wool, leather, meat, and minerals. The focus is also on developing value chains in the province for the products that are presently produced in the province but their value addition takes place outside Balochistan (BCDS, 2018).

With public private partnership, the establishment of modern agriculture markets at strategic locations with initially one agri-marketing consortia established linked with smaller markets at district level and then would be expanded at tehsil level. These can be gradually equipped with cold storages, processing and value addition facilities. These facilities will also be having the marketing information of all national markets and such information can be disseminated to grass root level under proposed ICT Extension model.

CCDS also emphasizes to ensure availability of agriculture credit through a special arrangement with the State Bank of Pakistan (SBP) for Agriculture, livestock, fisheries, markets, processing and packaging etc. This can be initially started by evolving a Credit Guarantee scheme to create greater confidence of the financial sector and the customers. BCDS also proposes to evolve a program for grant of subsidized inputs to women farmers including certified seed and fertilizer for the production of high value products. More focus would be on women through dedicated interventions under on- going and new community empowerment programs (BCDS, 2018). It also suggests to formulate Agriculture Policy for Balochistan in line with the Integrated Water Resource Management (IWRM) Policy 2006 to cover all major farming systems.

### **3.3.3 Existing physical infrastructure**

#### **3.3.3.1 Road infrastructure**

This section indicates how existing road infrastructure hinders the transport of goods which necessitates additional protection of the products through better packaging etc. and reduces their shelf-life. Balochistan's road network was about 33,588 km in length by 2012, out of which 20,221 km (60%) were gravel roads, while 18,367 km (40%) were metaled road. The metaled road includes 8 national highways of 3600 km; the rest are provincial highways. In Balochistan, the road density (road length per km<sup>2</sup>) is 0.09 km, while the national road density is 0.33 km, Punjab 0.51 km, Sindh 0.57 km and KPK 0.30 km (MPDR, 2013; BCDS, 2013). Moreover, most of the existing provincial highways are generally in poor condition and in terms of road maintenance, there is a huge backlog and some 70% to 90% of the road networks are in need for urgent repair. These poor roads

not only cause an increase in transport cost but also cause wear and tear to the heavy transport vehicles. The repair and maintenance budget of these roads has been insufficient to repair the road in remote and far flung areas of the province and this issue has not been in the top priorities of the provincial policy makers for a long time (BCDS, 2013). These Poor roads add to high post-harvest losses of agriculture products specially the perishables.

Moreover, due to global competition the transport and logistics services cost is decreasing worldwide, but in Pakistan these costs are quite high when compared to the region, which is affecting the export competitiveness of the country (MPDR, 2013). Keeping the above context in mind, in the 11<sup>th</sup> five-year plan of Government of Pakistan, a thematic change to the traditional definition of the 'transport and logistics sector' was proposed. i.e., it will not be just confined to physical infrastructure such as rails, roads and transport but will include services such as packaging, delivery, storage and trade logistics as well.

### **3.3.3.2 Storage facilities**

Storage facility helps stabilize agricultural prices which are highly volatile most of the time, and evenly distribute the supply. In Pakistan, adequate and efficient storage facilities at farm and market level in both the public and private sector are lacking that is eroding power of farmers to retain the product longer for better price (MNSR, 2018). The cold storage facilities are owned either by *Arthis*, other middlemen who provide storage facilities to farmers for some fruits and vegetables to farmers. Farmers dependency causes the involvement of some middlemen which could have been otherwise avoided. The public owned storage facilities are not adequate to fill the gap and store the surplus production. Moreover, the available storage facilities are not used properly. In case of non-refrigerated storage, frequently the produce is not stored in a ventilated and proper sanitary space or any preventive measures for insect and disease control taken. Moreover, the overwhelmingly fragmented production and marketing system also makes refrigeration non practicable.

According to the Ministry Planning Development and Research (MPDR), the extent of post-harvest losses of fruit, vegetables and other perishable good are estimated to be about 35% in Pakistan due to the absence of appropriate transport logistics, lack of cold storage facilities, and refrigerated containers. According to World Bank (2013), in Pakistan the absence of refrigerated transport for fruits and vegetables, inadequate storage facilities, and the lack of processing and packaging facilities weaken the agricultural marketing system (World Bank, 2013).

In order to appreciate the enormous potential of the horticulture sector in the international market, MPDR in the 11<sup>th</sup> five-year plan, the Pakistan Horticulture Development and Export Corporation (PHDEC) was assigned the task of developing infrastructure for CCS using public-private partnership modalities. Moreover, in order to

enhance exports of perishable goods, the plan also included the development of a well-integrated Cold Chain System (CCS) infrastructure such as pack houses, cold storages, reefer containers, reefer yards and testing labs in the country (MPDR, 2013).

The fruit and vegetable cold storage capacity of the province has improved over the last few years. There are some 14 cold storage facilities in Quetta, 15 in Kill Abdullah, and 1 in Pishin. There are no cold storage facilities in Killa Saifullah, Kalat and Ziarat.



View of cold store in Killa Abdullah where wooden crates and cartons are stored together

**Figure 7:** Apple storage in Killa Abdullah

### 3.3.4 Agricultural extension service providers

The agriculturr extensión service in Pakistan, generally train farmers in technical aspects of production and plant protection, but not in marketing due to lack of marketing extensión skills. The lack of marketing extension services, restrain farmers to properly plan production and marketing of their produce and get optimum returns (MNSR, 2018).

In Pakistan agriculture extension is primarily a provincial subject. The federal government however, provides back-sopping in terms of research, institutional development, agriculture credit, marketing intelligence, market intervention and trainings etc. In Balochistan, the Directorate of Agriculture is the main government authority involved in fruits marketing development. The extension methods applied by the agriculture extension department includes mainly the field demonstrations and distribution of written information in the form of leaflets, brochures, booklets etc.



The FGD survey (2020) shows that private extension institutions can be rarely seen in agricultural production and marketing extension service in the province except the input suppliers/private enterprises in (fertilizer, pesticides, machinery etc). Their major focus is on sale of their products through the use of media advertisements, leaflets, field demonstrations, personal contacts and exhibitions. Their main beneficiaries are relatively large farmers who are financially sound and have access to improved technologies.

In the private sector, some NGOs are quite active particularly the Balochistan Rural Support Programme. Their approach for the agriculture extension activities is trainings and demonstrations. The FGD survey (2020) shows that in Balochistan the activities of agriculture extension department are severely obstructed by lack of funds, lack of technical personnel, and lack of training. Baloch and Thapa (2019) reported that the top-down centralized method is used to provide the agriculture extension and technology transfer to farmers in Balochistan. Under which the officers are mostly skewed toward large farmers and non beneficial to small holder farmers who constitute the largest proportion of farmers in the country- consequently affecting agricultural production and rural incomes. Baloch and Thapa (2019) suggested that in Balochistan, to enable more farmers get farmers from the extension services the decentralized or bottom up approach should be implemented. Moreover, the required facilities such as financial resources, well trained officers, logistics etc for field may be provided to the extension staff to enable the resource poor agriculture extension department in the province serve the farming community (Baloch and Thapa, 2019). Moreover, due to globalization and commercialization of agriculture, the marketing extension services are the need of the time and should be provided to the farmers (MNSR, 2018).

Agriculture Extension (AE) is the wing of the provincial department of Agriculture and Cooperatives (DAC) and possesses hierarchy throughout the province. At the district level the department of agriculture extension is led by the Deputy Director Agriculture Extension (DDAE) who is 18 grade officer. He does have office set up with vehicle and operational budget to undertake field activities. Besides him there are three more DDAE's which include, DDAE Soil Fertility, DDAE On Farm Water Management, and DDAE Plant Protection. Each DDAE is supported by Agriculture Officers of grade 17, their number vary from district to district. DDAE's and Agriculture Officers generally hold Bachelor and/or Master's Degree in any Agriculture discipline. Further down the hierarchy are Field Assistants who are generally 2 to 3 per tehsil. The field assistants are supported by *Beldar*<sup>7</sup> who does the farm work. Except DDAE Agriculture extension, the other DDAEs and Agriculture officers have no operational budget nor transport facility to access farmers. Similar is the case with the Field Assistants and Beldars.

---

<sup>7</sup> A lower grade government servant hired for doing labour job in the field



According to the Director General Agriculture Extension, more than our 98% budget is spent on salaries and allowances. Only 1 to 2 percent is left in which we have to pay for the utilities of our Quetta office and offices and agriculture farms in other districts as well. Due to financial constraints currently, the AE is struggling to deliver its functions as it is underfunded and under-resourced. Moreover, as the farming population it serves is sparsely distributed throughout the province, makes its work more difficult. The following measures are suggested for the improvement in performance of AE through this project.

- Training opportunities for AE officers and staff to enable them to play leading role in marketing extension services provision to improve fruit and vegetable value chain performance;
- As agriculture is a technical field, the department should nominate the right person for the right job someone with strong agriculture background and qualification.
- Improve coordination with the research institutions, universities, and development sector
- The capacity building of AE staff on modern production and marketing practices of fruits and value addition

### **3.3.5 The Codex Alimentarius International Food Standards**

There are various technical requirements of various certifications such as SPS, ISO, HACCP, Euro-Gap, and Golbal-Gap on the exporters to be met. The compliance cost of these certifications is a big barrier to the agriculture product exporters of the developing countries (Gómez et al. 2011, cited by Babar, 2014).

Codex food safety standards are part of the Sanitary and Phytosanitary measures agreement of the World Trade Organization (WTO). The Codex standards are guidelines and codes of practice regarding the fairness, safety and quality of international trade. The purpose of Codex Alimentarius is to ensure safe and good food for everyone and everywhere (FAO and WHO). Codex take care for food safety issues especially with regard to the use of veterinary drugs, pesticides, food additives and contaminants. In many countries, Codex Standards serve as part of national trade rules for those countries who adopt these.

The Codex standards have implications on food exports from Pakistan. As compares to developed countries, Pakistan implements lower SPS standards both in terms of quality and quantity therefore, like many other developing countries of the world our food exports face many hindrances. However, this agreement facilitates and acknowledges the developing countries problems in complying with SPS measures and favors them for special and differential treatment.

Pakistan's major constraints in adhering to the SPS agreement have been its insufficient ability to participate in dispute settlement procedures and its inability to show that the domestic SPS measures are at par with the developed countries requirements. These constraints are largely due to insufficient scientific and legal expertise and limited financial resources (Planning commission, 2009). As a result of these, Pakistan considers the SPS requirements as impediment as it's agricultural and foods products exports abilities to developed countries are largely constrained by the SPS conditions. Additionally, the prevalent production and marketing system of food is not well-matched with the SPS standards and requirements given the weak and fragmented SPS controls measures in Pakistan (Planning commission, 2009). Moreover, the SPS measures applied by developed countries are stricter than developing countries and therefore, in order to reduce impediments in the way of Pakistan exports which are largely primary products, significant structural and organizational changes on large-scale are required to comply with SPS requirements. .

#### **3.3.5.1 Legislation regarding SPS measures**

As part of National Food Security Policy (2018), and to improve the implementation of food safety standards in Pakistan in the light of SPS measures, a bill for National Food Safety, and Animal and Plant Health Regulatory Authority has been approved by the Prime Minister of Pakistan with stipulation to have organogram. The parliament has yet to approve it. After its approval from the parliament it will become act. for the provision of safe food to its growing population. This legal framework improves the implementation of food safety standards in Pakistan for the improved compliance of the SPS measures. Under this the following measures are taken: Guidelines in the light of SPS measures for adherence in agricultural imports and exports, inspection and quarantine controls of food products exports at points of entry and exit, co-ordination with Provincial Governments on matters relating to management of SPS related risks associated with the agriculture products marketing and production, nomination of the accredited testing facilities and laboratories for official controls relating to the SPS measures, coordinate with international organizations regarding SPS matters and saving national interest; development of legal and regulatory framework for improved implementation of food safety standards in light of SPS measures, addressing food safety regulations particularly for milk, meat, fruits and vegetables, facilitate enhancement of food and horticulture exports up to 20 percent, legislate agricultural and food safety regulatory laws, and establish credible regulatory trade regimes for food products (MNFSR, 2018).

#### **3.3.6 Access to resource for food manufacturing**

The following section presents the details of access to resources for food manufacturing in Balochsitan and Quetta.

