THE AGRIBUSINESS PROJECT (TAP)

Chili- Value Chain Competitiveness Assessment

Sub Agreement TAP-ISA-013-002

Monday, January 27, 2014

Asad Zahoor and Marcos Arocha

Table of Contents

Acknowledgements

This report encapsulates the results of the Chili 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.

Acronyms and Abbreviations

ASF	Agribusiness Support Fund
FAO	Food and Agriculture Organization of United Nations
FEG	Farmer Enterprise Group
GAP	Good Agricultural Practices
IMLP	International Market Linkages Program
NGO	Non-Government Organization
M&E	Monitoring & Evaluation
SME	Small and Medium Enterprises
SMEDA	Small and Medium Enterprise Development Authority
TDAP	Trade Development Authority of Pakistan
TA	Technical Assistance
UNIDO	United Nations Industrial Development Organization
USAID	United States' Agency for International Development
VCP	Value Chain Platform

Exchange rate used: US$1 = PKR 105

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 one of a series resulting from the effort to deepen the analysis provided in these reports by assessing the competitiveness of the selected value chains. These competitiveness assessments focused on the following:

a) Identification of the precise gaps 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) Subsequent M&E will be facilitated 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, Economic Survey 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 documents were designed to focus on the competitiveness of the selected value chains. However, they shouldn't be considered final. They were conducted in a relatively short time given (about 8 weeks) given the previous work done. Nevertheless, VC strategies should be "living documents" and continuously be updated as potential interventions are further tested and more information is uncovered.

Introduction[1]

Chili peppers have been a part of the human diet in the Americas since at least 7500 BC. There is archaeological evidence at sites located in southwestern Ecuador that chili peppers were domesticated more than 6000 years ago, and were one of the first self-pollinating crops cultivated in Central and South America.

Chilies were cultivated around the globe after Columbus. Diego Álvarez Chanca, a physician on Columbus' second voyage to the West Indies in 1493, brought the first chili peppers to Spain and first wrote about their medicinal effects in 1494.

The spread of chili peppers to Asia was most likely a natural consequence of its introduction to Portuguese traders (Lisbon was a common port of call for Spanish ships sailing to and from the Americas) who, aware of its trade value, would have likely promoted its commerce in the Asian spice trade routes then dominated by Portuguese and Arab traders.

There is a verifiable correlation between the chili pepper geographical dissemination and consumption in Asia and the presence of Portuguese traders, India and Southeast Asia being obvious examples.

The chili pepper features heavily in the cuisine of the Goan region of India, which was the site of a Portuguese colony (e.g., vindaloo, an Indian interpretation of a Portuguese dish). Chili peppers journeyed from India, through Central Asia and Turkey, to Hungary, where it became the national spice in the form of paprika.

[1] *Most of the information below was taken from Wikipedia.*

An alternate, although not so plausible account (no obvious correlation between its dissemination in Asia and Spanish presence or trade routes), defended mostly by Spanish historians was that from Mexico, at the time a Spanish colony, chili peppers spread into their other colony the Philippines and from there to India, China, Indonesia. To Japan, it was brought by the Portuguese missionaries in 1542, and then later, it was brought to Korea.

In 1995 archaeo botanist Hakon Hjelmqvist published an article in *Svensk Botanisk Tidskrift* claiming there was evidence for the presence of chili peppers in Europe in pre-Columbian times. According to Hjelmqvist, archaeologists at a dig in St Botulf in Lund found a Capsicum frutescens in a layer from the 13th century. Hjelmqvist thought it came from Asia. Hjelmqvist also said that *Capsicum* was described by the Greek Theophrastus (370–286 BCE) in his *Historia Plantarum*, and in other sources. Around the first century CE, the Roman poet Martialis (Martial) mentioned "Piperve crudum" (raw pepper) in Liber XI, XVIII, allegedly describing them as long and containing seeds (a description which seems to fit chili peppers - but could also fit the long pepper, which was well known to ancient Romans).

Species and cultivars:

The five domesticated species of chili peppers are:

- *Capsicum annuum*, which includes many common varieties such as bell peppers, wax, cayenne, jalapeños, and the chiltepin
- *Capsicum frutescens*, which includes malagueta, tabasco and Thai peppers, piri piri, and Malawian Kambuzi
- *Capsicum chinense*, which includes the hottest peppers such as the naga, habanero, Datil and Scotch bonnet
- *Capsicum pubescens*, which includes the South American rocoto peppers
- *Capsicum baccatum*, which includes the South American aji peppers

Though there are only a few commonly used species, there are many cultivars and methods of preparing chili peppers that have different names for culinary use. Green and red bell peppers, for example, are the same cultivar of *C. annuum*, immature peppers being green. In the same species are the jalapeño, the poblano (which when dried is referred to as ancho), New Mexico (which is also known as chile colorado), Anaheim,serrano, and other cultivars.

Peppers are commonly broken down into three groupings: bell peppers, sweet peppers, and hot peppers. Most popular pepper varieties are seen as falling into one of these categories or as a cross between them.

Intensity:

The habanero pepper is known for its unique combination of intense flavor, aroma and heat

The substances that give chili peppers their intensity when ingested or applied topically are capsaicin (8-methyl-*N*-vanillyl-6-nonenamide) and several related chemicals, collectively called *capsaicinoids*. Capsaicin is also the primary component in pepper spray, a less-than-lethal weapon.

When consumed, capsaicinoids bind with pain receptors in the mouth and throat that are responsible for sensing heat. Once activated by the capsaicinoids, these receptors send a message to the brain that the person has consumed something hot. The brain responds to the burning sensation

by raising the heart rate, increasing perspiration and release of endorphins. A 2008 study reports that capsaicin alters how the body's cells use energy produced by hydrolysis of ATP. In the normal hydrolysis the SERCA protein uses this energy to move calcium ions into the sarcoplasmic reticulum. When capsaicin is present, it alters the conformation of the SERCA, and thus reduces the ion movement; as a result the ATP energy (which would have been used to pump the ions) is instead released as thermal energy.

The "heat" of chili peppers was historically measured in Scoville heat units (SHU), which is a measure of the dilution of an amount of chili extract added to sugar syrup before its heat becomes detectable to a panel of tasters; the more it has to be diluted to be undetectable, the more powerful the variety and therefore the higher the rating. The modern commonplace method for quantitative analysis of SHU rating uses high-performance liquid chromatography to directly measure the capsaicinoid content of a chili pepper variety. Pure capsaicin is a hydrophobic, colorless, odorless, and crystalline-to-waxy solid at room temperature, and measures 16,000,000 SHU.

Common peppers

A wide range of intensity is found in commonly used peppers:

Bell pepper	0 SHU
New Mexico green chilies	1,500 SHU
Jalapeño	2,500-8,000 SHU
Habanero	100,000–350,000 SHU

Notably hot chili peppers:

Some of the world's hottest chili peppers are:

Trinidad Moruga Scorpion	2.0M SHU
Bhut Jolokia	1.6M SHU[1]
Carolina Reaper	1.474M SHU
Trinidad Scorpion Butch T	1.463M SHU
Naga Viper	1.4M SHU
Infinity chilli	1.2M SHU
Trinidad Moruga Scorpion	1.2M SHU

Uses:

Culinary uses:

Chili pepper pods, which are berries, are used fresh or dried. Chilies are dried to preserve them for long periods of time, which may also be done by pickling.

Dried chilies are often ground into powders, although many Mexican dishes including variations on chilies rellenos use the entire chili. Dried whole chilies may be reconstituted before grinding to a paste. The chipotle is the smoked, dried, ripe jalapeño.

Many fresh chilies such as Poblano have a tough outer skin that does not break down on cooking. Chilies are sometimes used whole or in large slices, by roasting, or other means of blistering or

charring the skin, so as not to entirely cook the flesh beneath. When cooled, the skins will usually slip off easily.

The leaves of every species of Capsicum are edible. Though almost all other Solanaceous crops have toxins in their leaves, chile peppers do not. The leaves, which are mildly bitter and nowhere near as hot as the fruit, are cooked as greens in Filipino cuisine, where they are called *dahon ng sili* (literally "chili leaves"). They are used in the chicken soup, *tinola*. In Korean cuisine, the leaves may be used in kimchi. In Japanese cuisine, the leaves are cooked as greens, and also cooked in *tsukudani* style for preservation.

Chili is by far the most important fruit in Bhutan. Local markets are never without chili, always teemed with different colors and sizes, in fresh and dried form. Bhutanese call this crop ema (in Dzongkha) or solo (in Sharchop). Chili is a staple fruit in Bhutan; the *ema* datsi recipe is entirely made of chili mixed with local cheese. Chili is also an important ingredient in almost all curries and food recipes in the country.

In India, most households always keep a stack of fresh hot green chilies to hand, and use them to flavour most curries and dry dishes. It is typically lightly fried with oil in the initial stages of preparation of the dish. Some states in India, such as Rajasthan, make entire dishes only by using spices and chilies.

