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THE AGRIBUSINESS PROJECT (TAP)

Tomato- Value Chain Competitiveness Assessment

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REPORT DISCLAIMER

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Acronyms and Abbreviations

ABL	Allied Bank of Pakistan
ABP	State Bank of Pakistan
ADB	Asian Development Bank
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
PIDE	Pakistan Institute of Development Economics
PITD	Pakistan Institute of Trade and Development
PKR	Pakistan Rupee
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
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
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations 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 Taraqiat Bank Limited

I. 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 the value chain assessment was to assess the competitiveness of the tomato 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.

Potatoes, onions and tomatoes are the most consumed vegetables in Pakistan. The tomato sector has major opportunities to grow and support revenue increase for the producers and has opportunities as a source of foreign reserve by increasing the exports and decreasing imports.

Pakistan is a net importer of tomatoes for the domestic household consumption. According to UN data, Pakistan imported 115,077 MTs of tomatoes in the year 2012 and exported only 9,704 MTs indicating potential for greater domestic production.

Pakistan enjoys several competitive advantages for tomatoes. Climactically, Pakistan has advantages over Europe and could have a year-round planting cycle with better planning and coordination of production. Proximity to the GCC, ASEAN and the CIS markets offer an advantage over other producing countries which require more expensive logistics.

Pakistan is not only a net importer of tomatoes, but has a high negative Relative Trade Balance (RTB) of -0.93. As Table 12 shows, even in 2011, the best export year in the last five, the RTB only improved to -0.6, showing the strong import orientation of this commodity¹.

Likewise, the Revealed Comparative Advantage (RCA) index in 2012 stood at a low 0.4, indicating that Pakistan trade patterns reveal a comparative disadvantage. The RCA index focuses on the concept of comparative advantage, accounting for the relative efficiency of producing different goods in the home country compared with the rest of the world.

India is a major exporter of tomatoes to Pakistan while the largest volumes from Pakistan are exported mainly to Afghanistan.

¹¹ Marcos Arocha

To improve the competitiveness of the tomato value chain we have to consider all of the constraints and solutions. Most of the issues which were obvious from this study are discussed in general here and in detail, later in this report. The primary issues are summarized below.

- **Farmer capacity Building:** There is a need to build the capacity of producers for better crop husbandry and knowledge of good agricultural practices. Small and medium scale producers dominate production. In particular, vegetable farmers are mostly small-scale producers. Pakistan has not been able to supply the buyers with good quality tomatoes consistently due to the constraints of the small farmers.
- **Credit:** Proper credit availability to the producers is a major issue. The credit system forces small farmers to under-invest in farming inputs like pesticides and fertilizers, leading to lower yields and poor quality.
- **Seed:** There is a lack of availability of appropriate seed. A comprehensive seed development program focusing new technologies should be developed in the private sector with emphasis on the research and development.
- **Market Linkages:** Proper mechanism for domestic and International market linkages and marketing information has to be developed.
- **Harvest and Post-Harvest Loss:** 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. Capacity building for better harvesting and post harvesting practices of majority producers is urgently needed, without which post-harvest loss will continue to be an issue.
- **Grading:** Better knowledge of grading and introduction of standards in quality control mechanism is needed. Quality is a combination of agronomic practices, variety characteristics, grading, processing and finally packaging. The absence of even a single factor makes the product inferior in quality and reduces the price received.
- **Storage:** It is important to promote knowledge and technology of energy efficient storage facilities.
- **Cold Chain:** The cold chain is very underdeveloped from the producer to the consumer. Leasing facility may be provided to exporters who will establish cold storage facilities near clusters of production. Refrigerated vehicles on lease terms 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.
- **Value Added:** Pakistan lacks the value addition sector for the tomato crop. During the glut season, tomatoes should be processed into tomato paste, puree, juice or even dried tomatoes, but this potential remains underdeveloped.
- **Trade Facilitation:** Need a simpler process for exports with one window service for all regulatory operations.
- **Market Development:** Exporters are price takers due to the lack of international market linkages. New markets identification and linkages need to be developed.
- **Sector Data and Management:** A reliable data management system has to be established for better sector management.
- **Stakeholder Coordination (Cluster Development):** Development of a better consultative mechanism between value chain actors for competitiveness development. Nothing can be

achieved unless stakeholders work in coordination with each other. So far, there has been none or very little coordination among the groups.

- **Contract Farming:** Introduction of better contract farming can strengthen linkages with domestic and International buyers.
- **Cooperatives:** 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.
- **Air Cargo Development:** Pakistan International Airlines provides cargo space in its passenger planes and is not operating dedicated freighter plane flights. Due to highly perishable nature, tomatoes can only be exported by air other than the neighboring countries. So exports of perishable products with very little shelf life cannot be increased unless additional cargo space is provided. A designated air cargo service, servicing the horticulture sector can help an increase in the exports tremendously. Multan airport can act as a major fresh produce hub as majority production areas are in close vicinity.
- **International Marketing:** No institutional support is available for marketing on an international level. The individual exporters are not large enough to run international marketing campaigns to promote a brand name. Moreover, due to absence of basic infrastructure, large orders cannot be entertained.
- **Export Finance:** Available export refinance is limited because of weaknesses in documentation. Many exporters are selling their produce on Documents Advance (DA) that does 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 could play a role in addressing this problem².
- **Anti-Dumping:** Dumping of cheaper products from the eastern border may be leading to a diversion of cropland from horticulture to other products³.

To improve its competitiveness, the tomato sector will need to lower input cost, improve quality and yields, reduce post-harvest loss, invest in cold chain infrastructure and develop stronger market linkages while coordinating closely with Government on trade facilitation issues. New markets can be developed by Pakistani exporters in foreign markets.

² Mian Shahkoti, Pakways

³ Mian Sajjid, Mailsi

II. 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). The ASF is 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:

- a) Identification of the precise gaps (and therefore, the potential) of Pakistan producers in the selected value chains;
- b) Validate ongoing and planned interventions;
- c) Identification of attractive/alternative markets for the value chain products;
- d) Identify additional interventions that could enhance value for all the chain actors;
- e) Facilitate further prioritization of VCs and of the potential interventions in light of the augmented information and analysis
- f) Facilities subsequent by the information in the assessments

The methodology employed included refining maps of the functions and actors participating in each value chain, identifying variations in each depending on the product and relative efficiency of the different participants, and gathering as much information as possible on prices, costs, and efficiency metrics at each level, as well as volumes of product flowing through each of these channels. In parallel, world market information was obtained to assess Pakistan's recent performance in each chain's product(s), assess its relative position vis a vis international competitors considering volumes, prices, and recent export growth, and benchmark the gaps between them.

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 key informants from among academia, 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.

Assistance was provided to the value chain consultant by ASF staff to set up these meetings in the various districts where interviews were conducted. Marcos Arocha, JE Austin Associates Consultant (IC) assisted in the design of the overall framework provided guidance throughout the elaboration of the work. The work was also informed by the Rapid Market Assessment conducted in parallel by another JE Austin Associates' consultant, Matthew Brown.

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

The tomato has its origin in Mexico where it was named as Tomatillo. Later its cultivation spread to the North America and subsequently to Europe. In the Indo-Pak sub-continent, its consumption is growing year by year resulting into more cultivation. Tomatoes are also used in various value added products such as juice, ketchup, puree, paste and dried tomato. Tomatoes are used in large quantities in household cooking and commercially at the restaurants. It is a rich source of vitamin A & C and is cultivated worldwide.

Potatoes, onions and tomatoes are the most highly consumed vegetables in Pakistan by volume. Tomato is an essential ingredient of Pakistani cuisine, almost each culinary dish is prepared with tomatoes. There is hardly any recipe that could avoid tomato consumption and therefore its demand (although not its price) is exempted from seasonality. The demand for tomatoes is constant year round with the exceptional increase during the month of Ramadan and during Eid ul Adha.

Tomatoes have become one of the most popular and widely grown vegetables in the world. Out of 15 vegetables listed by the FAO, tomato is placed sixth in terms of total annual world production. It is a very important vegetable, having high nutritional value at comparatively low prices relative to other vegetables. It is consumed in the home in different ways, such as vegetable, salad, ketchup and in the preparation of other dishes. The demand for tomatoes is increasing in keeping with population growth.

Pakistan's variety of elevation and lengthy north-south extension enable it to grow tomatoes in different localities at different times of year. 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 the 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 sensitive to hot climate and this is one of the major limitations in optimum production of summer tomato crop in plains of Pakistan.

Tomatoes are often grown in polyethylene tunnels. Major tunnel farming of tomatoes is done in the Districts of Khanewal, Vehari, Pakpattan, Sahiwal, Toba Tek Singh, Chiniot and Gujranwala. Tunnel farming usually involves hybrid varieties that achieve higher production as compared to local varieties.

Yet very little effort has been made for the improvement of tomato sector. Very few local varieties are available for cultivation and most of them are selections from introduced seed. Few if any local hybrid varieties have been brought to the market despite the existence of 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 higher yields, 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 (22 MTs per acre or 54

MTs per hectare). Tomato nurseries are planted in the month of October and the saplings are transplanted in the first week of November. The crop is harvested through the end of March.

Tomatoes are highly perishable with a limited storage life and can be kept in a temperature controlled facility for a short period of 7-10 days. Tomatoes can be preserved by canning, drying, freezing, or pickling. Most tomatoes are picked at the semi ripe stage to increase the shelf life. Most of the product is stored at between 1.1 and 2.2 °C and with relatively low humidity. Most cold storage is not equipped for multiple and variable internal temperature zones and so tomatoes are often stored with other products with different requirements for temperature and humidity. The problem is further compounded by the lack of cool chain system from the farm to the consumer.