### **3.3.6.1 Water, electricity and human resources**

In Balochistan the districts under study are overwhelmingly dependent on groundwater which is pumped from hundreds of meters. Electric tubewells are source of water. Agricultural tubewells are subsidized by the government in their electric bills. In Quetta, Water and Sanitation Authority (WASA) is mainly responsible to supply drinking water. For new tubewell, the permission for WASA is a requirement. Electricity is supplied by Quetta Electric Supply Company. The time to get new connection can vary from weeks to months due to their procedural formalities. Balochistan Agriculture College (BAC) and Agriculture Training Institute (ATI) Quetta are responsible for the training of agriculture graduates and agriculture department's employees and farmers. BAC is a degree awarding institution. ATI is mainly responsible to train the field staff of agriculture department. In short, for the human resource development, institutional capacity exist in Balochistan but international best practices still need to be disseminated.

### **3.3.7 Education system in the province**

There are 65 intermediate colleges, 35 graduate colleges, 4 residential colleges, 5 cadet colleges, 3 poly technic colleges and 10 universities and Balochistan Agriculture College (BAC). BAC is going to be upgraded as Agriculture University and the construction work of the campus is going on.

Currently, there is no degree offered specifically in value chain, however, the business administration schools of two universities namely, Balochistan University of Information Technology, Engineering and Management Sciences (BUITEMS) and University of Balochistan (UOB) offers the supply chain management and agriculture economics course in undergraduate and graduate levels. Moreover, the departments of economics at the various other universities, colleges and research institutes in Balochistan are also engaged in generating and preparing agricultural production and marketing related information through cost of production and agricultural marketing studies at the various levels of higher education research.

Moreover, the Balochistan Agriculture College (BAC) is the only agriculture specific institution in Balochistan offering some courses on agriculture value chain. The college offers Bachelor of Science (Honors) Agriculture degree with specialization in Horticulture, Food Technology and Agriculture Economics. The curriculum includes of these degree programmes certain courses related to fruit and vegetable value chain.

At BAC, the Department of Food Technology was established in March, 2013 to bring measurable enhancements in the level and quality of education and research in food related fields. At present, the Department offers four years B.Sc (Hons.) degree in Food Technology and more than 200 students have graduated and 50 students are enrolled in 5th and 7th semester together. The objectives of the department are; (i) to impart quality

education to train manpower in the field of Food Technology to meet the demand of growers & food industry; (ii) to conduct research on various aspects of Food Sciences and Technology; (iii) to develop technologies to reduce post-harvest losses of fruits and vegetables. Moreover, a Food Technology Laboratory is available at BAC, where jam, jelly and juice making trainings are given and experiments are conducted for farmers and students. There are eight faculty members including one professor, one assistant professor and 6 lecturers in the department of food technology at BAC. The value chain related courses offered in BSc (Hons) food technology are Food processing and preservation, Food laws and regulations, food packaging, post-harvest technology, and food quality management. Moreover, to upgrade the food technology laboratory at BAC a concept note has been submitted to the UNIDO for the up gradation of the laboratory in terms modern equipment.

While at the department of Horticulture at BAC there are currently 1 associate professor, 2 assistant professors and 2 lecturers. The value chain related courses in BSc (Hons) are food processing and preservation and post-harvest horticulture offered at the department

### **3.3.8 Access to finance (credit opportunities and relevant banks in the province)**

The institutional sources of credit that includes commercial banks and other public institutions are availed by some 20-30 % apple producers due to collateral requirements, lengthy procedures, less accessibility and high interest rate on loans (FGD, 2020). Some 26 commercial banks are providing agricultural credit. These are two specialized banks namely Zarai Taraqiati Bank Limited (ZTBL) and Corporative Bank Limited. ZTBL Bank offers a number of special loan programs, including production loans, development loans, agricultural loans, off-farm Income generating loans and cottage industry loans. In order to enable farmers to buy modern inputs and technologies to improve agricultural productivity and improve their living standards, many commercial banks such as National Bank of Pakistan (NBP), Habib Bank Limited (HBL), Allied Bank Limited (ABL), Muslim Commercial Bank (MCB), and Union Bank Limited (UBL), fourteen domestic private banks and five microcredit banks are also providing agriculture credit facilities for crop cultivation, livestock, poultry farming and fish farming (Chandio et al. 2017). Moreover, large farmers due to their accessibility and influence get the loan facilities easily from the commercial bank but the small farmers on their other hand are mostly deprived of this facility due to their less accessibility and inability to meet the procedural requirements.

According to FGD survey conducted in 2020, apple farmers mostly rely (70-80%) on non-institutional sources of credit to meet production, marketing and other expenses. These sources include crop inputs dealers, Arthis (commission agents) and other marketing middlemen such as pre-harvest contractors and processors. For example, in fruit and

vegetable markets, apple farmers are financed by any one or more actors with whom they do business deals such as Arthis, Ladanwala, or Cold storage owners. The reasons for accessing them by apple farmers were accessibility, easy availability, no security requirements. However, the problems with non-institutional credit were that it was conditional, and the amount disbursed was usually not concomitant with the needs of farmers. The lender is in a strong bargaining position due to his financial capabilities and securing excessive profits. However, the borrowers who are generally in weak bargaining position have to compromise on prices for their produce.

### **3.3.9 Current and future negative impact of climate change on the production and processing of the value chain**

According to Intergovernmental Panel on Climate Change IPCC (2014), factors such as water stress, sea-level rise, floods, droughts, and tropical cyclones can cause decreases in agricultural productivity and aquaculture and can cause food insecurity in many countries of Asia. FAO (2017) reported that the most significant hazards in Pakistan are climate change-related floods, droughts and cyclones. In Pakistan response on climate change has been mainly reactive during post-disaster period and less on the prevention and adaptation. FAO suggested that in order to combat the climate change issues, more inputs from climate change experts and a broader partnership framework is needed. MNFSR (2018) revealed that in Pakistan, the climate change related projections shows greater likelihood of variability in the climate and weather with regular extreme events such as droughts and floods and the pressure on the limited surface and groundwater is likely to increase tremendously, and the agriculture and livestock sectors are very likely to be affected the most (MNSR, 2018). Moreover frequent and severe droughts and floods arising from climate change will have serious management implications for water resource users (Halcrow, 2008). The ecosystems are threatened and limiting our capacity and in the attainment of sustainable agriculture in the long run.

Due to climate change effects, the crops yields are low and declining over time (MNSR, 2018). The climate change related challenges are more severe in Balochistan due to poor resilience and adaptive capacity. Leads (2017) revealed the realization of Sustainable Development Goal (SGD) 13 (strengthening resilience and adaptive capacity) seems challenging in Balochistan province due to its low adapting capacity to meet the challenges of climate change related hazards such as droughts, and floods. There are various factors responsible for low adapting capacity against the adversaries of climate change such as lack of provincial climate change related policy, less awareness about climate change, poor governance and insufficient focus on climate change in education and research (Lead, 2017).

The poor adapting capacity in the form of absence of sufficient preparedness for climate change minimization and mitigation, the impacts have been noticed in the form of

frequent droughts and floods. Droughts have impact on food security caused primarily by the decline in crop yields, and livestock losses and depletion of water for agricultural and daily use. The apple production areas of Quetta and Pishin were no exception in terms of the adverse effect of drought in the form of reduction in fruits production by 20-40% and yields by some 15-25% during the 2013-14 drought (BUIITEMS and UNDP, 2015).

To cope with the climate change effects, some adaptation strategies have been implemented in Balochistan by the Government and other national and international agencies such as allocations in Public Sector Development Programme (PSDP) for improved water management related initiatives such as water courses and provision of water delivery pipes, development and construction of check and delay action dams for water storage, establishment of cold storages for fruits, improved packaging material, and construction of water tanks (BUIITEMS and UNDP, 2015).

MNFSR (2018) suggests that in order to cope and adapt to climate change in future, an adaptation program is required in order to better deal with climate change impacts. Specifically, the measures such as adopting soil and water conservation technologies, enhanced use of high efficiency irrigation systems, promoting low delta high value cropping pattern, new cultivars of fruits, and climate smart agriculture practices with maximum water productivity and the treatment of waste water for use in agriculture are need of the time. The long-term measures focused on improving groundwater management and governance, business and farm diversification strategies (e.g. selecting drought-tolerant varieties) and reinforcing legal, policy and institutional frameworks for drought risk mitigation are suggested.

### **3.3.10 Situation analysis and needs assessment of value chain stakeholders**

Situation analysis takes a snapshot view of a situation and where things stand at a certain point in time. It is sometimes accomplished by means of a SWOT analysis, to examine all aspects in relation to the results of the project in question. Situation analysis while using market research and other observations for decision making, help structure strategic marketing plan and determine its effectiveness, allowing making course corrections when the plan isn't achieving expected results. The results of FGD are presented in the following section to delineate the situation analysis and need assessment of value chain stakeholders

#### **3.3.10.1 Apple value chain map**

Design a value chain map or flow diagram with the different stages the product is going through Value chain mapping illustrates the way the product flows from raw material to the end markets and presents how the industry functions. The dimension of value chain to



map are, the major processes, actors involve and their function, flow of product, change in value throughout the chain, types of business services feeding into the chain etc.

#### **3.3.10.1.1 The core process in the apple value chain**



The core processes involve in the apple value chain are presented above. These processes start from the inputs provision, where apple farmers acquire the crop inputs such as plants, fertilizer, water, labour and other inputs. Afterwards, the trees need intensive care in the form of supply of necessary inputs, tree pruning, thinning etc. The next process is production, the attainment of which requires 7-10 years. In case of Balochistan, where mostly traditional varieties such as Tor Kulu, Shin Kulu, Kaja, Amri, Mashadi etc are grown which requires 7-10 years to start fruit bearing. The 3<sup>rd</sup> process starts after the product is ready to harvest which includes picking, sorting, grading, packing at farm. Afterwards, the produced is transported to different markets where is it either sold out or kept in cold stores. Some of the produce is processed into juices, jams, extracts, syrups etc mostly in Karachi, Lahore and other cities where such facilities are available. Some of the produce finds its way towards the international markets, while imports mainly from Iran, Afghanistan, and China also find their place in local markets. The final process is retail where the apple is sold to consumers.

#### **3.3.10.1.2 Actors involve in the apple value chain in Balochistan and activities undertaken by them**



After mapping the main processes involve, it is possible to move on to the actors- those people involve in apple value chain and what they actually do. Inputs suppliers are those who supply production and marketing inputs usually on credit for one season. They receive their loans back from the farmers after the crop is harvested and sold. The FGD survey (2020) respondents revealed that the price of borrowed crop inputs was 2-5% higher than the inputs bought on cash.

Contractors are those actors who buy the orchards for one season mostly at the blossom stage and also when the crop is ready to harvest in rear cases. The contractors after buying the orchard take on the responsibilities of all the orchard management practices such as watering, pesticides application, fertilizer application etc. Transporters are mostly