Chilies are present in many cuisines. Some notable dishes other than the ones mentioned elsewhere in this article include:

- Paprikash from Hungary uses significant amounts of mild, ground, dried chilies, aka paprika, in a braised chicken dish.
- Paprykarz szczeciński is a Polish fish paste with rice, onion, tomato concentrate, vegetable oil, chili pepper powder and other spices.
- Chiles en nogada from the Puebla region of Mexico uses fresh mild chilies stuffed with meat and covered with a creamy nut-thickened sauce.
- Mole poblano from the city of Puebla in Mexico uses several varieties of dried chilies, nuts, spices, and fruits to produce a thick, dark sauce for poultry or other meats.
- Puttanesca sauce from Italy is a tomato-based sauce for pasta including dried hot chilies.
- Kung Pao Chicken (also spelled Gong Bao) from the Sichuan region of China uses small hot dried chilies briefly fried in oil to add spice to the oil then used for frying.
- Nigerian dishes[] and those in many parts of Africa.
- Som Tam a Green Papaya Salad from Thai/ Lao cuisine traditionally has, as a key ingredient, a fistful of chopped fresh hot Thai chili, pounded in a mortar.
- Nam phrik is a traditional Thai sauce prepared with chopped fresh or dry chilies in fish sauce and lime juice.
- Sambal Belacan (pronounced 'blachan') is a traditional Malay sauce made by frying a mixture of mainly pounded dried chillies and fermented prawn paste. It is customarily served with rice dishes and is especially popular when mixed with crunchy pan-roasted ikan bilis (sun dried anchovies) when it is known as Sambal Ikan Bilis.

- Curry dishes which usually contain fresh or dried chilies.

Fresh or dried chilies are often used to make hot sauce, a bottled condiment to add spice to other dishes. Hot sauces are found in many cuisines including harissa from North Africa, chili oil from China (known as rāyu in Japan), and sriracha from Thailand.

Table 1: Nutritional Value

Nutritional value:	
Peppers, hot chili, red, raw Nutritional value per 100 g (3.5	
Energy	166 kJ (40 kcal)
Carbohydrates	8.8 g
Sugars	5.3 g
Dietary fiber	1.5 g
Fat	0.4 g
Protein	1.9 g
Water	88 g
Vitamin A equiv.	48 µg (6%)
- beta-carotene	534 µg (5%)
Vitamin B_6	0.51 mg (39%)
Vitamin C	144 mg (173%)
Iron	1 mg (8%)
Magnesium	23 mg (6%)
Potassium	322 mg (7%)
Capsaicin	0.01g – 6 g
Percentages are roughly approximated	

Source: Wikipedia

Red chilies contain large amounts of vitamin C and small amounts of carotene (pro vitamin A). Yellow and especially green chilies (which are essentially unripe fruit) contain a considerably lower amount of both substances. In addition, peppers are a good source of most B vitamins, and vitamin B_6 in particular. They are very high in potassium, magnesium, and iron. Their very high vitamin C content can also substantially increase the uptake of non-heme iron from other ingredients in a meal, such as beans and grains.

Importance of Chilies in the Pakistani Context

According to the FAO, Pakistan ranked 3rd in the world among chili growing countries with 5.87% of world total production in 2011, after India, China and Taiwan (FAO 2013). Total world production of Red Chilies reached 3,457,533 Tons during 2011 (FAO Stats). Pakistan produced 40,414 Tons of red chilies having share of 2.05% in total national condiments production in 20011-12 (Fruit, Vegetables and Condiments Statistics of Pakistan, 2013)

According to Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-2012 Statistics published in April 2013, Pakistan exported 3,584 Tons of chilies worth 415 million rupees to UAE, Mexico, South Africa, Sri Lanka, USA and Bahrain. Pakistan also exported 960 Tons red chilies powder having value of 138 million rupees in major markets included Saudi Arabia, UAE, Canada, Egypt, USA, Kuwait etc. Also Pakistan imported 554 Tons chilies worth 124 million rupees. India and China were the main markets in 2010.

Table 2: Top 10 Chili Producing Countries of the World in 2012

Producing Country Rank	Producing Country	Production TONSs in 2010-11	% of Production
1	India	1,445,947	41.82%
2	China	282,342	8.17%
3	**Pakistan**	**202,934**	5.87%
4	Bangladesh	176,134	5.09%
5	Peru	171,929	4.97%
6	Thailand	139,322	4.03%
7	Myanmar	124,321	3.60%
8	Ethiopia	95,000	2.75%
9	Viet Nam	90,001	2.60%
10	Ghana	88,000	2.55%

Source: FAO Stats

Pakistan Chilies Production Base:

In Year 2011-12 Pakistan produced 40,414 Tons of Red Chilies on around 24,776 hectares as per Pakistan Crop Reporting Services Statistics. This was only 21% as compared to total production of around 188,859 Tons in 2009-10 on 74,784 hectares.

Sindh has been the major producer of chilies followed by Punjab and Baluchistan. According to Pakistan Crop Reporting Services Statistics Sindh produced about 24,113 Tons from an area of 13,853 thousand hectares, with an average yield of 1.74 Tons per hectare. Sindh has recorded a significant decrease in Chili production from its record high level of production in year 2009-10.

Table 3: Province Wise Breakup of Area under Chili Production

Chili Area under Cultivation (Hectares)

Chiles	2007-08	2008-09	2009-10	2010-11	2011-12
Pakistan	64,175	73,864	74,784	63,608	24,776
Punjab	5,121	5,298	5,439	5,147	5,510
Sindh	54,154	63,707	64,380	52,732	13,853
KPK	693	629	643	529	422
Baluchistan	4,207	4,230	4,322	5,200	4,991

Source:- Crop Reporting Services of Provinces

Table 4: Province Wise Breakup of Chili Production in Last Five Years

Production (Tons)

4	2007-08	2008-09	2009-10	2010-11	2011-12
Pakistan	116,101	187,689	188,859	171,764	40,414
Punjab	8,087	8,590	8,943	7,983	8,456
Sindh	104,190	172,171	172,809	158,195	24,113

KPK	830	749	781	586	490
Baluchistan	2,994	6,179	6,326	5,000	7,355

Source:- Crop Reporting Services of Provinces

The above table indicates a steep decrease in Chili production in 2011-12, whereas peak production level was recorded in year 2009-10.

Table 5: Province Wise Province Wise Share in National Production in Last Five Years

Province Wise Share in National Production

Chiles	2007-08	2008-09	2009-10	2010-11	2011-12
Punjab	7%	5%	5%	5%	21%
Sindh	90%	92%	92%	92%	60%
KPK	1%	0%	0%	0%	1%
Baluchistan	3%	3%	3%	3%	18%

Source:- Crop Reporting Services of Provinces

Table 5 above indicates a steep decrease in Chili production in Sindh in 2011-12, whereas Table 6 shows that Sindh share in national production dropped from 92% to mere 60% in 2011-12.

Table 6: Change in Chili Production in Sindh Province

Change in Production as Compared to Year 2009-10

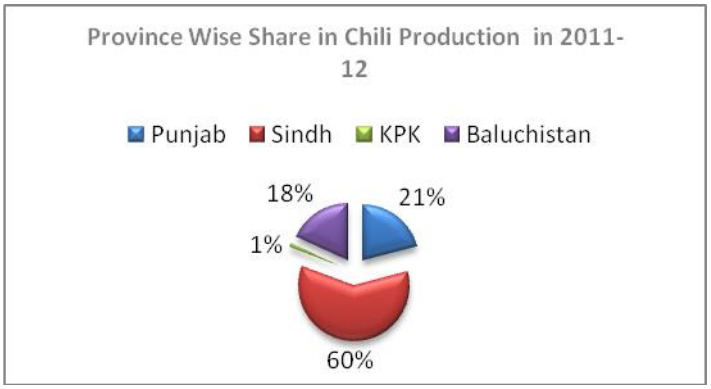
Chiles	2007-08	2008-09	2009-10	2010-11	2011-12
Pakistan	61%	99%	100%	91%	21%
Punjab	90%	96%	100%	89%	95%
Sindh	60%	100%	100%	92%	14%
KPK	106%	96%	100%	75%	63%
Baluchistan	47%	98%	100%	79%	116%

Source:-Crop Reporting Services of Provinces

Table 6 above highlights that Pakistan Chili production in 2011-12 dropped to 21% of it's production level in 2009-10. The overall decrease occurred due to a significant decrease in Sindh where production dropped to 14% of production level in 2009-10.

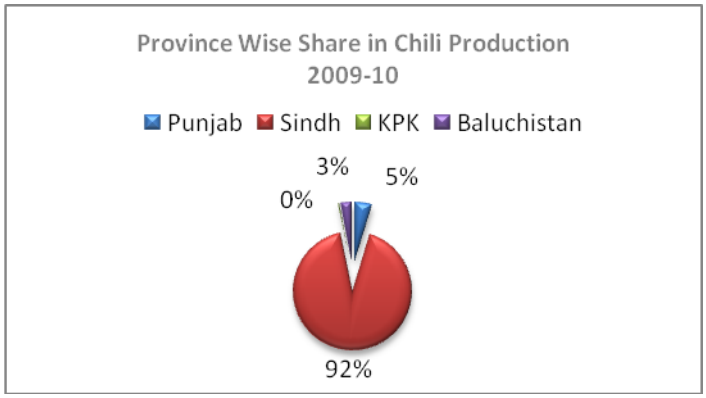
The Pie Chart below shows the change in province wise production, showing decrease in Sindh contribution to national production to 60%, down from 92% in 2009-10.

Chart 1: Province Wise Share in Pakistan Chili Production in 2011-2012



Source:-Crop Reporting Services of Provinces

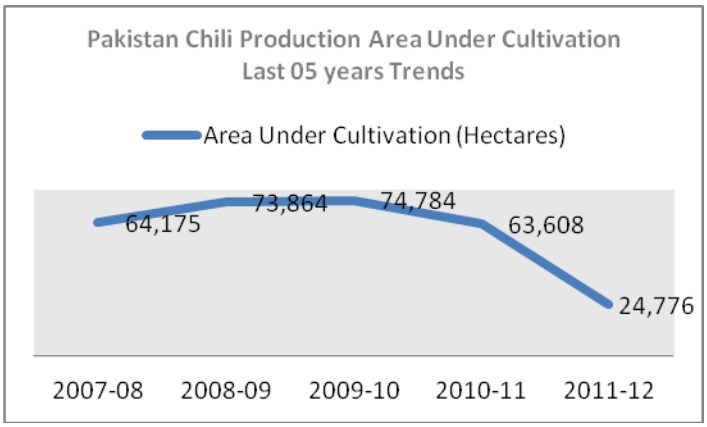
Chart 2: Province Wise Share in National Production 2009-2010



Source:-Crop Reporting Services of Provinces

The Graph below bellow shows a decrease in area under cultivation from 74,784 hectares to 24,776 in 2011-12.

