THE AGRIBUSINESS PROJECT (TAP)

HVOSV- Value Chain Competitiveness Assessments for:

1. **Bitter Gourd**
2. **Capsicum**
3. **Cucumber**
4. **Tomatoes**
5. **Squash**

Sub Agreement TAP-ISA-013-002

J.E. AUSTIN ASSOCIATES, INC.

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This report encapsulates the results of the HVOSV's Value Chain Competitiveness Assessment (VCA) study undertaken by the USAID Agribusiness Project (TAP). The authors wish to thank all the associated organizations and their project staff for their valuable contributions particularly the TAP value chain leads and the field staff for their tireless efforts spent during the data gathering in the field. We would also like to thank the management of Hyperstar for sharing retail data with this project for analysis as part of their policy on corporate social responsibility and commitment to developing Pakistan's domestic traceable supply chain and strengthening the agriculture sector.

Acronyms and Abbreviations

ABL	Allied Bank of Pakistan
ABP	State Bank of Pakistan
ADB	Asian Development Bank
ADDP	Agribusiness Development and Diversification Project
AJK	Azad Jammu Kashmir
AMIS	Agriculture Marketing Information system
ASF	Agribusiness Support Fund
ASLP	Agriculture Sector Linkages Program
ATTA	Afghan Transit Trade Agreement
BCR	Benefit Cost Ratio
BOP	Bank of Punjab
BRSP	Baluchistan Rural Support Program
BSF	Business Support Fund
CIP	Commodity Import Program
CMP	Crop Maximization Project
DCO	District Coordination Officer
DFID	Department for International Development
FAO	Food and Agriculture Organization
FAP	Farmer Association of Pakistan
FATA	Federally Administered Tribal Areas
FIAS	Foreign Investment Advisory Services
GB	Gilgit Baltistan
GDP	Gross Domestic Product
HACCP	Hazard Analysis and Critical Control Points
HBL	Habib Bank Limited
IFC	International Finance Corporation
IRR	Internal Rate of Return
JAA	J. E. Austin Associates
KPK	Khyber Pakhtun Khawa
LUMS	Lahore University of Management Sciences
MCB	Muslim Commercial Bank
MT	Metric Tons
NAA	Nilibar Agriculture Association
NARC	National Agricultural Research Council

NBP	National Bank of Pakistan
NGO	Non- Government Organization
NIOA	National Institute of Organic Agriculture
NPIW	National Program for Improvement of Water Courses
NRSP	National Rural Support Program
NWFP	North West Frontier Province
PAMCO	Punjab Agriculture and Meat Company
PARB	Punjab Agriculture Research Board
PARC	Pakistan Agricultural Research Council
PBIT	Punjab Board of Investment and Trade
PBS	Punjab Bureau of Statistics
PERI	Punjab Economic Research Institute
PHDEC	Pakistan Horticulture Development and Export Company
PIA	Pakistan International Airline
PIDE	Pakistan Institute of Development Economics
PITD	Pakistan Institute of Trade and Development
PKR	Pakistan Rupee
PR	Pakistan Railways
PRI	Potato Research Institute
PSC	Punjab Seed Corporation
PSQCA	Pakistan Standards and Quality Control Authority
QA	Quality Assurance
SAARC	South Asia Association for Regional Cooperation
SAFTA	South Asia Free Trade Area
SBI	Sindh Board of Investment
SCARP	Salinity Control and Reclamation Project
SDC	Swiss Development Corporation
SDPI	Sustainable Development Policy Institute
SME	Small and Medium Enterprises
SMEDA	Small and Medium Enterprise Development Authority
SPS	Sanitary and Phytosanitary
SRSP	Sindh Rural Support Program
TDAP	Trade Development Authority of Pakistan
TOR	Terms of Reference
UBL	United Bank Limited
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNIDO	United Nations Industrial Development Program

USAID	United States Agency for International Development
USD	United States Dollar
USDA	United States Department of Agriculture
UVAS	University of Veterinary and Animal Sciences
VRI	Vegetables Research Institute
WB	World Bank
WTO	World Trade Organization
ZTBL	Zarai Taraqiati Bank Limited

Executive Summary

The five-year USAID funded Agribusiness Project, now commonly referred to as The Agribusiness Project (TAP) being implemented by the Agribusiness Support Fund (ASF) has the overall goal of supporting improved conditions for broad-based economic growth, creating employment opportunities and contributing to poverty alleviation through increases in competitiveness of horticulture and livestock value chains in partnership with all stakeholders. Specific objectives of the project are to; (i) strengthen the capacity in horticulture and livestock value chains to increase sales to domestic and foreign markets; (ii) strengthen the capacity of smallholders and farmer enterprises to operate autonomously and effectively; and, (iii) increase agriculture efficiency and productivity through adoption of new farming techniques and technological innovation among targeted beneficiaries.

The overall objective of this assessment was to assess the competitiveness of the selected value chain. With a specific focus on: identifying the precise gaps in the value chain; the potential of Pakistan producers; validation of ongoing and planned interventions; Identification of attractive/alternative markets for the value chain products and identification of additional interventions that could enhance value for all the chain actors. Once completed, the augmented information and analysis presented in the assessments will also be used to facilitate further prioritization of the value chains and of the potential interventions.

Building the competitiveness of high value horticulture requires taking into account the critical success factor of seasonality and proper timing for specific domestic and international markets. Seasonality is complex in that it includes both periods of high demand as well as the ability or inability of competing producers in other countries to produce during specific windows of opportunity. Prices may vary considerably from day to day and week to week and production times can be subject to uncertainty, especially when grown outside of controlled environments such as greenhouses.

This study set out to identify seasonality opportunities for five high-value vegetables produced in Pakistan: Bitter Gourd, Capsicum, Cucumber, Squash, and Tomatoes. Determining these “windows” requires the availability of robust monthly data sets for several years, including unit values (prices) and volumes sold to assess whether at different months of the year prices for a particular vegetable increase in relation to those observed throughout the rest of the year. This can be done through the compilation and analysis of import data and through the compilation of data from a representative selection of retailers. These observations can be complemented and refined by interviewing industry stakeholders. Information and insights from this study can facilitate ASF and USAID assistance programs. One major limitation of this study is the lack of reliable historical data for the specific products studied here. Even basic data regarding production, imports and exports are limited.

To study these five products the authors relied on data provided by the management of a major national supermarket, Hyperstar. This organization was the only business that was willing to share their data and also had a reliable organized data management structure. This useful primary source was supplemented by inputs and confirmations in the stakeholder’s workshops with the leading

producers, processors, middlemen, exporters and policy makers for the issues related to these products.

Summary of Conclusions and Key Constraints to Address

The high value horticultural products provide opportunity for growth and have the potential to boost farmer income while contributing to Pakistan's agricultural GDP. Opportunities exist for making new market linkages in both national and international markets. These linkages can in turn drive the modernization, quality improvement, value chain coordination and improved timing and coordination of production. Pakistan's agricultural growing conditions, and the growing demand in national and international markets, create good prospects for the future. Nonetheless, production is at a very basic level and there are major constraints and bottlenecks that need to be addressed at each stage of the value chain. The authors believe that starting with the consumer and market demand is the appropriate way to begin, although value chain analysis often starts from the inputs and works forward to production, trading, processing and retailing or export. Therefore this study starts with the market and works back.

Market demand is attractive: Sales graphs and supply chain information in this report confirm that there is strong market demand for vegetables during the winter months. The stakeholders' survey also found that higher exports were in evidence during these months going to the north to the CIS through Afghanistan. The potential for growth is high, especially given the climactic conditions and relative isolation of these markets from other sources of production. The comparative advantage of Pakistan to serve these markets is based on natural advantages such as growing conditions, weather, soil, relatively inexpensive labor and relative geographic proximity. Pakistan's winter vegetable industry has the opportunity to build on these comparative advantages to create what Harvard's Dr. Michael Porter calls "competitive advantage" that are created rather than inherited. This study identifies how to build a number of these competitive advantages but doing this will require greater stakeholder cooperation and public-private cooperation.

Market Development: Unlike the US Cooperators Program, there is little institutional support in Pakistan for crop-specific associations to engage in market intelligence, develop new market linkages and to engage in market development activities. Individual exporters are not large enough or organized to run international marketing campaigns to do this, much less to promote a brand image for their industries. And yet pooled market development activities could generate benefits throughout the supply chain if these could be organized.

Trade Finance Constraints: Available export refinance is limited because of weaknesses in documentation. Many exporters are selling their produce on Documents Advance (DA) and these do not qualify for refinance from banks. Export refinance serves as the working capital much needed to ensure liquidity to buy raw materials in sufficiently large volumes. The State Bank of Pakistan might be able to play a constructive role here[1].

Air Transportation Limitations: The highly perishable nature of fresh produce, combined with their relatively high value, means that air transportation is normally ideal except for neighboring countries. Pakistan International Airlines (PIA) and other commercial airlines provide cargo space in

[1] Mian Shahkoti, Pakways

their passenger planes. However, there are no freighter planes currently dedicated for fresh produce. Additional cargo space will be required for exports to increase. A designated air cargo service, servicing the horticulture sector can help an increase in the exports tremendously. For example, Multan airport could act as a major fresh produce hub as production areas are in close vicinity.

Storage, Cool Chain Limitations and Post-Harvest Loss: Almost all related products are highly perishable in nature and have a very limited shelf life. They cannot be stored for a longer period unless they are properly harvested and kept in a temperature-controlled environment, referred to in some countries as either the "cold chain" or "cool chain." Adequate cold storage facilities are not available in the country that results in very high post -harvest losses estimated by stakeholders to range from 25 to 30 per cent.

Processing and Packaging: Internationally accepted standards for farms, packing and processing are required to be competitive in domestic and the global markets. These standards have to be economically justified in order to providing value for the work done.

Farmer Credit: Proper credit availability to the producers is a major issue. The fallacy of credit system forces small farmers to under-invest in farming inputs like pesticides and fertilizers that leads them to lower yields and poor quality.

Farm Practices and Crop Husbandry: Combination of agronomic practices, product variety characteristics, grading, processing and packaging can be defined as quality. The absence of even a single factor makes the product inferior in quality and thus less acceptable in international and high end local markets. Crop husbandry can be linked directly to the combination of the price insecurity, resulting from the absence of the contract farming including, buy back agreements, advance sales and grade of the seeds. Most of the progressive farmers have better yields due to better crop husbandry practices.

Risk Mitigation, Value Chain Harmonization and Farmer Contracts: Since the highly perishable nature of these products, it is very imperative for the producers to make sure that their product is sold before it is harvested. For this, the only way is the pre-sold product before the seeds go into the ground or contract farming. It is a global phenomenon for more perishable products as everyone in these value chains know that longer the shelf life, lower the risks and more profits. Introduction of Cooperative farming can help small farmers act as a bigger and more organized market force, resulting not only in better supply and demand coordination but it can also influence matters related to the pricing of their produce.

Seed Development and Inputs: A comprehensive seed development program focusing new technologies should be developed in the private sector with emphasis on the research and development so appropriate seed is available to the producers. Appropriate inputs, delivered on a timely and cost-effective basis, will be critical to successful growth of these products in the future. One key input that is being used increasingly by the medium to large producers is that of "tunnel farming" where polyethylene plastic tubes surround the rows of planted crops, creating a more protected environment for watering and temperature control. More than 2000 acres under tunnel have been changed from vegetable farming to other crops in the year 2013 in response to policies

allowing imports from the eastern border[2]. It will be important to analyze in more detail the competitiveness of Pakistan's winter vegetable production compared to that of India, something beyond the scope of the current study.

Developing Institutions for Coordination and Cooperation: Pakistan lacks the institutions that could coordinate initiatives across the value chain, beginning with in-depth market studies in specific destination markets. Such coordination councils convene the stakeholders, reach an agreement to work together, benchmark current industry competitiveness, quantify current constraints, identify strategic initiatives to boost the competitiveness of the industry and coordinate public-private dialogue so as to reduce the impediments to private sector competitiveness in serving national and international markets. For example, trade policy might examine the impacts of alleged occasional dumping of imported products. This industry coordination body, value chain association or competitiveness council could also promote education and capacity building in crop husbandry from nursery growing till harvesting. The association should be instrumental in developing linkages for the sale of the products domestically and globally.

Donor Technical Support: Donors should consider supporting appropriate data collection efforts on markets and prices through an existing organization or an emerging High-Value Association. Better records and market information can not only help the growth of this crop but also the whole sector.

[2] Mian Sajjid, Mailsi

I. Background

The USAID's Agribusiness Project, now commonly referred to as The Agribusiness Project (TAP) is being implemented through Cooperative Agreement (No. AID-391-A-12-00001) by the Agribusiness Support Fund (ASF). ASF, a Pakistani non-profit company registered under section 42 of the Companies Ordinance of 1984 was formed to provide demand-driven technical and managerial assistance and private sector service delivery mechanisms throughout the agribusiness value chains including supply inputs, production, processing, and market access for domestic and export markets.

The five-year TAP project began on November 10, 2011. The overall goal of the project is to support improved conditions for broad-based economic growth, create employment opportunities and contribute to poverty alleviation through increases in competitiveness of horticulture and livestock value chains in partnership with all stakeholders. Specific objectives of the project are to;

(i) Strengthen the capacity in horticulture and livestock value chains to increase sales to domestic and foreign markets;

(ii) Strengthen the capacity of smallholders and farmer enterprises to operate autonomously and effectively; and,

(iii) Increase agriculture efficiency and productivity through adoption of new farming techniques and technological innovation among targeted beneficiaries.

The ASF had developed some basic information on many of the selected value chains targeted by the project. This information has been published in the following reports:

1. Horticulture (Peaches, Dates, Potatoes, Chilies) Value Chain Assessment Final Report for the Agribusiness Project (31 December 2012)

2. Dairy Value Chain Assessment Final Report for the Agribusiness Project (24 February 2013)

3. Meat Value Chain Assessment of the Livestock Sector of Pakistan (2 November 2013)

The present report is part of a series resulting from the effort to deepen the analysis provided in those reports. These competitiveness assessments focused on the following:

- Pinpoint the gaps and opportunities in selected value chains;
- Validate ongoing and planned interventions;
- Identify attractive/alternative markets for the value chain products;
- Identify additional interventions that could enhance value for all the chain actors;
- Facilitate further prioritization of VCs and of the potential interventions in light of the augmented information and analysis.