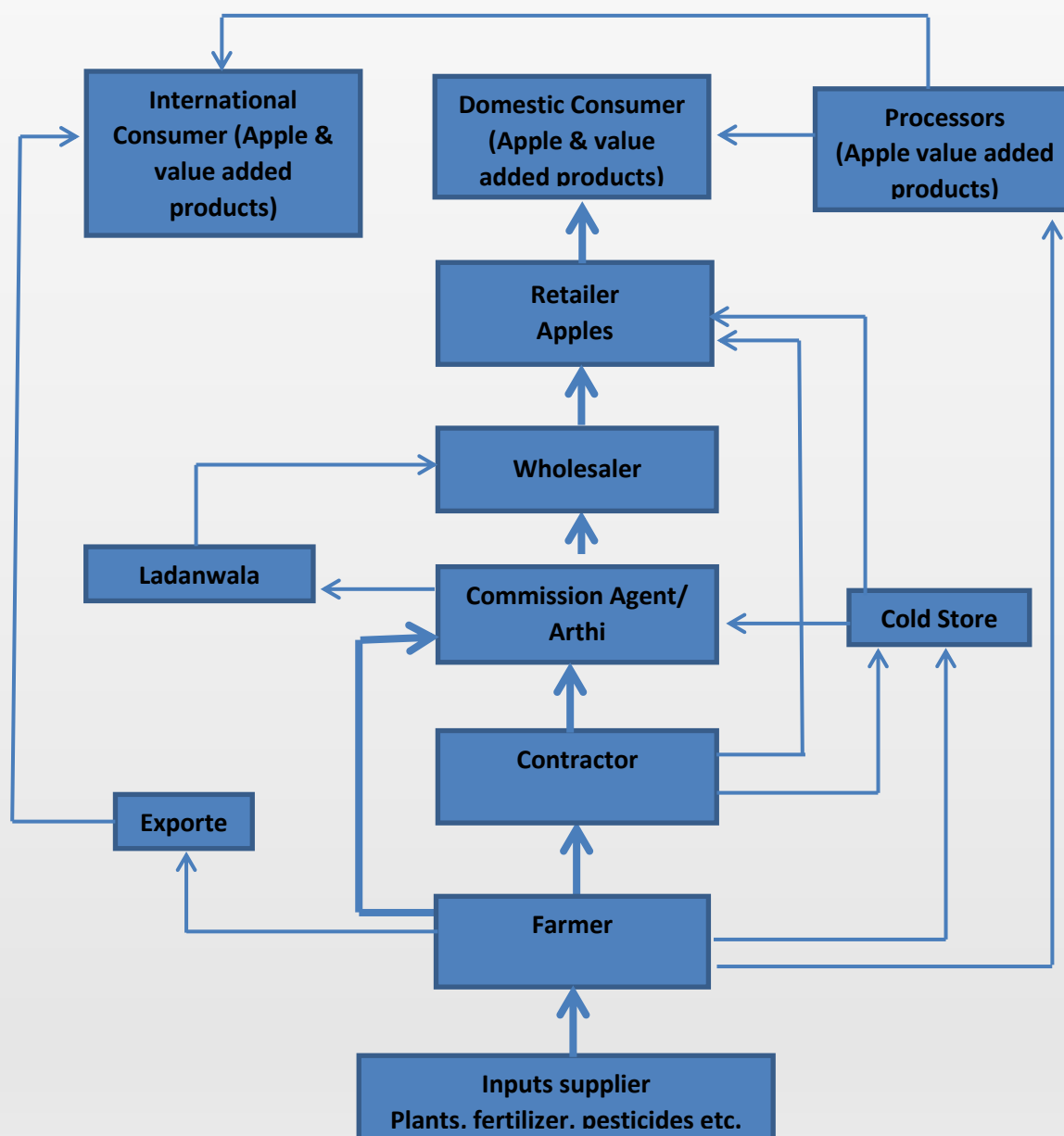
local people who use ordinary goods trucks to supply apple to different markets. Some 500 to 600 crates are loaded into a small truck, while 850-1000 crates are loaded into a large truck. The apple is stored in the cold storage facilities in Karachi, Lahore, Islamabad and other cities where the wholesale markets exist. Commission agents locally called as *Arthi* are actors who sell the farmers produce through auction and charge commission at the rate of 5-7% of the selling price and doesn't take the title of the product. Apple is exported in small amounts to UAE, Sri Lanka and other countries due to different standards put in place by different countries. While apple imports from Afghanistan, Iran and China are made both legally and illegally under the border trade arrangement. Wholesaler buys the product in auction through participation in the bidding process. He takes the title of product, and after sorting, grading and repacking. He mostly sells the produce to retailers or consumers. *Ladanwala* buys the produce in Quetta market and sells in other markets of the country for profit. Retailer is the last actors in the value chain who buys the produce from the wholesalers or in the auction, and sells it to consumers. The flow of apple and its by products through various marketing channels is presented in the following section:

#### **3.3.10.1.3 Flow of apple through the value chain**

As shown by Figure 8, apple value chain starts with the inputs supplier who provides inputs to farmers mostly on loan. Inputs include pesticides, fertilizers, packaging material etc. According to the FGD survey (2012), farmers showed their dissatisfaction over the quality and price of the inputs. The inputs are usually bought on credit which is reimbursed after the apple is marketed. Apple farmer either sell the apple to the contractor or market through the commission agent. The contractor is responsible to undertake all the production and marketing activities till the produce is disposed off. For pre-harvest contractor the money to buy orchards usually comes from the commission agents who then look after the marketing of the produce as well. The contractor works in an environment of risk and uncertainty (Mushtaq et al. 2016).

Those apple farmers who self-market also get financial support from the commission agents with the condition that the produce will be marketed through them. The marketing of the apple is undertaken mostly in a haphazard way both by apple farmer and the contractor. Mushtaq et al. (2016) reported that in Balochistan there is non-availability of any technical advice regarding the modern production technology of apple orchards. On the marketing side, apple grading, packing and marketing standards are not followed and low and good quality apple is mixed. SPS measures are not adopted. The produce is marketed in a traditional manner and cold storage facilities are poor leading to high post-harvest losses.

Around ten percent of apple produced in Balochistan is marketed to Quetta wholesale market while the remaining 90 % is marketed to the distant wholesale markets such as Lahore, Karachi, Islamabad, Dera Ghazi Khan, Rawalpindi, Multan, Hyderabad, Gujranwala, Kohat, Peshawar and other markets.



Major Flow ———

Minor Flow ———

### **Figure 8: Map of apple value chain**

Figure 8 shows the flow of apple through the various marketing channels facilitating by various marketing actors.

The cold store owners (who are also commission agents in most cases) of Lahore, Karachi and other cities also invest money by financing apple farmers and contractors with the condition that the produce will be stored with them. The role of inputs dealers, commission agents and cold store owners is very important by providing necessary capital at the time of need to fuel the apple economy at the time of need. However, this puts apple farmers at a minor disadvantage in the form of compromised prices. Packaging material is not produced locally rather readymade packaging material is imported from Karachi, Lahore, Faisalabad and other cities. Two types of the packaging material are used i.e., wooden crates and carton boxes. For wooden crates, the wood sheets are imported from Punjab along with skilled labour to nail the wooden sheets to prepare wooden crates. Cartons are ready to use and available with many packaging material sellers.

A very small amount of apple is exported due to non-availability of the required facilities and the obsolete methods used. As far as the value addition of the Balochistan apple is concerned, a very small part of the produce is processed to prepare value added products such as apple juice, syrup, jam, jelly, squash, etc for which mostly C and D grade apples are used (Mushtaq et al. 2016).

#### **3.3.10.1.4 Gross margins analysis of apple**

Gross Margin is the difference between the gross income or total revenue and the direct costs (or variable cost of inputs) required for production. Gross Margin analysis is a very important tool to determining the level of farm profitability. It also tells the percentage of various costs items in the direct costs. Table 6 shows the gross margin of apple farmers for low and high altitude apple producing areas. The analysis of various cost components in the variable/direct costs shows that largest cost incurred was on irrigation followed by pesticides, labour and fertilizer and farm-yard manure (FYM). According to FGD survey (2020), farmers reported the rising water shortage due to frequent droughts and the massive installation of tubewells. The droughts are causing an increase in pest attack and resistance to pesticides increasing the cost of crop protection. Moreover, farmers also complaint about the fragile electricity supply in the peak demand season of apple. The other dimension of the issue is that the apple varieties grown in the area are low density and high water demanding. Farmers irrigate orchards using traditional flooding methods and over irrigating the trees by more than their water requirement (Saeed, 2016).

The comparison of the two altitudes shows that apple farming at high altitudes have advantage than the lower altitudes in terms of lower cost and higher income due to more favorable climatic conditions prevailing over there for apple growth (Table 6). The per kg gross margin at farm gate was Rs. 11.30 at lower altitudes and 39.21 at higher altitudes showing, showing a more than three time returns from apple.

The gross margins analysis of apple produced in different areas of Balochistan helps estimate the difference between total revenue and direct costs.

**Table 6: Gross margins analysis of apple (per acre)**

Costs/Revenue	Low altitude (1400-1900) meters	% of total cost	High altitude (1900 & above) meters	% of total cost
Tillage	3,500	3	3,000	3
Fertiliser & FYM	10,500	9	11,519	10
Pesticides	21,138	18	18,950	17
Labour	13,524	11	15,163	13
Irrigation	66,500	56	62,500	55
Supporting stick & rope	4,500	2	3,000	1
Total Variable costs	119,662		114,132	
Yield (Kg/acre)	6,400		5,500	
VC cost per kg	19		21	
Price per kg	30		60	
Income (Rs/acre)	192000		330000	
Gross margin (per acre)	72,338		215,868	
Gross margins (per kg)	11.30		39.21	

Source: FGD survey (2020)

The variable cost per unit area is estimated that will help estimate the net return of apple producers after meeting the production and marketing costs at various altitudes. It also helps understand the worthiness of apple farming in different areas of Balochistan and guide policy makers for future planning about agriculture sector.

### **3.3.10.1.5 Marketing costs and marketing margins analysis**

Marketing margin is the difference between the price received by the apple producers and the price paid by the apple consumers. It is also computed as the percentage share of final price received by each marketing intermediary. There is inverse relationship between the extent of marketing margin and the income received by apple growers from the sale of

apple. High marketing margins mean low share of apple producers in the consumer price and high share to various middlemen and marketing costs and vice versa.

Market intelligence generally provides policy signals about the overall success of agriculture. By using price indicators, the main strength and through it combines nutrient deficiency areas with surplus areas, domestic markets to foreign markets and vice versa. In fact, the analysis of marketing costs and margins helps in the measurement of marketing efficiency for both input and exit markets as well as for the whole market or supply chain (FAO, 2011). In Balochistan's perspective, these questions have been incredibly difficult to solve that each actor in the value chain earning a fair share of the rates paid to consumers.

Results of the FGD survey (2020) presented as table 7 shows that the share of apple farmers in consumer price was Rs. 60 and 30 in absolute terms and 44 % and 32 % in percentage terms of the consumer price, showing that a lion shares 56 % and 68 % of the consumer paid price goes to different market middle men and spent on marketing costs. This is questioning the efficiency of the marketing system because the ultimate producer gets a smaller share.

**Table 7: Marketing costs and margins for apple (per kg)**

Market Functionary	Gross margin (Rs/kg)	Marketing Costs (Rs/kg)	Costs as % of consumer price	Net margin (Rs./kg)	Net margin % of consumer price	Farmer share as % of consumer price
<b>Low altitude areas (1400 to 1900 meters)</b>						
Farmer	30	-----		30	32	32
Contractor	74	36.8	39	7	7	
Commission Agent	7	2	-----	5	-----	
Wholesaler	74	2	2	4	4	
Retailer	80	5	5	10	11	
Consumer price	95		46		54	
<b>High altitude areas (1900 meters and above)</b>						
Farmer	60	-----		60	44	44
Contractor	112	40	29	12	9	
Commission Agent	10	2	-----	8	-----	
Wholesaler	112	2	1	7	5	
Retailer	121	4	3	12	9	
Consumer price	137		34		66	

Source: FGD Survey (2020)



The results also in table 7 show that the high altitude apple farmers as compare to low altitude are getting double share in consumer price. Similar is the case with the other intermediaries such as contractor, commission agent, wholesaler and retailer whose share in consumer price increases as well.

The reason for the significant difference in profit margins was the favourable climatic condition of high altitudes for apple growing than the low altitudes which is reflected as significant difference in the marketing margins as well. The favourable climatic conditions help in fulfilment of the chilling requirement at high altitudes (1200-1400 hours), less fruit dropping, good colour and appearance, less disease and pest attack, more sugar and water content, low post harvest losses etc. These all things reflect in the consumer price (FGD survey, 2020).

### **3.3.10.1.6 Pre and post harvest losses of apple in Balochistan**

Table 8 shows the magnitude of pre and post harvest losses of apple in Balochistan. Seven (2011-12 to 2017-18) years average production data was used. Preharvest losses mainly occurs during the production due to fruit dropping, pest and diseases attack, drought like conditions, high temperature, inappropriate variety selection. The extent of preharvest losses was 5% reported by apple producers and preharvest contractors during the FGD survey 2020.

Post harvest losses include the fruit losses during harvesting, fruit picking, handling, packaging, transportation and processing. According to the FGD survey (2020) respondents, the extent of post harvest losses was upto 20% of total production. The preharvest and post harvest losses both together worth PKR 7816 million at 2018-19 prices (Table 8).