Pakistan is a net importer of this product but have all the resources to meet the local demand and even export tomatoes to the Middle East and other markets if better crop husbandry is practiced along with better market linkages for the farmers.

III. PRODUCTION AND VALUE CHAIN STRUCTURE

Pakistan grows tomatoes in all seasons of the year helped by varying climatic conditions. 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 harvested in May and June.

Even so, we can make a distinction between two main 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. A third crop can be distinguished as the one produced under the tunnels.

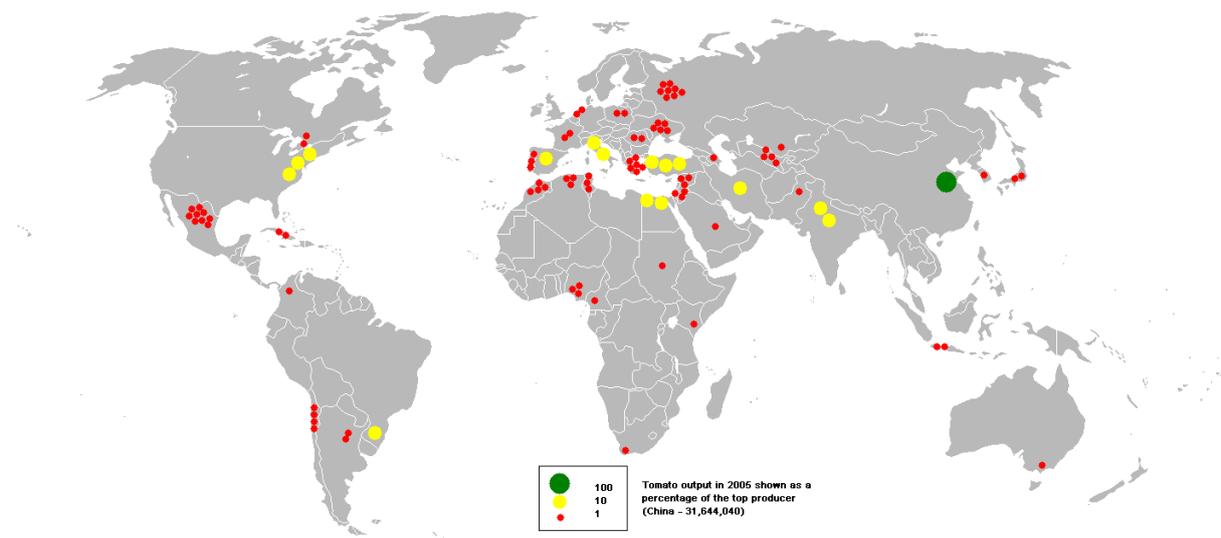
Baluchistan produces 40 per cent of the total, Khyber Pakhtun Khawa 30 per cent, while Punjab and Sindh combined produce the rest. Punjab's production is on the rise due to the increased use of the tunnel farming.

Still very little efforts have been made on the improvement of tomato crop. 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 various 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 higher yields of tomatoes, better crop husbandry practices need to be emphasized.

Processing of tomato is yet to be fully exploited in Pakistan. Products, such as tomato paste/puree have high potential demand in the retail market. Rise of the fast food industry in the country is also having a substantial impact on the increased demand for tomatoes.

Figure 1: Major Tomato Production areas of the world.



Source: FAO Data

In the global context, tomatoes are produced on all continents as we can see from the world production map in figure 3. We can see the major cropping areas on this map from Mexico to the North East of the United States and moving to the major production areas of the Europe, Africa, the Middle East, Russia, CIS, India, Pakistan and China.

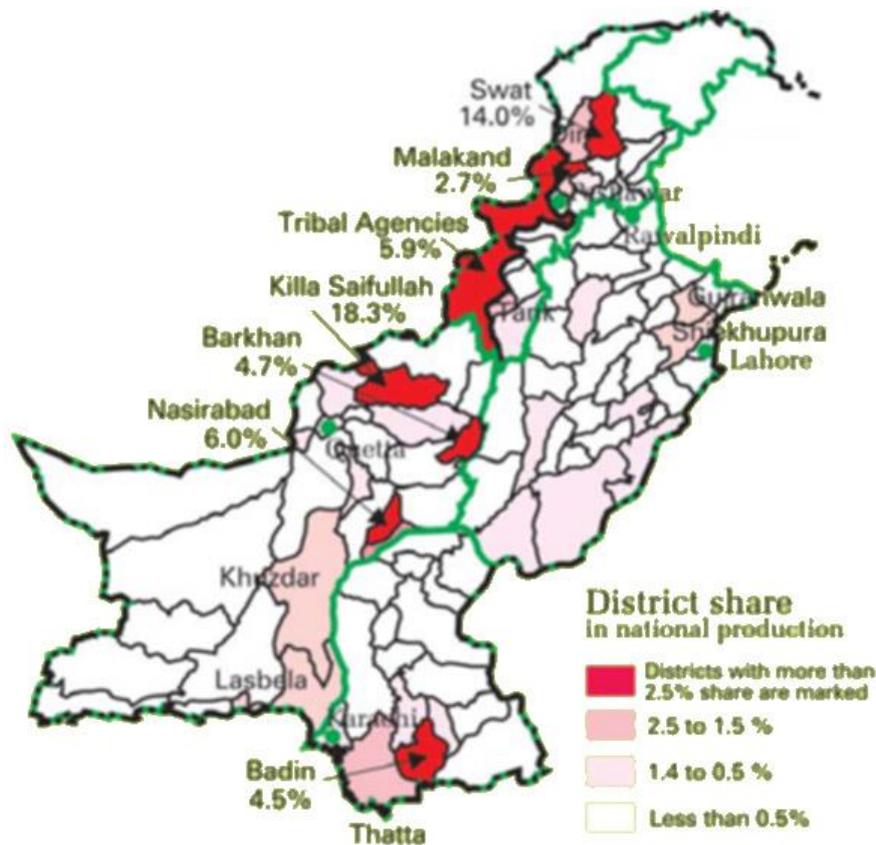
Table 1: Top ten tomatoes producing countries of the world. (Source: FAO Data)

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

Table 1 shows that India and China combined produce more than a quarter of the world tomatoes. The consumption in both countries is also very high. India exports tomatoes to various countries including Pakistan as the major market. Egypt has a major hold of the UAE market as the country is the 5th largest producer in the world. Turkey and Spain are the major suppliers to the European market, they are also among the top ten producers of the world. United States is the third largest producer of tomatoes but still imports tomatoes from Mexico as the demand for the product is high, domestically.

Geography of Production in Pakistan

Figure 2: Tomato production areas of Pakistan.



Source: World Life Organization

Figure 2 shows the major production areas for tomatoes in Pakistan. We can see from this map how the cooler temperature areas are more suitable for this crop. This is also supported by the table 2, where the mean annual temperature in Baluchistan is ideal for the growth of tomatoes. Also, the production of tomatoes in the tunnels from the Central and South-Central Punjab is getting a major share of the domestic market. Nevertheless, Pakistan remains a net importer of the product and its exports are minimal and to very few destinations.

Table 2: Major Ecological Zones of Pakistan.

The Major Ecological zones of Pakistan				
Ecological Data	Punjab	Sindh	KPK	Balochistan
Mean Annual Temp.	20-25°C	25-30°C	5-25°C	10-15°C
Mean Annual Rainfall Range	250-750mm	100-125mm	250-750mm	125-250mm
Climate	Sub Topical Low Lands Semi- Arid Hot Summer, Mild Winter	Sub Topical Low Lands Arid Hot Summer, Mild Winter	Sub Topical High Lands Humid + Semi -Arid Warm to Cold winter	Sub Topical High Lands Semi -Arid Warm summer, Cool winter
Soils	Loamy & some sandy and clay soils of flood plains	Loamy, sandy loam, silts of piedmont plains and desert soils	Rocky outcrops & shallow loamy soils of high steep mountains	Shallow loamy, gravelly soils of river valleys rock outcrops of plateau

Source: World Life Organization

The temperature of Baluchistan and the KPK is perfect for the tomato production for the open fields. Punjab and KPK have the majority of the tunnel farming as the temperature goes high in the summer and very cold in the winter months. Due to major population centers, availability of the favorable land and ease of input provision, there are more acreages under tunnels in Punjab as compared of the other provinces.

Table 3: Top ten tomato producing districts of Pakistan.

District	Province	Hectares	Tons	Tons/ Hectare	% of Total Production
Killa Saifullah	Baluchistan	6,488	85, 473	13.17	18.26
Swat	KPK	5,752	65,374	11.37	13.96
Nasirabad	Baluchistan	1,569	27,918	17.79	5.96
Barkhan	Baluchistan	1,605	22,187	13.82	4.74
Badin	Sindh	3,520	20,876	5.93	4.46
Jaffarabad	Baluchistan	1,340	15,990	11.93	3.42
Malakand	KPK	1,070	12,553	11.73	2.68
Tank	KPK	835	10,430	12.49	2.23

Dir Lower	KPK	772	10,073	13.05	2.15
Mohmand Agency	KPK	1,220	8,545	7.00	1.83

Rank with respect to yield. Source PHDEB

Table 3 explains that the Killa Saifullah and Swat produce more than third of the total tomatoes produced in the country. It is also interesting to see a wide range of the production levels per hectare from 5.9 MTs to almost 18 MTs per hectare. The primary reason for this is the crop husbandry and the size of the farms.

Table 4: Percentage of total production for top four districts.