The information sources used include a review of previous studies, interviews with adequate representation of all functions and participant groups in each value chain, including producers,

intermediaries (contractors, commission agents, traders (beuparies), exporters, supermarkets, and input suppliers as well as experts from academia and research and development professionals. The data presented in the reports primarily come from reports and databases published by the Pakistan Bureau of Statistics, Trade Development Authority of Pakistan (TDAP), Directorate of Market Information, Department of Agriculture Punjab and other domestic and international secondary sources of information, particularly international databases such as International Trade Center (ITC) in Geneva and FAOSTAT. For each specific chain, various knowledge and information sources available on the worldwide web were utilized as well.

These assessments, while enriching the information originally developed in the initial value chain reports through the competitiveness lens, are intended to guide and narrow down the areas where additional research efforts by TAP may be required and desirable. In this sense, rather than being considered final, they are intended to be "living documents" and evolve as those areas are further explored.

Introduction

One of the critical success factors of growing vegetables competitively is the ability of producers to get their products to market at particular points in time (also known as “windows” of opportunity) when they will fetch a higher price in a particular market. In other words, taking advantage of seasonality will make the farming activity more competitive and may even be vital for certain operations to remain profitable. Seasonality has several dimensions to it, as these higher prices are the result of either less competition due to the inability of competitors to reach that particular market, or because demand is higher than usual at those particular points in time. Likewise, seasonality is not confined to the local market, as opportunities may also present themselves in international markets.

As such, this study set out to identify seasonality opportunities for five high-value vegetables produced in Pakistan: Bitter Gourd, Capsicum, Cucumber, Squash, and Tomatoes. These were selected in dialogue with stakeholders and were based on perceived potential for growth. Determining these “windows” requires the availability of robust monthly data sets for several years, including unit values (prices) and volumes sold to assess whether at different months of the year prices for a particular vegetable increase in relation to those observed throughout the rest of the year. This can be done through the compilation and analysis of import data (for import oriented commodities such as tomatoes), and through the compilation of data from a representative selection of retailers. These observations were then complemented and refined by interviewing industry stakeholders. This information is intended to provide input into USAID and ASF assistance programs looking to build growers competitiveness by linking them to these opportunities.

It is important to indicate up front the limitations of this study, especially the unavailability or unreliability of data. Limited national data sources could only be partly addressed by international sources. On the international side, volumes of trade do not seem to be large enough to warrant a Harmonized Tariff System (HTS) code of their own to these vegetables. As all WTO countries conduct and record international trade transactions using this system, this also limited our ability to determine if these vegetables were import or export oriented, as well as in the identification of seasonality and trends in foreign markets. Up to 2011, most of these vegetables are lumped into one category- HS Code 0709 which includes all Vegetables "not elsewhere specified" (n.e.s.). In 2012, the HTS was revised to include a disaggregated category- 070993- Fresh chilled pumpkins, squash, and gourds- but utilizing this data is pointless as it still is not disaggregated enough to be meaningful in terms of prices, and no trend and seasonality analysis is possible with only one year of data. Finally, there is a disaggregated category in the HTS system for cucumbers and gherkins, but Pakistan is either not trading this product internationally, or these transactions are not being recorded by national customs authorities and therefore also their international counterparts.

In the national context, the data constraints include a “porous border” plagued by informal trade, poor record keeping from customs authorities, market administrators, retailers, and the absence of organized groups of growers and exporters that in other countries often help to fill the data gap. The VC assessment team attempted data collection from various sources. A detailed list of sources consulted is enclosed in the Annex 1) with some of them are listed below;

AMIS	Agriculture Marketing Information system
FAP	Farmer Association of Pakistan
NAA	Nilibar Agriculture Association
NRSP	National Rural Support Program
PARC	Pakistan Agricultural Research Council
PBS	Punjab Bureau of Statistics
PHDEC	Pakistan Horticulture Development and Export Company
PBIT	Punjab Board of Investment and Trade
TDAP	Trade Development Authority of Pakistan
VRI	Vegetables Research Institute
ZTBL	Zarai Taraqiati Bank Limited
WLO	World Life Organization

Only one of the multiple retailers contacted had the required robustness in their record-keeping and was willing to share data. By some estimation, Hyperstar, a modern supermarket, has an overall 2.5% market share of fresh produce in Lahore and Karachi. As prices in these two cities are in line with the retail prices in the other retail markets, they can be used as proxies. So while analysis of this data may provide an adequate picture of price variability in the overall market, we must qualify any conclusions noting that it is based on data from a small fraction of the market. Furthermore, the data may be skewed towards pricing practices that could be more reflective of corporate strategy than real market conditions. For example, if a product is not selling enough, discounts may be applied. Likewise, the store manager may decide to make a smaller margin in certain product categories to attract a certain type of customer at certain periods of time, while increasing its margin in others. Nonetheless, this data provides a starting point for useful analysis and a benchmark for subsequent work.

Conclusions should be interpreted with extreme caution and these important qualifiers should be kept in mind. In the following sections, this retail data is analyzed for each of the vegetables in the scope of this assessment, along with any other contextual information obtained that helps support the availability of a high value market for them.

I would like to thank the management of the Hyperstar for sharing this data with this project for analysis as part of their commitment to corporate social responsibility, to developing domestic traceable supply chain and to strengthening Pakistan's agriculture sector. Hyperstar’s management expressed their concerns for getting a better supply chain established for these products in order for them to effectively retail the fresh produce with traceability and improving the quality not only for the domestic retail outlets but also export to their locations in other countries.

II. Bitter Gourd

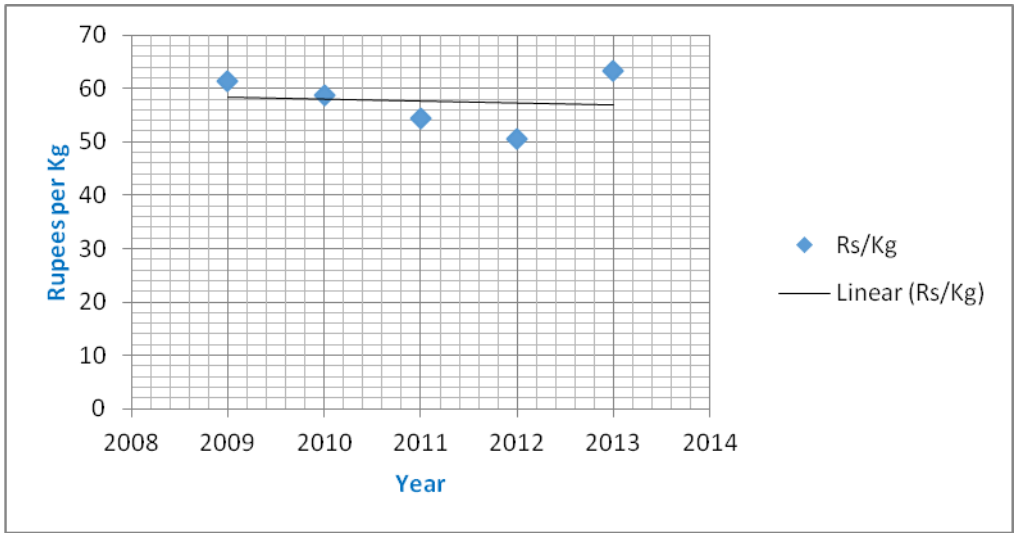
Bitter Gourd (*Momordica charantia* L.), or 'Kraila' as it is known locally, is a tropical and a subtropical vine belonging to the family of Cucurbitaceae and is a cross-pollinated crop. An annual crop, it can perform as a perennial produce in areas with mild, frost-free winters. The crop is also grown under the plastic tunnels or green houses to control the temperature for maximum returns at the times when the market has a higher demand with low supplies. It is a common vegetable grown in Asia, Africa, Caribbean and other parts of the world. There are various varieties developed and grown according to the taste of the people, mostly the bitterness. South Asian varieties have higher bitterness as compared to the varieties commonly used in Thailand, Taiwan, China, Philippine, Vietnam and Okinawa. Bitter gourd originated on the Indian subcontinent, and was introduced into China in the 14th century.[3]

Bitter Gourd grows throughout Pakistan's vegetable growing areas. Comparatively it is a hardy vegetable and can have a longer shelf life as compared to the other high value vegetables. It can be kept in a proper cold chain for more than twenty days. Bitter Gourd is planted in the month of November under the tunnel and the harvesting starts as early as February. According to the current domestic market practices, the product is harvested and is transported in a 25-27 Kg. hessian bag. Most of the progressive farmers, in a season, achieve production of about 700 bags per acre under tunnels.[4] Product mostly leaves the farm for the local mundi and is taken to other larger markets or to the exports channel from there.

Bitter Gourd is also considered as a good herbal treatment for the diabetic patients. There are three value addition companies where various products are produced such as powder, juice and cream from the bitter gourd for the diabetic patients.

[3] Dr. Zafar Altaf
[4] Mian shaukat, Mamoon Kanjan

Graph #1: Retail prices for Bitter Gourd.



Source. Shahid Hussain and Laurent Nazet. MAF-Hyperstar

Graph number 1 shows the retail prices in the domestic markets for the past three years. We can see from this graph that the average yearly prices for this produce have gone through an unstable curve. The linear projection shows that there is a more than 20% variance in the price from the lowest to the highest sales prices. This also shows that the domestic market is still changing and there is a room for growth.

Table #1: Quantity and Amount Sold of Bitter Gourd for Five Years.

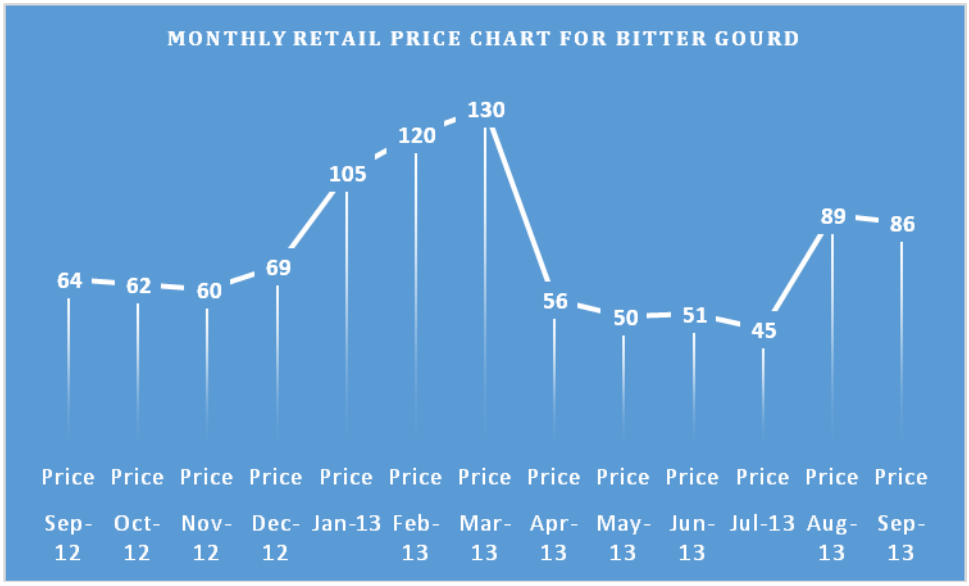
Year 2009		Year 2010		Year 2011		Year 2012		Year 2013 (Jan ~ Aug 19th)	
Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold
2966	181804	8335	489429	19934	1083350	14647	739875	8145	515798

Source. Shahid Hussain and Laurent Nazet. MAF-Hyperstar

Similarly there is a variable trend in the quantity sold at the same location while comparing the years 2010, 2011 and 2012. We can see that in the year 2010 the quantity sold was 8.335 MTs, in the year 2011 the total amount sold was more than double of the previous year to 19.9 Mts. In the year 2012 the total quantity of the product sold had gone down to 14.65 Mts even though we can see that the retail prices had gone down. The sales figures for the first eight months of the year 2013 show that the quantity sold is 8.15Mts while the average price for the first eight months is higher than the previous years. The price of the bitter gourd has been historically higher in the winter months as the produce is more in demand and the supplies are short due to severity of the weather. This is also the time when the high value product starts getting harvested from the tunnels. We can see that the

tunnel farmers generate almost three times more revenues as compared to the conventional farmers. This also justifies the cost of production as the profits are much higher.

Graph #2: Monthly Retail Price for Bitter Gourd.



Source. Shahid Hussain and Laurent Nazet. MAF-Hyperstar

The sales prices peak during the months of January, February and March. This is the time when the product from the tunnels is coming to the market. We can see a sharp fall in the prices in the months of April through July due to the availability of the crop from the conventional fields. We have a clear picture from the above graph that how the retail prices increase more than double with the high value production of the bitter gourds. The profitability also increases more than twice as the profit margins from the conventional farming of the bitter gourd stay pretty close to the breakeven point.

This pattern also shows that there is a demand for the high value bitter gourd and also the consumer behavior supports this pattern too as this vegetable is used more in the cooler months, as the data from the retail sales graph also confirms the consumer behavior. This increases the demand as the supplies are low due to non availability of the crop from the conventional fields.

Our stakeholders' survey showed a trend of exports, whole year to the UAE, KSA, Qatar, Bahrain, Kuwait, Afghanistan, U.K, Canada, Scandinavia and Germany. It was also discovered in the interviews that the Peshawar fruits and vegetable market works as a hub for the Afghan trade. Afghan traders even procured vegetables directly from Burewal, Arifwala, Shorekot and Mamoon Kanjan regions, for the export purposes.

One of the exporters Mr. Muhammad Sajjad from Lahore expressed that he exports a mix of vegetables from Pakistan to Germany, Norway, Canada and the U.K, on daily basis. Due to the

limited availability of the cargo space in the passenger planes, the products are shipped in a small amount, even though the demand is there. He said that bitter gourd is a good seller for the consumers of Pakistani, Indian and other Asian origins. The demand is high but he is unable to cater this market due to limited and very expensive air cargo space. Mr. Sajjad explained that if there is a designated cargo service, Pakistan can sell a major amount of the vegetables to not only the markets that he services but to the CIS, all over G.C.C and the European countries.

Mr. Sufiyan Bhatti, another exporter of the fresh products expressed the need for the better grading and packing facilities along with better produced high value vegetables to increase the sales to the export market. He expressed that the demand for the bitter gourd is huge if we have better shipping mechanisms for these markets.

One of the largest producers, Mian Shaukat stated that the quality of the product plays a major role. He said that the demand of the bitter gourd is huge and majority of his produce is exported to Afghanistan through the Peshawar mundi. Mian Shaukat has his agents in the mundi and his products fetches 10% more price than the competition as he has established a name for the quality in the market. He expressed that his product is different from the rest of the market due to better varieties produced, uniform size, product harvested at right time under right conditions and also packed for least chances of transportation losses. According to him he has exporters willing to buy product from him as much as he can produce.