**Table 8: Pre and post harvest losses of apple**

S.No	Description	Average value (2011-12 to 2017-18)
1.	Quantity of Apple traded (77 %) of production (tones) **	512,529
2.	Pre harvest losses @ 5 % of production (tones) ***	25,626
3.	Post -harvest losses @20 % of production (tones)***	102,506
4.	Total losses (pre-harvest + post- harvest @ 25 % of production (tones)	128,132
5.	Value of total (pre-harvest & post -harvest losses PKR (Million)*	7,816

\* Apple average wholesale price of PKR. 61000/- per tone in 2018-19

\*\* Source: various issues of agriculture statistics Balochistan

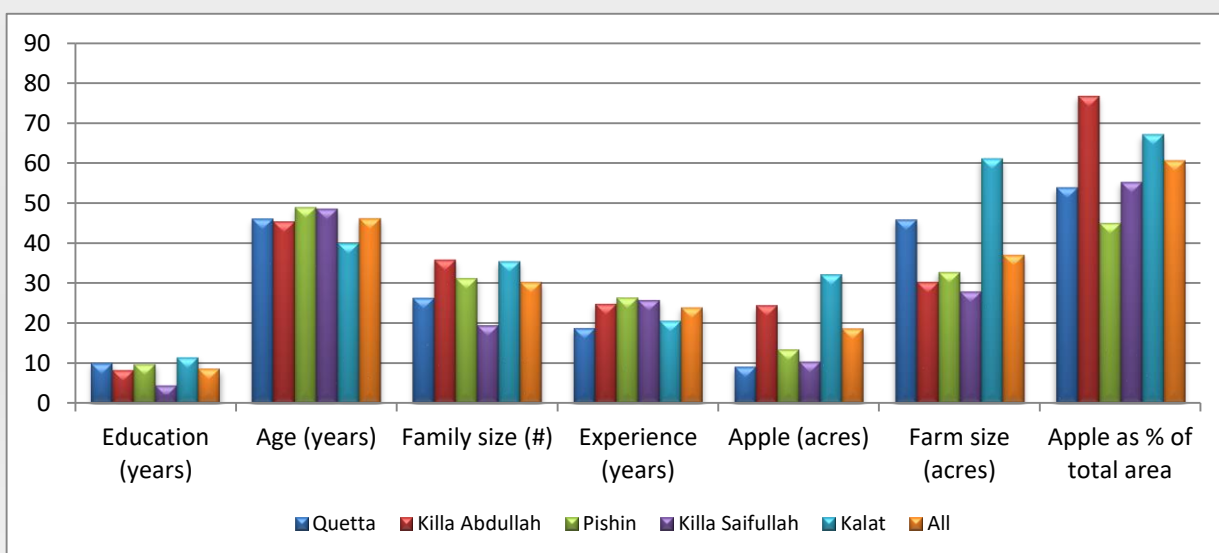
\*\*\* FGD Survey (2020), MNFSR (2018), Usman (1996)

### 3.4 Socioeconomic characteristics of farmers

Figure 9 shows the socioeconomic characteristics of the FGD participants. The average education level in all the districts was around ten years, showing the FGD participants have enough literacy level to understand the purpose and importance of the survey. The average age ranges between 40 to 50 years showing the experience of the group. The average family size was quite high with the overall average of 30. The reason told by respondents for such larger family size was the joint family system where many families live and cook together for the cultural reasons. The average experience ranges between 18 to 25 years showing that the respondents selected were quite experienced, thus increasing the validity of the survey. So far as the apple area owned by FGD participants in terms of the percent of total farm area is concerned, it ranged between 45 to 75 % in different districts. On average when all the districts taken together was more than 60 % of the farm area, with the highest ratio in Killa Abdullah district (more than 75%), followed by Kalat, Killa Saifullah, Quetta and Pishin. This is showing the importance of apple in the cropping pattern which occupies more than 50 % of farm area.

Figure 9 shows the dependence on agriculture and access to mobile phone, television and newspaper. The majority of respondents had agriculture as primary profession and source of livelihood in all the districts. The results given as Figure 9 shows the highest proportion of dependency on agriculture in district Killa Abdullah, followed by Pishin, Kalat, Quetta and Killa Saifullah. The other professions included trade and business, government Jobs, and labour Jobs.

**Figure 9: Socioeconomic characteristics of FGD participants**

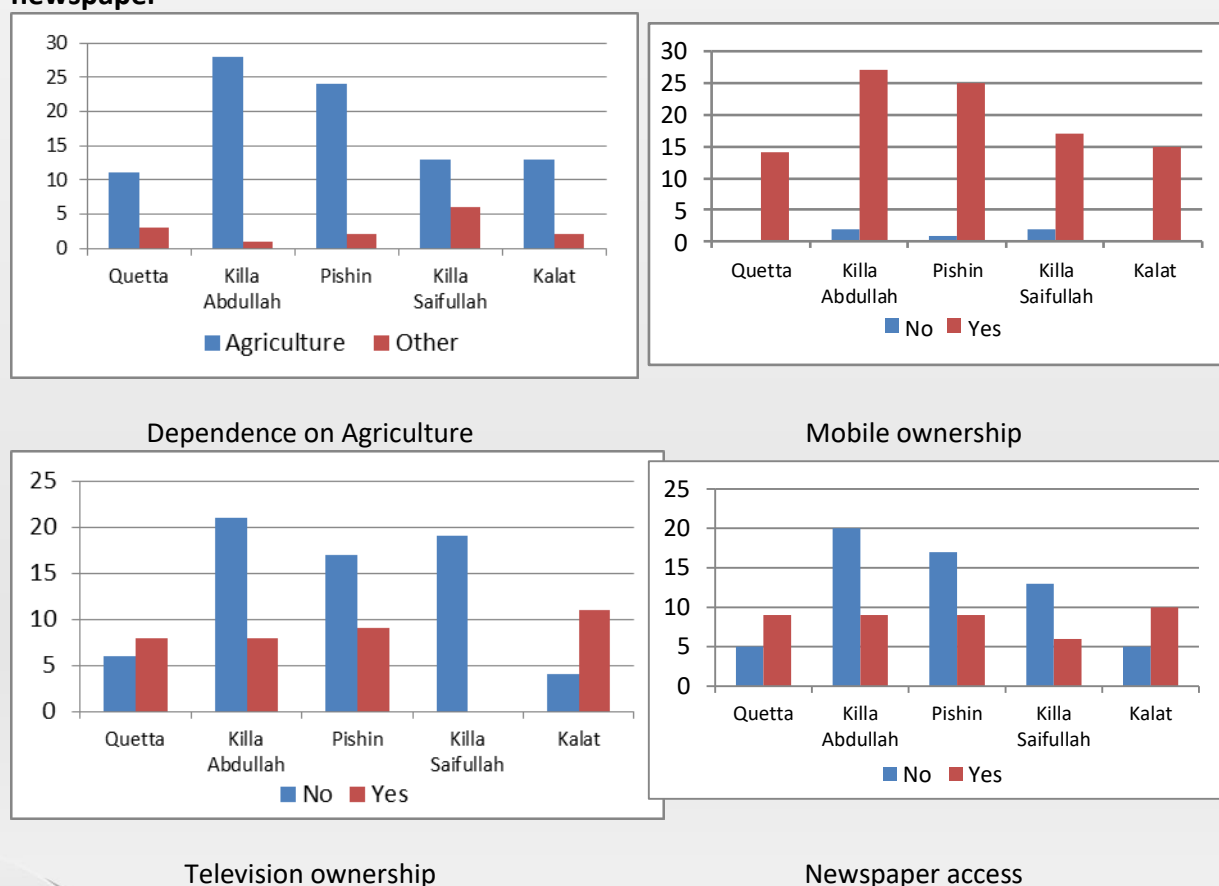


Source: FGD Survey (2020)

The results given as Figure 9 further shows that majority of repondents own mobile phones, a small proportion of respondents in Killa Abdullah, Pishin and Killa Saifulla did not own mobile phones. The ownership of mobile phone shows the Access of Apple farmers in majority to the information using phones. The ownership of television and newspaper shows mixed response on behalf of respondents. In Killa Saifullah, no respondent showed the ownership of television, it may be due to the lack of television signals over there. The other reason may be that due to local norms many people in rural village avoid television at their homes.

To the question regarding reading the daily newspaper, the majority in district Killa Abdullah, Pishin and Killa Saifullah reported yes, while in Quetta and Kalat the majority responded in no. The possible reason may be the availability of android phones which makes it easy to access the electronic version of newspaper reading for information (Figure 10).

**Figure 10: Dependence on agricultue and access to mobile phone, television and newspaper**



Source: FGD Survey (2020)

### 3.5 Challenges of apple value chain and solution

The below given Table 8 presents the production, processing and marketing and policy and enabling environment related issues and recommended measures to resolve these in short, medium and long term. The highlighted part shows the issues and their proposed solutions that come under the scope of this project.

**Table 8: Challenges of apple value chain, solutions and roadmap**

Issues	Short terms measures (1-2 years)	Medium term measures (3-4 years)	Long term measures (More than 4 years)	Target stakeholder (s)
<b>1. Production</b>				
Traditional apple rootstock are used, these require high chilling hours (1200 to 1400), late economic bearing (after 10 years), high water requirement that make these unsuitable in many areas specially low altitude upland areas.	- The dwarf apple M9 rootstock may be imported and introduced.	- Nurseries of M9 rootstock may be raised - Distribute the rootstock among apple farmers in the selected districts to propagate high density apple cultivars - Establish nurseries for the multiplication of high density apple cultivars	- Introduce high density apple cultivars with less chilling requirement, less water requirement	- Apple farmers - Agriculture extension field staff
Use of flood irrigation method	- Introduce drip irrigation for efficient water use on a pilot scale	- Extend the drip irrigation system to the selected districts	- Extend the interventions to other areas of the province	- Apple farmers - Agriculture extension field staff
Lack of know-how on optimum crop inputs use	- Soils and water testing facilities - Training on good agricultural practices (GAP)	- Training on proper crops inputs mix/ use such as fertilizer, Farm Yard Manure (FYM), irrigation, etc.	- Training on proper crops inputs mix/ use such as fertilizer, FYM, irrigation, etc.	- Apple farmers - Agriculture extension field staff
Apple produce is overwhelmed by Small sized fruit (10-20 %) of output, locally called <i>Gola</i> apple	- Training on tree pruning, thinning etc - Provide the tools required for pruning and thinning	- Replace the present apple cultivars with high density cultivars	n/a	- Apple farmers - Agriculture extension field staff
Climate change, droughts, depleting water levels, electricity load-shedding causing water shortage	- Training on improved irrigation practices - Training on water saving techniques - Improvement in the quality and quantity of electricity supply	- High density cropping on high efficiency irrigation system	- High density cropping on high efficiency irrigation system	- Apple farmers - Agriculture extension field staff
High pre-harvest losses (5-10 %), due to lack of know how about proper crop management	- Training on Total Soluble Solids (TSS), firmness test, maturity index etc. of apple before picking	- Introduce apple cultivars at low altitudes with low chilling requirement	- Introduce apple cultivars at low altitudes with low chilling requirement	- Apple farmers - Agriculture extension field staff
<b>2. Processing and marketing</b>				

Currently, near to no value addition of apple takes place in the form of value added products in Balochistan	- Mobile grading plants	- Establishment of apple value addition facilities such as apple processing line and apple juice, jam producing units in the selected districts	- Extend the value addition facilities to the other areas of the province	- Apple farmers - Current cold storage owners - Entrepreneurs - Farmer's organizations
Apple grading, packing and packaging standards are not followed and low and good quality apple is mixed	- Training on apple grading, packing and marketing standards	- Establishment of apple processing units near the production areas in the selected districts	- Establishment of apple processing units in other districts	- Apple farmers and - Agriculture extension and research staff
Minimize the role of middle men (commission agent, pre-harvest contractor) in apple value chain	- Vertical integration through the apple marketing channel	- Training of apple farmers on direct marketing	- Promote producer – retailer linkages	- Apple farmers - Contractors - Extension staff - Retailers
Cold storage facilities are insufficient, poor, leading to high post-harvest losses.	- Training on cold store use	- Establishment of cold stores in Killa Saifullah and Kalat districts	- Establishment of cold stores in other districts	- Apple farmers - Farmer organizations - Cold store owners - Extension staff
Higher post-harvest losses (30-40 %) due to poor picking, grading, packaging, handling, transportation, loading and unloading etc	- Training of fruit pickers and handlers on fruit post-harvest handling - Provision of apple harvesting and collecting bags - Provision of modern packaging	- Provision of precooling facilities - Provision of refrigerated transport	- Provision of precooling facilities - Provision of refrigerated transport	- Apple farmers - Fruit pickers and handlers - Packaging material suppliers