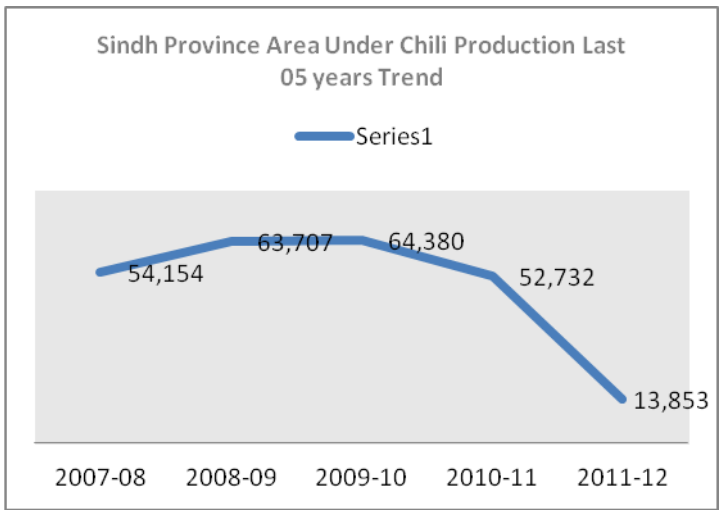
Chart 3: Pakistan Chili Production Area under Cultivation Last 05 years Trends



Source:-Crop Reporting Services of Provinces.

A correspondent decrease in production is recorded as shown below. Pakistan produced 40,414 Tons of chili in 2011-12 as compared to 188,859 Tons in 2009-10. Decrease in Chili production has recorded due to steep decrease in production in Sindh in 2011-12, which was recorded at 13, 853 Tons, down from 64,380 Tons in 2009-10.

Chart 4: Sindh Chili Production Area under Cultivation Last 05 years Trends



Source:-Crop Reporting Services of Provinces.

Punjab produced 8,456 Tons of chilies in 2011-12. This accounts for 28% of national production. Multan, Khanewal, Vehari, Bahawalpur and Lodhran are major chilies growing districts in Punjab. Hybrid chilies skyline-2 variety is more popular variety in Punjab.

Figure 1: Map of Chili Cluster in Punjab

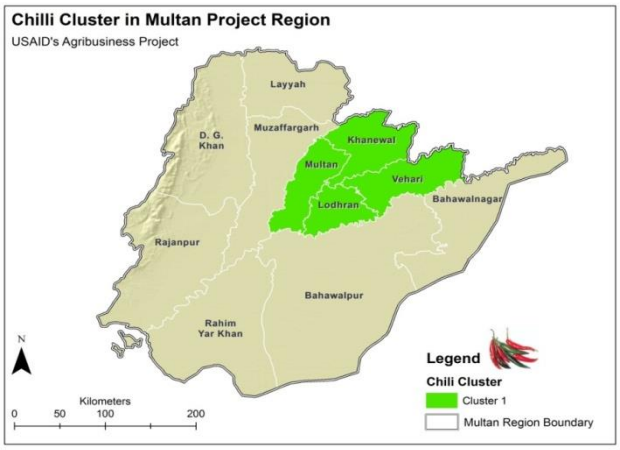
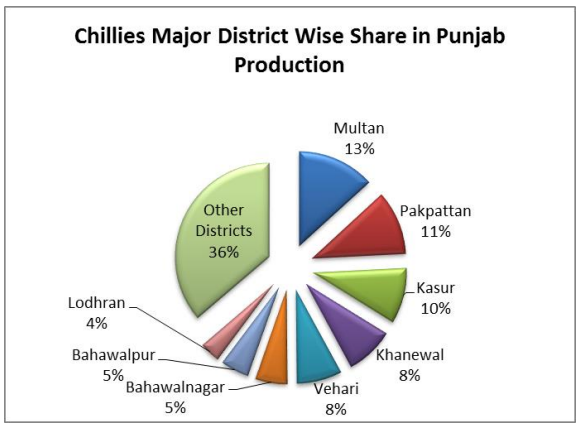


Chart 5: District Wise Share in Punjab Chilies Production



Source: Agribusiness Project, computed from Statistics of MINFA and Punjab Govt. 2009-10

In province KPK, Chili production is negligible as shown in the Table 08 above.

II. Market Trends

Domestic Markets:

Red Chili is by and large sold to consumers in a traditional way. Most of the local consumption is fed through small grocery shops in villages, small towns and even big cities.

According to the traders, demand for the processed Red Chilies is increasing in the urban markets. Consumers are attracted to attractive packing are ready to pay a premium for the packed as compared to the "open" product available in the market. The trend was confirmed by the purchasing staff at the organized super markets like Metro Stores and Hyper Star Store. The relative size of market for processed and packed Red Chili however is very small (less than 5%) as compared to Red Chili sold the traditional way.

Based on the market information collected from the Kunri "mirchi mandi" or the Chili Wholesale market, breakup of sales to different secondary wholesale markets is shown below. This is indicative of consumption of red chili in various regions of Pakistan.

Table 7: Breakup of Sales to Secondary Wholesale Markets in Pakistan

Market	# of Bags	% Share
Karachi	2,000	33
Lahore	3,500	58
Other Wholes Sale Markets	500	8
Total	**6,000**	**100**

Source: Kunri Wholesale Market Traders

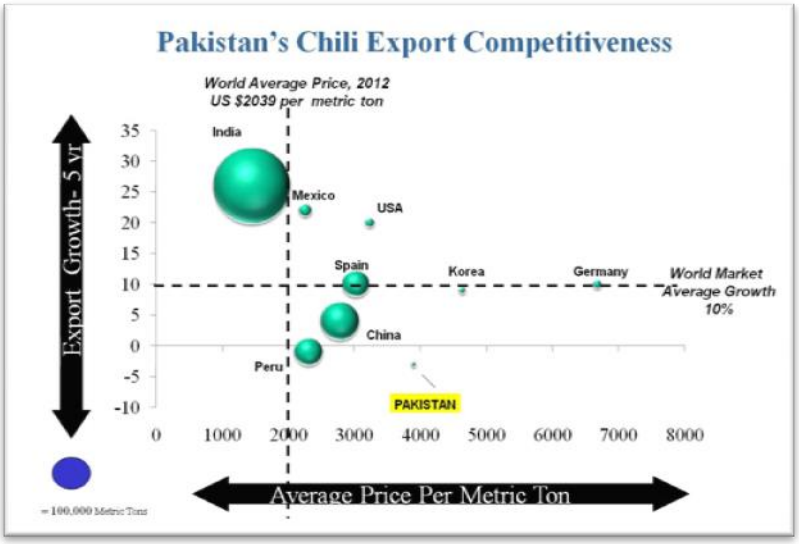
Dried Chili: World Markets

World dried Chili exports stood at US dollar $1.3 billion in 2012 with total 629,591 Tons exported at an average price of USD 2,039 per ton. Market has been growing in value terms at a very strong annual rate of 10% from 2008-2012, and at 5% in volume terms. However, Pakistan exports have declined over the same five-year period at rate of 3% annually. Pakistan exports were worth USD 5.4 million, which represent a world market share of 0.41 %.

In spite of the negative trend in exports, Pakistan's Revealed Comparative Advantage (RCA) index stood at a still strong 3.1 in 2012. 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. It must not be confused with a competitive advantage- which requires many other elements to be in place— including appropriate marketing links and 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. [2]

Chart 6: Pakistan Chili Export Competitiveness



J E Austin Calculation on UN COMSTrade Database

Besides a still strong RCA, Pakistan exports received an average price of per metric ton of $3,891, which is nearly double that of the world average in 2012, which stood at USD $2,039 per ton. The figure below depicts the relative export performance of Pakistan in the last five years vis a vis the top 10 exporters in the world.

The figure above suggests that Pakistan's export volumes have been declining, and as such it has become a smaller player in the world market at the moment. However, Pakistan shows strength in higher prices than world market, and the world market is growing at 10% per annum. Thus, Pakistan has a competitive product and can fully build its competitive position through volume increases.

A comparison between current Pakistan export markets and the world largest importers reveals that Pakistan is not currently selling to the more sophisticated markets in terms of volumes, growth, and prices per unit. The table below shows country wise breakdown of Pakistan dry chili exports.

Table 8: Pakistan Exports in 2012

Country	Exported value 2012 (USD thousand)	Share in Pakistan's exports (%)	Growth in Export value between 2008-2012 (%, p.a.)	Share of partner countries in world imports (%)	Total import growth in value of partner countries between 2008-2012 (%, p.a.)	Ranking of partner countries in world imports
Pak Total Exp.	**5,397**	**100**	**-3**	**100**	**9**	
Mexico	2,066	38.3	7	2.1	-24	13
United Arab Emirates	1,445	26.8	9	1.2	18	20

[2] 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.