III. Capsicum

Capsicum is a genus of flowering plants in the nightshade family Solanaceae. Its species are native to the Americas, where they have been cultivated for thousands of years. In modern times, it is cultivated worldwide, and has become a key element in many regional cuisines. In addition to use as spices and food vegetables, capsicum has also found use in medicines.

The fruit of Capsicum plants have a variety of names depending on place and type. The piquant (spicy) variety is commonly called chili peppers, or simply "chili". The large mild form is called red pepper, green pepper or bell pepper in North America and Britain and typically just "capsicum" in New Zealand, Australia, and South Asia. The fruit is called paprika in some other countries (although paprika can also refer to the powdered spice made from various capsicum fruit).

Bell peppers are sometimes grouped with less pungent pepper varieties as "sweet peppers". Peppers are native to Mexico, Central America and northern South America. Pepper seeds were later carried to Spain in 1493 and from there spread to other European, African and Asian countries. Today, China is the world's largest pepper producer, followed by Mexico and Indonesia.

Ideal growing conditions for bell peppers include warm soil, ideally 21 to 29 °C (70 to 84 °F), which is kept moist but not waterlogged. Bell peppers are sensitive to an abundance of moisture and excessive temperatures.[5]

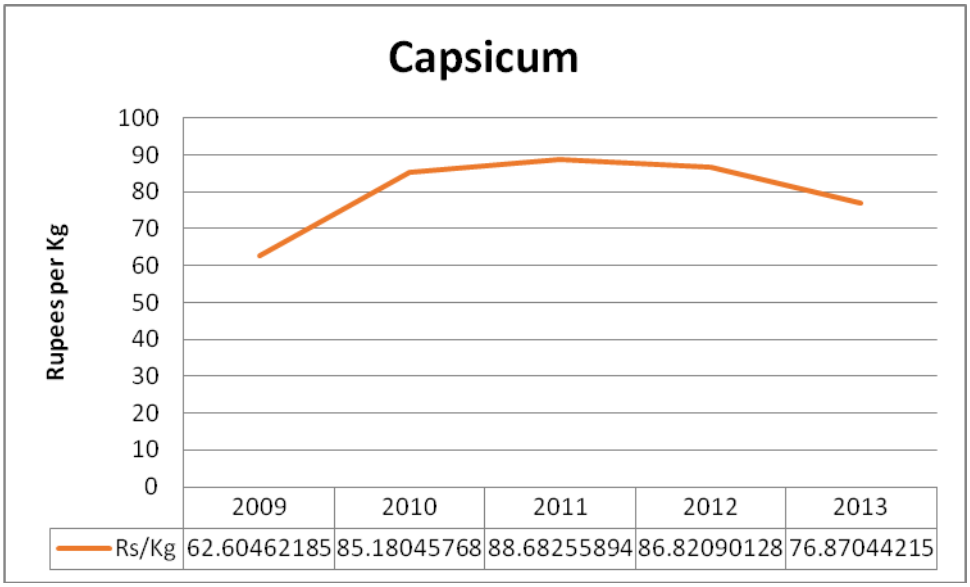
Capsicum is generally known in the market as Bell pepper, Shimla Mirch or sweat pepper. There are various varieties of capsicum grown conventionally and also under the tunnels for commercial purposes. The nursery is primarily planted in the month of September and the plants are transplanted in October. The producers start harvesting capsicum in December.

Capsicum is a very delicate product and care has to be taken while harvesting and transporting. Progressive farmers harvest between 1000-1200 bags in a season under tunnels[6]. Mostly it is packed in a 25-27 Kg. bag and transported in stacks which damages the products and reduces the shelf life. In general practice the product is harvested and shipped to local mundi. From the local mundi the product goes to the larger mundis and then some of it is purchased by the exporters.

Interviewed exporters revealed that there are exports of Capsicum to various markets. Peshawar is a major market for the export to Afghanistan and further re-exported to the CIS. Most of the other exports are to the UAE and to the U.K. and the Scandinavia by air. Most of the exporters mentioned the problems with the limited availability for the air cargo space. They mentioned unfulfilled orders and inability to supply on regular basis. [7]

[5] Dr. Zafar Altaf
[6] Mian Shaukat, Mamoon Kanjan
[7] Ch. Muhammad Ali, WLO

Graph #3: Retail Price of Capsicum sold for the past five Years.



Source. Shahid Hussain and Laurent Nazet. MAF-Hyperstar

We can see Graph # 3 a variable trend in the sale price for capsicum in the domestic retail market. It shows that the average retail price has been Rs. 63 to Rs. 89 during this period. This shows that there has been a change of more than 30% clearly demonstrating a price improvement market. This change in the percentage shows that this is a growth sector with opportunities to expand as the consumer demand and the supply are changing with an upswing demand.

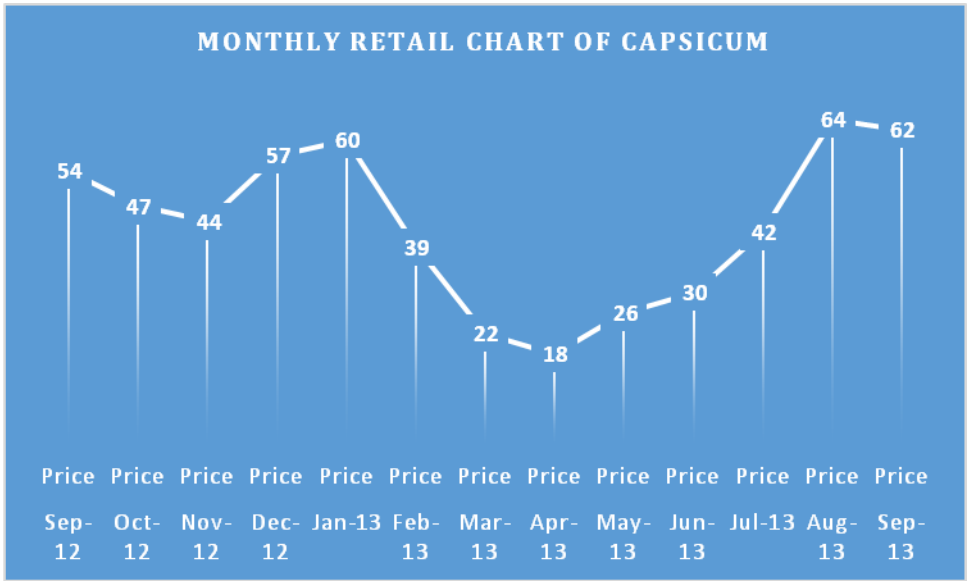
Table #2: Retail Quantities and Amount of Capsicum Sold

Year 2009		Year 2010		Year 2011		Year 2012		Year 2013 (Jan ~ Aug 19th)	
Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold
4,760	297,998	12,629	1,075,744	18,961	1,681,510	18,152	1,575,973	13,932	1,070,959

Source. Shahid Hussain and Laurent Nazet. MAF-Hyperstar

Table 2 provides details of the growth trajectory of capsicum demand in the domestic market. The same store sales show a positive trend with a huge surge in the quantities sold- from 4.7 Mts. In 2009 to nearly 19 Mts in 2011. The trend seemed to stabilize in 2012, but the first eight months of 2013 already show a higher than the total in 2010.

Graph #4: Monthly Sales Graph of Capsicum Retail Sales.



Source. Shahid Hussain and Laurent Nazet. MAF-Hyperstar

The above graph gives us very interesting data for the difference of prices between the conventionally grown capsicum and the high value capsicum grown under a tunnel. December and January have a high price ratio as there is an extreme weather for production. On the other hand we can see the glut in the market when the capsicum is sold at the third of the price in the months of March, April and May.

The demand for the Capsicum grown under the tunnels is high as we can see from the above review of the sector. Capsicum is also exported to various countries over land and by air. Few of the constraints which were discussed repeatedly in individual meetings and the stakeholder's workshop were lack of the availability of cargo space for shipping, reliable and better market linkages. Few exporters who shipped this product had above average returns. On average in the European market the product was sold at $4.00 per Kg. in the year 2012 while the domestic wholesale price was at an average of $ 0.68. Capsicum is also a high profit product for the vegetable farmers as the harvest times matches with the demand in the markets, domestic or export. This crop under tunnel can give better returns as compared to other traditional crops.

IV. Cucumber

Cucumber (*Cucumis sativus*) is a widely cultivated plant in the gourd family Cucurbitaceae. It is a creeping vine that bears a cylindrical fruit that are edible when ripe. There are three main varieties of cucumber: slicing, pickling and burpees. Within these varieties, several different cultivars have emerged. The cucumber is originally from Southern Asia, but now grows on most continents. Many different varieties are traded on the global market.

The cucumber is a creeping vine that roots in the ground and grows up trellises or other supporting frames, wrapping around supports with thin, spiraling tendrils. The plant has large leaves that form a canopy over the fruit. The fruit of the cucumber is roughly cylindrical, elongated with tapered ends, and may be as large as 60 centimeters (24 in) long and 10 centimeters (3.9 in) in diameter. Having an enclosed seed and developing from a flower, botanically speaking and cucumbers are classified as accessory fruits. Much like tomatoes and squash they are often also perceived, prepared and eaten as vegetables. Cucumbers are usually more than 90% water.[8]

According to the Food and Agriculture Organization of the United Nations, China produced at least 60% of the global output of cucumbers, followed at a distance by Turkey, Russia, Iran and the United States.

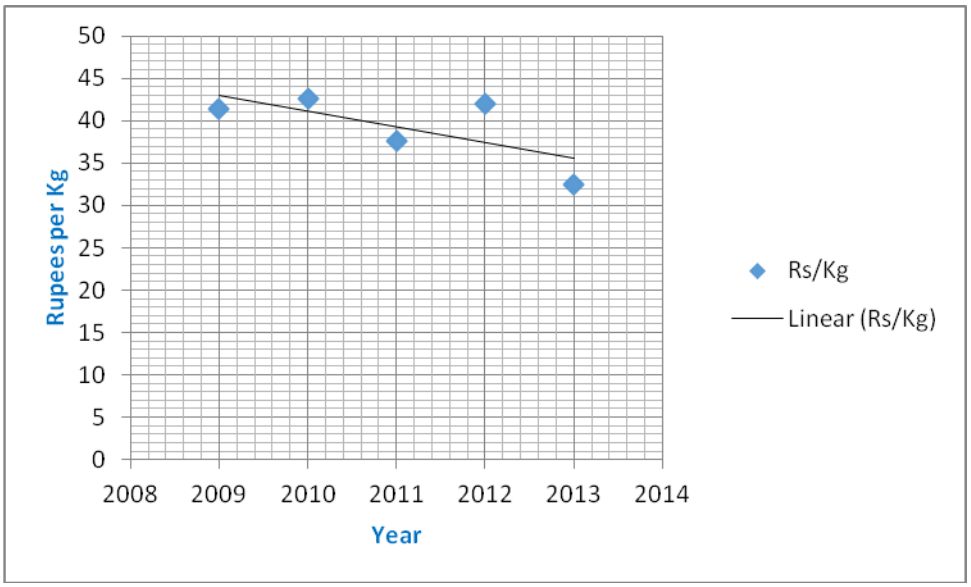
Cucumber is grown under tunnels in various districts of Pakistan with majority grown in the districts of Faisalabad, Toba Tek Singh, Sahiwal, Pakpattan, Khanewal, Vehari, Lodhran, Gujranwala, Chiniot and Narowal.

Mostly hybrid varieties are planted under the tunnels which have better profitability and production as compared to the local varieties. Cucumber crop is planted in the middle of December and the harvesting starts after 45-50 days of sowing. The average yield from the tunnels for cucumber is 1,500 – 18,000 bags of 45 Kg. each[9]. There are multiple pickings of this crop which makes it better for the farmers as they can cover their losses if one picking does not get profits. Subsequent picking may have better market demand or even the farmers can send their products to other markets with better performance.

During the stakeholders workshop conducted, the producers and the exporters mentioned that their product is exported to Afghanistan with further exports to the CIS. UAE is a strong market for the product as the product is flown by air and also shipped by sea in reefer containers. Like other vegetables there is a problem with the recording of the data due to the amount of the quantities exported and their categorization as discussed in the introduction of this report.

[8] Dr. Zafar Altaf
[9] Mian Mehmood, Shadi Farms

Graph #5: Average Retail Sales Prices of Cucumbers for the Past Five Years.



Source. Shahid Hussain and Laurent Nazet. MAF-Hyperstar

The retail price graph showing the trends for the past five years shows that the prices have actually gone down. We should keep this in mind that the data for the year 2013 gives partial numbers from the first eight months. If we consider the year 2010, we can see that there was an increase from the previous year but a decrease in the average yearly sales prices in the year 2011. The retail price was higher in 2012 as compared to 2011, which shows higher market demand and lower supplies.

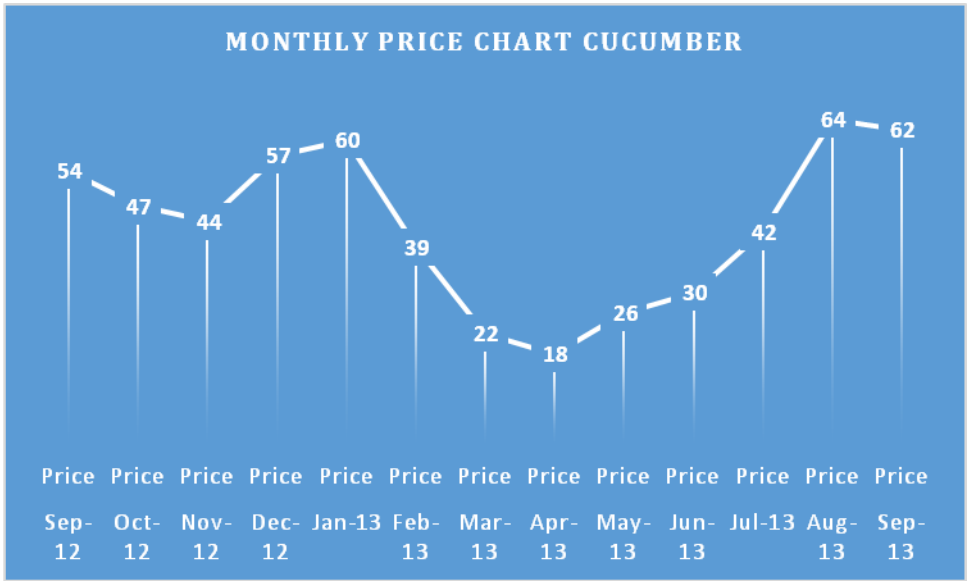
Table #3: Yearly Retail Quantities and the Amount of Cucumbers Sold.