	<b>material</b>			
<b>Lack of ware houses, farmers cannot withheld the produce to wait for better prices</b>	<b>- Feasibility study for the establishment of ware houses for apple</b>	<b>- Establishment of ware houses preferably on farms</b>	<b>- Establishment of ware houses preferably on farms</b>	<b>- Apple farmers</b>
Poor link of apple producer with other value chain actors, Market information systems (MIS) doesn't exist	- Establishment of a mechanism for the provision of real time market price and other information from the other value chain actors to apple producers	- Training of farmers on MIS	- Training of farmers on MIS	- Agriculture extension and marketing - Apple farmers
<b>Inadequate transportation, The produce is marketed using obsolete methods</b>	<b>- Awareness of farmers on the use of refrigerated transport</b>	<b>- Provision of refrigerated transport on trial basis in the selected districts</b>	<b>- Provision of refrigerated transport in other districts</b>	<b>- Apple farmers - Cold store owners - Extension staff</b>
<b>3. Policy &amp; enabling environment</b>				
<b>An apple value chain strategy to improve the create a PPP-based strategy for the apple sector</b>	<b>- Apple value chain strategy based on public private partnership (PPP) for the apple sector</b>	<b>- Apple value chain strategy based on public private partnership (PPP) for the apple sector</b>	<b>- Balochistan horticulture Policy</b>	<b>- Government of Balochistan and private sector</b>
Import of Afghani, Irani apple depresses market prices for local produce	- Study the causes and impact of apple imports	- Recommend appropriate measures to minimize the harm to local apple industry due to apple imports	- Recommend appropriate measures to minimize the harm to local apple industry due to apple imports	- Government of Pakistan, Government of Balochistan
<b>Product quality and safety</b>	<b>- Study the feasibility of up gradation of laboratories at Balochistan Agriculture College (BAC), Balochistan Food Safety Authority (BFSA) and Agriculture Extension Department (AED).</b>	<b>- Improvement of the laboratory testing capacities at BAC, BFSA and AED</b>	<b>- Improvement of the laboratory testing capacities at BAC, BFSA and AED</b>	<b>- BAC - BFSA - AED</b>
Revision of vertical and horizontal standards	- As standards were adopted from other authorities, this	- As standards were adopted from other authorities, this needs	n/a	- BFSA

	needs to be revisited based on the risk analysis principle	to be revisited based on the risk analysis principle		
Applied research for the industry	- Putting the developed research into practice particularly on proper production and processing practices	- Putting the developed research into practice particularly on proper production and processing practices	n/a	- Industry - BAC - AED
Women and youth involvement	- Training on Cottage industry-women empowerment	- Training on candy making, jam, juice and drying of fruits etc	n/a	- Women and youth
Public-private partnership building for the successful project interventions	- To avoid red tap/bureaucratic hurdles, driving seat may be given to the farmers.	- Improve coordination with farmers and agriculture extension	n/a	- Apple farmers - Agriculture extension

## References

- AASA & GRHO (2015). Development profile of Killa Abdullah district. Situation Analysis & Baseline Surveys for Poverty Reduction through Rural Development in KPK, FATA & Balochistan
- Aazim, M. (2016). The Balochistan government on Wednesday launched a number of projects in horticulture, livestock and tourism sectors, aimed at improving their production and quality to the international standards.  
<https://www.dawn.com/news/1183230https://www.dawn.com/news/1301835>
- Arsić, S.; Nikolić, D.; Živan, Ž (2017). Hybrid SWOT-ANP-FANP model for prioritization strategies of sustainable development of ecotourism in national park Djerdap, Serbia. For. Policy Econ. 2017, 80, 1126.
- Badar, H. (2014). Value Chain Performance Improvement for Sustainable Mango Industry Development in Pakistan. Unpublished thesis submitted for the degree of Doctor of Philosophy at The University of Queensland, School of Agriculture and Food Sciences in 2014.
- Balochistan Agricultural Produce Markets Act, 1991. Department of Agriculture and Cooperatives, Government of Balochistan.
- Balochistan Agriculture Sector Policy and Strategy (2015 – 25) (draft), Food and Agriculture Organization (FAO) of the United Nations, 2016.
- Balochistan Comprehensive Development Strategy BCDS (2013). Planning and Development Department, Government of Balochistan. Draft Balochistan Comprehensive Development Strategy BCDS (2013-2020).  
[https://www.undp.org/content/dam/pakistan/docs/PROCUREMENT/2018/July%202018/2\)%20BCDS%20Revised%20Final%20Draft%20August%2027%202013.pdf](https://www.undp.org/content/dam/pakistan/docs/PROCUREMENT/2018/July%202018/2)%20BCDS%20Revised%20Final%20Draft%20August%2027%202013.pdf)
- Balochistan Food Authority BFA (2014). Balochistan Food Authority Act 2014. (Act No. VI of 2014).
- Baloch, M.A., Thapa, G.B. (2019). Review of the agricultural extension modes and services with the focus to Balochistan, Pakistan. Journal of the Saudi Society of Agricultural Sciences. 18(2019), 188-194.  
<https://reader.elsevier.com/reader/sd/pii/S1658077X16302168?token=1F25AC2A24390981F1B0293C3C436F83D9C75F6E3B67FE43E171C027A0B6333811983A2A95B84D7FD8A135510FEB4D24>
- Balochistan Express, (2019). Farming with toxic water in Quetta.  
<https://www.bexpress.com.pk/2019/07/farming-with-toxic-water-in-quetta/>
- BUIITEMS & UNDP (2016). Drought Risk Assessment in the Selected Districts of Balochistan.  
<https://www.undp.org/content/dam/pakistan/docs/CPRU/Disaster%20Risk%20Management/Drought-Risk-Assst-Balochistan-Nov%202015-lowres.pdf>
- Bureau of Statistics Balochistan, (2015). *Development statistics of Balochistan (2014-15)*. Bureau of Statistics, Planning and Development Department, Government of Balochistan. Available from <http://balochistan.gov.pk>
- [Climate data.org](https://en.climate-data.org/asia/pakistan/balochistan/quetta-1206/). Retrieved on March 12, 2020 from <https://en.climate-data.org/asia/pakistan/balochistan/quetta-1206/>
- Chandio, A.A., Magsi, H., Rehman, a., Sahito, J.G.M., (2017). Types, Sources and Importance of Agricultural Credits in Pakistan. , TextRoad Publication ISSN: 2090-4274 Journal of Applied Environmental and Biological Sciences. 7(3)144-149.  
[https://www.textroad.com/pdf/JAEBS/J.%20Appl.%20Environ.%20Biol.%20Sci.,%207\(3\)144-149,%202017.pdf](https://www.textroad.com/pdf/JAEBS/J.%20Appl.%20Environ.%20Biol.%20Sci.,%207(3)144-149,%202017.pdf)
- <https://www.cnfa.org/program/the-agribusiness-project/>.
- District Development Profiles (DDPs) of different districts. Planning and Development Department, Government of Balochistan, (2011).
- Food and Agriculture Organization FAO (2017). Evaluation of FAO's contribution to the Islamic Republic of Pakistan 2012-2017. food and agriculture organization of the united nations office of evaluation November 2017. <http://www.fao.org/3/BU280/bu280.pdf>

- FAO (2016). A Scheme and Training manual on Good Agricultural Practices (GAP) for Fruits and Vegetables. Volume 1, The scheme - standard and implementation infrastructure. <http://www.fao.org/3/a-i6677e.pdf>
- FAO (2015). Generating better jobs along the wool value chain in Pakistan Balochistan Agriculture Project (wool value chain component).
- Government of Balochistan, (2020). Official website of the government of Balochistan. [https://www.balochistan.gov.pk/index.php?option=com\\_content&view=article&id=42&Itemid=71](https://www.balochistan.gov.pk/index.php?option=com_content&view=article&id=42&Itemid=71)
- Government of Balochistan (2019). Agriculture Statistics of Balochistan 2018-2019. Directorate of crop reporting services, Agriculture and cooperative department, Balochistan, Quetta.
- Government of Balochistan (2018). Agriculture Statistics of Balochistan 2017-2018. Directorate of crop reporting services, Agriculture and cooperative department, Balochistan, Quetta.
- Government of Balochistan, (2011). District Development Profiles (DDPs) of different districts. Quetta, Planning and Development Department.
- Government of Pakistan (2018). Fruit, Vegetables and Condiments Statistics of Pakistan 2017-18. Economic Wing, Ministry of National Food Security & Research. Available at <http://www.mnfsr.gov.pk/frmDetails.aspx>
- Government of Pakistan (2017). Pakistan Bureau of Statistics, Population Census, 2017. Retrieved from [http://www.pbscensus.gov.pk/sites/default/files/DISTRICT\\_WISE\\_CENSUS\\_RESULTS\\_CENSUS\\_2017.pdf](http://www.pbscensus.gov.pk/sites/default/files/DISTRICT_WISE_CENSUS_RESULTS_CENSUS_2017.pdf)
- Government of Pakistan (2010). Agricultural census 2010 {Pakistan report statistics division. Agricultural census organization. Website: <http://statpak.gov.pk>  
[http://www.pbs.gov.pk/sites/default/files/aco/publications/agricultural\\_census2010/Tabulation%20of%20%20Balochistan%20Province%20Report.pdf](http://www.pbs.gov.pk/sites/default/files/aco/publications/agricultural_census2010/Tabulation%20of%20%20Balochistan%20Province%20Report.pdf)
- Haider, Fazl-E. (2018). Lucrative export opportunities in Balochistan for apple and dates. <http://www.pakistaneconomist.com/2018/02/12/lucrative-export-opportunities-balochistans-apple-dates/>.
- Iqbal, M. (2016). How horticultural farmers in Balochistan benefited from the 'reform' value chain approach. Acta Hortic. 1120, 261-266. DOI: 10.17660/ActaHortic.2016.1120.39 <https://doi.org/10.17660/ActaHortic.2016.1120.39>
- IUCN (2011) Integrated District Development Vision of Different Districts of Balochistan. Karachi, IUCN (International Union for Conservation of Nature and Natural Resources).
- Kaplinsky R. (2000), "Spreading the gains from globalisation: What can be learned from value chain analysis?", Journal of Development Studies, Vol. 37, No. 2.
- **Khan, Israr (2018)**. Illegal import of fruit and vegetables affecting Balochistan farmers. Article published in "The News" newspaper.
- <https://www.thenews.com.pk/print/382237-illegal-import-of-fruit-and-vegetables-affecting-balochistan-farmers>
- Leadership for Environment and Development (LEAD) Pakistan (2017). Sustainable Development Goal 13: A Legislative and Policy Gap Analysis for Balochistan OCTOBER 2017.
- <http://www.lead.org.pk/lead/Publications/Sustainable%20Development%20Goal%20Balochistan.pdf>
- Ministry of Commerce (MoC). Strategic Trade Policy Framework. Government of Pakistan <http://www.commerce.gov.pk/strategic-trade-policy-framework/>
- Ministry of National Food Security and Research MNFSR (2018). National Food Security Policy, 2018. Government of Pakistan. Ministry of National Food Security and Research Islamabad. GOP (2018). National Food Security Policy. Government of Pakistan Ministry of National Food Security and Research Islamabad. <http://mnfsr.gov.pk/mnfsr/userfiles1/file/Policy%20Draft%2029%20September.pdf>
- MPDR, (2013). Pakistan Vision 2025, Ministry of Planning Development and Research. Government of Pakistan, 2017.