Saudi Arabia	974	18	-12	0.7	16	28
Yemen	210	3.9	-37	0	-32	95
Kuwait	130	2.4	-12	0.2	13	56
United States of America	94	1.7	-15	23.4	11	1
Bahrain	71	1.3	-15	0.1	8	69
Chinese Taipei	62	1.1	45	0.3	8	43
Egypt	55	1	-56	0.2	-8	48
Qatar	48	0.9	0	0.1	15	62

Source: ITC Trade Map. 2013

As per Table 8 above, Pakistan exports more than 70% to three markets: Mexico, the UAE and Saudi Arabia. However, none of them appear in the list of the top ten importers worldwide (see Table 9, below). Further, the Mexican market has actually declined 24% in the past five years. From the list of the largest markets, the USA, the UK and Korea stand out in terms of their growth and average price paid per ton, which are larger than the world average.

It is also interesting to note that, of the largest 10 markets globally, only 3 are European- Spain, Germany and the UK, which together represent only 14.2 of the world market. The other 7 represent over 50% of world demand, and have higher tolerance for alfatoxin levels.

Table 9: World's Top 10 Import Markets for Red Chilies, 2012

Importers	Value imported in 2012 (USD thousand)	Quantity imported in 2012	USD per Ton, All Imports	Annual growth in value between 2008-2012 (%)	Annual growth in quantity between 2008-2012 (%)	Share in world imports (%)
World	1,302,218	620861	2097	9	4	100
United States of America	**304,782**	**120460**	**2530**	**11**	**4**	**23.4**
Malaysia	101,376	56297	1801	8	-1	7.8
Spain	85,385	40569	2105	8	3	6.6
Viet Nam	74,432	44174	1685	146	113	5.7
Germany	65,823	18208	3615	1	-1	5.1
Japan	56,183	11475	4896	6	-1	4.3
Republic of Korea	**40,504**	**12120**	**3342**	**29**	**12**	**3.1**
Sri Lanka	38,217	33572	1138	5	1	2.9
Thailand	35,803	50654	707	13	7	2.7
United Kingdom	**32,301**	**9032**	**3576**	**10**	**6**	**2.5**

Source: ITC Trade Map. 2013

ITC Trade Map statistics shows export of ***"Fruits of the genus Capsicum or Pimenta, dried, crushed or ground"*** reported under Harmonized Code 090420. FAO and Crop Reporting Services use their own respective definitions which are different from the one used by ITC. The export statistics in the tables below represent chili data from Fruit, Vegetable and Condiment Statistics of Pakistan and represent chili only as opposed to ITC statistics used in this study which include peppers in addition to chilies.

Table 10: Pakistan Chili Exports (Whole)

	2011-12		2010-11	
	Quantity (KGs)	Value ('000 PKR)	Quantity (KGs)	Value ('000 PKR)
Total		2,110,605,451		2,120,846,733
	425,487	108,102	1,120,845	208,443

Australia	1,725	490	430	66
Bahrain	2,482	695	54,816	10,108
Canada	4,860	1,496	6,422	1,498
Denmark	12	4		
Germany	176	47	55	15
Greece			700	208
Italy			700	143
Jordan	1,600	330	735	147
Kenya	452	91	854	176
Kuwait	3,750	911	15,000	2,767
Lebanon	1,000	210	215	54
Madagascar			38	7
Malaysia	66	18		
Mexico	21,000	6,583	42,000	10,228
Netherlands			10	2
New Zealand			100	15
Oman			18,900	4,222
Qatar	15,495	3,515	7,225	1,624
Saudi Arabia	87,744	26,152	355,510	71,638
Senegal			12,200	1,732
Singapore			30	5
South Africa	71	23	48	14
Sudan			501	117
U. S. America	2,663	746	16,303	2,810
UAE	269,440	64,576	587,793	100,794
United Kingdom	85	26	260	52

Source: Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-12

Table 11: Pakistan Chili Exports (Powder)

	2011-12		2010-11	
	Quantity (KGs)	**Value ('000 PKR)**	**Quantity (KGs)**	**Value ('000 PKR)**
Total	396,380	123,316	881,555	212,094
Australia	1,882	585	8,791	2,139
Bahrain	18,281	5,525	50,392	12,189
Brunei Darussalam	290	90		
Canada	28,005	8,900	38,252	9,015
Chile			154	53
Denmark			1,184	308
Fiji	52	20		
France	712	211	700	145
Germany	244	92		
Greece			2,701	560
Hong Kong	10,156	3,193	8,274	2,093
India			58	16
Iran (Islamic R.)			60	16
Ireland	498	131	450	94
Italy			1,564	460
Kuwait	16,986	5,470	43,438	9,927
Lebanon	12	4		
Malaysia	2,768	972	340	74
Mauritius	92	26	200	47
Netherlands			180	47

New Zealand	16	5	220	65
Oman	501	196	714	168
Qatar	2,608	937	3,197	758
Saudi Arabia	202,296	63,123	606,365	146,944
Singapore	1,936	546	808	183
South Africa	1,914	670	255	58
Sudan			50	17
Thailand			744	268
U.S. America	84,235	26,475	58,702	14,139
Uganda			390	79
United Arab Emirates	17,999	4,825	35,527	8,812
United Kingdom	4,677	1,253	17,845	3,420

Source: Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-12

Table 12: Pakistan Chili Exports (Seed for Growing)

	2011-12		2010-11	
	Quantity (KGs)	Value ('000 PKR)	Quantity (KGs)	Value ('000 PKR)
Total	120,695	36,204	61,133	15,169
Australia	2,348	1,106		
Bahrain	1,000	312		
Botswana			145	26
Canada	5,251	2,095	730	239
Greece	15,022	4,761	2,618	878
Hong Kong	6,225	2,096	1,800	272
Japan			2,100	337
Kuwait	2,982	714	1,008	326
Mauritius			200	25
Mozambique	134	73		
New Zealand	77	37		
Philippines	1,300	400		
Saudi Arabia	49,475	13,546	41,731	10,189
Singapore	19	12	1,335	364
South Africa	2,703	839	296	61
U.S. America	27,623	8,409	3,919	689
Uganda	350	106		
United Arab Emirates	6,186	1,698		
United Kingdom			5,251	1,763

Source: Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-12

Table 13: Pakistan Chili Exports (Other Capsicum Genus)

	2011-12		2010-11	
	Quantity (KGs)	Value ('000 PKR)	Quantity (KGs)	Value ('000 PKR)
Total	10,143	3,360	6,990	1,747
Australia	81	24		
Canada	2,446	1,113	4,200	1,065
France	150	46		
Greece	2,402	653		
Kazakstan	130	38		
Malawi			255	127
Malaysia	1,992	585		
Singapore			35	7
U.S.America	1,771	545	1,820	377

United Kingdom	1,171	355	680	171

Source: Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-12

Table 14: Pakistan Product Mix Chili Exports

	2011-12		2010-11	
	Quantity (KGs)	**Value ('000 PKR)**	**Quantity (KGs)**	**Value ('000 PKR)**
Red Chiles Whole	425,487	108,102	1,120,845	208,443
Red Chilies (Powder)	396,380	123,316	881,555	212,094
Red Chilies (Seed for Growing)	120,695	36,204	61,133	15,169
Other Capsicum	10,143	3,360	6,990	1,747
Total	952,705	270,982	2,070,523	437,453

Source: Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-12

Table 14 above shows product mix as reported by Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-12. This shows that Chili exports are reported under 04 different harmonized codes (Level 08). The majority of export is recorded under the HS Code for chili powder. This also signifies that a significant quantity is exported by leading spice processing and export companies under their brands or by commercial exporters. The table also shows that a significant quantity (120 Tons) was reported under "seed for growing" category and apparently indicates misreporting on the part of exporters of forwarding agents.

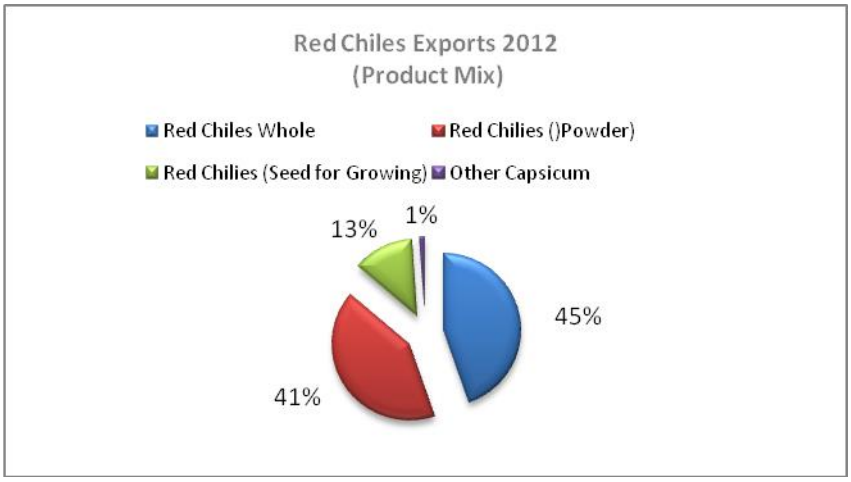
Table 15: Pakistan Product Mix Chili Exports

Product	**Ave Price (PKR/Kg)**	
	2011-12	**2010-11**
Red Chiles Whole	254.07	185.97
Red Chilies (Powder)	311.11	240.59
Red Chilies (Seed for Growing)	299.96	248.13
Other Capsicum	331.26	249.93

Source: Author's Calculations based on Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-12

The product mix in the Pie Chart below (Chart 7) also indicates that 41% chili is exported as "dried whole" as opposed to power form in consumer packed. This indicates that value addition is not taking place in Pakistan as compared to general practice in case of other producing and exporting countries.