Year 2009		Year 2010		Year 2011		Year 2012		Year 2013 (Jan ~ Aug 19th)	
Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold
19,331	800,533	54,061	2,303,283	92,445	3,481,544	72,723	3,053,729	60,112	1,954,573

Source. Shahid Hussain and Laurent Nazet. MAF-Hyperstar

From table 3 it is quite clear that there was a maximum amount of cucumbers sold at the same location in the year 2011, comparing the past four years (2009-2012). The management of the retail location could not give more details for the increase in the sales for that year and decrease in the amount sold the year after. This can be an anomaly but the sales in the first eight months of 2013 show strong numbers as more than 60 MTs have been already sold.

Graph #6: Monthly Price Graph for Cucumbers



Source. Shahid Hussain and Laurent Nazet. MAF-Hyperstar

It is interesting to watch the monthly consumer demand and the retail sales graph over a period of the past twelve months. It is obvious that there is a market glut when the product is available from the conventional fields. We can even see the retail prices as low as Rs. 18 per kilogram of cucumber. There is a market spike in the retail market when the product is coming from the tunnels in the months of December and January. Similarly there is a price hike in the months of August and September. These four months are the most ideal months for the production of cucumber as there is a higher market demand and lower supplies. The window of this variation should be utilized by the producers for maximizing their profitability.

The interviews and the stakeholders' workshop clearly demonstrated that this is an important crop and the market shows a trend for the growth and opportunities for development. Cucumber is a widely consumed crop in domestic and commercial uses as a fresh product. Cucumbers have relatively short life and are consumed within days of the harvest. The export market is still undocumented and looks small according to what was expressed during our stakeholders' workshop.

Last year cucumber was one of the vegetables which were exported to India. There is a potential for the export of this crop if there are any contracts developed for market linkages between the buyers and the producers. Pakistan is among the largest exporters of the hybrid cucumber seeds in the world as Shadi farms exported 1.2 MTs of seed to the European market in 2012.[10]

[10] Mian Shaukat, Mamoon Kanjan

V. Tomatoes

Tomatoes are grown at different places during different time of the year. Pakistan is blessed with a vast land and varying climates at any given time of the year. This helps the traders to source tomatoes from different parts of the country at different times. When the tomato season is off in Punjab, it is supplied by Baluchistan and KPK, after the season is over there Sind starts producing tomatoes. So we can find tomatoes in a domestic market coming from places such as Killa Saifullah in Baluchistan, Wana in tribal areas, Swat in KPK, Badin in Sindh, Burewala in Vehari or Lodhran district. The transportation charges from these places to the markets have a bearing on tomato prices for the end user

The open field cycle of production starts from Badin, Hyderabad and moves to Dera Ghazi Khan, Lodhran, Vehari, Khanewal, Toba Tek Singh, Pakpattan, Sahiwal, Faisalabad, Kasur, Lahore, Chiniot, Gujranwala, Narowal and to Khyber Pakhtun Khawa. On the parallel sowing pattern we have major production in Baluchistan and Gilgit Baltistan. Tomato cultivars are much sensitive to hot climate and this is one of the major limitations in optimum production of summer tomato crop in plains of Pakistan.

Major tunnel farming of tomatoes is done in the Districts of Khanewal, Vehari, Pakpattan, Sahiwal, Toba Tek Singh, Chiniot and Gujranwala. Majority of the varieties in the tunnel farming are the hybrid varieties and have higher production as compared to the local varieties.

In Pakistan there are two tomato crops one in the plains and the second in hilly areas. In plains tomato is grown in mild winter season while in hilly areas it is grown in summer season due to availability of mild temperature. The third crop is the one produced under tunnels.

Province of Baluchistan produces 40 per cent of the total national yield, Khyber Pakhtun Khawa 30 per cent, while Punjab and Sindh combined produce the rest. Punjab's production is on the rise due to the increased use of the tunnel farming.

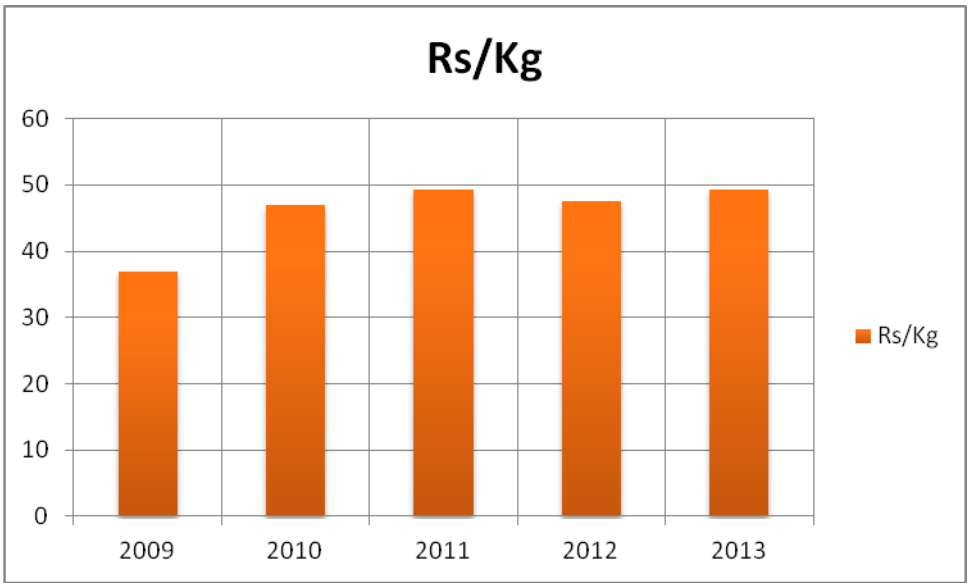
Pakistan grows Tomatoes in all seasons of the year helped by varying climatic conditions. Its early sowing takes place in August/September. Nursery for another sowing is prepared in September which is transplanted in October. The plants produce fruits from December to late January. The main crop season is in mid-November when the nursery is prepared. The saplings are planted in February and the crop gets ready in abundance by May and June.

Still very little efforts have been made on the improvement of tomato. Very few local varieties are available for cultivation and most of them are selections from introduced seed and absolutely no local hybrid variety have been brought to the market even though we have few government research and development facilities working in this field.

The average per acre yield of tomato in Pakistan is very low when compared to its yield in neighboring India and China which combined account for more than 25 per cent of the world production. To obtain high yield of the tomatoes better crop husbandry practices need to be emphasized.. On average the tunnel farmers take production of up to 2,000 bags of 10-11 Kg . Tomato nursery is planted in the month of October and the saplings are transplanted in the first week of November. The crop is harvested till the end of March.

Tomatoes are highly perishable vegetable, have a limited storage life and can be kept stored only for a short period of 7-10 days. The problem is further compounded by lack of cool chain system. Tomatoes can be preserved by canning, drying, freezing, or pickling. Majority of the tomatoes are picked at the semi ripe stage to increase the shelf life. Most of the product is stored at 1.1-2.2 °C and relatively low humidity. Most of the cold storages are not equipped with having various temperature zones and the tomatoes are ended up being stored with other products with different requirements for temperature and humidity.

Graph #7: Average Yearly Retail Prices of Tomatoes



Source: Hyperstar

When we study the retail data we can see an upward trend in the retail prices for this crop, the price of tomatoes jump from 2009-2010, but have been stable in the range of Rs. 45 to Rs. 49 per Kg ever since.

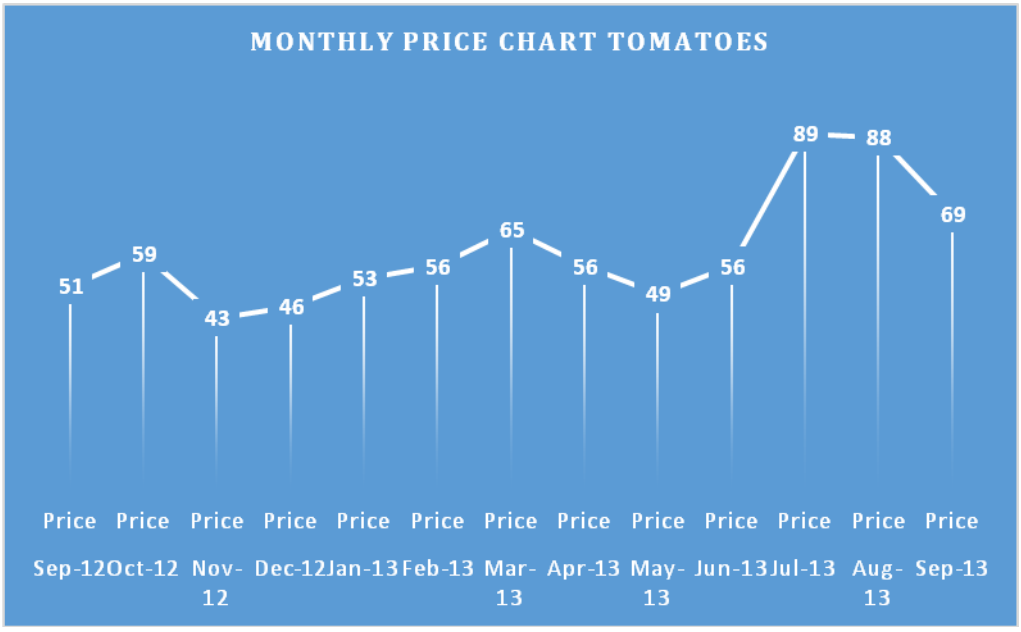
Table #4: Yearly Quantities and Amount of Tomatoes Sold at Retail Store.

Year 2009		Year 2010		Year 2011		Year 2012		Year 2013 (Jan ~ Aug 19th)	
Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold	Qty in Kg	Amount Sold
46,000	1,700,000	120,530	5,669,003	156,466	7,700,980	139,405	6,625,114	119,437	5,879,793

Source: ITC calculations based on UN COMTRADE statistics.

The above table also shows that the amount of the tomatoes sold at the same location in the three years between 2010 through the year 2012 has been quite close to each other. This shows a matured sector as the demand for the tomatoes is stable with a stable supply available for the market.

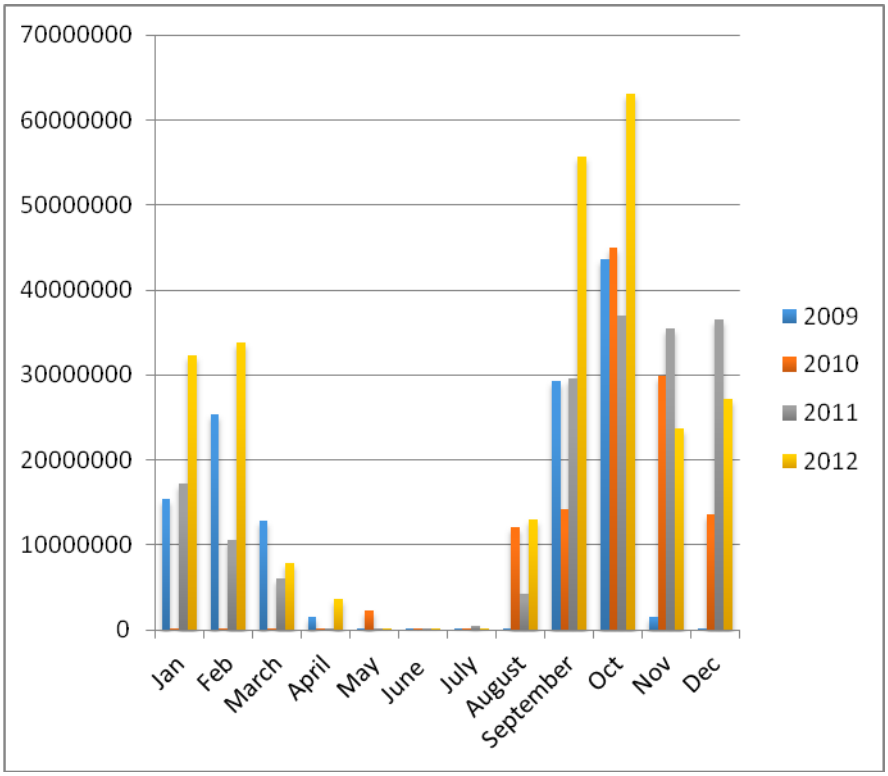
Graph #8: Monthly Retail Price Graph for Tomatoes



Source: Hyperstar

The above price graph number 4 of the tomatoes for one year shows us that there is not a big difference in the prices of the tunnel produced tomato as compared to the conventionally produced tomato in Pakistan. This validates the frustration of the stakeholders in the workshop that there is an unfair practice adopted by the government of Pakistan to open the Eastern borders to flood the market with tomatoes when the high value tunnel crop is harvested for sales in Pakistan.

Graph # 9: Monthly Imports of Tomatoes (Kgs)

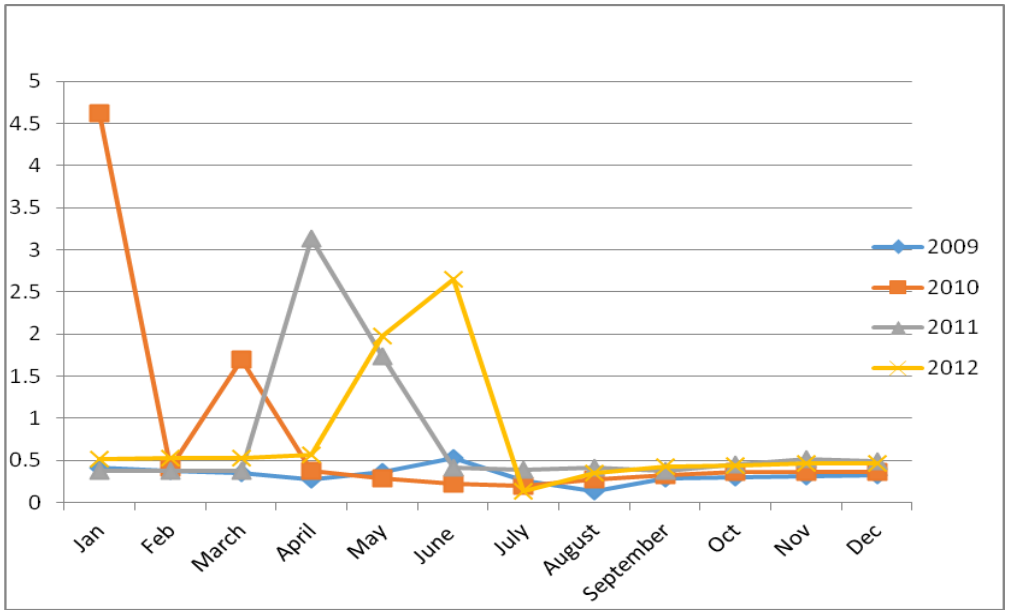


Source: ITC based on UN Comtrade Data

Graph number eight shows the monthly imports. We can see a jump in the months of the September and October. This gives an incentive to the local farmers to grow more product in these months to make higher profits at least to the level of the imports. These numbers are showing the imports primarily from India.