- Ministry of Planning Development and Reform MDPR (2013). 11<sup>th</sup> five year plan (2013-18. Government of Pakistan, Planning Commission. Ministry of Planning Development and Reform, Islamabad. <https://www.pc.gov.pk/uploads/plans/000-Inner-Titleencrypted1.pdf>
- Mushtaq, K., Adil, A.S., Hussain, M.(2016). Apple Value Chain: A Case Study from Baluchistan Province. Proceedings of Pakistan Society for Horticultural Science. 2nd International Conference on Horticultural Sciences, February 18-20, 2016. Theme: Production Challenges and Food Security. Institute of Horticultural Sciences, University of Agriculture, Faisalabad, Punjab 38040, Pakistan
- [http://www.pshsciences.org/wp-content/uploads/2018/05/ICHS2016Proceedings\\_335.pdf](http://www.pshsciences.org/wp-content/uploads/2018/05/ICHS2016Proceedings_335.pdf)
- Pasha, H. A. (2015). Growth of the Provincial Economies. Institute for Policy Reforms, IPR BRIEF, available from <http://ipr.org.pk/wp-content/uploads>
- Planning Commission of Pakistan. (2016). Multidimensional poverty in Pakistan. Ministry of Planning, Development and Reform, Poverty Alleviation and SDGs. UNDP & OPHI. Section, P-Block, Pakistan Secretariat, Islamabad, Pakistan.
- Planning Commission of Pakistan. (2009). Agricultural Marketing Infrastructure and Post-harvest Management for the 10th Five Year People's Plan, 2010-15. Food and Agriculture Section, Planning Commission Islamabad. <http://uaf.edu.pk/oubm/Files/Reports/Report%202/002.%20AGRICULTURAL%20MARKETING%20INFRASTRUCTURE.pdf>
- Mustafa, U. (1996). Inter provincial trade of apples. Proceedings of National Workshop on Agricultural Marketing (1996). Outreach and transfer of fruit technology in Balochistan. FAO and Department of Agriculture Balochistan. Deciduous Fruits Development Centre (DFDC) Sariat Quetta. AG:DP/PAK/89/014, Occasional paper # 31. ISBN 969-8304-06-03.
- Iqbal, M (1994). Proceedings of National Workshop on Agricultural Product Marketing Extension (1994). Outreach and transfer of fruit technology in Balochistan. FAO and Department of Agriculture Balochistan. Deciduous fruit development centre Sariat Quetta. ISBN 969-8304-01-0.
- Saeed, M. (2016). Horticulture in Balochistan: Challenges and Prospects. Proceedings of Pakistan Society for Horticultural Science. 2nd International Conference on Horticultural Sciences, February 18-20, 2016. Theme: Production Challenges and Food Security. Institute of Horticultural Sciences, University of Agriculture, Faisalabad, Punjab 38040, Pakistan. [http://www.pshsciences.org/wp-content/uploads/2018/05/ICHS2016Proceedings\\_32.pdf](http://www.pshsciences.org/wp-content/uploads/2018/05/ICHS2016Proceedings_32.pdf)
- FAO (2011). Price and Market-Structure Analysis for Some Selected Agricultural Commodities: Marketing Costs and Margins. Food security technical secretariat/Ministry of agriculture (FSTS) FAO- Sudan integrated food security information for action (SIFSIA). Available at [http://www.fao.org/fileadmin/user\\_upload/sifsia/docs/Marketing\\_Cost\\_Margin\\_Final\\_May\\_2011\(2\).pdf](http://www.fao.org/fileadmin/user_upload/sifsia/docs/Marketing_Cost_Margin_Final_May_2011(2).pdf)
- United Nations Industrial Development Organization (UNIDO, 2019) <https://www.unido.org/news/japan-and-unido-support-agro-industry-development-pakistan>
- UNDP (2019). Development Advocate Pakistan: Balochistan Challenges and Opportunities. Special Issue. [https://www.pk.undp.org/content/pakistan/en/home/library/development\\_policy/dap-sp-issue-balochistan.html](https://www.pk.undp.org/content/pakistan/en/home/library/development_policy/dap-sp-issue-balochistan.html)
- UNIDO (2009). Agro-value chain analysis and development: The UNIDO approach, A staff working Vienna, Austria.
- USAID (2013). Apricot Value Chain Assessment Final Report for the Agribusiness Project. The Agribusiness Project (TAP) Under Sub Agreement UAP-ISC-012-001-CNFA
- USAID (2011). Meat Value Chain Assessment of the Livestock Sector in Pakistan. Agribusiness Project (UAP) Under Sub Agreement UAP-ISC-012-001-CNFA
- USAID Pakistan (2011). FIRMS PROJECT Agricultural Marketing Policy Reforms – Balochistan.
- USAID (2009). Pakistan's Food and Agriculture Systems.

- World Bank (2013). Balochistan Development Issues and Prospects (2012). Islamic Republic of Pakistan Balochistan Needs Assessment Development Issues and Prospects Part I - *Main report* No: ACS2258 January 2013. Pakistan Country Management Unit South Asia Region.
- <http://documents.worldbank.org/curated/en/965761468334151857/Main-report>
- World Bank (2009). PAKISTAN, NWFP Growth Policy Note. Poverty Reduction and Economic Management Sector Unit South Asia Region. Report Number. 44436-PK. Available at <http://documents.worldbank.org/curated/en/781921468145475286/pdf/444360v20ESW0B00PolicyNote000final.pdf>



## Appendix- A: Focus Group Discussion

سیب ویلیو چین تجزیہ  
(F\_گروپ انٹر ویو)  
نام سہولت کار — نوٹ لیے والا — تاریخ —

### 1- شرکاء کی تفصیلات

نمبر شمار	نام	تجربہ	تعلیم	ازدواجی حیثیت	عمر (سال)	کھیت رقبہ (ایکڑ)	سیب رقبہ ایکڑ	بنیادی پیشہ	تحصیل وضع	خاندان (تعداد)	موبائل / ٹی وی اخبار

### 2- منڈی تک رسائی

فاصلہ	مقام	کلو میٹر	گھنٹے
مرکزی سڑک			
مقامی منڈی			
مرکزی منڈی			
1-			
2-			
3-			
4-			
5-			

### 3- موجودہ فصلات

نام فصل	سرمائی (ایکڑ)	گرمائی (ایکڑ)	باغات (ایکڑ)
1-			
2-			
3-			
4-			
5-			

#### 4- کل رقبہ زیر مختلف اقسام سیب (2020)

قسم سیب	رقبہ (ایکڑ)	کل تعداد درخت (فی ایکڑ)	فی ایکڑ پیداوار (کریٹ 16 تا 18) کلو
1-			
2-			
3-			
4-			
5-			

#### 5- ذرائع آبپاشی

- 1- ٹیوب ویل (%) 2- کاریز / چشمہ (%) 3- خرید شدہ پانی (%) 4- دوسرے (%)

#### 6- آبپاشی سے متعلقہ مسائل

- 1- پانی کی کیمیا 2- گرتا زیر زمین پانی 3- بجلی کی فراہمی میں تعطیل 4- کچی نالیاں 5- دوسرے

#### 7- فصلاتی خوراک

فصلاتی خوراک	سیب پودے	کھاد	زیر یات	مشینری
*ذرائع				
**مسائل				
***ادائیگی رقم				

\*-ذرائع : 1- اپنی نرسری 2- پرائیویٹ نرسری 3- محکمہ زراعت 4- دوسرے

\*\* -مسائل : 1- مہنگے 2- کم معیار 3- عدم دستیابی 4- بوقت دستیابی عدم دستیابی 5- دوسرے

\*\*\* -رقم ادائیگی : 1- نقد 2- بوقت کٹائی ادائیگی 3- اقساط میں ادائیگی 4- دوسرے

#### 8- قرضہ مقصد اور ذرائع

\* استعمال زرعی قرضہ - 1- ہاں 2- ناں

\*% زمیندار استعمال قرضہ

\* زرعی قرضہ مقاصد

- 1- پیداوار 2- ماکیننگ 3- پراسیسنگ

\* ذرائع

- 1- ادارہ جاتی 2- غیر ادارہ جاتی

\* ادارہ جاتی ذرائع

1 - تجارتی بینک 2- زرعی ترقیاتی بینک 3- دوسرے

\* مسائل ادارہ جاتی قرضہ

1- رسائی 2- لمبا ریکہ کار 3- زیادہ شرح سود 4- دوسرے

\* غیر ادارہ جاتی ذرائع

1- اینٹ ڈیلر 2- آرٹھی 3- زیادہ شرح سود 4- دوسرے

\* غیر ادارہ جاتی قرضہ لینے کی وجوہات

1 - آسانی سے دستیابی 2 - رین کی شرح نہ ہونا 3 - دوسرے

\* غیر ادارہ جاتی قرضوں کے مسائل

1- مشروط 2 - مہنگا 3- کم رقم 4- دوسرے

9- سیب کے انتظامی ور اور طریقے (فی ایکٹر)

درخت (تعداد)	
اقسام سیب (%)	
اعلیٰ قسم پیداوار (%) اور (کلو)	
دوسرے درجہ پیداوار (%) اور (کلو)	
کٹائی کے بعد کے نقصانات (%)	
کٹائی سے پہلے کے نقصانات (%)	

فی ایکڑ پیداواری لاگت

قسم	تعداد / مقدار	قیمت فی عدد
درخت		
باغ لگانا (مزدور)		
گوبر		
مزدوری		
کھاد کو ریاجوری		
DAP		
NPK		
دوسرا		
مزدوری کھاد		

زیر یات استعمال		
مزدوری		
چھریاں (بند بنانا)		
کدال		
شاخ تراشی		
درخت پتلا کرنا		
کٹائی		
پانی خرچ (اپنا)		
خریدا ہوا		

#### 10- پیداواری مسائل

- 1- غیر معیاری اجزا 2- مہنگے اجزا 3- کم بارش / پانی کم 4- کیڑوں کی مزاحمت
- 5- پیسہ کمی 6- تکنیکی مہارت کی کمی 7- دوسرے

#### 11- ان پیداواری مسائل کے سیب کے پیداوار پر اثرات

- 1- کم 2- درمیانہ 3- اونچے

#### 12- دستیابی زراعت توسیع خدمات

- 1 - ہاں 2- ناں

\* زرائع

- 1- محکمہ زراعت 3 - ترقی پسند زمیندار / کاشتکار 4- ڈیلر 5- ساتھی زمیندار
- 6 - دوسرے

#### 13- سیب کی قبل اور بعد از کٹائی

\* کٹائی طریقہ

- 1- ہاتھ 2- مشین 3- دوسرے

\* سیب کی کٹائی میں مسائل

- 1- ہنر مند مزدوروں کی کمی 2- زیادہ گرمی 3- اوزار کی کمی 4- سیب کا گرنا 5-
- دوسرے

مقام	مقدار	قسم سیب	وقت/مہینہ	مدت	کرایہ فی کریٹ

## 15 - وجہ استعمال ٹھنڈا گودام

1 - شیلف زندگی بڑھانا 2 - اچھی قمیات کا انتظار کرنا 3 - مارکیٹ میں زیادہ مقدار سے بیچنا

\* مقام ٹھنڈا گودام

2 - دور دراز

1 - لوکل / مقامی

\* وجہ استعمال ٹھنڈا گودام دور دراز

1 - عدم سستماپی مقامی گودام 2 - مہنگا مقامی 3 - غیر معیاری خدمات 4 - مرکزی مارکیٹ سے  
5 - مقامی مارکیٹ کی کم کھپت 6 - دوسرے

## 16 - ٹھنڈا گودام سے متعلقہ مشکلات

1 - کم صلاحیت / جگہ 2 - دور دراز ہونا 3 - مہنگا 4 - سیب خراب ہونا 5 - کٹی چیزیں اکھٹے  
سٹور ہونا 6 - دوسرے

## 17 - سیب کا تناسب جو خراب ہو اور اس کی وجوہات

## 18 - وضع مارکیٹنگ

1 - خود 2 - ٹھیکیدار 3 - دوسرا (منکت)

\* ابتدا کٹائی مہینہ / تاریخ — اختتام کٹائی مہینہ / تاریخ —

\* وجوہات خود مارکیٹنگ / عدم فروخت ٹھیکدار

1 - ٹھیکدار خیال نہیں رکھتا 2 - ادائیگی بدیر 3 - بار بار گفت شنید بابت قیمت باغ 4 - کم قیمت  
پیش کش 5 - دوسرے

\* اگر فروخت بذریعہ ٹھیکدار تو بتائیے کس سٹیج پر فروخت کرتے ہیں ؟

1- بھول کے وقت 2 - جب فصل پک جائے 3 - دوسرے

\* وجوہات فروخت باغ بذریعہ ٹھیکدار

1 ہنر کی کمی 2 - نقد کی ضرورت 3 - کم خطرہ 4 - دوسرے

19 - سیب کی فروخت کے مقامات / مارکیٹ

1 - کوئٹہ 2 - کراچی 3 - لاہور 4 - اسلام آباد 5 - دوسرے

\* وجوہات ایک خاص مارکیٹ میں بھیجنے ک

1 - اچھی قیمت ملنا 2 - وقت پر ادائیگی 3 - قرضہ دستیابی 4 - مقامی منڈی کی کم صلاحیت 5 -

دوسرے

\* کیا ایک خاص آرٹھی سے فروخت کرواتے ہیں ؟ 1 - ہاں 2 - ناں

\* وجوہات برائے فروخت از آرٹھی خاص

1 - قابل بھروسہ 2 - قرضہ 3 - خوراک اور رہائش دیتا ہے۔ 4 - دوست / رشتہ دار

5 - اچھی قیمت پر فروخت کرتا ہے 6 - دوسرے

20 - مارکیٹنگ

مارکیٹنگ اخراجات	روپے فی کریٹ	طریقہ
پیکجنگ مواد		
کٹائی		
گریڈنگ		
پیکنگ		
ٹرانسپورٹ		
مزدوری		
سٹور		
کمیشن		
فیس / ٹیکس		
دوسرے		



## 21- نقصانات (%)

سرگرمی	قبل از مارکیٹنگ	بعد از مارکیٹنگ
کٹائی		
گریڈنگ		
سٹور		
ٹرانسپورٹ		
دوسرے		

## 22- قیمتوں کا رویہ

\* کیا قیمتوں میں اتار چڑھاؤ ہوتا ہے۔ 1 - ہاں 2 - ناں

وقت	مہینہ / ہفتہ	قیمت فی پیٹی	وجہ مختلف قیمت
موسم کا شروع			
موسم درمیان			
موسم اختتام			

\* کیا آپ قیمت سے مطمئن ہیں؟ 1 - ہاں 2 - ناں

اگر ناں تو وجوہات بتائیں۔

\* کم قیمت بوجہ

- 1- غیر معیاری سیب
- 2- صحیح گریڈنگ اور پیکنگ نہ ہونا
- 3- مارکیٹ میں درآمد شدہ مال ہونا
- 4- زیادہ مال جمع ہونا
- 5- فروخت / بولی طریقہ کار غیر شفاف ہونا وغیرہ