Chart 7: Pakistan Chili Export Product Mix



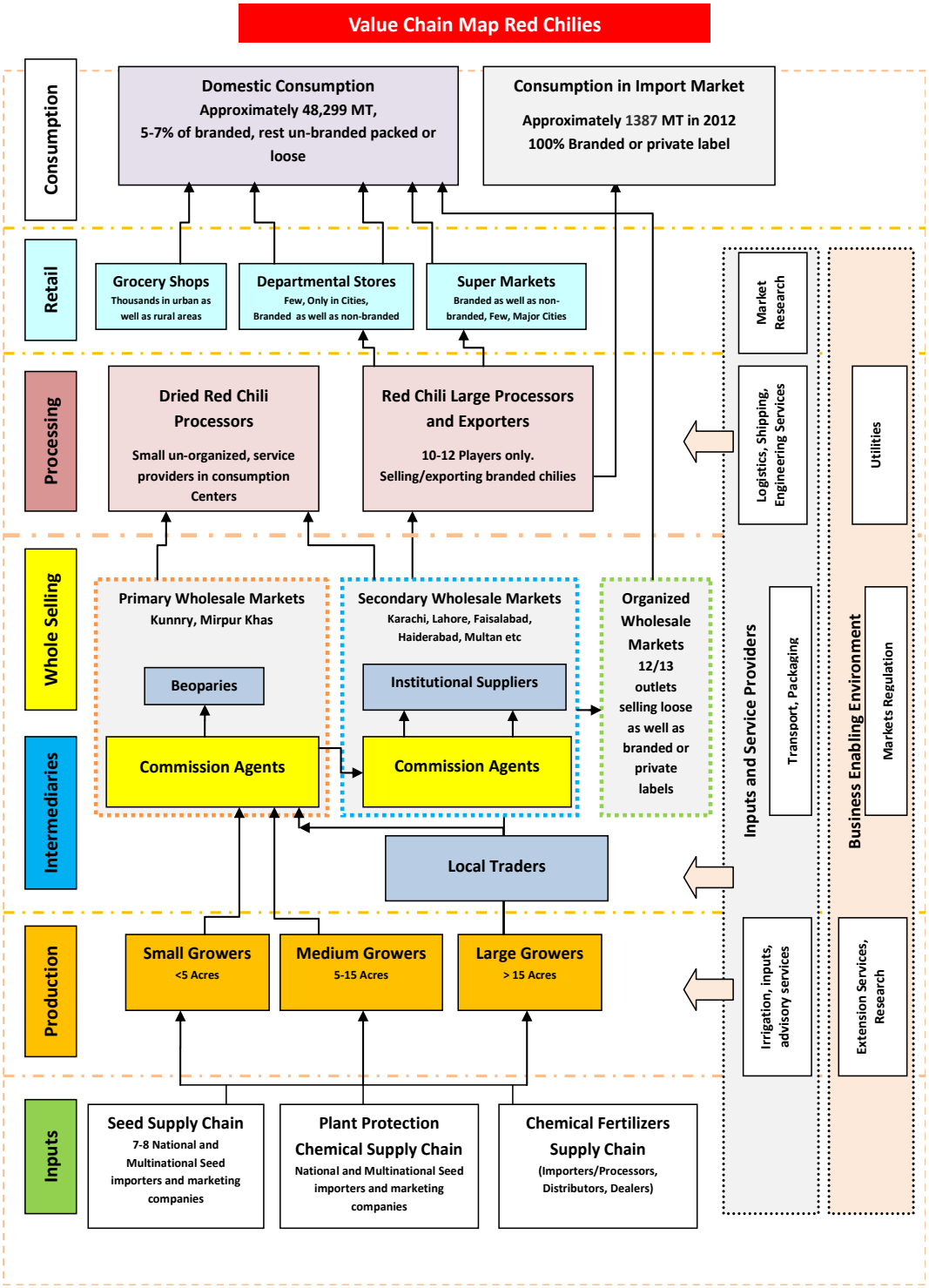
Source: Author's Calculations based on Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-12

This report is mainly concerned with dried chili, since Pakistan currently does not appear to have significant amounts of fresh chili exports- or at least, until 2012, these were not registered by official statistics. Nevertheless, as it was the case regarding other products covered in these series of reports, some exporters reported exporting fresh chili to the CIS and other neighboring countries.

As such, it seems pertinent to mention that the world market for fresh chili and peppers registered worldwide exports of 2.8 million Tons in 2012, for a value of nearly 4.3 billion USD. On these metrics, the market in fresh is about 4 times the size of the market for dried. Although the growth in the last five years has been a more modest 4% (compared to 10% for dried), there could be opportunities for Pakistan in this market which is 4 times as large. Likewise, the alfatoxin level would not constitute a barrier in the fresh market as it currently is for dried chilies as explained in the latter chapter of this report.

III. Structure of the Red Chili Value Chains

Figure 2: Pakistan Red Chili Value Chain Map



Value Chain Map (Figure 2) above depicts the flow of goods across the chain that comprise of the following participants and actors;

- Inputs Suppliers (fertilizer, pesticide etc)

- Growers
- Commission agents
- Traders
- Spice Processors
- Chili Value Added Product Manufacturers
- Exporters

Input Providers:

Several input providers have their presence in the production areas. In addition to authorised dealers for fertilizers and pesticide marketing companies several commission agents and "financiers" also deal in inputs. These dealers usually supply to growers who cannot buy on cash. They usually charge high markup on the inputs which usually go as high as 48% per annum. In addition to dealers' network, inputs are also provided by commission agents in the whole sale markets. The mode of payment usually is also credit and commission agents usually charge marked up prices for the inputs they provide.

Due to proliferation of plant protection chemical brands/labels, growers find it difficult to differentiate between quality products and sub standard ones. Availability of standard products is reported as an issue by growers.

Similarly there are many stories of cheating growers by selling counterfeit products by fertilizer as well as pesticide dealers.

There are serious implications of sub-standards and counterfeit fertilizers and plant protection chemicals for Red Chili growers as well. Many experts believe that incidence of disease has increased due to ineffectiveness of these chemicals. They also claim that some of the pathogens have persisted due to in appropriate application of broad spectrum pesticides and therefore several insect pests have developed resistance against plant protection chemicals available in the market.

In order to ensure that adulteration does not take place at the retail level and that counterfeit products are not sold under their establish brands, many leading input marketing companies' have established their own networks of franchised outlets. The franchise outlets are gaining popularity with growers who buy on cash and who had un-satisfactory experience with the non-branded or conventional input dealers in the past.

The number of private dealers runs in several dozen in the Red Chili producing areas alone and a proliferation is observed over the last few years. This is attributed to heavy profits available to the dealers by selling products of un-known brands or labels or counterfeit products of popular brands.

Whereas leading brands of fertilizers and other inputs are trying to create awareness among growers and also trying to increase availability of standard products through their franchise networks, the problems due to sale of substandard inputs is on the rise. Growers complain that they incur heavy losses due to substandard products. They also complain that at times government extension staff collude with sellers of substandard products and try to influence purchase decisions in favor of substandard products in exchange for gains offered by these companies.

An industry leader held the department of agriculture responsible for the prevailing situation. He questioned the wisdom of the provincial government to approve hundreds of labels at the first place. He also expressed deep concern over the capacity of the government to ensure that the licensed producers were packing as per the standards and counterfeits were not selling in the market place.

Structure of the Production:

Red Chili is mostly produced by small and medium growers. Typically, the owner of the farm manages all the farming activities.

Province Sindh has been the main contributor to the national production of Red Chilies till year 2009-10. Its total contribution was reported to be around 92%. Umer Kot, MirpurKhas and Sanghar are the major Chili growing districts in Sindh.

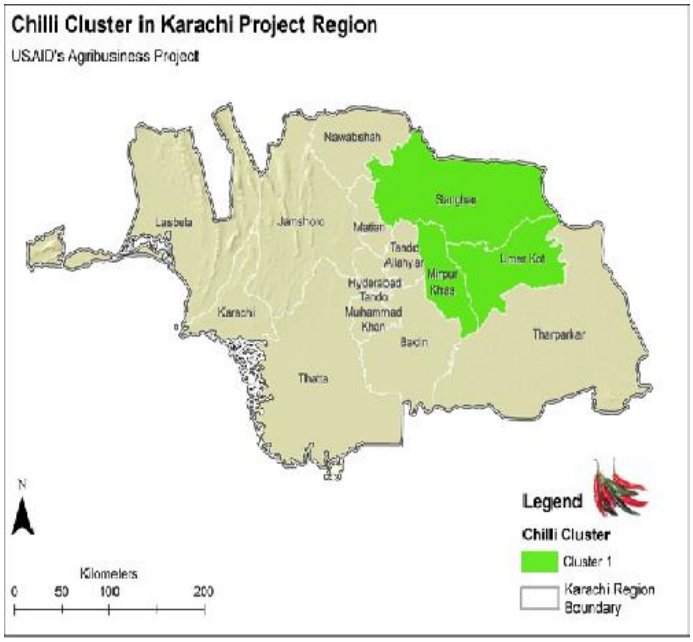
Kunri, a small town of Umer Kot district is the home of the largest production cluster in the production belt. Kunri has been reported as the major production hub, which contributed over 85% of Pakistan Red Chili production till 2009-10 and has been known as one of the largest production center for Red Chilies in Asia. Maxi, Desi & Nageena have been reported as the three major varieties of Chili grown in the cluster.

Kunri produces different crops, including red chilies, cotton, and mangoes. However, the most popular crop is the red chili, which sustains the financial structure of the town. Red chilies cluster is distributed in District Umerkot in areas like Kunri, Jhuddo, Bustan and some other areas like Mirpurkhas, Badin, Tando Muhammad Khan.