April, May, June and July have no imports. This is the time of the year when the local produce is in the market from many areas. This is also the best time for the product purchases by majority of the value addition facilities. There are examples of many farmers dumping the product along the side of the road as the sales do not cover even the price of transportation

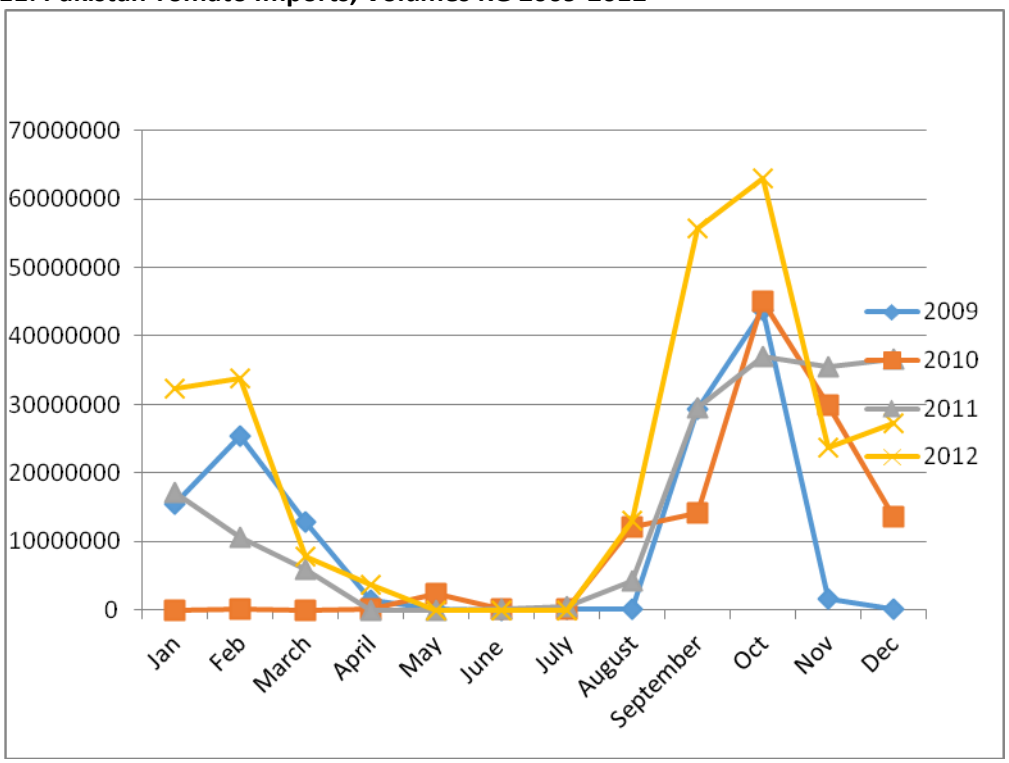
Graph #10: Pakistan Tomato Imports, USD per Kg 2009-2012



Source: ITC based on UN Comtrade Data

On the other hand the Graph number nine shows that the best time to grow more tomatoes for the domestic market is the months of January, March, April and June for commanding the highest prices.

Graph #11: Pakistan Tomato Imports, Volumes KG 2009-2012



Source: ITC based on UN Comtrade Data

Graph number 10 gives us a view that the largest amount of the imports is in the months of February, September, October and November. This also gives incentive to the farmers to grow more product under better temperature controlled units.

The top three graphs have some anomalies in data as we can see that there are few months where the import prices are above $2.5 to $4.5 per Kg. and we know that the tomatoes have never been sold at prices as high as these in the retail market. Even then it is an interesting data to study as it gives information about the lean and heavy import periods along with the selling prices.

This gives an opportunity to Pakistani producers to produce more during the heavy import periods and go for the better market

VI. Squash

Cucurbita (Latin for gourd) is a genus in the gourd family Cucurbitaceae native to and originally cultivated in the Andes and Mesoamerica. They were brought to Europe after the discovery of America and are now used in many parts of the world. The plants (referred to as *squash* or *pumpkin*, depending on variety and local parlance), are grown for their edible fruits and seeds. There are five domesticated species: Cucurbita Argyrosperma, C. Ficifolia, C. maxima, C. Moschata and C. Pepo. C. pepo includes varieties of both winter squash and summer squash, and *C. moschata* may be used as winter squash because the full-grown fruits can be stored for months.

Most species are vines, grow several meters in length, and have yellow or orange flowers. The *Cucurbita* genus is an important source of human food and is also used for other purposes such as beverages, medicine, oil, and detergent. Most *Cucurbita* species, are climbing annual (mesophytes) vines while the perennials (xerophytes) grow in tropical zones. The plant stem can grow five to fifteen meters and produces tendrils that help it climb adjacent plants and structures or along the ground. The morphological differences in the species *C. pepo* are so vast that its various subspecies and cultivars have been misidentified as totally separate species.[11]

In Pakistan, there are various varieties under this category such as zucchini (desi, marrow, green, yellow, bottle gourd, ridge gourd, sponge gourd, pumpkin (hybrid, paitha, halwa, white), Tinda and Kadu, are the most popular ones. All of these varieties are grown in conventional fields and the tunnel farms. Most of the tunnel crops are planted in October and November. There is not any geographical area for this crop as it is grown all over Pakistan and consumed all over the country. There is a major trend with the sugarcane and the cotton farmers for the past few years for growing the squashes as intercropping. This gives two crops at the same time without hurting the yields of the primary crop. If the price is right due to the prevailing demand conditions, the farmers can make more money from the vegetable than the main cash crop.[12]

The data for squash was the most problematic as none of the sources could confirm the validity of the numbers. We have the data from the UN Comtrade statistics for all the gourds, pumpkins and squashes but Pakistan is not listed in any of those numbers. Similarly the other domestic sources did not had reliable data. The local market committee data also aggregated it as one category for all of the quashes and still does not reflect what has sold that day as the data is entered arbitrarily before the end of the week for the records sake.[13]

Major retail and wholesale stakeholders could not give us any breakdown of this category either. The stakeholder's workshop had many inputs for this vegetable as many producers were farming these vegetables in conventional and temperature controlled fields. According to the stakeholders this is a profitable category of the vegetables and is growing every year due to increased demand. When questioned about the demand it was discovered that majority of the product is going to Afghanistan through Peshawar and smaller amounts are flown to the European and the UAE markets. It was also discovered that during the months of January and February a lot of squash is going to the CIS through Afghan route in regular trucks as the temperatures are almost freezing in the north. There are few Uzbek traders living in Pakistan dealing in these commodities directly with the farmers. They even purchase the standing crop and harvest the crop themselves for further

[11] Dr. Zafar Altaf
[12] Parvez Gondal, Nilibar Agriculture Association
[13] Haji Ashiq. Commission Agent, Grower, Wholesaler, exporter

transporting it to the CIS. In the year 2012 there were also exports to India but the quantities could not be confirmed by any government regulatory body.

The domestic market has a good demand for the squashes as explained by the manager of the Hyperstar. The major constraints for this vegetable are the harvesting and the transportation. Due to very sensitive skin, there are more chances for higher losses. Even slight skin bruises to this produce, spoils it in a relatively short time. There are exceptions such as the pumpkins with thick skin which can withstand local transportation methods.

Talking to various stakeholders from the production to the export sectors it is quite obvious that this is a growing sector and more acres are being planted every year even though the cost of production is higher for this vegetable as compared to the others. To compare the cost of production, the better grade imported hybrid seeds for one acre, cost over Rs. 50,000 for better selling varieties. Generally the retail prices observed in various retail stores showed that the prices for squash and gourds are comparatively higher than few other vegetables, compared.

Better records and market information can not only help the growth of this crop but also the whole sector[14].

[14] Mian Sajjid, Mailsi

VII. Cross Cutting Constraints to HVOSV Farming

The multiple interviews conducted revealed a set of constraints common to all high-value vegetable farming. These are explained in the paragraphs below.

During stakeholders' review and interviews of various producers, wholesalers, brokers, exporters and government officials, logistics was one of the common constraints for the high value, off season vegetables. Due to the nature of high perish ability of these produce, they have to be delivered to the consumers at the shortest possible time. Even though there are other constraints such as the harvesting and the post harvesting issues, the product has to be kept in the cool chain after the removal of the field heat. Pakistan has a shortage of the cool chain maintained logistics and comparatively expensive due to the demand. We have seen that the majority of the product is moving without even reefer containers all year long. This sector is in developmental phase as more companies are demanding reefer vans and containers for the transportation of their high value products. At the end the expenses are transferred to the consumers.

For the export sector there is a major problem with the air cargo. Majority of the goods are moved through the commercial passenger planes in the cargo hull. In most cases this cargo is subject to the availability and there are not any guarantees involved. This limits the exports in getting long term orders from the buyers as they are never 100% sure to deliver the product as promised. Because of this behavior the commercial airlines have a cartel and dictate their own prices. One of the major exporters, Mr. Nawaz Dogar said that if there is a designated air cargo facility available, the exporters will guarantee the air cargo space all year round. There can be a good model for some business such as Frio Aereo in Peru, which is a company created to facilitate air logistics of asparagus. He also mentioned one of the competitors who had purchased the yearly cargo space from an airline in advance, this way he guarantees the delivery of his product and quantity on time and in return commands better prices.

Due to non availability of the data for exact production and the product sold in the domestic markets or the exports to the international markets, it is very hard to justify the basics for the future forecasting for production. The economies of scale cannot be justified as majority of the product shipped by air is all listed under a general HS code referred to as vegetables. Similarly when the product reaches to the other end , due to small amount of the shipped product, it is also put in the similar code and at the end of the year, it is hard to find out any useful data. We tried to back track imports from Pakistan to few countries but could not justify the numbers as the amount shipped was small to be logged as one category. Muhammad Sajjad, a vegetable exporter to the Canadian and the European markets ships vegetables in every possible flight to these countries. Mostly his orders have multiple vegetables, the local and the foreign agencies both log his products under general vegetable category.

On the contrary to the air cargo, we have learnt about a major bulk of the exports through the Afghan border, with further destination to the CIS. Unfortunately this trade is not documented in any system and does not help the sector to improve without proper forecasting for the production of these products.

Proper data is also a constraint in the domestic market. Each mundi has a system to record all the sales for each day. Interestingly, most of the data from this source is also not reliable as most of the vegetables are pushed under one heading or not reported correctly. Daily average prices are recorded but there are no records for the quantities sold. To make a bad situation worse, the retail shops do not have any organized data. One of the major stakeholders in this sector, Mian Shaukat Ali mentioned that getting reliable figures for this sector at any level is harder than Alchemy. He also mentioned that majority of the reported numbers portray only 25% of the trade, in general. More than three fourth of the business is conducted in an informal business manner.

One of the common concern of the high value vegetable farmers was the product dumping from east of the border. According to the stakeholders, the vegetable growers are losing against Indians at the home turf after opening of trade across Wagha border, mainly because their rivals are growing vegetables at much lower cost as they avail subsidies from their government. There are fears that the vegetable sector of Pakistan may further loose and ultimately reach to an unrecoverable stage if not properly taken care of and provided with subsidies, incentives. Ibrahim Mughal of Agri Forum Pakistan Quoting figures compiled by farmers organizations of Pakistan, he said that out of the total Indian exports to Pakistan, around 38 percent are fresh vegetables. According to the official numbers from the state department of India, India exported $1.84 billion worth of products to Pakistan, formally . Stakeholders mentioned that the tunnel acreage had touched 55,000 acres during the last few years. Out of them, over 40,000 acres are in Punjab. Now, the figure has dropped to 30,000 acres in the last two years. An official of Punjab Agriculture department conceded that the acreage of tunnel farming is on the decline. He also admitted that Indian vegetable imports are much cheaper than what they cost to the Pakistani farmers to the point that they have reduced the acreage of the tunnels in the past couple of years.

There are various other priority inputs needed to be implemented for the improvement of the competitiveness of this sector, such as the glut season is inflicting heavy losses to the growers to the point that many of the new farmers do not try to cultivate vegetables again. Higher post-harvest losses and the treatments are also inflicting major losses to the farmers at the end of the day. Most of these factors boil down to better market linkages and means of communication. Lack of the processing industry is a major gap in this sector. Timely assistance of credit is a major gap in the development of this sector for the domestic and the international markets. Proper packaging and quality standards have to be improved for the growth of this sector. Similarly lengthy paperwork and certification programs are a hindrance to the competitiveness of vegetable sector.

VIII. Tunnel Technology

The majority of the vegetables can be cultivated in all seasons, with the induction of a controllable technique like tunnel technology, in which temperature and moisture is controlled for specific growth of vegetables. The production of vegetables all around the year enables the growers to fully utilize their resources and supplement income from vegetable growing as compared to other conventional agricultural crops. As the landholding powers of farmers are decreasing, they need to increase the productivity of their available land, off-season vegetable farming is a measure through which they can attain higher profit margins from the crop.

Benefits from year-round production include year-round income, retention of old customers, gain in new customers, and higher prices at times of the year when other local growers do not have produce. Other potential benefits of season extension technologies are higher yields and better quality. In summers for off season vegetables cultivation high quality indeterminate seed is easily available in markets. This indeterminate seed grows upwards with provided support similar to Pumpkin instead of spreading on ground.

Tunnel farming has increased the production of plants in even smaller areas, which is turned out to be profitable. Small farmers with small cultivating area can get benefits from plastic tunnel farming and can increase their income. In plastic tunnel farming, problems due to less supply of water are alleviating by using drip system irrigation. In addition, with year-round production you can provide extended or year-round employment for skilled employees whom you might otherwise lose to other jobs at the end of the conventional growing season. Disadvantages include no break in the yearly work schedule, increased management demands and higher production costs.

Figure 1: Picture of the Tunnels at Various Stages.