## 23- سیب کی مارکیٹنگ میں درپیش مشکلات

- 1- کم قیمت
- 2- عدم دستیابی قرضہ
- 3- خراب روڈ
- 4- ریلیف ٹرک عدم دستیابی
- 5- سیب کی درآمد 6- جدید پیکنگ سہولیات کی عدم دستیابی
- 7- غیر معیاری سیب
- 8- دوسرے

\* سیب کے خریدار کون ہیں آپ کے علاقہ میں؟

- 1- ٹھیکدار
- 2- تاجر
- 3- پراسیسر
- 4- دوسرے

## 24- کیا کاشتکاروں کو کوئی فنی مشورے ملتے ہیں؟ 1- ہاں 2- ناں

\* اگر ہاں تو ذریعہ بتائیں۔

- 1- محکمہ زراعت
- 2- NGOs
- 3- ساتھی کاشتکار
- 4- دوسرے

\* کن شعبوں میں مشورے ملے؟ اور کتنے مفید تھے؟

25۔ ضلع/تحصیل/گاؤں میں سیب کے کاشتکاروں کی تعداد

اندازہ تعداد	پراسیسنگ سہولیات مینوفیکچرنگ سہولیات/تفصیل	تجارتی راستے/تفصیل	موجودہ خریدار مقامی اور غیر مقامی/تفصیل

\*ضلع میں دوسری سہولیات کی دستیابی

exportE قیمت (فی کلو)	خوراک کا معیار چیک کرنے کی سہولیات (صوبائی/مرکزی)	پیکنگ میٹریل / دکانیں / کارخانے (تعداد اور تفصیل)	کولڈ سٹور سہولیات (صفائی / کیڑوں مکوڑوں سے بچائو) کا معیار

ٹرانسپورٹ / ائیر کنڈیشن (تعداد)	ٹرانسپورٹ عام	تعداد کریٹ فی ٹرک اور کرایہ

26۔ کیا آپ درجہ ذیل بعد از کٹائی طریقے اپناتے ہیں ؟

کٹائی کے لئے خاص بیگ کا استعمال	ہاں	ناں	اگر ناں تو وجہ بتائیں
سیب کی یکساں درجہ کی پیکنگ			
گریڈنگ			
A اور B گریڈ کا عدم استعمال			
لکڑی کے کریٹ کا استعمال			
کاربو سٹیڈ کارٹن کا استعمال			
پروسسنگ (ڈبہ - جوس - وغیرہ) کی تیاری اور فروخت			

\* مزید تفصیلات یہاں درج کریں ۔

27۔ خواتین and جوانوں کا کردار سیب کی پیداوار اور مارکیٹنگ میں

پیداوار	خواتین	نوجوان خواتین	نوجوان مرد
کٹائی			
سٹورنگ			
پراسیسنگ			
دوسرے			

\* سیب کی مارکیٹنگ میں خواتین اور نوجوانوں کے کردار کے حوالے سے مزید تفصیلات :

28- وجوہات کم / عدم شرکت خواتین / نوجوان بابت سیب مارکیٹنگ

29- APPLE ویلیو چین کی بہتری کیلئے تجاویز

## Appendix-B Survey for Apple Value Chain Actors in Balochistan

**DISTRICT:** [single-select]

**CATEGORY:** FARMER

1.	Gender of the farmer [Single-select]  <input type="checkbox"/> Male <input type="checkbox"/> Female
2.	How many family members do you have? [Numeric]
3.	Which varieties do you grow at your farm?  <input type="checkbox"/> Kaja <input type="checkbox"/> Mashadi <input type="checkbox"/> Tor Kulu <input type="checkbox"/> Shin Kulu <input type="checkbox"/> Amri
4.	How many men and women do you employ on the farm? [Numeric/multi-select]  <input type="checkbox"/> Men: ____ <input type="checkbox"/> Women: ____ <input type="checkbox"/> Don't know <input type="checkbox"/> Not Answered
5.	Have you received any training on farm practices?  <input type="checkbox"/> Yes (If yes, go to 5a) <input type="checkbox"/> No <input type="checkbox"/> Don't know/remember
5a.	When was the last time you received any training on farm practices? [Numeric/single-select]  <input type="checkbox"/> Year: _____ <input type="checkbox"/> Never <input type="checkbox"/> Don't know/remember
6.	How much do you produce (in kilos) every year? [Numeric/multi-select]  <input type="checkbox"/> Minimum _____ KG <input type="checkbox"/> Maximum _____ KG <input type="checkbox"/> Not Answered
7.	Approximately how many kilos of apple do you lose every year? [Numeric/multi-select]  <input type="checkbox"/> Minimum _____ KG <input type="checkbox"/> Maximum _____ KG <input type="checkbox"/> Not Answered
8.	To whom do you sell your product? [multi-select? Confirm with value chain expert]  <input type="checkbox"/> Aarthi/Commission Agent <input type="checkbox"/> Wholesaler <input type="checkbox"/> Middle-men (beopari/trader) <input type="checkbox"/> Other
9.	What is your average annual income? [Numeric/multi-select]  <input type="checkbox"/> Minimum Rs. _____ <input type="checkbox"/> Maximum Rs. _____ <input type="checkbox"/> Not Answered
10.	Location of the farm [auto-populated]_____

**DISTRICT: [single-select]****CATEGORY: MIDDLE-MAN**

1.	How do you add value to the apple value chain? [multi-select] <input type="checkbox"/> Transport <input type="checkbox"/> Storage <input type="checkbox"/> Contract Farming <input type="checkbox"/> Credit Lines to Farmers <input type="checkbox"/> Package Material Provider <input type="checkbox"/> Other: ____
2.	How many family members do you have? [Numeric]
3.	How many men and women do you employ? [multi-select/numeric] <input type="checkbox"/> Men: ____ <input type="checkbox"/> Women: ____ <input type="checkbox"/> Don't know <input type="checkbox"/> Not Answered
4.	How many kilograms of apple do you buy/move every year? [multi-select/numeric] <input type="checkbox"/> Minimum _____ KG <input type="checkbox"/> Maximum _____ KG <input type="checkbox"/> Not Answered
5.	To whom do you sell your product? [multi-select?-confirm with value chain expert] <input type="checkbox"/> Cold Chain Owner <input type="checkbox"/> Trader <input type="checkbox"/> Retailer <input type="checkbox"/> Supermarket <input type="checkbox"/> Arthi/Commission Agent <input type="checkbox"/> Other: ____
6.	What is your average annual income (on apples)? [multi-select/numeric] <input type="checkbox"/> Minimum Rs. _____ <input type="checkbox"/> Maximum Rs. _____ <input type="checkbox"/> Not Answered
7.	Location [auto-populated]

**DISTRICT: [single-select]****CATEGORY: COLD-CHAIN FACILITY OWNER**

1.	How many employees do you have? [Numeric]
2.	From whom do you purchase your apples? [Multi Select- confirm with value chain expert] <input type="checkbox"/> Trader <input type="checkbox"/> Retailer <input type="checkbox"/> Supermarket <input type="checkbox"/> Mandi <input type="checkbox"/> Other _____
3.	To whom do you sell your purchase? [Multi Select- confirm with value chain expert] <input type="checkbox"/> Trader <input type="checkbox"/> Retailer <input type="checkbox"/> Supermarket <input type="checkbox"/> Mandi <input type="checkbox"/> Other _____
4.	Do you have ethylene control unit (ethylene scrubber) in your facility? [Single select] <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
5.	Is there any semi-processing in your facility? [multi-select] <input type="checkbox"/> Washing <input type="checkbox"/> Grading <input type="checkbox"/> Waxing <input type="checkbox"/> No semi-processing <input type="checkbox"/> Don't know
6.	Is there a quality control of products prior to their storage in your facility? [Single select] <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
7.	At what capacity does the storage facility operate? [Single Select] <input type="checkbox"/> 90% – 100% <input type="checkbox"/> 70% – 89% <input type="checkbox"/> 50% – 69% <input type="checkbox"/> <50% <input type="checkbox"/> Don't Know

8.	Location [auto-populated]_____
----	--------------------------------

**DISTRICT: [single-select]**

**CATEGORY:WOLESALER/RETAILER**

1.	How many family members do you have? [Numeric]
2.	How many men and women do you employ? [Numeric/multi-select]  <input type="checkbox"/> Men: _____ <input type="checkbox"/> Women: _____ <input type="checkbox"/> Don't know <input type="checkbox"/> Not Answered
3.	From whom do you buy your apple produce? [Multi Select- confirm with value chain expert]  <input type="checkbox"/> Farmer <input type="checkbox"/> Trader <input type="checkbox"/> Aarthi/ commission agent <input type="checkbox"/> Mandi <input type="checkbox"/> Other _____
4.	How many kilograms of apple do you buy/move every year? [Numeric/Multi- select]  <input type="checkbox"/> Minimum _____ KG <input type="checkbox"/> Maximum _____ KG <input type="checkbox"/> Don't know
5.	What type of apple do you buy/move/sell? [multi-select]  <input type="checkbox"/> Kaja <input type="checkbox"/> Mashadi <input type="checkbox"/> Tor Kulu <input type="checkbox"/> Shin Kulu <input type="checkbox"/> Amri
6.	Which of the following do you have access to: [multi-select] <input type="checkbox"/> Transport <input type="checkbox"/> Cold Storage <input type="checkbox"/> None of the above
7.	What type of packaging material do you use and where do you get it from?
8.	How many kilograms of apple do you lose per year due to lack of certain logistics (transportation, storage etc.)? <input type="checkbox"/> Minimum _____ KG <input type="checkbox"/> Maximum _____ KG <input type="checkbox"/> Don't know/Not Answered
9.	To whom do you sell the product? [Multi select] <input type="checkbox"/> Retailer <input type="checkbox"/> Cold Storage <input type="checkbox"/> Trader <input type="checkbox"/> Processor/Exporter <input type="checkbox"/> Other
10.	What is your annual income on apple? [Numeric/Multi-select]  <input type="checkbox"/> Minimum _____ KG <input type="checkbox"/> Maximum _____ KG <input type="checkbox"/> Don't know/Not Answered
11.	Location [auto-populated]_____

### Appendix C: Primary products in Balochistan (2017-18)

Crops	Area in Hectares	Production in Tonnes	Yield (Kg/Ha)	Value (Million PKR)
<b>RABI CROPS</b>				



Wheat	394443	935375	2371.382	31943.06
Barley	10637	14196	1334.587	596.23
Rape Seed/ Mustard	14197	10697	753.469	558.70
Cumin	4785	2238	467.7116	1157.91
Gram	38563	32569	844.566	4653.72
Mutter Pulse	9927	5896	593.9357	417.44
Masoor	1674	1118	667.8614	87.26
Vegetables	17204	274495	15955.3	743.48
Fodder	17068	565502	33132.29	7238.43
Canola	3335	2209	662.3688	143.59
Sunflower	193	318	1647.668	9.54
<b>Total Rabi Crops</b>	512026	1844613		47549.35
<b>KHARIF CROPS</b>				
Rice	169803	553828	3261.591	5186.73
Sorghum (Jowar)	18623	15610	838.2108	768.01
Millet (Bajra)	2972	1823	613.3917	85.32
Maize	2935	3013	1026.576	99.65
Sesamum	5688	3654	642.4051	420.58
Castor seed	1215	1370	1127.572	79.73
Moong	4658	3165	679.4762	302.02
Mash	3290	2916	886.3222	387.10
Moth	1332	1544	1159.159	132.17
Fruits	203207	995985	4901.332	99720.01
Onion	35690	680286	19060.97	24609.35
Potato	1487	23405	15739.74	550.79
Vegetables	16621	120841	7270.381	16361.23
Melons	8650	100467	11614.68	3230.85
Chillies	4111	6268	1524.69	1189.35
Fodder	17413	537961	30894.22	6885.90
Coriander	1821	1046	574.4097	35.77
Garlic	1057	9210	8713.34	1030.14
Guar Seed	6427	4235	658.9389	257.49
Tobacco	983	1435	1459.817	172.20
Sugarcane	855	43400	50760.23	629.30
Cotton	35491	47131	1327.97	4006.14
<b>Total Kharif Crops</b>	544329	3158593		166139.83
<b>GRAND TOTAL</b>	1056355	5003206		213689.18

Source: Crop Reporting Services (2017-18) and Economics & Marketing Section (Quetta wholesale market prices, 2017-18), Agriculture Extension Department, Balochistan.