There are more than 500 red chili growers in Kunri having different land holdings classified as:

- Large growers: having more than 15 acres (15% of the Kunri chili cluster)
- Medium Growers having 5 – 15 acres (60% of Kunri chili cluster)
- Small Growers having less than 5 acres (25% of Kunri chili cluster)

Figure 3: Map of Production Clusters in Sindh



Source: USAID Agribusiness Project Rapid Market Assessment

Table 16: Number of Growers Cultivating Chilies in District Umer Kot

Category	Size (Acre)	# of Acres	# of Growers
Small	1-5	17,150	3,430
Medium	5-15	12,250	817
Large	16-30	5,745	192

Source: Department of Agriculture, Government of Sindh

According to Crop Reporting Services of Provinces data, Pakistan average yield per hectare was 1.22 Tons in 2011 for Red Chilies. The figure differed from the FAO one for the same period. According to FAO Stats, Pakistan average yield per Hectare was 2.97 Tons per hectare for Chilies and Peppers dry category. Since Crop Reporting Services data is segregated for Chilies only, therefore is preferred over the FAO figure which is aggregated for chilies and peppers combined.

As the table below indicates yields have slightly improved for Punjab whereas the yield figures for Sindh are constant over the last 5 years.

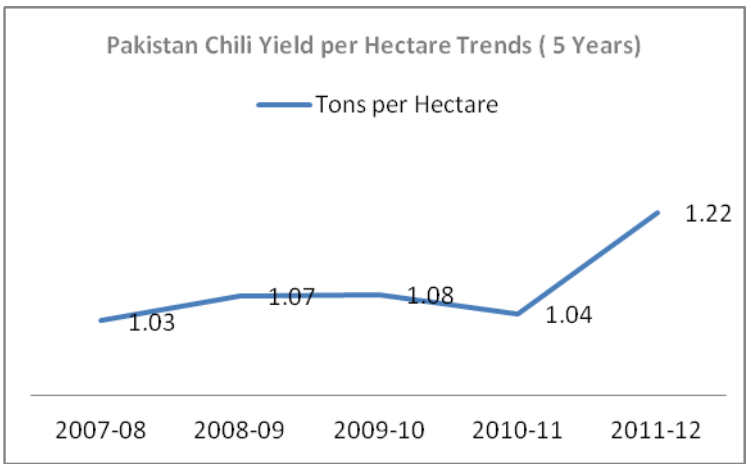
Table 17: Chiles Yield Trends Last 5 Years (Tons per Hectare)

Chiles	2007-08	2008-09	2009-10	2010-11	2011-12
Pakistan	1.03	1.07	1.08	1.04	1.22
Punjab	1.58	1.62	1.64	1.55	1.53
Sindh	1.00	1.00	1.00	1.00	1.00
KPK	1.20	1.19	1.21	1.11	1.16
Baluchistan	0.71	1.46	1.46	0.96	1.47

Source: Author's Calculations based on Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-12

According to Agricultural statistics of Pakistan during the year 2011 average yield per hectare was 1190 kg. When compared with the yields of leading producers of the world and even the progressive growers in other parts of Pakistan (Rahimyar Khan and Lodhran) yield is significantly lower.

Chart 8: Chiles Yield Trends Last 5 Years (Tons per Hectare)



Source: Author's Calculations based on Fruit, Vegetables and Condiments Statistics of Pakistan, 2011-12

From the cost of production table below, it is evident that producing Red Chilies are profitable for growers at the going market prices and the yields levels. It is however coming strongly from the inputs from the growers that the profitability has eroded on account of higher input costs as the produce prices have not increased in the same proportion

Table 18: Cost of Chili Production in Kunri (Small Growers)

Cost of Production

Variety Name:	**Dandicut**	**Place:**	**Kunri**

A **Value of Production**

Output Unit	**# of Output Units**	**Ave Wt per Output Unit**	**Total Output Weight per Acre**	**Ave Rate per Unit**	**Revenue per Acre**
Bags	70	25	1,750	112.5	196,875

B Cost of Production

	Item	**Description**	**Unit**	**Qty**	**Price(PKR/U**	**Amount (PKR)**
a	**Land Preparation**					
	Ploughing	Ploughing (with different Ploughs)	No. of Ploughing	4	600	2,400
	Planking	Planking after Ploughing	No. of Planking	2	600	1,200
	Ridging	Ridge making for seed sowing	No. of Ridging	1	1,000	1,000
	Laser Leveling	Land Leveling	No. of Ops	0		-
b	**Nursery Sowing/Transplanting in Fields**					
	Seed	Amount of Seed used	Bags/Acre	12	1,400	16,800
	Seed Treatment	Seed treatment with Chemicals	No. of Ops			-
	Sowing Expenses	Machine or manual sowing	No. of Ops	1	1,000	1,000
	Transplanting Expenses					
c			**Fertilizer**			
	Urea	Bags of Urea Fertilizer used	No. of Bags	6	1,800	10,800

DAP	Bags of DAP Fertilizer used	No. of Bags	2	3,850	7,700
SOP/MOP	Bags of Potash Fertilizer used	No. of Bags	1	4,500	4,500
Zink	Bags of Zink used for crop	No. of Bags			-
Other	Bags of Other Fertilizer used	No. of Bags			-

d **Plant Protection**

Weedicide spray	Weed Control	No. of Sprays	2	800	1,600
Pesticide spray	Insect/Pest Control	No. of Sprays	2	600	1,200
Fungicide	disease control	No. of Sprays	5	750	3,750

e **Crop Irrigations**

Tube-well Irrigations	Tube well Irrigations for whole crop period	No of Irrigations	6	800	4,800
Canal water Charges	Fixed Canal Water charges for crop period	Acre	1	150	150

f **Harvesting**

Harvesting Labor	External Contract Labor	Acre	1	2,500	2,500
Picking Labor	Farm's own Labor	Acre	1	3,500	3,500

g **Transportation**

Transportation	Transporting to the Market	Acre	100	15	1,500
Miscellaneous	Any other Expenses	Acre			-
I	**Total Variable Cost of Production**				**64,400**
Land Rent (For Crop Period Only)	Land Rent/Lease for crop period(Months)	Acre	1	40,000	40,000
Labor Charges	Ag-Labor Charges for crop	Acre	1	7,000	7,000
Depreciation	For Ag-Machinery/Buildings	Acre	1	2,000	2,000
Repair & Maintenance	For Farm Machinery etc	Acre	1	3,000	3,000
Total Other Expenses					**52,000**
Total Expenses					**116,400**
Net Income Per Acre					**80,475**

Table 19: Cost of Chili Production in Kunri (Small Growers)

Cost of Production Medium Growers					
A	**Value of Production**				
	Output Unit	**# of Output Units**	**Ave Wt per**	**Total**	**Ave Rate per**	
	Bags	60	25	1,500	112.5	168,750
B	**Cost of Production**				
a	**Land Preparation**				

Ploughing	Ploughing (with different Ploughs)	No. of Ploughing	4	600	2,400
Planking	Planking after Ploughing	No. of Planking	2	600	1,200
Ridging	Ridge making for seed sowing	No. of Ridging	1	1,000	1,000
Laser Leveling	Land Leveling	No. of Ops	0		-

b **Nursery Sowing/Transplanting in Fields**

Seed	Amount of Seed used	Bags/Acre	12	1,400	16,800
Seed Treatment	Seed treatment with Chemicals	No. of Ops			-
Sowing Expenses	Machine or manual sowing	No. of Ops	1	1,000	1,000
Transplanting Expenses					-

c **Fertilizer**

Urea	Bags of Urea Fertilizer used	No. of Bags	6	1,800	10,800
DAP	Bags of DAP Fertilizer used	No. of Bags	2	3,850	7,700
SOP/MOP	Bags of Potash Fertilizer used	No. of Bags	1	4,500	4,500
Zink	Bags of Zink used for crop	No. of Bags			-
Other	Bags of Other Fertilizer used	No. of Bags			-

d **Plant Protection**

Weedicide spray	Weed Control	No. of Sprays	2	800	1,600
Pesticide spray	Insect/Pest Control	No. of Sprays	2	600	1,200
Fungicide	disease control	No. of Sprays	5	750	3,750

e **Crop Irrigations**

Tube-well Irrigations	Tube well Irrigations for whole crop period	No of Irrigations	6	800	4,800

Canal water Charges	Fixed Canal Water charges for crop period	Acre	1	150	150

f **Harvesting**

Harvesting Labor	External Contract Labor	Acre	1	2,500	2,500
Picking Labor	Farm's own Labor	Acre	1	3,500	3,500

g **Transportation**

Transportation	Transporting to the Market	Acre	100	15	1,500
Miscellaneous	Any other Expenses	Acre			-
I **Total Variable Cost of Production**					**64,400**
Land Rent(For Crop Period Only)	Land Rent/Lease for crop period(Months)	Acre	1	35,000	35,000
Labor Charges	Ag-Labor Charges for crop	Acre	1	7,000	7,000
Depreciation	For Ag-Machinery/Buildings	Acre	1	5,000	5,000
Repair & Maintenance	For Farm Machinery etc	Acre	1	5,000	5,000
Total Other Expenses					52,000
Total Expenses					**116,400**
Net Income Per Acre					**52,350**

The production table shows that in comparison, small Red Chili growers making higher returns as compared to growers with large land holdings. It is learned that the difference is coming from the fact that growing chilies is a labor intensive process as compared to other main crops, and small growers usually employ their family labor for crop husbandry practices as well as picking/harvesting of chilies from the field. This makes them more cost effective as compared to larger growers who have to resort to hired labor for the same operations.