District	% of Total Production	
	Baluchistan	Pakistan
Killa Saifullah	44	18
Nasirabad	14	6
Barkhan	12	5
Jafarabad	8	3

Source PHDEB

The above four districts of Baluchistan produce over 40% of the total national tomato production.

Table 5: Provincial Shares in Area and production.

Punjab	Sindh	Baluchistan	KPK	Pakistan
14.5 %	9%	42%	34.5%	100%

Source PHDEB

Pakistan Horticulture Development and Export Board (PHDEB) has estimated that over the last two years Baluchistan has emerged as major producer of tomatoes with 42 percent share in the national production, followed by NWFP 34.5 percent, Punjab 14.5 percent and Sindh has nine percent share.

Table 6: Important Production Area in Pakistan.

Province	Major Areas	Availability
Punjab	Gujranwala, Nankana Sahib, Muzaffargarh, R Y Khan, Khushab, Bahawalpur, Bahawalnagar, Sheikhpura, 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, Newshehra, 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

Source: World Life Organization

Table 6 breaks down the production by seasons and the areas of production. We can see from the above table that the tomatoes are available year long from different areas of Pakistan.

Table 7: Major Tomato varieties grown in Pakistan.

Roma, Plum Tomatoes	Breakfast tomatoes
Pear Tomatoes	Cherry Tomatoes
Green Tomatoes	Paste Tomatoes
Globe tomatoes	San Marzano Tomatoes

Source: Fruits and vegetable association of Pakistan

Most tomato varieties grown in Pakistan are hybrids and have better production levels as compared to the local varieties.⁴

Description of the Value Chain Drivers and Participants

Analysis was done by identifying the main drivers of the value chain and then assessing the extent to which these drivers contribute, positively or negatively, to performance. For analytical convenience, these performance drivers can be considered under the following broad themes.

Enabling environment refers to all the policies, institutions and support services that form the general setting under which enterprises are created and operated.

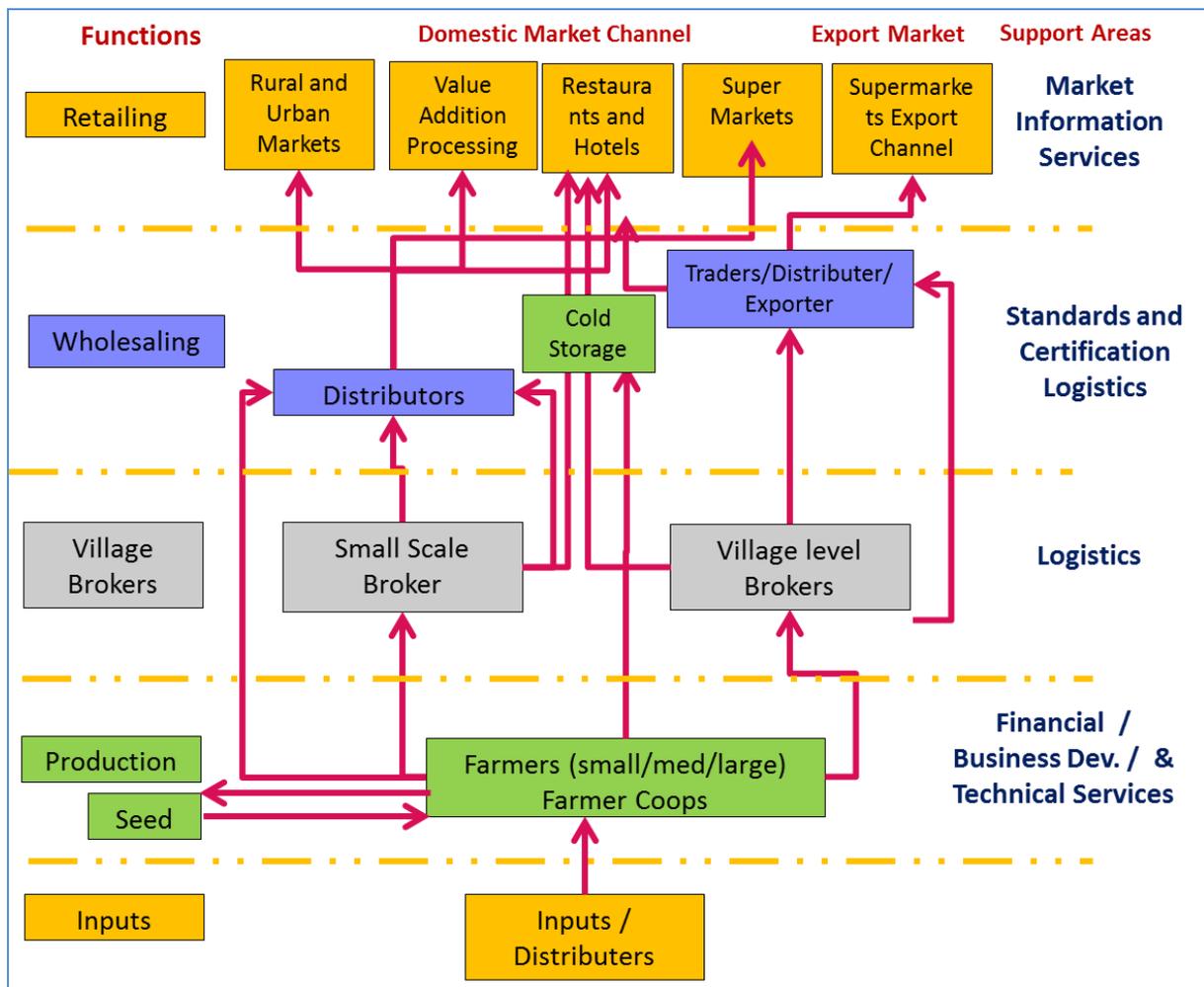
Technologies are essential determinants of performance at all stages of the value chain including production, processing and distribution. Technologies refer to the methods, processes, facilities and equipment used in chain operations as well as those used in research and development. This theme also includes consideration of technology adaptability and adoption patterns.

Market structure refers to whether buyers and sellers at each stage of the value chain are concentrated or not or whether they are oligopolies or monopolies. This has a large impact on chain performance and the performance of individual firms and business operations.

Chain coordination determines the harmonization of the physical, financial and information flows along the value chain. Good coordination will enhance value chain performance. For example, when consumer or buyer preferences are known accurately on a timely basis, this tends to enhance production and processing responses. Direct linkages to demanding consumers can often serve to improve production quality, seasonal response, product features and varieties planted. Coordination tends to occur, but is not automatic and can be improved by encouraging value chain actors to meet and coordinate.

⁴ Jaan Muhammad, Seed Supplier, Burewala

Figure 3: Tomato value chain map.



J.E. Austin Associates

Managing business operations is necessary at every stage along the value chain if individual firms are to allocate resources efficiently, respond to consumer needs and adapt to market changes.

Inputs directly affect performance, deeming it necessary to determine the availability and cost of inputs such as land, labor and capital at every stage in the value chain.

Product demand drives the entire value chain and serves as the entry point for analysis. Value chains cannot exist if demand does not exist. Demand begins a domino-like set of communications rippling through the actors of the value chain.

Outline of the Value Chain Actors

Pakistan is a country where farmers are involved in multiple crops therefore similarly other actors of the value chains are involved in multiple sectors. The government does not have a strong trade registration system and therefore it is very hard to predict exact numbers of the actors in each

sector or a crop. What follows is a rough description based on existing data and some additional data uncovered from the main participants in Pakistan's tomato value chain.

1. Growers

There are over 200,000 growers all over Pakistan including small farmers of the North. Producers can be characterized by five types: Small Farmers, Medium Farmers, Large Farmers, Corporate Farmers, Cooperatives and Farmer Associations. In the stakeholder workshop, it was mentioned by the Vice Chancellor of the University of Agriculture Faisalabad that it is hard to define the small to large farmers as this is a cash crop and even a one acre farmer can have a higher production and receive more cash than a larger land owner receiving less money at the end of the crop. The majority of farmers market their produce as either standing crops or at the farm gate following harvest. A smaller number of growers directly market their produce at the wholesale markets. This category includes mainly medium and large producers. Some large growers engage in direct bulk supply to downstream industries, traders and exporters. There are also few farmer cooperatives engaged into formal contract farming for various companies, including seed companies.

2. Traders and Middlemen

Traders play a most important role in the marketing of tomatoes in Pakistan including the provision of credit to the farmers for crop production. This layer of the actors includes the Contractor (Thakedar). These operatives tend to purchase standing crops in advance or at harvest time for onward sale to commission agents or wholesale dealers. Contractors directly finance transactions from their own resources or from credit proceeds obtained from formal mechanisms or from informal credit supplied by commission agents.

Middleman (Beopari) *Beaoparies* operate at the early stages of the marketing chain. They act as collectors of small quantities of perishable and non-perishable agricultural produce at the village level. *Beaoparies* take produce to wholesale markets or sell it to commission agents. The *beaoparies* almost always purchase produce directly from farmers. Their major contribution is to consolidate produce from individual growers into large lots and transport them to the *mandis*, or primary markets and to higher levels in the value chains.

The principal function of wholesalers is to collect agricultural produce from other dealers and distribute it to the end users in the marketing system. They purchase in bulk and directly supply processing industries, mills, traders and exporters. Wholesalers often work for traders and industries as agents. Wholesalers purchase in bulk and supply against contracts with different sources including, agribusinesses, traders and sub-wholesalers and retailers.