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figures 5 and 6 show the shells of the common tunnels in Pakistan. Majority of the tunnels are built with steel pipes. There are small tunnels also made of bamboo sticks and they are covered with plastic sheet to save the crop from extreme winter. Figures 2 and 3 show the tall tunnels and the medium height tunnels covered with plastic. Figure 1 shows the farmers getting the nursery ready for planting of tomatoes. Also in figure 4 we can see the last days of the bitter gourd crop. This tunnel is used with netting on the top with as we can see the bitter gourd planted out of the tunnels.

Figure 7

Figure 8

Figure 9

Figures 7 and 9 also show the planted nursery under a shade to be planted in the tunnels and in the figure 8 we can see a farm worker resting under a tree during the irrigation of a crop.

IX. Conclusions and Recommendations

Vegetables are a primary part of human diet and are consumed in many forms. In Pakistan there is hardly a day in a household rich or poor, meal without a vegetable dish. With the increase in the population the demand is on a rise for all consumer products including the vegetables. The best remedy to coup with the food security is to increase competitiveness of each sector which is based upon higher productions with lower inputs. One of the mechanisms for higher productivity and increased overall availability of the vegetables is the temperature controlled farming of these products. This is most of the times done under various sizes of low cost plastic covered tunnels or high cost-high tech, controlled green houses.

Majority of the Pakistani vegetable farmers have knowledge and are equipped to grow various vegetables in tunnels. There are few world class Global Gap Certified farmers with similar production levels as some of the top producing countries.[15]

During the stakeholders' workshop and other one on one interviews conducted, it was discussed by various links of this sector that there is a great demand for this product in the domestic and for the export markets. Following topics were part of the concluding information along with the recommendations for this integral sector.

Crop Husbandry:
Majority of the produce grown at the progressive farms is the same as at any other farm in the world but the overall produce is not in line with the international standards and internationally demanded varieties. Dedicated research organizations to develop varieties that best meet the needs of the global market are not there. Any work done by agricultural research organizations has not reached the farmers due to weak extension services and absence of any coordination between the entities.

This can also be linked directly to the combination of the price insecurity, resulting from the absence of the contract farming including, buy back agreement, advance sales and grade of the seeds. Most of the progressive farmers have better yields due to better crop husbandry practices.

Contract Farming:
Since the highly perishable nature of these products, it is very imperative for the producers to make sure that their product is sold before it is harvested. For this, the only way is the pre-sold product before the seeds go into the ground. It is a global phenomenon for more perishable products as everyone in this value chain knows that longer the shelf life, lower the risks and more profits. We can see from the example of the Quincy Farms in the US, where every piece of vegetable is grown after a contract between the retailers and the producer. This ensures the preferences of the consumers are translated to the producers, what they want and when they want. There is a free flow of the information between all actors of the value chain supporting the flow of the orders.

It suggests farmers to produce a commodity in certain quantity and supply it to the market at certain time. A similar system is adopted by big chain stores that calculate their demands and enter into

[15] Mian Shaukat Ali, Mamoon Kanjan

supply contracts with farmers. Few corporate consumers of agriculture commodities have adopted this method of Contract Farming in Pakistan as well.

As discussed with the management from the Hyperstar, Metro and the Alfateh stores, they were all interested in working with a farmer association directly, if any major organization is working with them for their capacity building.

Cooperative farming:
Farmers Association is a popular option for this kind of more perishable crops. It can help small farmers act as a bigger and more organized market force resulting not only in better supply and demand coordination but it can also influence matters related to pricing of their produce. But the legal space for the cooperatives has to be defined appropriately by the State. Moreover, a cooperative, though an economic organization, has to defy a number of social, ethnic and caste taboos to come into effective and productive existence.

Credit and Finance Issues:
Since there is very large number of small horticulture farmers, a major segment is deprived of agricultural credit. Lack of credit for farming inputs and better Credit system for farmers is such that it does not cater to the needs of small farmers. This fallacy of credit system forces small farmers to under-invest in farming inputs like pesticides and fertilizers that leads to lower yields and poor quality.

Due to financial constraints, the farmers are often forced to sell their produce in advance to the middlemen. The price that they get is much lower than the price at which a middleman sells the produce in turn.

Similarly export financing is not available, as banks often hesitate in financing this trade as being highly perishable in nature. It is recommended that finance facilities may be provided to small farmers and exporters who are engaged in exports.

Harvest & Post Harvest:
Combination of agronomic practices, product variety characteristics, grading, processing and packaging can be defined as quality. The absence of even a single factor makes the product inferior in quality and thus less acceptable in international and high end local markets.

According to the statistics compiled by the Ministry of Food and Agriculture, because of lack of post-production care, the loss of the yield suffered by growers amounts to almost one-third of the total yield.

Storage:
Almost all related products are highly perishable in nature and have a very limited shelf life. They cannot be stored for a longer period unless they are properly harvested and kept in a temperature-controlled environment, cold storage. Adequate cold storage facilities are not available in the country that results in very high post -harvest losses ranging from 25 to 30 per cent.

Due to highly skewed production resulting from seasonality and perishability of produce, the exporter has very limited time to ship his products. He is forced to export whatever is available and within the limited time span. The exporters cannot adopt better marketing practices unless cold

storage infrastructure is available to enhance the shelf life and varieties are developed which are suited for exports. So in the end Pakistan is a price taker rather price maker.

The cold storage facilities in Pakistan are not sufficient to manage the crops when harvested and this at the end creates a glut in the market. Growers cannot store their output and processors can process only the amount which can be exported right away.

Transportation:
The limited cold storage facilities available are not integrated with proper refrigerated transportation network. Lack of cold storage facilities near production areas, air and seaports result in enormous post harvest losses. Lack of storage and transportation infrastructure result in about 30 per cent post harvest losses which shrink supplies and put pressure on prices as lost quantities never reach consumers. The prevention of such losses can provide surplus for exports.

Pakistan International Airlines provides cargo space in its passenger planes and is not operating dedicated freighter plane flights. Due to highly perishable nature, high value vegetables can only be exported by air. So exports of perishable products with very little shelf life cannot be increased unless additional cargo space is provided.

Limited Inland transportation is available with temperature controlled environment. Pakistan Railways is not providing any facility at all for inland transportation of refrigerated containers. PR is considered as a cheaper source for providing service for inland transportation of refrigerated containers as they have flat- bed rolling stock and need to invest only in generators. Fruits and vegetable export companies involved in the business in Pakistan are mostly family run small concerns.

Leasing facility may be provided to exporters who will establish cold storage houses near clusters of production. Refrigerated vehicles on long term lease are also recommended to strengthen transport network from clusters to air/seaport. These facilities should also be close to the airports to preserve freshness of the products.

Market Linkages:
One of the major issues behind the plight the producers is the absolute lack of coordination between the demand and the supply side actors of the value chain. Less resourced and unorganized producers scattered all over the country have no clue about the correct demand of the product, knowledge of the consumer taste, market information and other basic trade dynamics. This results in a cycle of gluts followed by shortages. Ideally, there should be a free flow of the information from the consumer to all the way to the producer and a hassle free flow of the product to the consumer according to his demand.

This scenario provides a profitable opportunity for all the stakeholders except the producer. A glut is sure to ruin farmers but it does not bother consumers who buy it cheap and consume more or shopkeepers, wholesalers or distributors who sell it at low price and in greater quantities to get higher profits.
We recommend exploring options to link producers to those high-value markets. Additionally, in the context of these linkages, solutions to the other constraints identified in these report could be facilitated. There should also be some capacity building and linkages for the exporters as they often compromise on quality and price in order to grab market share from other exporters operating in

the same limited markets. At the end of the deal, they are the price takers rather price maker. Majority of these exporters are engaging in spot deals with no long term linkages.

Value Addition:
Pakistan lacks the value addition sector for the vegetables. During the glut season the vegetables should go for the options to increase the shelf life. One of the major value chain actors in this sector, Mitchell's Foods explained the opportunity in this sector. They mentioned that their company has entered into major contract farming programs to supply them produce for value addition.

There are no laid down procedures for standardization and quality specifications. In the absence of brand names, the importer is not sure of the quality he will be getting that prevents the better quality to fetch a higher price in the international market. We need to promote sensible GAP standards and full traceability.

Standards:
Internationally accepted standards for farms, packing and processing are required to be competitive in domestic and the global markets. These standards have to be economically justified in order to providing value for the work done. We have seen various donor agencies spending millions on certifications but there was no value generated. We need to establish unified Pakistan GAP standards with a broader based capacity built of the producers at justified costs.

Institutional Support:
We need to have a functional body the high value vegetable producers which can work in addressing the common issues of this sector. Apart from the training of the producers for higher production, the association should also promote education and capacity building in crop husbandry from nursery growing till harvesting. The association should be instrumental in developing linkages for the sale of the products domestically and globally.

ASF should consider supporting appropriate data collection efforts on markets and prices through an existing organization or an emerging High-Value Association. Even an individual collecting data daily from 5 retailers and inputting them on a spreadsheet can be of big help, it doesn't need to be a huge effort to improve the situation. Better records and market information can not only help the growth of this crop but also the whole sector.

Over all we can see from the sales graphs and the supply information from this report that for all of the vegetables under study, there is a market demand during the winter months. The stakeholders' survey also suggested that the higher exports were noted during these months to the north to the CIS through Afghanistan. This clearly shows that the potential is high. The only negative behavior noted was during the meeting with the Punjab Government officials, it was mentioned that due to the cheaper imports from India, many tunnel farmers have ceased their operations due to unjustifiable financial returns.

Support for an air logistics service should be considered as the example has been provided from the Central America. A dedicated air cargo service can make a big impact on the agricultural exports

from Pakistan. This can support not only vegetables but also mangoes during summer along with other products. Exports of meat alone can utilize an independent cargo plane all year long.[16]

[16] Muhammad Nawaz Dogar. Abdeen Abattoir, Lahore.

Annex-A: Sources, Detailed List of Interviews/Workshops

Sr. #	Organization	Name &Title	Contact
	Ammiza Logistics and Warehousing	Khalil Ahmad Manager, Projects-Cold Chain	423.751.6311 Khalil.ahmad@raaziq.com.pk
	Badami Bagh Fruit & Vegi Market	Various dealers	
	Chemonics	Muhammad Junaid Senior Technical Advisor	300.456.2738 mjunaid@chemonics.com
	Dairy & Rural Development Foundation	Jacob Moser Chief of Party	423.111.637853
	DuPont Pioneer USA	Dr. Asif Ali Shah	423.530.0247
	Farmall	Mian Asif Shareef	423.532.2205
	Farmers Associates Pakistan	Malik Afaq Tiwana Managing Director	346.515.8417 atiwana@hotmail.com
	Farmers Associates Pakistan	Dr. Mohammed Tariq Bucha President	300.844.1100 buchatariq@gmail.com
	Farmers Associates Pakistan	Maqsood Jatt Okara District Governor	333.698.2641 344.681.4406
	Freshpack	Shamoon Sadiq	
	Ghausia International	Muhammad Shabir Chief Executive	423.588.0342
	Ghausia International	Nisar Ahmed Manager Exports	423.588.0342
	Government of Punjab	Ch. Muhammad Arshad Jatt Special Assistant to Chief Minister	429.920.0669 Arshad163@hotmail.com
	Government of Punjab	Muhammad Asif Khan DG Fruits and Vegetables	429.922.3454 300.635.8950
	Government of Punjab	Dr. Farrukh Javed Minister Agriculture	429.920.3325
	Government of Punjab`	Muhammad Rafiq Akhtar DG Information	423.920.0731
	Haji Sona		
	Hunza Seeda	Azhar Bhatti	423.573.1281
	Hyperstar	Shahid Hussain Merchandise Manager Market	423.662.3344 shhussain@hyperstar.pk
	Kahna Fruit & Vegetable Market	Various vendors, packers, exporters	
	Large Tunnel Farmer	Khalid Sindhu Owner Kamalia	301.729.2400
	Large Tunnel Farmer	Professor Allah Dita Gujranwala	333.629.9689
	Metro	Sagar Mahmood Khan Sr. Manager QA	423.750.9634 Sagar.mahmood@metro.pk
	Metro	Hamid Hussain Khan Director Foods	423.750.8000 Hamid.hussain@metro.pk
	Metro	Bouzeneth Benaouda Managing Director	423.750.9789 Bouzeneth.benaouda@metro.pk

	Metro	Pervaiz Akhtar Director Corporate Affairs	423.750.9635 Pervaiz.akhtar@metro.pk
	Mitchell's	Mujeeb Rashid Managing Director/CEO	423.587.2392 mujeeb@mitchells.com.pk
	Nilibar Agriculture Association	Chaudhary Muhammad Ali Vice President	307.699.9102
	Nilibar Agriculture Association	Parvez Gondal Coordinator	332.558.1092
	Pak Turk Business Association	Mehmet Kiratas Business Consular	321.707.9048
	PLDDB	Col. Arshad Head of Sialge	322.888.0093
	Potato Growers Association of Pakistan	Dr. Afzal Haider Rizvi President	300.844.1132 Afzaal2020@yahoo.com
	Punjab Chamber of Agriculture	Chaudhary Nasir Cheema	300.864.2426
	Punjab Chamber of Agriculture	Ch. Tanveer Ahmed	300.945.6246
	Punjab Halal Development Agency	Justice (R) Khalil-ur-Rehman Khan Chairman	423.637.0661 justicekhalil@phda.com.pk
	Punjab Potato Growers Association	Dr. Haider Rizvi President	
	Raaziq International	Asif Zia Khan Manager, Air Export/Airfreight Division	421.117.22947 Asif.raaziq.com.pk
	Rainbow Enterprises	Sheikh Shoaib CEO	300.841.6423
	Sajjad Packing and Exports	Sajjad Hussain Owner	333.425.2965
	Shadi Farms Yuksel Seeds	Mian Shaukat Ali CEO	03454111141 mianshadi@yahoo.com
	Tunnel Farmer	Qazi Naeem Ullah	321.615.5214
	Tunnel Farmer	Tahir Iqbal Large Farmer in Shorekot	321.676.1033 333.676.1033
	Vegetable & Fruit Cooperative	Ch. Manzoor Ahmed	300.840.2987
	Vegetable Nursery Farmer	Jaan Muhammad	344.712.9704
	Vegetable Seed Provider	Waseem Hassan Arifwala	300.875.1547
	F.A. International All Pakistan Fruits and Vege Exporters Assn.	Aslam Pakhali Owner Vice Chairman,	300.825.9125 www.fafruits.com
	Vegetable Wholesaler	Zeeshan Mujahid	323.445.7731
	Chase International	Abdul Wahid CEO	324.256.8804 wahid@chase.com.pk
	Roshan Enterprises	Saadat	
	Haji Ashiq and Brothers	Haji Ashiq	300.699.1711
	Vege Exporter Tasco	Karachi	213.432.2255 www.tasco.com.pk
	Vege Exporter	Umer Sajjad. Gujranwala	321.321.6466