Quality Grades of Dried Chilies Arrived at Kunri Market (A Typical Day in September):

The table below shows quality grade of dried Red Chili arrival in Kunri market on September 28, 2013. Growers informed that quality of product depends largely upon the incidence of rain during the days when chili is dried in the open fields. It is reported that grade D and E increase significantly for a typical day arrival in case of rain. Table 20 below shows that growers typically suffer an overall value loss 12-15% from the optimum value of “A” grade in the market on the days. This loss of value can be attributed largely to losses during the drying process.

Table 20: Quality Grades of Dried Chilies Arrived at Kunri Market on September 28, 2013 (A Typical Day in September)

Grade	Quantity	Price	%age of Total Produce	Revenue (PKR)
A	2,500	5500	50%	2750
B	1,500	4500	30%	1350
C	600	4000	12%	480
D	300	3000	06%	180
E	100	2500	02%	50

Source: Author's Calculations based on market information obtained from Kunri Whole Sale Market

Table 21 depicts a loss of economic value suffered by growers due to poor quality of chili brought to the wholesale market on September 28, 2013.

Table 21: Economic Value Loss due to Conventional Drying

Total Quantity/Arrival (# of Bags)	**5,000**
Price of Grade A in the Market (PKR)	**5,500**
Weighted Average of Price per 40 KG Recovery (PKR)	**4,810**
Value Recovery as Percent of Grade A Value	**87%**

Source: Author's Calculations based on market information obtained from Kunri Whole Sale Market

Table 22 below indicates loses occurring during the various stages of post harvest product handing.

Table 22: Estimated Chili Produce Wastages

Picking and collecting	2%
Placing for drying	3%
After drying	1%
Packaging in bag and transportation to mandi	1%
In mandi and collection the lot by buyer	3%
Total	**10%**

Source: Author's Calculations based on market information obtained from Chili Growers

Structure of Marketing Channels:

Farmers, traders, commission agents, processors and exporters and retailers are the main players of the market. Farmers sell to or through the commission agents. The following comprise of market channels for domestic markets:

- Primary Whole Sale Market (Kunri)
- Secondary or terminal markets of other towns of Pakistan (Karachi, Lahore, Rawalpindi, Faisalabad and others)/Organized Wholesalers
- Processors/ exporters
- Value Added product processors
- Local retailers

Primary Wholesale markets:

More than 75% of Red Chili is grown in Umer Kot district. Kunri "mirchi mandi" is the primary wholesale market for chili. Almost 99% of product is traded through Kunri mirch mandi. There are around 40 licensed commission agents in Kunri Whole Sale Market.

There are three main players who manage the various functions at the wholesale market:

- The Brokers or Commission Agents *(Aaarhtis)* are responsible for the auction of the produce. There as some 40 commission agents in Kunri Whole Sale market.
- Stockists/Dealers/Traders buy produce during the harvesting season and sell during the year. They make investments in stock and make profit out of trading or speculations out of demand supply situations.
- Brokers are agents who sell produce of commission agents or stockists to other brokers at the terminal market. The intermediaries at the terminal end usually buy on behalf of traders or processors or exporters in the terminal markets.

Commission Agent (Aarthi)

There are 40 license holder commission agents dealing Red Chili at the Kunri wholesale market.

A broker or a commission agent holds trading license issued by the local market committee and is supposed to facilitate the sale and purchase of produce. His clients are the sellers (growers) the traders or commission agents at the other end. A typical auction entails bulk quantities in multiple lots, only the resellers and the distributors participate in the auction. The broker makes a commission as a percentage of the sale price of fruit charged from the seller and fixed fee per crate from the purchaser. While the maximum commission to be charged from the seller is generally fixed by the market committee in consultation with the brokers (normally 6%), the actual commission charged varies from broker to broker.

Brokers are the major capital investors themselves and therefore dictate the commission terms. More than 80% of market is driven on credit starting from the broker to the retailer. On the supply side of brokers, they often give loan to the growers who are then bound to sell their produce through them. Growers who have borrowed from the brokers are charged with higher commissions depending on the amount of money borrowed. These commissions generally vary from 3-5% and are not publicly disclosed. On the selling side, while the broker makes a flat per crate commission from the buyer. Any credit sale is sold at higher rate, thereby making a higher margin for the broker. In the absence of a proper credit monitoring system, the brokers are also exposed to the credit risk and default.

There is a strong perception in the minds of Red Chili Value Chain actors that middle men exploit situations for their advantage. Most of the middlemen are expanding their role to become fresh fruit processors eventually hoping to become exporters themselves.

Beupari:

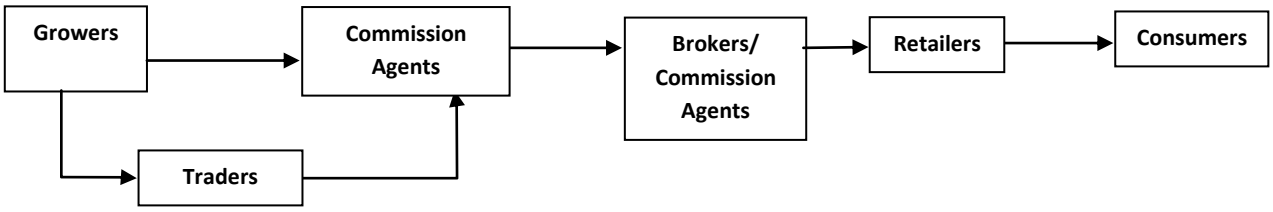
Beupari is the trader operating between primary and secondary markets. He purchases product from the broker in open auction from the primary wholesale market in multiple lots and sends it to secondary markets as a combined load for sale through commission agents of the secondary markets at a higher price.

Secondary or Terminal markets:

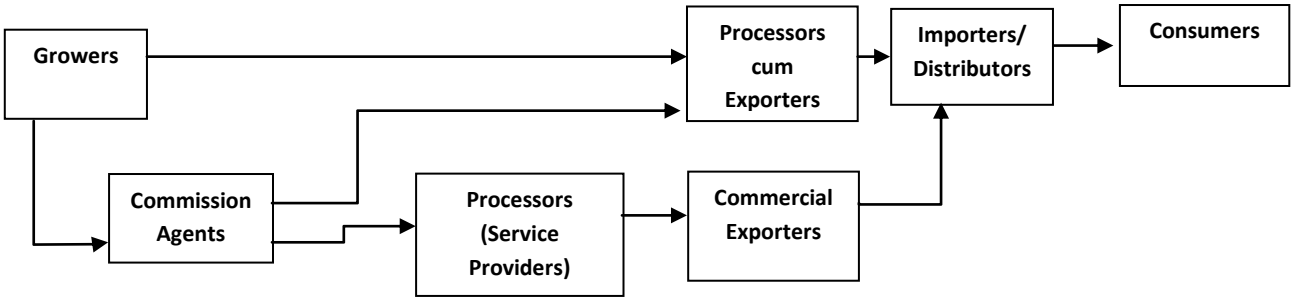
These markets are generally located in big urban locations. Lahore and Karachi, Islamabad and Rawalpindi, Peshawar, Faisalabad are prominent terminal markets in the country.

Red Chili reaches through three distribution channels to the consumers. It reaches the domestic consumers through commission agents and middle-men.

Value Chain # 1/Marketing Channel # 1: Local Supplies



Value Chain # 2/Marketing Channel # 2: Exports



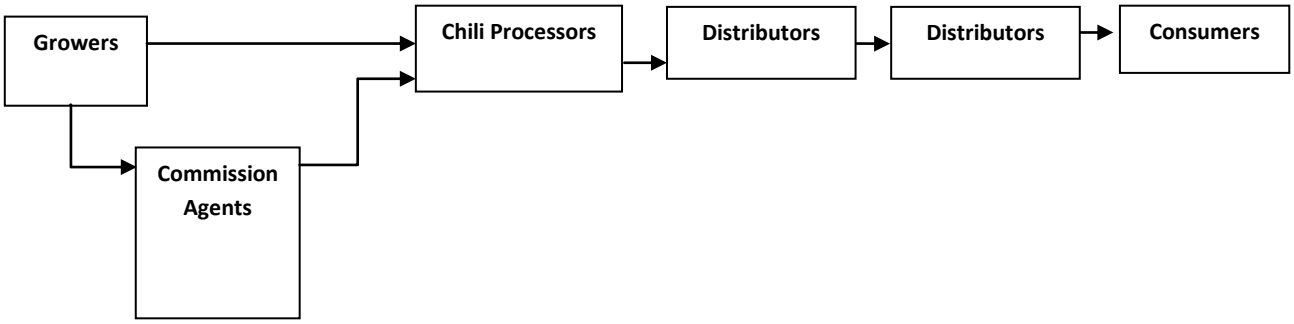
The 2nd channel runs for the export. The product is purchased by the processors. It undergoes processing i.e., grinding and packing.

There are two chains operative for exports. One comprises of Growers, Commission Agents, and Processors cum Exporters, Importers and Consumers in the end market. By far this is the shortest of all chains. The chain is the most efficient for its participants. However, in the absence of a direct business relationship between the growers and processors, many distortions exit in the chain. Processors are dependent upon the commission agents or brokers to meet their quantity and quality requirements. At the moment around 99% of the business is done this way. On the other hand growers are dependent upon the commission agents as well. Since bulk of the profit for the commission agents does not depend on the quality of the produce in the present system and rather depends upon the market fluctuations arising of the manipulations, growers believe that the incentive or premium on quality is not enough to cover for the additional costs. Therefore the trade

takes place with either side trying to squeeze margins by unhealthy practices like mixing/adulteration and keeping moisture content high. These practices have direct implications for product quality and high level of aflotoxin in red chilies.

The other chain operative for exports comprises of Growers, Commission Agents, Processors, Commercial Exporters and Importers/Distributors. Usually commercial exporters buy from processors who the act as a service providers. These exporters are exporting "whole" chilies along with powder form.