Sub-wholesalers (Phariawala) are middlemen who sell to their parent markets or within the vicinity of these markets. These operatives usually purchase in small bulk from auction lots, purchased by wholesalers for onward resale to retailers. Primarily they target small retailers or individuals whose demands do not justify them to buy in bigger volumes in auction. Phari literally means a mat and it is also referred to a dealer who buys the products and sells on the floor (Tharha) of the wholesale market.

The current market committee regulations (1939 act) require that farmers sell through commission agents (Arhti). These agents operate as mediators between buyers and sellers. The Agents arrange auctions for the sale of agricultural produce brought into markets and charge fees for their services.

The fees are usually derived as a fixed percentage of the ad valorem transaction. Often commission agents own the produce brought to market, having extended credit to the supplier, a grower, middleman or a contractor. Commission agents fall into two categories: the “katcha arhti” and the “pucca arhti”. The Katcha arhti specializes in the collection of produce and the pucca arhti engages in sales and distribution.

Although the commission agents enjoy clear monopsony power, they perform some important functions in facilitating the operation of the marketing chain. These functions include; displaying produce to buyers before price settlement, explaining to seller and buyers prices fixed in the transaction, arranging for weighing equipment at the purchase destination, collecting invoiced sales revenues from buyers and paying sellers, providing post-harvest credit, storage, arranging and paying for transportation and providing labour for loading and unloading.

3. Processors

Value addition includes on-farm harvesting, cleaning, grading and packing. Processing includes ketchup, paste, puree, drying, juice and canning. From the stake holder’s survey, it was stated that there are fewer than fifty medium or large value addition facilities available in Pakistan for tomatoes. Most of these include tomato ketchup and few tomato paste facilities.

4. Retailers

Retailers make direct purchases at the wholesale markets. At the end of the marketing chain, the retailer buys from wholesalers and sub-divides produce lots into smaller quantities which are commensurate with consumer demand. Some retailers, particularly large shop keepers, procure from open auctions for subsequent resale to smaller retail players. Retailers usually buy from wholesalers on credit. Repayment is required within 24 to 48 hours as the retail stock is liquidated. Retail markets include pushcart vendors, small retail and corner convenience stores, medium size retailers, supermarkets, hotels and restaurants.

5. Exporters

Exporters include small, medium and large exporters, exporter groups and multinational supermarkets operating in Pakistan. In the tomato sector it was estimated that there are over 25 medium and large exporters of other fresh produce who also deal in the export of tomatoes, which indicates the institutional capacity to increase tomato exports if cost-effective production can be further developed.

6. Input and Service Providers

There are various input and service companies and individuals working in Pakistan with domestic and foreign links including seed suppliers, importers, contract seed growers and buyers from the domestic market. These also include wholesalers, fertilizer dealers, agricultural equipment rental providers, and those providing tractors, laser levellers, ridgers, planters, harvesters and irrigation to small farmers and cooperative farmers

7. Sector Support Service Providers

Local and international certification bodies catering to the export sector include both private and government extension services, logistics, dry (or cold) storage providers, GAP consultation services

and R&D services. Also included are Government and private sector's training services and education and capacity building Institutes.

IV. MARKET TRENDS

Domestic Trade

Tomato prices go through a breathtaking roller coaster ride throughout the year at the farm-gate levels. Prices may range in a given year from a low of Rs. 5 per kg to Rs. 50 before averaging Rs. 20 on the next day. Wide price fluctuations on the same day are not uncommon.

One of the factors for the fluctuation in the price of tomatoes is the cost of transportation. The product has to go through either a cool chain maintained transportation or transported to a market within manageable commuting distance. The tomato distributors (Arhti) follow simple thumb rules of demand and supply. The tomato is a fragile item and can be stored for a maximum of one week to ten days after harvesting. In the trade circles the best strategy is to off load its stocks as soon as possible. As the demand is static, the distributors have a fairly good idea of how much tomato will they sell at what rate, on any given day. If the market pays Rs 20 per kg against a supply of 30 truck-loads of tomatoes in a day and 60 arrive on one particular day, the price is bound to spiral down. But if only 10 of them knock at the market gates, the price will skyrocket. This is the simple market logic in tomatoes.

Market and price risks are generally passed on to the producers. There is more than one player in the tomatoes' journey from farmer to the consumer. A dealer (*beoparee*) buys it from the farmers on behalf of the distributors. The distributors in urban markets auction their product to wholesalers (*pharea*) in bulk, who in return sells it to retailers in smaller quantities. The dealers and the distributors pay back to farmers whatever the price their commodity fetches on the day of its sale after deducting their commission and other dues, while the wholesalers and the retailers add their margins on top of their purchase price to sell it to consumers.

The dealers and the distributors charge their commission as percentage of sale price. This means that if they sell 10 truck-loads at Rs 20 per kg; or 20 at Rs 10 per kg or 5 truck-loads at Rs 40 per kg, their net earning remains the same. The same is true for the wholesalers and the retailers as they will add their margins and pass it on to the consumers. They however, sell less quantity when the price is high and more when it is cheap. This effectively means that all the players in the tomato trade are able to safeguard their interests by raising or lowering the price and through this mechanism they shift the entire burden of volatility on to the farmers.

Farmers can earn reasonable profits if they bring their produce to the market on the day when the overall supply is in short of demand. But if they are out of luck and their merchandise arrives at the auction dock when the supply exceeds the demand, they can only repent and end up indebted. Price discovery mechanisms such as are used on mobile cell phone applications in Kenya and elsewhere, could be used in Pakistan to improve value chain coordination and to enable farmers to maximize their sales timing and sales prices.

Contract farming is another coordination mechanism enabling farmers to know when and what to plant and to reduce risk. As there are many tomato farmers are spread all over the country, especially small farmers, current decisions are often made based on a vague assessment of how they fared in the last season. The technology now exists to improve proper market linkages with clear

channels of communication for the benefit of producers and the reduction of their risk. This will also ensure better values passed on to consumers.

Tomatoes are still produced by food insecure tenants, an overwhelming majority of whom are tenant farmers who acquire small pieces of land on rent for vegetable cultivation. During our visits to the four tomato districts of the Punjab, we could not identify even a single tomato cultivator with more than five acre lands of land for farming. However, there are few large farmers using plastic covered tunnels for tomatoes.

Tenants in Punjab typically pay their land rent in cash and the owners have nothing to do with whatever the tenants grow. In Baluchistan however tenancy takes the form of contracted labor. In the northern Pakhtun belt of Baluchistan that grows tomatoes, a *bazgar* has a one third share in the produce under the agreement that binds the owner to provide all the cash inputs and the *bazgar* to do all the manual labor on the farm. In some areas the *bazgar* also has to pay for the cash inputs in proportion to his share which is one third. The *bazgar* is essentially a contracted laborer whose wages are attached to the market price of the produce. He shares the market risks with the land owner and his condition is worse than the farm laborer in Punjab who charges wages in cash at a certain rate regardless of the market prices of the farm produce.

In Punjab, the tomatoes are grown in the nursery in late October with harvesting done in May and June. The Baluchistan farmers sow the seeds in February and reap in July and August. This overlaps with the wheat growing season. This means that these farmers do not grow the main staple food and have to buy wheat from the market. Notwithstanding the seasonal overlap, it is financially not feasible to grow wheat at the land rent that they have to pay to their landlords. In other words if the tomato market fails that year, the farmers may have to go without food.

The majority of tomato farmers are bonded producers. In many cases, an acre of tomato crop requires a cash input in excess of Rs 30,000 over a period of seven months. This is beyond the financial capacity of most of these farmers. They almost always have to borrow money or purchase inputs on credit. The tomato dealers and distributors are always “generous enough to offer this support” to the poor framers under the condition that they will sell their produce to them and pay back the loaned amount with interest. The price of their produce is however not decided in advance and it remains the market price of the particular day of sale. The government and private banks prefer to stay away from this sector. Moreover, the banks offer a credit financing facility to the landowners only and not to the tenants. The farmers are left with no option but to seek money from the distributors. The distributors send millions of rupees to their agent dealers in different areas for loaning these to farmers. As the farmers are then bound to supply their produce to that particular distributor, it helps the distributors to ensure year round supply of tomatoes from different corners of the country. The distributors pay the farmers the price that their produce gets in the market, after deducting the dues. This includes the money borrowed by the farmers for crop inputs and the interest which is anywhere from 10 to 20 percent.

The farmers in Punjab and Baluchistan generally get around 5,000 kg of produce from their one acre plot while in NWFP it is around 4,000 and in Sindh just 2,000. The national average is around 4,000 kg (around 100 maunds) per acre. The top global performers like Netherlands and UK harvest 18,000 kg per acre. Even the world average is three times the Pakistani yield. While the high tech inputs that Western farmers use may not be feasible, there is still a lot that can be done. Even basic improvements in farming require cash inputs that are not currently affordable for these resource-poor producers. Moreover, the market does not reward greater output. It in fact punishes farmers for producing more by lowering the price below the cost of production. On the other hand low per acre yield keeps farmers gains to a bare minimum level even at reasonable market prices as the cost of production is relatively high.