	Producer	Sajjad Kahloon	
	Producer	Ibrar Hussain	
	Producer	Dr. Shafiq	
	Ex. PARC Chair	Dr. Zafar Altaf	
	PARC	Dr. Sher Muhammad	
	PARC	Hamida Masood Shah	
	PARC Chair	Dr. Sharif Kallu	
	Sun Gold	Shahid Sultan, CEO	
	Sunny International	Rizwan	300.859.0723 info@sunnyinternational.com.pk
	Tunnel Farmer	Qazi Naeem Ulah	321.615.5214
	Tunnel Farmer	Tahir Iqbal	321.676.1033
	Tunnel Farmer	Professor Allah Ditta	321.644.0721 334.550.7979
	Tunnel Farmer	Najeeb Ullah	344.786.0786
	Zaheer Model Farm	Mian Tanveer	300.877.2291
	Farmer	Hafiz Jehanzeb	300.688.7522 333.965.5550
	Farmer	Haq Nawaz Sargana Rajana	345.757.7481

List of Farmers from Mailsi, Vehari Region with average acres planted:

Name	Mobile #	Residence	Cucumber	Bitter Gourd	Melon	Capsicum	Watermelon	Pumpkin	Tomato	Egg Plant
Mian Mohammad Arshad	03007734085	Arain Wahen	4	4						
Mian Akhatr	03007313872	Arain Wahen		1.5				1		
Mian Tariq		Arain Wahen	6	2			4			
Mian Khadim Hussain	03007738678	Arain Wahen	5	7	3			1		
Rao Abdul Waheed	03007728599	Arain Wahen	2	5			6			
Haji Iftikhar	03016587621	Arain Wahen	2	1	2			1		
Mian Awais	03007809494	Arain Wahen	4	4	3		2			
Mohammad Ayaz	03087139521	Arain Wahen	6	7		3		1	2	1

Haji Valiyat Hussain	0300 2292042	Ahmad Wala Mailsi	2	4						
Mian Zahid	0300 7722223	Ahmad Wala Mailsi	1							
Mohammad Nawaz	0333 6258239	Arain Wahen		2						
Mian Mohammad Aslam	0301 8730906	Arain Wahen	15	5	5					
Mian Mohammad Mushtaq	0300 7731155	Arain Wahen	18	5	10	3				
Mian Aslam+Mian Mushtaq		Arain Wahen	16	25	50					
Abdul Lateef Khan	0342 7293161	Jalla Jeim	3	2						
Rana Mumtaz Sahib	0301 2362848	Arain Wahen		2						
Mian Mehtab Hussain	0300 8670985	Arain Wahen	60	6	150	10				
Mian Adnan	0301 7502505	Arain Wahen	10	1	10					
Mian Asim	0301 4669584	Gareeb-a-Baad	2	1						
Mian Shoaib	0302 7810590	Arain Wahen	8	5	5					
Mian Abbass	0301 6573958	Arain Wahen	4	10						
Mian Shahbaz	0300 2030537	Arain Wahen	5	5	5					
Mian Suhaib Qazi	0300 3963999	Arain Wahen	5	4						
Mohammad Shehzad	0307 7808559	Arain Wahen	6	3						
Mumtaz Hussain Mukkal	0300 7742651	Arain Wahen		1				1		

Abdur Rehman Sheikh	0300 7733063	Gareeb-a-Baad		1				1		
Mian Akhatr	0304 5497734	Arain Wahen	6	5						
Haji Talib Hussain	0305 8755081	Arain Wahen	2	7						
Sheikh Mohammad Arshad	0306 4525881	Sheikhan Wala					2			
Shiekh Mohammad Abbass	0307 3207703	Sheikhan Wala		1			1			
Mian Amjad Abbass	0301 7935210	Arain Wahen	10	12					3	
Mian Faraz Sahib	0300 7727758	Arain Wahen	10	5		3				
Dr. Mohammad Asif	0301 7933845	Arain Wahen	4	4						
Mian Sameer	0303 7879710	Arain Wahen	6	4	1					
Mian Hamza		Arain Wahen	2	2						
Dil Mohammad		Arain Wahen	2	2						
Mian Aun		Arain Wahen	1	1						
Mian Yaseen	0302 3574676	Arain Wahen	2	2						
Mian Athar	0301 4567708	Arain Wahen	14	4						
Mian Bilal Qazi	0300 7311880	Arain Wahen	13	3	3					
Professor Abbass	0300 7724022	Arain Wahen	3							
Mumtaz Ahmad Wala	0300 7171807	Ahmad Wala	2							
Mohammad Wasim Ch.	0305 6617990	Arain Wahen	5	3						

Mian Kashif	0300 5049999	Arain Wahen	8	12						
Mian Waqas	0300 199494	Arain Wahen	1	2				1		
Mian Abdur Razzaq	0300 7722664	Arain Wahen	13	6	10	2				
Rao Khaleel Khan		Jalla Jeim	4							
Mian Imran	0301 7459451	Wahgry Wala	4	2	6					
Mian Asif		Wahgry Wala	4	4	10					
Haji Mohammad Yar	0305 7788567	Arain Wahen	4							
Qaisar Abbass	0302 3545340	Arain Wahen		2				1		
Mian Riaz		Wahgry Wala		4	15					
Mian Saeed	0300 7732671	Wahgry Wala	6	4	15					
Mian Mohsin	0333 7741588	Arain Wahen					2			
Mian Muaaz		Arain Wahen					2			
Mian Mazhar	0301 4843475	Arain Wahen		10	5		3			
Haji Nawaz		Arain Wahen					3			
Haji Arif		Arain Wahen					3			
Rao Saleem Khan	0300 2774831	Arain Wahen		2						
Aziz Khan	0300 8353367	Arain Wahen	2							
Mian Nadeem Ahmad	0345 8254444	Kikri Khurd	18							
Shan Agri-Farm	0333 6276644	Saifun Road Mailsi	17		35				10	
Nawaz Khan	0300	Mailsi	10							

Khichi	7332628									

Workshop of the Value Chain Actors in Burewala				November 26, 2013
1	Zafar Iqbal	346.487.6076	439 E.B	Cotton, maize, vegetables
2	Javed Iqbal	334.719.8923	323 E.B	Spinach, Cabbage, Tomatoes, Gourd
3	Muhammad Fiaz	308.458.4159	439 E.B	Turnip, Tomatoes, onion, bitter gourd
4	Malik M. Iqbal Langharial	300.699.1657	445 E.B	Tomatoes, Potatoes, Turnip, Capsicum, Gourds
5	Abid Hanif	302.618.4687	439 E.B	Tomatoes, cabbage, capsicum, gourds, carrots
6	Rana Talib Hussain	301.794.9800	549 E.B	All Vegetables
7	Warris Jatt	346.412.9559	549 E.B	All Vegetables
8	Asghar Ali Jatt	333.628.1995	501 E.B	All crops and vegetables
9	Abdul Ghafoor	301.799.0355	443 E.B	All Crops and vegetables
10	M. Shahid Latif	300.699.3123	Zaheer Nagar	All crops and vegetables
11	M. Idrees	345.713.9185	185 E.B	Tomatoes, gourds, bitter gourds, chilies, cucumber
12	Yaseen	344.729.6027	417 E.B	All fruits and vegetables
13	Ahmad Sher	300.076.7212	313 E.B	tomatoes, gourds, cucumber
14	M. Javed	333.628.1149	471 E.B	Onion, Okra, Cucumber, Capsicum
15	Haji Muhammad Akram	301.659.2631	311 E.B	All fruits and vegetables
16	Abdul Qayyum	300.076.7898	313 E.B	All Fruits and vegetables
17	Rana Hussain	345.814.5572	185 E.B	All vegetables in tunnel and out
18	Ch. Muhammad Ali	332.699.9102	102 E.B	All fruits and Vegetables
19	Maqsood Ahmad Zia	334.717.6569	569 E.B	Egg Plant, Tomatoes, Cucumber

20	Iftikhar Ahmad	346. 695.2475	475 E.B	All Vegetables
21	Asghar Ali		431 E.B	Cucumber, capsicum, chilies
22	Manzoor Ahmad		178 E.B	Bitter gourds, gourds,
23	Abdul Hameed	334.718.3171	305 E.B	All vegetables
24	Mumtaz Ahmad	302.658.0358	305 E.B	All vegetables
25	Azhar Iqbal Bajwa	304.668.0934	313 E.B	Chilies, Okra, Tomatoes
26	Muhammad Rafiq	345.696.8169	169 E.B	All vegetables
27	Muhammad Amin	343.341.0047	118 E.B	Tomatoes, Cucumbers
28	Allah Ditta		263 E.B	All vegetables
29	Amjad Ali Gill	303.714.9281	291 E.B	All crops and vegetables
30	Malik M. Farid Khokhar	306.657.0652	463 E.B Tibba Musa Abad	Various seasonal vegetables






Annex-B: Tomato Data

Table #2.1:. Important Production Areas in Pakistan.

Province	Major Areas	Availability
Punjab	Gujranwala, Nankana Sahib, Muzaffargarh, R Y Khan, Khushab, Bahawalpur, Bahawalnagar, Sheikhupura, Sahiwal, Vehari, Khanewal, Sargodha, Toba Tek Singh	April to July
KPK Kharif	Mardan, Mangora, Swat valley, Hazara, Dir, Mansehra, Haripur, Charsada, Malakand, D.I. Khan	August to November
KPK Rabi	Peshawar, Charsada, Nowshehra, Mangora, Mardan, Malakand, Tank, D.I. Khan.	December
Baluchistan Kharif	Quetta, Loralai, Qila Saif Ullah, Mastung, Khuzdar, Pishin	November to February
Baluchistan Rabi	Bolan, Kharan, Lasbella, Turbat, Sibi	September and October
Sindh	Badin, Hyderabad, Thatha, Karachi, Noshehra Feroze, Nawab Shah, Umerkot, Mirpur Khas	December to April

Table#2.2:#World Exports for Tomatoes.

Exporters 2012	Trade Indicators Tomatoes 0702								
	Value exported in 2012 (USD thousand)	**Trade balance in 2012 (USD thousand)**	**Quantity exported in 2012**	**Quantity Unit**	**Unit value (USD/unit)**	**Annual growth in value between 2008-2012 (%)**	**Annual growth in quantity between 2008-2012 (%)**	**Annual growth in value between 2011-2012 (%)**	**Share in world exports (%)**
World	8021638	-242345	6615100	Tons	1213	4	3	-5	100
Netherlands	1808483	1427667	1018955	Tons	1775	2	0	6	22.5
Mexico	1687803	1655563	1472390	Tons	1146	13	10	-19	21
Spain	1188957	1119745	901648	Tons	1319	-1	0	1	14.8
Morocco	570471	570412	499542	Tons	1142	5	3	5	7.1
Turkey	400804	400703	560430	Tons	715	1	6	-7	5
Pakistan	4164	-110913	9704	Tons	429	72	24	-78	0.1

Source: ITC calculations based on UN COMTRADE statistics.

The above graph explains how Pakistan has only 0.1% share of the global market and there is a huge negative annual growth in the year 2012 as compared to the year 2011.

Table #2.3: Pakistan Yearly Imports, Value 2008-2012 (000 USD)

Exporters	Imported value in 2008	Imported value in 2009	Imported value in 2010	Imported value in 2011	Imported value in 2012
World	21616	43178	41036	77071	115077
India	21051	42626	39868	76179	112635
Afghanistan	529	215	1117	643	2237
Iran	31	322	15	220	189
United Arab Emirates	4	8	30	11	17

Source: ITC calculations based on UN COMTRADE statistics.

Pakistani imports of tomatoes come largely from the Indian Punjab through the Wagha border, the main border crossing between India and Pakistan, located 22 km from Lahore and 32 km from Amritsar, India, along the Grant Trunk Road. Expanded trade is currently the subject of discussions between the two governments and the current Pakistani Government has indicated its commitment to achieve expanded trade relations with India. There are imports from Afghanistan and Iran but still Pakistan's largest import partner is India by far.

Table #2.4: Exporters of tomatoes to Pakistan (Qty MT)

Exporters	2008	2009	2010	2011	2012
	Imported quantity, Tons	**Imported quantity, Tons**	**Imported quantity, Tons**	**Imported quantity, Tons**	**Imported quantity, Tons**
World	72010	130337	115314	171319	247984
India	67380	127622	110862	166576	235259
Afghanistan	4487	1496	4257	4047	11987
Iran (Islamic Republic of)	124	1178	70	617	700

Source: ITC calculations based on UN COMTRADE statistics.

The above graph explains the quantity of tomatoes imported from the top three exporting countries to Pakistan. Almost 95% of Pakistani tomato imports are from India.

Table#2.5: Export value and trade balance to Pakistan.

Exporters to Pakistan	Trade Indicators										
	Import value 2012 (USD 000)	**Trade balance 2012 (USD 000)**	**Share in Pakistan's imports (%)**	**Import qty 2012 MT**	**$/ MT**	**Import growth value 2008-12 (%, p.a.)**	**Import growth qty 2008-12 (%, p.a.)**	**Import growth value 2011-12 (%, p.a.)**	**Ranking of partner countries in world exports**	**Share of partner countries in world exports (%)**	**Total export growth in value of partner countries between 2008-**

											2012 (%, p.a.)
World	115077	-110913	100	247984	464	48	32	49		100	4
India	112635	-112635	97.9	235259	479	48	32	48	14	0.7	20
Afghanistan	2237	1890	1.9	11987	187	49	34	248	51	0	49
Iran	189	-189	0.2	700	270	38	33	-14	64	0	-17

Source: ITC calculations based on UN COMTRADE statistics.

This graph explains a huge negative trade balance between Pakistan and India in the exports of tomatoes in the favor of India.

Table#2.6: Importers of Pakistani tomatoes.