#### Appendix D: Primary products in district Quetta

CROPS	Area in Hectares	Production in Tonnes	Yield in Kgs / Ha:	Value in million PKR
<b>RABI CROPS</b>				
Wheat	2,500	5,183	2,073	177.00
Barley	190	288	1,516	12.10

Cumin	100	51	510	26.39
Vegetables	255	3,741	14,671	134.82
Fodder	240	6,290	26,208	80.51
<b>Total Rabi Crops</b>	<b>3,285</b>	<b>15,553</b>		<b>430.81</b>
<b>KHARIF CROPS</b>				
Other Fruits	3,049	20,779	6,793.66	2,045.90
Apple	1,336	11,937	10,185	1,052.71
Onion	370	6,852	18,519	247.87
Potato	35	525	15,000	20.27
Vegetables	323	2,434	7,536	135.25
Melons	60	782	13,033	25512.75
Fodder	203	6,012	29,616	76.95
<b>Total Kharif Crops</b>	<b>5,376</b>	<b>49,321</b>	---	<b>29091.70</b>
<b>GRAND TOTAL</b>	<b>8,661</b>	<b>64,874</b>	---	<b>29522.51</b>

Source: Crop Reporting Services (2017-18) and Economics & Marketing Section (Quetta wholesale market prices, 2017-18), Agriculture Extension Department, Balochistan.

#### Appendix E: Primary products in district Killa Abdullah

CROPS	Area in Hectares	Production in Tonnes	Yield in Kgs / Ha:	Value in million PKR
<b>RABI CROPS</b>				
Wheat	2,500	5,183	2,073	177.00
Barley	190	288	1,516	12.10
Cumin	100	51	510	26.39
Vegetables	255	3,741	14,671	134.82
Fodder	240	6,290	26,208	80.51
<b>Total Rabi Crops</b>	<b>3,285</b>	<b>15,553</b>		<b>430.81</b>
<b>KHARIF CROPS</b>				
Other fruits	3,119	6,631	7,160.89	798.91
Apple	5,635	26,072	8,814	2,299.70
Onion	370	6,852	18,519	247.87
Potato	35	525	15,000	20.27
Vegetables	323	2,434	7,536	135.25
Melons	60	782	13,033	25512.75
Fodder	203	6,012	29,616	76.95
<b>Total Kharif Crops</b>	<b>5,376</b>	<b>49,321</b>	---	<b>29091.70</b>
<b>GRAND TOTAL</b>	<b>8,661</b>	<b>64,874</b>	---	<b>29522.51</b>

Source: Crop Reporting Services (2017-18) and Economics & Marketing Section (Quetta wholesale market prices, 2017-18), Agriculture Extension Department, Balochistan.

#### Appendix F: Primary products in district Pishin

CROPS	Area in Hectares	Production in Tonnes	Yield in Kgs / Ha:	Value in million PKR
<b>RABI CROPS</b>				
Wheat	3524	6993	1984.39	238.81

Barley	257	499	1941.63	20.96
Cumin	23	18	782.61	9.31
Vegetables	136	2300	16911.76	70.23
Fodder	143	5269	36846.15	67.44
<b>Total Rabi Crops</b>	<b>4083</b>	<b>15079</b>		<b>406.76</b>
<b>KHARIF CROPS</b>				
Other fruits	11028	55708	6600.00	6223.27
Apple	6877	31713	9035.04	2796.74
Onion	133	2425	18233.08	87.72
Potato	183	3492	19081.97	82.18
Vegetables	942	7478	7938.43	326.05
Melons	562	5549	9873.67	207.05
Chillies	41	62	1512.20	11.76
Fodder	612	22910	37434.64	783.52
Tobacco	293	405	1382.00	48.60
<b>Total Kharif Crops</b>	<b>20671</b>	<b>129742</b>	<b>---</b>	<b>10566.89</b>
<b>GRAND TOTAL</b>	<b>24754</b>	<b>144821</b>	<b>---</b>	<b>10973.65</b>

Source: Crop Reporting Services (2017-18) and Economics & Marketing Section (Quetta wholesale market prices, 2017-18), Agriculture Extension Department, Balochistan.

#### Appendix G: Primary products in district Killa Saifullah

Crops	Area in Hectares	Production in Tonnes	Yield in Kgs / Ha:	Value in million PKR
<b>RABI CROPS</b>				
Wheat	9910	19391	1956.71	662.20
Barley	990	1323	1336.364	55.57
Cumin	52	29	557.6923	15.00
Vegetables	1442	23993	16638.7	70.23
Fodder	68	2587	38044.12	33.11
Sunflower	20	21	1050	0.63
<b>Total Rabi Crops</b>	<b>12482</b>	<b>47344</b>		<b>836.75</b>
<b>KHARIF CROPS</b>				
Maize	120	125	1041.667	4.13
Moong	52	21	403.8462	2.00
Mash	53	28	528.3019	3.72
Fruits	63735	352127	5524.861	9049.057
Apple				24029.3
Onion	540	9820	18185.19	355.24
Potato	495	6950	14040.4	922.61
Vegetables	3110	22801	7331.511	1951.77
Melons	472	5033	10663.14	187.79
Chillies	350	530	1514.286	100.57

Fodder	96	3725	38802.08	47.68
Garlic	76	572	7526.316	63.98
Tobacco	550	826	1501.818	99.12
<b>Total Kharif Crops</b>	<b>69649</b>	<b>402558</b>		<b>36816.97</b>
<b>GRAND TOTAL</b>	<b>82131</b>	<b>449902</b>		<b>37653.72</b>

Source: Crop Reporting Services (2017-18) and Economics & Marketing Section (Quetta wholesale market prices, 2017-18), Agriculture Extension Department, Balochistan.

#### Appendix H: Primary products in district Kalat

Crops	Area in Hectares	Production in Tonnes	Yield in Kgs / Ha:	VALUE IN MILLION PKR
<b>RABI CROPS</b>				
Wheat	4745	9965	2100.11	340.30
Barley	412	571	1385.92	23.98
Cumin	1335	559	418.73	289.22
Vegetables	138	2040	14782.61	121.75
Fodder	316	10265	32484.18	131.39
Total Rabi Crops	6946	23400		906.64
<b>KHARIF CROPS</b>				
Other fruits	2617	13964	7675.96	1449.04
Apple	1867	20455	17160.23	1803.91
Onion	2575	56565	21966.99	2046.24
Potato	285	4290	15052.63	100.96
Vegetables	1154	9768	8464.47	405.45
Melons	21	252	12000.00	9.40
Chillies	74	113	1527.03	21.44
Fodder	256	12261	47894.53	156.94
Coriander	90	53	588.89	1.81
Total Kharif Crops	10806	138176		5995.20
<b>GRAND TOTAL</b>	<b>17752</b>	<b>161576</b>		<b>6901.84</b>

Source: Crop Reporting Services (2017-18) and Economics & Marketing Section (Quetta wholesale market prices, 2017-18), Agriculture Extension Department, Balochistan.

#### Appendix I: District and Tehsil-wise distribution of apple value chain actors

##### District Quetta

Category		District Quetta	
Farmer	Population	700	
	Sample	35	
Large Farmer	Selection Criteria	3	Tehsil level distribution could not be followed in Quetta as division of tehsils was unclear for enumerators

Medium Farmer		11	
Small Farmer		21	
Cold Storage	Population	12	
	Sample	12	only 12 cold storages were found in the city
Pre-harvest Contractors	Population	100	
	Sample	20	
Urban	Selection	9	
Rural	Criteria	7	
Commission Agents	Population	258	
	Sample	25	
Urban	Selection	11	
Rural	Criteria	14	
Retailers	Population	2000	
	Sample	100	
Urban	Selection	44	
Rural	Criteria	56	
Wholesalers	Population	866	
	Sample	33	
Urban	Selection	19	
Rural	Criteria	24	
*Large Farmer: Orchard size >25 Acres (>4000 crates)			
Medium Farmer: Orchard size 5 to 25 Acres (1000 - 4000 crates)			
Small Farmer: Orchard size <5 Acres (<1000 crates)			

#### District Killa Abdullah

Category		District Killa Abdullah	Tehsil Gulistan	Tehsil Killa Abdullah	Tehsil Dobandi	Tehsil Chaman
Farmer	Population	2914	1050	1159	700	5
	Sample	146	55	64	21	6
Large Farmer	Selection	12	7	5	0	0
Medium Farmer	Criteria	79	33	41	4	1
Small Farmer		55	15	18	17	5
Cold Storage	Population	14	2	12		
	Sample	14	2	12		
Pre harvest Contractors	Population	725	300	300	100	25
	Sample	30				
*Big Farmer: Orchard size >25 Acres (>4000 crates)						

Medium Farmer: Orchard size 5 to 25 Acres (1000 - 4000 crates)				
Small Farmer: Orchard size <5 Acres (<1000 crates)				
Sample Size for Large farmers in Tehsil Gulistan was slightly revised due to access/availability				
Sample size for Tehsil Dobandi was revised as no large farmers were found in that area.				

### District Pishin

Category		District Pishin	Tehsil Barshore	Tehsil Karezat	Tehsil Bostan	Tehsil Hurmzai	Tehsil Pishin	Tehsil Saranan
Farmer	Population	3250	700	800	200	500	1000	50
	Sample	163	34	40	10	29	50	0
Large Farmer	Selection Criteria*	9	1	2	1	2	3	0
Medium Farmer		51	11	13	3	7	16	1
Small Farmer		104	22	25	6	20	31	0
Cold Storage	Population	1	0	0	0	0	1	0
	Sample	1	0	0	0	0	1	0
Pre harvest Contractors	Population	425	115	75	45	85	105	0
	Sample	20						0
*Large Farmer: Orchard size >25 Acres (>4000 crates)								
Medium Farmer: Orchard size 5 to 25 Acres (1000 - 4000 crates)								
Small Farmer: Orchard size <5 Acres (<1000 crates)								

### District Killa Saifullah

Category		District Killah Saifullah	Tehsil Muslimbagh	Tehsil Killah Saifullah	Tehsil loiband
Farmer	Population	3840	2100	1200	540
	Sample	193	105	60	28
Large Farmer	Selection Criteria	36	7	19	10
Medium Farmer		65	25	32	8
Small Farmer		92	73	9	10
Pre harvest Contractors	Population	21	11	7	3
	Sample	20			

*Large Farmer: Orchard size >25 Acres (>4000 crates)					
Medium Farmer: Orchard size 5 to 25 Acres (1000 - 4000 crates)					
Small Farmer: Orchard size <5 Acres (<1000 crates)					
Sample sizes for large farmers in Muslimbagh and Tehsil KS were revised/reduced- this is mainly due to the terrain of the area and the recent droughts that have resulted in uprooting of apple orchards					
Later it was found that Muslimbagh has fewer large and medium farms hence sample was further reduced but KS tehsil has more large farms hence sample was increased for large/medium farms					

#### Appendix J: List of stakeholders interviewed

S.No	Name	Organization
1	Mr Faizullah Shah	Secretary Market Committee, Quetta wholesale Market.
2	Mr Inam Ul Haq	Ex. Director General, Agriculture Extension Department Balochistan.
3	Dr Javed Tareen	Ex. Director General, Agriculture Research Department Quetta.
4	Syed Sadiq Agha	Deputy Director, Agriculture Research Institute, Quetta.
5.	Miss Dori Semi	Director Extension (Women división), Agriculture Extension Department Quetta.
6.	Mr Abdul Salam Baloch	Ex Secretary and Ex Director General Agriculture Extension, Balochistan.
7.	Mir Naseer Shahwani	Member Provincial Assembly and Former President, Zamindar Association, Balochistan.
8.	Mr Kazim Khan	Progressive farmer and exporter
9.	Mr. Naqibullah Nasar	Deputy Director, Technical, Balochistan Food Authority, Quetta.
10.	Mr Syed Qayamuddin	Zarghoon Zarai Markez (Inputs dealer)
11.	Mohammad Salman Jaffar	Balochistan Agriculture College Quetta.
12.	Mr Mohammad Shah	Director Incubation Centre, BUIITEMS, Quetta.
13.	Haji Fateh Khan	Member Chamber of Commerce, Quetta.
14.	Haji Rafu Gul	President, All Balochistan National Fruits and Vegetables Commiossion Agents Association/Exporter
15.	Haji Sher Ali Bangulzai	President, All Balochistan National Fruits and Vegetables Commiossion Agents Association/Exporter
16.	Haji Mohammd Rafiq	Fruit Trader/Exporter
17.	Mr Noor Ali Achakzai	Trade Development Centre, Ministry of Commerce, Quetta
18.	Mr Saat Maluk	Al-Niamat Fruit & Vegetable Company, Quetta.