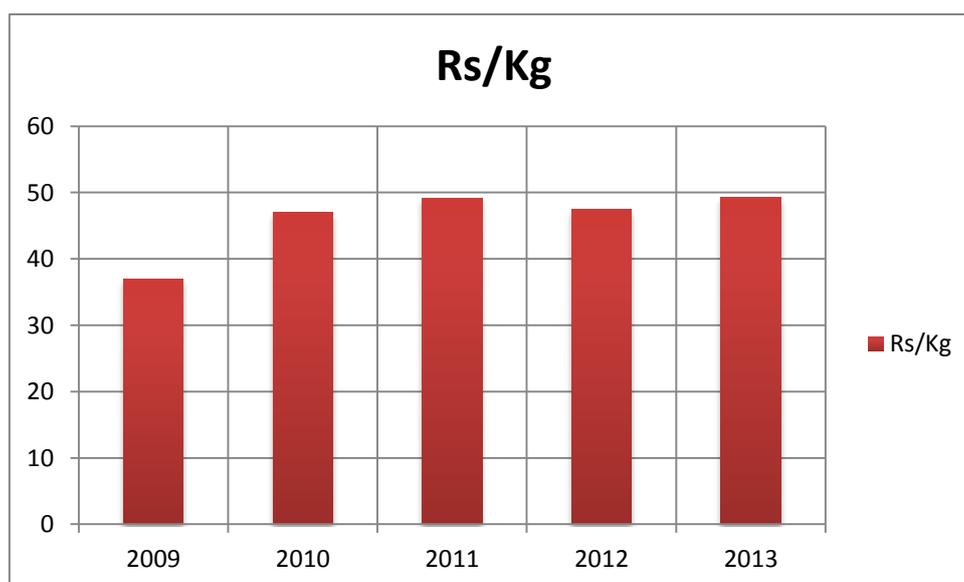
Tomatoes are not harvested completely at one time but rather picked around 15 times during the two-month harvesting season – twice every week or on alternate days. This provides the farmer some saving grace. As the market prices may fluctuate by the day, they can hope that at least one of their pickings will hit the market on an opportune day and make up for the losses caused by other pickings. In fact the farmers never expect all the 15 pickings to be profitable. They do expect that to cover their expenses then earn some cash. The other players in the tomato trade however never have to worry. They earn on all the 15 pickings by the farmers whatever the market price.

In Punjab tomatoes are cultivated along with other vegetables as well. Uncertain of returns on tomato, farmers prefer mixed cropping and grow one or two other small cash crops along with tomatoes. This mixed cropping is an approach to risk diversification and economic survival. Losses on tomatoes will require the farmer to make up the deficit with returns from other crops. Recurrent losses can also make them abandon the cultivation of tomato altogether.

Lack of organized market linkages and communication means potentially erratic supply where a bad season is followed by reduced production, albeit benefitting those farmers taking the risk of growing the same crop despite losses in previous season. Similarly, good returns in one year may stimulate over-production the next. High prices in two successive seasons often lead to a glut with the cycle beginning again. Better coordination mechanisms and development of more processing to absorb surplus production could help improve conditions and stimulate a more stable rate of continuous growth that would be attractive to farmers.

In 2009, the average tomato consumer retail price in Lahore was Rs38 per kg. The next year it fell to Rs 13 before rising to Rs 48 in 2010. But the farmers were not able to make gains in the wake of rising input costs and many abandoned the crop resulting in an even higher price of Rs 49 in 2011. The price ensured reasonable returns to the lucky few and encouraged higher plantings in 2012. But In 2012, the market had high levels of production although average prices tended to remain at Rs 48 per kg. The average price for tomatoes in the first three quarters of the year 2013 has been approximately Rs. 49 per Kg.

Graph 1: Retail Prices of Tomatoes in Lahore.



Source. Shahid Hussain and Laurent Nazet. MAF-Hyperstar

While the average nominal retail prices for the past five years have not changed in a major way, inflation has meant that production costs have increased by 30%, limiting profitability. Per Graph 1, provided by Hyperstar Supermarkets, retail prices were stable but the cost of production has increased by 30%.

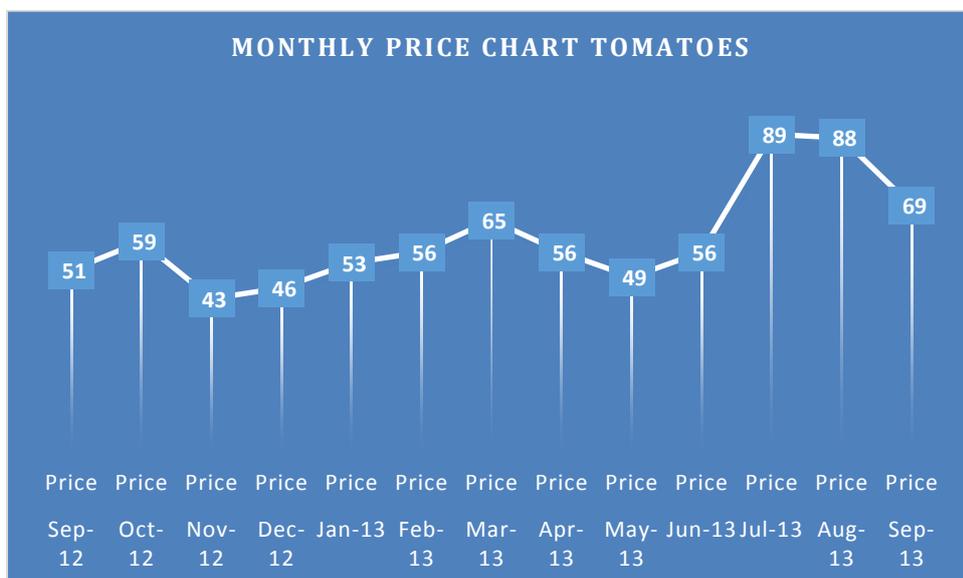
Table # 8: Yearly Quantities and Amount of Tomatoes Sold at Retail Store.

Year 2009		Year 2010		Year 2011		Year 2012		Year 2013 (Jan ~ Aug 19th)	
Qty in Kg (000s)	Amount Sold	Qty in Kg	Amount Sold						
46	1,700,000	120	5,669,003	156	7,700,980	139	6,625,114	119	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 relatively stable. This shows a matured sector as the demand for the tomatoes is stable with a stable supply available for the market. However, retail prices vary considerably over time as shown below from a low of 43 to a high of 89 Rs/Kg.

Graph # 2: Monthly Retail Price Graph for Tomatoes



Source: MAF Hyperstar

The above price chart 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. Stakeholders in the workshop complained that there is an unfair practice adopted by the government of Pakistan to open the Eastern borders to flood the market with tomatoes at times that coincide with sales of the high value tunnel crop in Pakistan.

International Trade

Tomato is both exported and imported in Pakistan, and the trends show both of them growing over the most recent five year period (2008-2012).

Table #9: 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
Pakistan's Total Import	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.

On the import side, as shown in Table 8 above, the largest supplier of tomatoes to Pakistan is by far India due to the proximity from the cropping zone and better crop logistics and storage. Afghanistan, Iran and the UAE have almost a null participation. While imports declined slightly from 2009 to 2010, the overall trend shows rising imports. By value, it has grown at an annual rate of 48% over the period, and by volume, they've done so at 32%.

Table # 10: World Tomato exporting countries.

Exporters 2012	Trade Indicators Tomatoes 0702								
	Value exported in 2012 (USD thousand d)	Trade balance in 2012 (USD thousand d)	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	802163 8	-242345	661510 0	Tons	1213	4	3	-5	100
Netherlands	180848 3	142766 7	101895 5	Tons	1775	2	0	6	22.5
Mexico	168780 3	165556 3	147239 0	Tons	1146	13	10	-19	21
Spain	118895 7	111974 5	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. For its part, exports have been growing at 72% per year in value terms (see table 8 above), and 24% in volume terms

Table # 11: Pakistan Yearly Imports, Quantity (2008-2012).

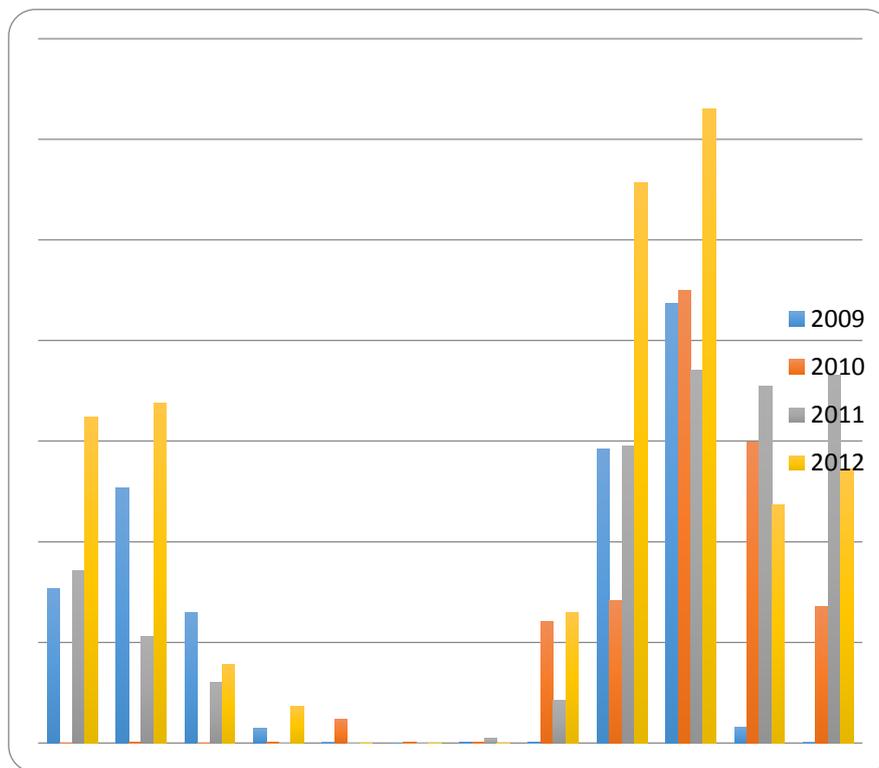
Importers	2008	2009	2010	2011	2012
	Exported quantity, Tons				
Pakistan's Total Export	3463	40682	5039	45142	9704
Afghanistan	2462	40594	2919	44814	9612
United Arab Emirates	351	71	517	181	42
Qatar	0	0	0	26	30
Saudi Arabia	0	0	8	11	13
Bahrain	11	15	0	10	8
Sri Lanka	610	0	1480	75	0
Iran (Islamic Republic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

Source: ITC calculations based on UN COMTRADE statistics.