Importers of Pakistani Tomatoes	Trade Indicators											
	Exported value 2012 ($ 000)	**Trade balance 2012 $ 000)**	**Share in Pak exports (%)**	**Export QTY 2012 MT**	**$/ MT**	**Export growth in value 2008-12 (%, p.a.)**	**Export growth in QTY 2008-12 (%, p.a.)**	**Export growth in value 2011-12 (%, p.a.)**	**Rank of partner country in world imports**	**Share of partner country in world imports (%)**	**Total import growth in value of partner countries between 2008-2012 (%, p.a.)**	**Tariff (estimated) faced by Pakistan (%)**
World	4164	-11091	100	9704	42	72	24	-78		100	5	

		3			9							
Afghanistan	4127	1890	99.1	9612	429	93	33	-78	53	0.1	93	10
UAE	20	3	0.5	42	476	-26	-28	-49	23	0.6	48	0
Qatar	12	12	0.3	30	400			140	72	0	20	0
KSA	4	4	0.1	13	308		90	0	38	0.2	13	0
Bahrain	2	2	0	8	250	7	-8	-50	82	0	14	0
Canada									7	3.3	2	7.3
France									5	6.8	0	23.9
Germany									2	16	2	23.9
Netherlands									6	4.6	8	23.9
Russian Federation									3	10.7	10	20.1
Sweden									8	2	1	23.9
United Kingdom									4	7.9	-2	23.9
United States of America									1	23.6	10	1.5
Iran		-189										20
India		-112635							170	0	-60	30

Source: ITC calculations based on UN COMTRADE statistics.

Table#2.7: Importers of Pakistani tomatoes (QTY): Nearly All Exports Go to Afghanistan

Importers	2008	2009	2010	2011	2012
	Exported quantity, Tons	**Exported quantity, Tons**	**Exported quantity, Tons**	**Exported quantity, Tons**	**Exported quantity, Tons**
World	3463	**40682**	5039	**45142**	9704
Afghanistan	2462	40594	2919	44814	9612
United Arab Emirates	351	71	517	181	42
Qatar	0	0	0	26	30
Saudi Arabia	0	0	8	11	13
Bahrain	11	15	0	10	8
Sri Lanka	610	0	1480	75	0
Iran (Islamic Republic of)	28	1	0	0	0
Malaysia	0	0	115	26	0

Source: ITC calculations based on UN COMTRADE statistics.

Almost 99% of the Pakistani exports of the tomatoes go to Afghanistan. Pakistan also exports small quantities of tomatoes to the GCC market, especially the UAE. Still Pakistan is a net importer of this commodity. Although exports fluctuate considerably, the overall trend has been up, growing from only 3,463 tons exported in 2008 to 9,704 tons in 2012 in non-peak years and rising to 40,682 tons in 2009 and 45,142 tons in 2011. The annual average growth rate from 2008-2012 was 24% in value, although mainly to Afghanistan.

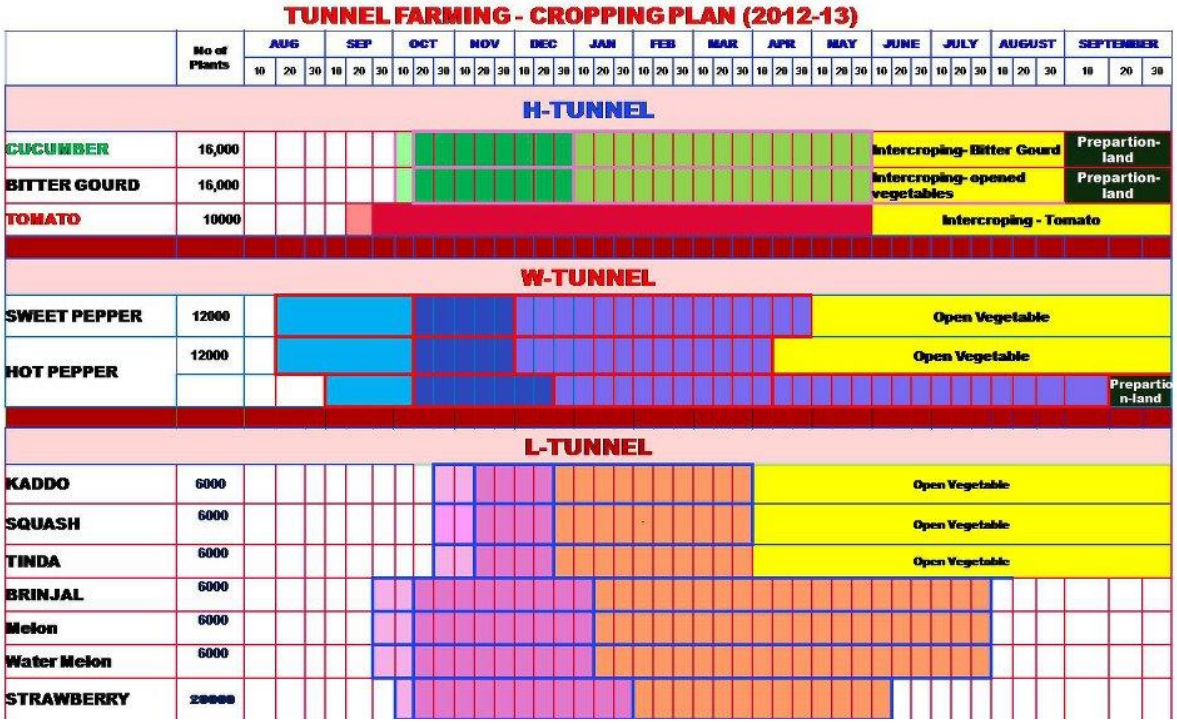
On the other hand, imports have outpaced export growth over the last 5 years, and do not follow the erratic pattern of exports. Over the 2008-2012, they have grown 48% in terms of value and 32% in terms of volume, reaching nearly 250,000 tons in 2012. Imports come mainly from India (97.9%). This would indicate significant opportunities for Pakistani producers to fill the seasonal gaps with local production, using technologies such as polyethylene tunnels and greenhouses, subject to more rigorous cost-benefit analysis.

Table #2.8: Top Producers of Tomatoes (MT)

Rank	Country	Production (MT)
1	China	48,572,921
2	India	16,826,000
3	United States	12,526,070
4	Turkey	11,003,433
5	Egypt	8,105,263
6	Iran	6,824,298
7	Italy	5,950,215
8	Brazil	4,416,652
9	Spain	3,864,120
10	Uzbekistan	2,585,000

Source: ITC calculations based on UN COMTRADE statistics

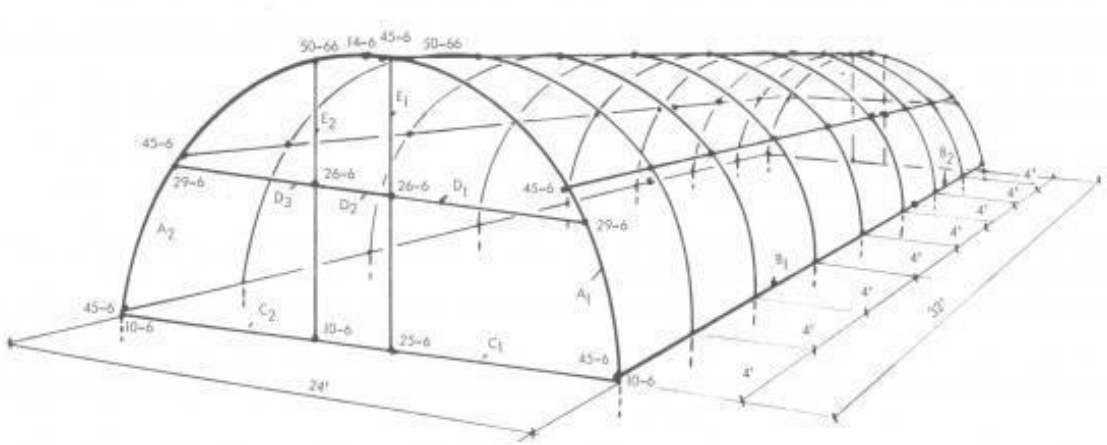
Annex-C: Tunnel Farming Cropping Plan (2012-2013)



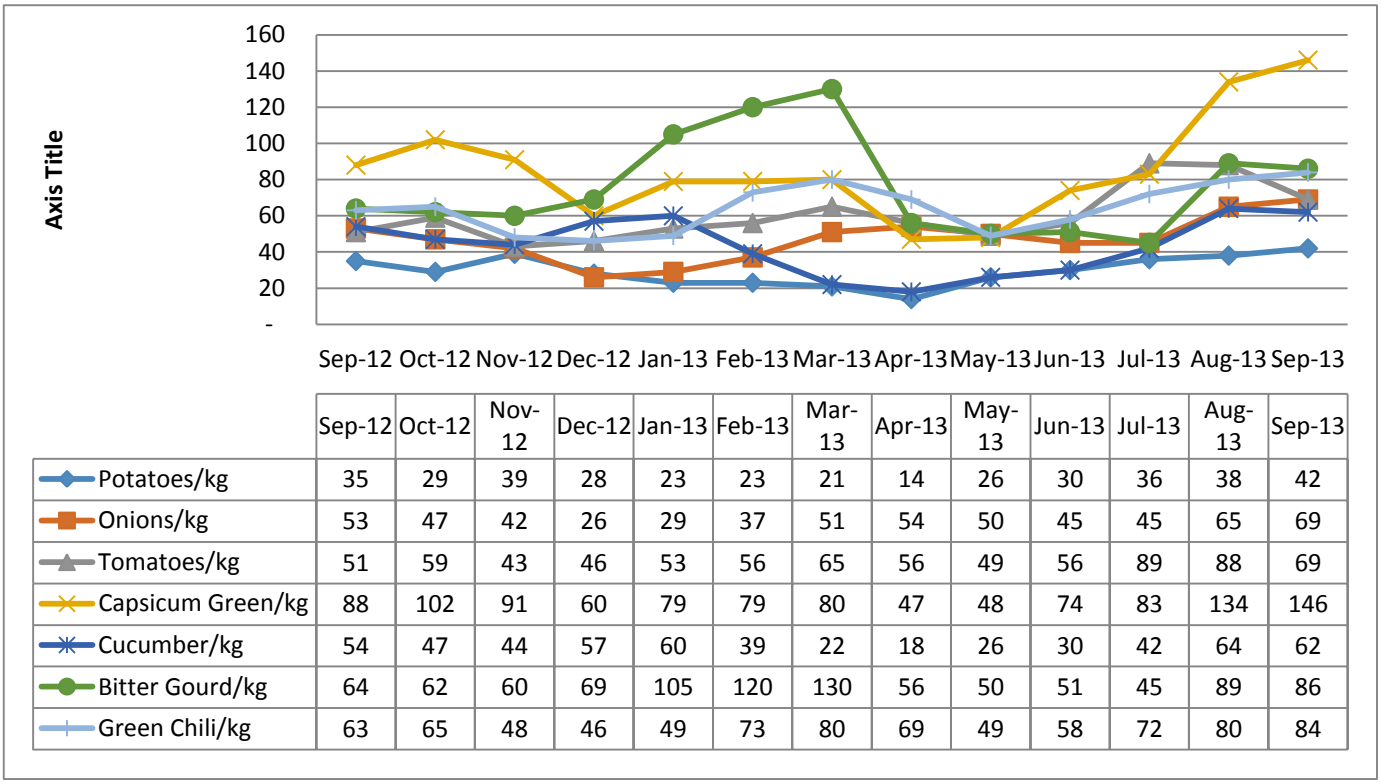
Annex-D: Vegetable Varieties and Harvesting Times

Product	Variety	Pics	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Bitter Gourd	Faisalabad Long, Pali, Prachi					■	■	■	■	■	■	■	■	
Bottle Gourd	Faisalabad Round					■	■	■	■	■	■	■	■	
Brinjal	Dilnasheen, Bimissal, Nirala									■	■	■		
Carrot	T-29, Chowkta		■	■	■									■
Cauliflower	C-35, Cool, Deepa, White Island, Shehzadi, White marble		■									■	■	■
Cucumber	Alfa Beta, Japanese Long Green					■	■	■	■	■	■	■	■	
Green Cabbage	Imported varieties		■	■	■	■	■	■	■	■			■	■
Green Capcicum	Shimla					■	■	■	■	■				
Marro Kaddu	Larika, Local Pear, Local round													
Okra	Sabzpari, T-13, Pusa Green					■	■	■	■	■	■	■	■	■
Peas	Peas-2009, Meteor Faisalabad, Advanta Selection, Climex, Samrina2and, Aleena		■	■	■									■
Radish White	40-Days, Mino, LalPari, Mino Wase		■	■	■					■	■	■	■	■
Radish Red	French Radish													
Sweet Potatoes	White Star,Desi Red, 1028-5		■	■					■	■	■	■	■	
Spinach	DesiPalak		■	■	■	■				■	■	■	■	■
Spring Onion	Phulkara													
Tinda Gourd	Dilpassand					■	■	■	■	■	■	■		
Turnip	Golden, Purple Top					■	■	■	■	■	■	■		
Sponge Gourd	Malika, Utsav					■	■	■	■	■	■	■	■	
Tomatoes	Roma, Gala, Faisalabad-1		■	■	■	■	■	■				■	■	■
Water Melon	Sugar Baby, Charliston grey, Black King, Black-A-906, Aysha, NWMH-4107				■	■	■	■						
Musk Melon	T-96, Hales Best, Time Dew					■	■	■	■					
Potatoes	Diamont, Cardinal, Desire, Faisalabad-1, Lal Faisal		■	■	■	■	■							■
Apples	Tur Kulu, Amri, Shin Kulu, Galas								■	■	■	■	■	
Dates	Aseel, Dhaki, Begum Jangi, Malavi								■	■	■			
Peach	Floridison, Robin, 6a, Florida King,						■	■	■	■	■			
Mango	Chaunsa, Langra, Sindhri, Dusheri						■	■	■	■	■			
Apricot	Nari, Shakrpara, Char Maghes						■	■	■	■				
Lichee	Gola, Surai, Bedana						■	■	■	■				
Citrus	Mausami, Red Blood, Rubby Red, Valencia Late, Feutrells Late, Kinnow		■	■	■	■							■	■

Annex-E: Visual Representation of Tunnel and Dimensions.



Annex-F: Retail Price Graph for Different Vegetables. (Rs./KG)



	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13
Potatoes/kg	35	29	39	28	23	23	21	14	26	30	36	38	42
Onions/kg	53	47	42	26	29	37	51	54	50	45	45	65	69
Tomatoes/kg	51	59	43	46	53	56	65	56	49	56	89	88	69
Capsicum Green/kg	88	102	91	60	79	79	80	47	48	74	83	134	146
Cucumber/kg	54	47	44	57	60	39	22	18	26	30	42	64	62
Bitter Gourd/kg	64	62	60	69	105	120	130	56	50	51	45	89	86
Green Chili/kg	63	65	48	46	49	73	80	69	49	58	72	80	84