Table 11 shows Pakistan majority of the exports go to Afghanistan. These exports are mostly registered during the winter months under tunnel production and find their way into CIS markets. The export volume fluctuates considerably every other year, although the trend is upwards considering the 3,463 tons exported in 2008 and the 9,704 tons exported in 2012, which are both non-peak years as opposed to the 40,682 tons and 45,142 tons exported on 2009 and 2011. The annual average growth over the full 2008-2012 indicates 24% growth p.a. as measured by value.

However, 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. As shown on table 10, imports come mainly from India (97.9%).

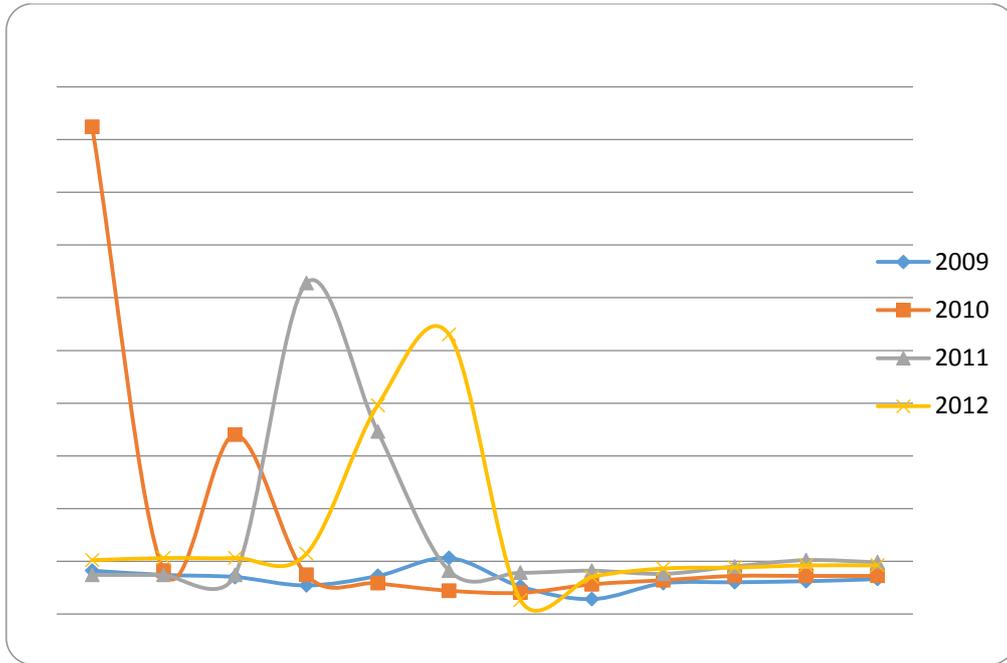
Graph # 3: Monthly Imports of Tomatoes (Kgs)



Source: ITC based on UN Comtrade Data

Graph number three 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.

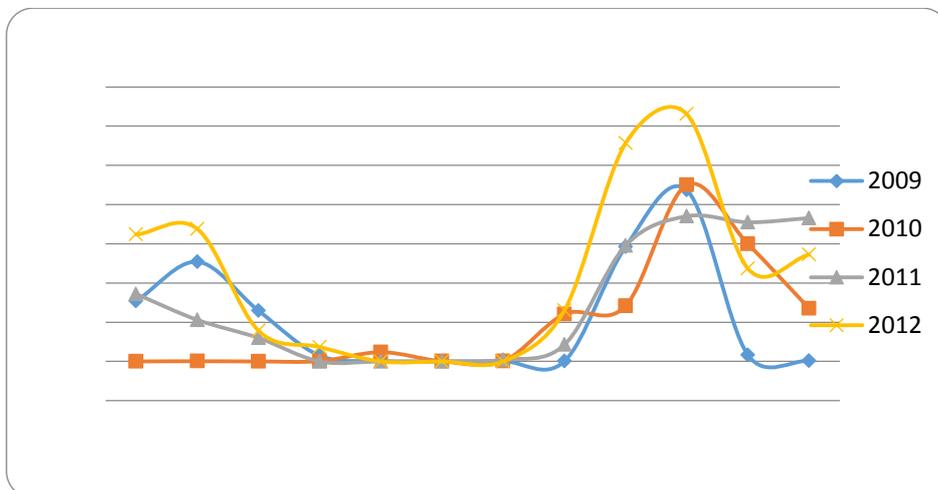
Graph # 4: Pakistan Tomato Imports, USD per Kg 2009-2012



Source: ITC based on UN Comtrade Data

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

Graph #5: Pakistan Tomato Imports, Volumes KG 2009-2012



Source: ITC based on UN Comtrade Data

Graph 5 gives shows that imports spike is in the months of September, October and November. This would provide a price incentive for temperature-controlled production.

Table #12: Revealed Comparative Advantage.

<i>Pakistan Tomatoes</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>
<i>Revealed Comparative Advantage (RCA)</i>	<i>0.1</i>	<i>0.5</i>	<i>0.1</i>	<i>1.5</i>	<i>0.4</i>
<i>Relative Trade Balance (RTB)</i>	<i>-1.0</i>	<i>-0.8</i>	<i>-0.9</i>	<i>-0.6</i>	<i>-0.9</i>

Marcos Arocha. J.E.Austin Associates

Pakistan is not only a net importer of tomatoes, but has a high negative Relative Trade Balance (RTB) of -0.93.⁵ As the table number 12 shows, even during the best year of the most recent five (2011), the RTB only improved to -0.6, showing the strong import orientation of this commodity.

Likewise, the Revealed Comparative Advantage (RCA) index in 2012 stood at a low 0.4, indicating that Pakistan has a comparative disadvantage. The RCA index focuses on the concept of comparative advantage, accounting for the relative efficiency of producing different goods in the home country compared with the rest of the world. The RCA denotes relative efficiency indirectly, based on trading patterns that emerge from actual market transactions must not be confused with a competitive advantage which requires many other elements to be in place including appropriate marketing links, input supply channels, financing mechanisms, uniform product quality, and many other demand requirements. In other words, comparative advantages can be built into competitive advantages. An RCA greater than 1.0 indicates a comparative advantage for that item, while an RCA lower than 1.0 identifies a comparative disadvantage.⁶ During the past five years we can see only in 2011 where the RCA was above 1.0 identifying a comparative advantage.

⁵ $RTB_c = (x_c - m_c) / (x_c + m_c)$ where x_c and m_c refer to exports and imports, respectively, of product chain or group c . This indicator is calculated for chains or groups of products and thus shows whether a set of related products is more export- or import-oriented as a whole. If $0.33 < RTB_c < 1.0$, then for the product group the country is considered to be a net exporter. If $-1.0 < RTB_c < -0.33$, then the country is considered to be a net importer of the product group. For cases in which $-0.33 \leq RTB_c \leq 0.33$, then either there is little international trade in the product group in this country's case or the trade goes both ways, imports and exports, in significant quantities.

⁶ While a useful tool, RCAs are imperfect because they also embody government policies and institutions that may be distorting markets and like many indicators, it accounts only past performance. As long as these imperfections and limitations are recognized, RCAs can be helpful as analysis tools, since data are generally available in the trade record to gauge comparative advantage.

V. VALUE CHAIN CONSTRAINTS

Various priority inputs are needed to be implemented for the improvement of the competitiveness of the tomato value chain. As discussed in this report, Pakistan is a net importer of tomatoes right now but has the capacity to expand if better conditions are provided.

“Basic factor conditions,” are comparative advantages that are typically inherited rather than created and Pakistan’s are attractive for tomatoes. Pakistan offers good agro-climatic conditions and the adapted varieties produce good grade tomatoes. Proximity to the GCC, ASEAN and the CIS means less expensive logistics and quicker time to market.

However, Pakistan has yet to build competitive advantages out of these comparative advantages. For example, the industry has not yet developed sufficiently advanced production, harvesting, post harvesting and packing sectors which will be necessary to become globally competitive.

The insufficient supply of certified quality seeds for multiplication and cultivation is another issue resulting directly in lower production. Better seeds are needed to get higher yield and reduce unit cost. Seeds need to match the seasonal and daylight requirements and have high resistance against locally prevalent diseases as curl virus and other diseases are often epidemic in some seasons. New varieties are not being developed in the research facilities, meaning over-reliance on imported hybrid seeds are available. Not all of these seeds are suitable for Pakistani market. For example, some have a very high water content with low shelf life and are unsuitable for longer distance shipping.

Finance is either expensive or unavailable and can be more than 20% for a short term crop, available mainly via middle men or wholesalers. But unfortunately they take advantage of the producers by providing low grade seed and paying lower than the average wholesale prices.

Pakistani farmers need better crop husbandry training for better production as there are no technicians with the adequate know-how to provide appropriate extension services.

Seasonal price spikes can be controlled by increasing the productivity at the farm levels, during the periods with shortage, using new varieties, and by expanding production using tunnels, hydroponics and green houses.

Improved market discovery mechanisms, including mobile phone applications, could also help farmers get real time data and make better selling decisions, perhaps supported by a national service revealing prices daily in relevant Pakistani markets.

More value added business such as, paste, ketchup, dried tomato, puree, juice, stewed tomatoes and peeled tomatoes would stabilize market prices and enhance profitability. More than 30% of the tomato crop in the top five producing countries goes into production of value added items and this will have to be a major feature of Pakistan’s tomato industry competitiveness strategy going forward.



There are problems with the glut and scarce market scenarios. When the fresh crop gets to the market, prices often fall drastically as there is a relatively short shelf life. Producers at times let the crop rot when they cannot justify the cost of transportation. Cool chain maintenance could theoretically improve this situation but there is not currently adequate space available for the storage of tomatoes, required transportation services and retailer display facilities to maintain this desired cool chain.

The Export market is available with demand in the UAE and the CIS, especially the landlocked areas of Central Asia where Baluchistan and Swat production areas enjoy the advantage of relative geographic proximity.

In order to develop this sector, linkages have to be developed between the end user in the international market and the producers as tomatoes need speedy and secure pathways from farm to ultimate market which minimize time delays for this perishable product. Farmers need to know where they will be able to sell and which varieties are desired and will fetch the best prices. Currently, Pakistan's relatively few exporters get the product from the wholesale market and fly it to the UAE market when there is a high demand. These are opportunistic sales that could become more standardized through mechanisms such as contract farming.

Air cargo space is an issue as discussed with various exporters. If there is a designated air cargo facility available, there can be a large jump in the export not only of tomatoes but of a variety of fresh produce from Pakistan⁷.

⁷ Mian Shakhkoti, Pakways

VI. CONCLUSION AND RECOMMENDATIONS

The main issue behind the plight of the small tomato farmers is the lack of coordination between supply and demand and among the successive actors in the value chain. The result of this lack of coordination is a succession of gluts and shortages resulting in higher price risk for farmers and supply uncertainty for all participants in the value chain even if sales are profitably for those value chain actors acting on commission.

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. A ruined farmer does not ruin the distributors who then bond the farmers to ensure supplies in coming seasons.

The problem is not unique to Pakistan. It is in fact a global phenomenon where small farmers are prevalent. Helping farmers has been the policy of a number of governments in developed countries where government departments, or those performing this role in the private sector, calculate the demand for a commodity in the coming season and provide ongoing forecasts on prices. This helps farmers to make their planting decisions.

Big retail chain stores or large buyers also calculate their demand and enter into supply contracts with farmers or with their representative cooperatives. Few corporate consumers of agricultural commodities have adopted this method of contract farming in Pakistan. Their impact however is very limited as they typically do not set the purchase price, so the farmers do not have the financial assurance that they need. While price controls have not usually been successful where they have been tried, crop insurance schemes could be introduced to mitigate farmer risk.

Cooperative farming is a popular option for more perishable crops such as tomatoes. It can help small farmers act as a bigger and more organized market force resulting not only in better supply and demand coordination while improving prices through more equal negotiating power. 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 socio-ethnic taboos to come into effective and productive existence.

Lack of credit for farm inputs and a credit system that does not cater to the needs of small farmers, further limits supply expansion. Since there are a very large number of small horticulture farmers, a major producer segment is credit-constrained, resulting in under-investment in farming inputs like pesticides and fertilizers leading to low yields and poor quality⁸.

Due to financial constraints, the farmers are often forced to sell their produce in advance to the middlemen. The price that they get is normally much lower than the price at which a middleman sells the produce in turn, with the upside price turns enjoyed by the middleman who has absorbed the credit risk.

Low yields result from a combination of price insecurity, resulting from the absence of buy back agreements, advance sales and seeds that do not meet international standards. On the other hand, many progressive farmers are getting better yields due to better crop husbandry practices.

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

⁸Dr. Zafar Altaf

storage infrastructure is available to enhance the shelf life and varieties are developed which are suited for exports.

Quality comes from a combination of agronomic practices, variety characteristics, grading, processing and packaging. The absence of even a single factor makes the product inferior in quality and thus less acceptable in the local or international markets, making a value chain approach necessary.

Small and medium scale producers dominate production, with vegetable farmers in particular being predominantly small-scale. Pakistan has not been able to supply the buyers with good quality tomatoes consistently due to the constraints of the small farmers.

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. Reducing this would enhance GDP, increase farmer income and meet consumer needs. Adequate cold storage facilities for highly perishable and temperature-sensitive tomatoes are not available in the country which results in very high post-harvest losses, ranging from 25 to 30 per cent. These large losses shrink supply and put pressure on prices as lost quantities never reach consumers. The prevention of such losses could potentially provide exportable surplus.

To do this will require internationally accepted standards of processing and packing. Processing of fresh fruits is limited to citrus fruit (kinno) and more recently mangoes and apples. All the remaining fresh fruits and vegetables being exported are either unprocessed or have undergone sub-standard processing and packaging.

Leasing facility may be provided to exporters who will establish cold storage houses near clusters of production. Refrigerated vehicles on lease terms 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.

Pakistan International Airlines provides cargo space in its passenger planes and is not operating dedicated freighter plane flights. Due to their highly perishable nature, tomatoes 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. A designated air cargo service, servicing the horticulture sector can help an increase in the exports tremendously. Provided there is sufficient volume, and that this volume can be maintained year-round, air cargo transport and refrigerated air cargo could be an attractive proposition. But there will be the "first mover" problem. And this in turn requires cooperation among other horticultural products, feasibility studies and development finance.

Inland transportation, while available, is typically without temperature-control. Pakistan Railways (PR) 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 flatbed rolling stock and need to invest only in generators and reliability.

Another challenge will be to bring Pakistani production up to international standards, including production of internationally demanded varieties. Dedicated research organizations have to date lacked the capacity to achieve results in this area. And work done by agricultural research organizations has not reached the farmers due to weak extension services and absence of

coordination between research and extension. Government expenditures in research and extension could be made vastly more effective with better private sector involvement and coordination.

No institutional support is available for marketing on an international level. Individual exporters are not large enough to run international marketing campaigns to promote a brand name. Moreover, due to absence of basic infrastructure, large orders cannot be entertained. Yet other countries have been successful at creating a national brand image for their specific fruits or vegetables, and for their horticultural quality in general. The authors believe that Pakistan can aspire in the future to having strong brand name identification for its horticultural exports, provided the appropriate investments are made in value chain coordination and product quality. Pakistan can be an abundant supplier of horticulture products, including tomatoes.

One priority will be to focus on value addition, including tomato paste, puree, juice and dried tomatoes. 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 their tomato ketchup and pasting facility this year. Coming years should see many more such projects.

Export refinance is currently limited because of weaknesses in documentation. Many exporters are selling their produce on Documents Advance (DA) that does 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 could play a role in addressing this problem⁹.

Competition among exporters has been described by stakeholders as indiscriminate or ruthless. They often compromise on quality and price in order to grab market share from other exporters of Pakistan operating in the same limited markets available. Cooperation for overall market development, which is done so well by US exporters, could help Pakistan gain a sustainable increase in market share going forward.

There are no laid down procedures for standardization and quality specifications. In the absence of known brand names, the importer is not sure of the quality he will be getting and as a result the opportunities to elicit full price advantage are lost in the international market. Pakistan's tomato industry will have to implement not only GAP standards but also full traceability.

Export financing is almost not available as banks often hesitate in financing perishable products. Innovative small farmer financing initiatives are needed but these would have to be accompanied by risk mitigation techniques such as minimum price guarantees, contract farming or crop insurance schemes.

Nothing can be achieved unless stakeholders work in coordination with each other, but to date there has been only limited coordination. A tomato industry competitiveness initiative, sponsored by an international development agency with requisite technical assistance budgets, could provide the stimulus for the industry to come together. Outside assistance could provide a catalyst for value chain coordination, bringing the stakeholder together, benchmarking the current situation, developing a strategy, crafting strategic initiatives and brokering the appropriate public-private

⁹ Mian Shahkoti, Pakways

dialogue to put into place comprehensive initiatives to build the competitiveness of the Pakistani tomato growing and processing industry for both domestic and export markets.

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	Multiple 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
	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	429.922.3454

		DG Fruits and Vegetables	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
	Hunza Seeda	Azhar Bhatti	423.573.1281
	Hyperstar	Shahid Hussain Merchandise Manager Market	423.662.3344 shhussain@hyperstar.pk
	Kahna Fruit & Vegetable Market	Multiple Dealers	
	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 Association	Agriculture	Parvez Gondal Coordinator	332.558.1092
	Pak Turk Association	Business	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	300.844.1132
	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		Ch. Manzoor Ahmed	300.840.2987

	Cooperative		
	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 RS Trader	Umer Sajjad. Gujranwala	321.321.6466
	Producer	Sajjad Kahloon	300.699.9521
	Producer	Ibrar Hussain	333.626.3042
	Producer	Dr.Shafiq	
	Ex-Government	Dr. Zafar Altaf	51.925.7889
	PARC	Dr. Sher Muhammad	331.510.5774
	PARC	Hamida Shah	300.271.1271
	PARC	Dr. Sharif Kallu	333.574.2529
	DG. PARC	Dr. Mubarak	300.921.5732
	GM, Mehran Foods	Daud Khan	302.827.1444
	Manager Quality, R&D, National Foods	M. Arif Sheikh	301.828.8422

	Manager Quality Operations, Shan Foods	M. Sarwar Haider	302.826.8422
Major Growers			
	Country Side Natural Products (Pvt) Ltd Lahore 42c,E/1 Gulberg Lahore	Gohar Sharif Butt	300.822.6356
	Sindhu Model Farms Rajana Road Kamalia	Khalid Iqbal Sindhu	301.729.2400
	Gugushat farms shorkoot c/o Waqas spinning mills	Imtiaz Sulaiman	300.531.0789
	Al Shammash Honda Muhammdi Road Arifwala	Ch Ali Asad	300.694.9177
	Dihati Traders Tahseel Road Arifwala	Zia Ud Din	300.694.9849
	5/137 Qazi House College Road Daska	Qazi Naeem Ullah	321.615.6214
	Arain Zari Farms Dhnote, Lodhran	Muhammad Islam	300.685.8700
	New Fatima Medical Store Railway Road Mailsi, Vehari	Mahtab Hussain	300.867.0985
	Dost Corporation Ghalla Mandi Hasilpur	Tahir Bashir	301.867.0159
	207 E.B. Arifwala. Thana Ahmad Yar Road	Ch Muhammad Aslam	322.784.2207
	House 66 Sector B Main Boulevard Askari X Lahore	Shoukat Khan	300.848.8935
	L-133 Model Town A Sarwar Shaheed Road Bahawalpur.	Jalil Rahman Adreshak	300.868.6845

House No. 40 A Street No. 10 Model Town A Bahawalpur	Nawab Inaam Ullah	345.870.0175
Raza Traders / Imtiaz Sons House No. 27/A Street No. 51 Toheadabad Ravi link Road Lahore	Mr. Arif	333.421.5357 423.770.6786
165-E.B Shahzadabad Burewala Road Arifwala	Ch Mujtaba	300.818.2288
102 E.B. Burewala	Ch. Muhammad Ali	307.699.9102

Annex – B: Sea freight to different destinations from Karachi port - Pakistan

Country	Port	Reefer 40 Feet (USD)	Reefer 20 Feet (USD)
Malaysia	Kuala Lumpur	1800	300
Malaysia	Penang	2400	300
Sri Lanka	Colombo	1700	300
UAE	Dubai	1800	300
Russian Federation	St. Petersburg	5000	3000
Czech Republic	Czech Republic	5000	3000

Source: Raaziq

Annex – C: Import and Export of Tomatoes from Pakistan

Export of Tomato From Pakistan			
Year	2007-08	2008-09	2009-10
Quantity "000" Tonnes	0.997	40.907	5.692
Value in Million Rs.	12.45	412.66	76.91

Import of Tomato in Pakistan			
Year	2007-08	2008-09	2009-10
Quantity "000" Tonnes	35.9	104.6	1.9
Value in Million Rs.	502.29	2818.82	1923.26

Annex – D: Traits of Various Tomato Varieties

Cultivars	Days to flowering	Days to maturity	Yield/plant(kg)	Yield/ha(tonne)	T.S.S	Acidity (%)	Ascorbic acid (mg/100g)
Roma	37.7d	67.7c	1.095d	6.46e	4.9	0.323c	15.27d
Rio Grand	39.7c	76.0b	1.208c	7.96d	5.0	0.313c	15.86b
Rio Fuegd	39.0d	77.7b	1.213c	7.97d	5.4	0.315c	15.85b
Avinash	46.7a	77.7b	1.215c	9.53b	5.5	0.366b	15.45c
Lyreka	45.3b	65.0c	1.283b	8.46c	5.2	0.380ab	16.00a
Yaqui	47.0a	85.0a	1.428a	11.22a	5.4	0.389a	15.21d
LSD	1.197	4.493	0.018	0.081	NS	0.018	0.087

Annex – E: Area Harvested/Yield/Production

Area Harvested (Ha)

	year						
country	item	2008	2009	2010	2011	2012	
Pakistan	Tomatoes	53150	53393	49992	52247		

[] = Official data FAOSTAT | © FAO Statistics Division 2013

Yield (Hg/Ha)

	year									
country	item	2008		2009		2010		2011		
Pakistan	Tomatoes	100887	Fc	105237	Fc	95380	Fc	101369	Fc	

Fc = Calculated data

FAOSTAT | © FAO Statistics Division 2013

Production (MT)

	year						
country	item	2008	2009	2010	2011	2012	
Pakistan	Tomatoes	536217	561891	476826	529620		

[] = Official data

FAOSTAT | © FAO Statistics Division 2013

Annex – F: Value Addition Companies

Shezan International	Top Fruits
Mitchell's Fruit Farms	S.A. Rehman
Ahmed Food Industries	Shangrila Foods
Nestle' Pakistan	Hamdard Fruit Products
Rafhan Best Foods	Hotels and restaurants

Annex – G: Total Brix in Tomato

Tomato Paste	30%-32%
Tomato Puree	12%-15%
Tomato Pulp	10%-26%

Annex – H: Cost of Production

Name of Crop		Tomato			
Acres		1			
Item	Description	Unit	Quantity	Price	Amount
				Rs/Unit.	(Rs/acre)
Value of Production					
Yield of Tomato	Yield Per Acre	Kg/Acre	7500	15	112500.00
					0.00
Total Gross Income					112500.00
Operating Expenses					
Land Preparation					
Ploughing	Ploughing (with different Ploughs)	No.of Ploughings	4	600	2400.00
Planking	Plankings after Ploughing	No.of Plankings	2	600	1200.00
Ridging	Ridge making for seed sowing	No.of Ridging	1	800	800.00
Laser Leveling	Land Leveling	No.of Operations			0.00
Seed & Sowing					
Seed	Amount of Seed used	Packs/Acre	3	2300	6900.00
Seed Treatment	Seed treatment with Chemicals	No.of Treatments	1	250	250.00
Sowing Expenses	Machine or manual sowing	No.of Operations	1	600	600.00

Transplanting expenses	manual transplanting	No. of operation	1	800	800.00
Fertilizer					
Urea	Bags of Urea Fertilizer used	No.of Bags	3.00	1800.00	5400.00
DAP	Bags of DAP Fertilizer used	No.of Bags	2.00	3750.00	7500.00
SOP/MOP	Bags of Potash Fertilizer used	No.of Bags	1.00	4500.00	4500.00
Zink	Bags of Zink used for crop	No.of Bags			0.00
Any other	Bags of Any other Fertilizer used	No.of Bags			0.00
Plant Protection					
Weedicides spray	Weed Control	No.of Spray/Applicatio n	2.00	600.00	1200.00
Pesticide spray	Insect/Pest Control	No.of Spray/Applicatio n	3.00	650.00	1950.00
Fungicide spray	Fungal disease control	No.of Spray/Applicatio n	4.00	700.00	2800.00
Crop Irrigations					
Tube-well Irrigations	Tube well Irrigations for whole crop period	No of Irrigations	6.00	800.00	4800.00
Canal water Charges	Fixed Canal Water charges for crop period	Acre	1.00	150.00	150.00
Harvesting/Picking					
Harvest manually	Charges for picking	Acre	20.00	1000.00	20000.00
					0.00

Marketing/Transportation					
Transportation	Charges for Transporting to Market	Acre	5.00	250	1250.00
Miscellaneous	Any other Expenses	Acre			0.00
Total Operating Expenses					62500.00
Land Rent(For Crop Period Only)	Land Rent/Lease for crop period(Months)	Acre	1.00		0.00
Labor Charges	Agri Labor Charges for crop	Acre	20.00	0.00	0.00
Depreciation	For Agri Machinery/Buildings	Acre	1.00		0.00
R & M	For Agri Machinery/Buildings	Acre	1.00		0.00
Total Other Expenses					0.00
Total Expenses					62500.00
Net Income Per Acre					50000.00

Total Income (All Acres)					50000.00
COST OF PRODUCTION OF TOMATO (NORMAL SEASON)					
FOR THE YEAR 2008-09 ON ONE ACRE					
Sr.No	Name of Operations	No/Qty	Rate / Unit	Expenses	
1	a Furrow turning	1	650	650	
	b Cultivator	3	450	1350	
	c Leveling	1	450	450	
	d Planking	3	225	675	
2	Seed bed Preparation			0	
	a Cultivator	3	450	1350	
	b Planking	3	225	675	
3	Cost of Seed	0.12	8000	960	
4	Cost of nursery raising	1	3000	3000	
5	Cost of manure & fertilizer			0	
	a FYM trolleys	6	800	4800	
	b Labor for applying FYM	6	275	1650	
	c DAP bags	1.5	1900	2850	
	d Urea	1	750	750	
	e SOP bags	1	2100	2100	
	f labor for applying Fertilizer	2	275	550	
6	a Bed making with ridger	1	650	650	
	b Sowing/transplanting	8	275	2200	
7	Cost of Irrigation			0	
	a Canal	6	10	60	

	b Tube well	6	450	2700
	c Cleaning of water courses M/D	2	275	550
	d Labor of Charges for irrigation	6	275	1650
8	Earthling up & weeding	24	275	6600
9	Plant protection charges	5	400	2000
10	Harvesting			0
	a Harvesting	60	275	16500
	b Handling & transportation	25	1000	25000
	c Cost of bags			0
11	Baskets	1200	18	21600
12	Land revenue & other taxes	1	100	100
13	Land rent of 6 months	0.5	20000	10000
	Total Expenditure			111420
14	Management Charges @ 15% of total Expense			16713
15	Interest on capital @ 16% of total Exp.			17827
16	Invisible Charges			350
17	Total Yield			15000
18	Total Value			
19	Total Cost of Production			146310
20	Cost of Production per Ton			9754
21	Cost of Production per Kg			9.75
22	Cost of Production per 40 Kg			390
23	Proposed Support price per 40 Kg			