Value Chain # 3/Marketing Channel # 3: Red Chili Value Added Products



Structure of the Red Chili processing industry:

There are hundreds of small processors across the country that grind chili in small quantities. These grinding mills either operate as small service providers on service charge basis or stock small lots for selling to retailers and sometimes directly to consumers.

There are 10-12 spice processing and marketing companies that comprise the top tier of processing industry. These spice processing and marketing companies usually have established brands in the domestic market. National, Shan, Ahmed, Phool are some of the leading names. These organized processors have technology and systems for processing operations. Top brands are also exporting in consumer packs.

Leading processors have also acquired HACCP and ISO Certifications. This is indicative of management systems in place with them.

Besides the top tier processing plants owned by the leading exporters, situation is different with small processing units who grind chilies in small operations. Usually these processors are not conscious of quality parameters. Most of the low grade chili ends up with small processors who are also involved in unscrupulous practices. In the domestic whole sale markets price of chili in powder form is lower than the price of "whole" red chili. This is indicative of the fact that adulteration is taking place.

In the absence of a food safety regime in place (weak legislation as well as enforcement) the demand for poor quality chili exists on one hand and due to lack of market system that rewards quality product, there is little motivation on the part of market players to work towards quality

improvement. The high incidence of Aflatoxin, inconsistent color and other quality issues are therefore persisting.

Chili Derivative and Recipe Products:

Many food processing companies also use red chili as one of the ingredients for the various recipe spice blends and value added products like sauces, ketchups and chutney (local recipe). The consumption of these companies is on the rise due to popularity of readymade products in the market. These processors also buy from the commission agents and whole sellers in the secondary whole sale markets.

IV. Constraints affecting Value Chain Competitiveness

An account of various constraints faced by value chain is synthesized below by segregating constraints and issues for each stage of the value chain for better understanding of the readers, as under:

Non-availability of high yielding Red Chili varieties:

Non-availability of high yielding Red Chili varieties is considered as one of the root causes for low productivity/yield followed by poor orchard management practices. It is a well considered opinion among the experts interviewed that yield can be significantly improved by introducing new varieties with higher yield potentials. Growers regard availability of disease free seed of a high yielding Red Chili variety as primary constraint. They claimed that it was imperative for the competitiveness of the value chain to develop improved varieties with higher yield potential and better product attributes. They are of the opinion that better seeds were primarily responsible for higher yields in USA, Korea and other top producing counties.

Increasing Cost of Inputs:

A sharp increase in the prices of inputs has been experienced by Chili growers in Pakistan in the recent years. There has been a 60% increase in cost of utilities over the last five years and similarly cost of fuel has witnessed over 100% increase in the last five years. These inputs are essential for Red Chili growers as they have to pump irrigation water using either electricity operated water tube wells or diesel operated engines (called peter engines) to energize pumps.

According to growers, high cost of utilities and inputs has squeezed their profitability in the recent years as they are not getting corresponding increase in price of their produce.

High Incidence of Diseases and Pests:

There are several pests and diseases that are common threats to the Chili farming in Pakistan. The incidence of fungal diseases have particularly has affected yield badly.

Weak Sanitory and Phytosanitory Compliance Capacity:

Satisfying health and food safety requirements of import markets, has become a challenge for Pakistani Chili exporters as EU requirements are particularly strict for food safety. To fulfill the SPS requirements of the developed countries, Pakistan Chili value chain needs compliance capacities. Food safety has become a very significant issue, particularly after the food scares in Europe. The quality requirements Red Chili exporters have to comply with are becoming stringent day by day and pose a major challenge to exports of Red Chili. Due to higher than permissible incidence of aflotoxin in Pakistani chili, EU had placed a ban for several years on imports from Pakistan. This is by far the biggest constraint for the chili value chain at this point.

High loses during the post-harvest handling:

Whereas the quantum of wastage as reported in the earlier studies has decreased, the overall loss of value is still substantial (10-12%) in many cases due to the quality deterioration during the drying process along with the losses during other stages of post harvest handing. According to analysis of market data during the month of September, it came to fore that 13-15% loss of value occurs due to poor grades of dried product on average, as compared to the optimum value available to Grade A product.

Relationships among the Value Chain Actors:

The existing relationships among the chili value chain actors may be characterized as "poor cooperation" at best. This assessment found that there is a general mistrust among the value chain actors. Even growers tend to be more competitive rather than collaborative even if they do not have any clash of interests. Flow of information and sharing of experience is generally weak and superficial. One of the reasons that good practices do not propagate despite the fact that more progressive and resourceful has access to such information.

Limited flow of information and resulting coordination between producers, processors and exporters may be attributed to cultural reasons and some historical reasons as well.

The distribution of profit among the Red Chili value chain actors is still reflective of a dominating role or power with the middlemen. As the calculations indicate, middlemen's real return on investment are very high as compared to the stated ones. Due to strong bargaining position and due to asyametry of information they are able to generally manipulate the supply-demand situation to their advantage whereas growers and consumers are on the receiving side on both the ends. As the price cost ladder for supplies system to domestic consumers indicates, growers only get between 40-45 % of price paid by the consumers at any point in time and for any quality or grade of fruit. The price cost ladder also indicates that bulk of the profit is retained by the intermediaries.

Unlike marketing systems in developed countries, the terms of transaction as well as parameters of trade are different on either side of a commission agent. While buying from the growers, the transaction is done through an auction system whereby the traction is apparently facilitated by the commission agent's representative. The title is not transferred to commission agent as such and apparently the commission agents do not have any vested interest in the transaction. In actuality however, the commission agent works hands in glove with bidders to determine/dictate prices. Growers are mostly price takers in the relationship. On the other hand the "buyers" in the 2nd part of the transaction are at an extreme disadvantage as compared to the seller for the reasons (1) a symmetry of information (2) bargaining power in the relationship due to scale and elasticity arising out of that and (3) financial power of the commission agent usually.

The prevailing situation is Chili value chains is reflective of dynamics described above. Although few growers are selling to processing industry directly the bulk of the business is done through the mandi system (over 99%) and therefore result in two strong manifestations (a) high spread of prices between the farm gate prices and the prices available to consumer and (b) very high price fluctuations between transaction to transaction, between season to season. The implications arising out of the 1st manifestation result in poor profitability for the growers and high prices for the consumers and the implications of the high variability/fluctuation create very high level of uncertainty for the other value chain participants, growers being unsure of their profitability and high perceived risk usually resort to low input-low output model.

A strong de-motivation prevails with them generally as they experience huge losses when they produce more (so called oversupply situations in the mandi). Due to sudden and high magnitude fluctuations in prices arising out of manipulation of the so called supply-demand situations in the mandi, growers get mix signals. They experience and also learn through "word of mouth" from other growers that price of produce is not determined on "quality" of produce. They also experience that the market place does not differentiate between various grades and qualities and therefore the price differentials offered do not provide sufficient premium for high quality produce.

The consultant believes that the prevailing market practices in Kunri Wholesale market is responsible for many distortions and also responsible for lack of incentives for growers to increase productivity well as quality of produce. This is regarded as one of the root-causes, impeding the Chili value chain competitiveness.

Poor Product Quality:

Pakistani Chili is not acceptable in majority of the markets due to more than permissible level of Aflatoxin. Various chili samples drawn from the stocks available have been found with aflotoxin levels as high as 180 ppb (parts per billion) whereas aflootoxin level are usually between 30 and 120 ppb. From the table below that list permissible level of aflotoxins as per WHO (World Health Organization) standards, most of lots do not qualify on acceptable standards.

Table 23: Chiles Permissible Aflatoxin Levels in Different Countries

S. No.	Country	Aflatoxin Level in Chilies	
		B1	Total B1, B2, G1, G2
1	Australia		15
2	USA		20
3	Brazil		30
4	Canada		15
5	EU	5	10
6	India		30
7	Japan		10
8	Mexico		15
9	New Zealand		20
10	Turkey	5	10
11	Great Britain	5	10
12	South Africa	5	10

Source: FAO Study

Even for the domestic markets the product with higher than WHO permissible levels should not be permitted for sales and consumptions. This again is one of the areas for regulatory reforms in the country.

With the exception of few brands, Pakistani exporters are generally targeting lower end of the market in the countries it is exporting for the consumption of Pakistani Diaspora. This is contrary to the general perception among the growers, processors as well as the policy makers who believe and also claim that Pakistani Red Chili is a premium product due to its unique product attributes.

Compliance Status:

There are serious issues/problems which hinder the producers to maintain the quality standards. Lack of knowledge, guidance and directional research of agriculture department is one of the primary problems. Farmers need support to properly manage their farms.

Red Chili Exporters share that most of the importers, especially from the developed countries demand certification from the exporters to ensure that a mechanism of systematic preventive approach to food safety is implemented by the suppliers, while addressing physical, chemical, and biological hazards. Similarly many importers require that their suppliers obtain produce from orchards that are Global GAP certified. Whereas there are only few dozen Global GAP certified farms in Pakistan as of September 2013, none of Chili growers have achieved this certification so far.

Testing & Certification Capacity

To comply with the standards and the requirements of international markets it has become essential that Pakistani producers and exporters have ready access to the product testing laboratories. At the moment, the cost of testing to determine toxin levels especially Aflatoxin is prohibitive for each lot.

Weak Role of Value Chain Support Organizations:

Several government organizations and donor funded projects have been working to support Red chili value chain. SMEDA had initiated a project to establish mechanical drying plant to serve chili growers as a common facility. The project has not completed due to shortage of funds. Chili Research Institute at Kunri had setup a modern laboratory to facilitate testing of Aflatoxin. The laboratory is not functional despite donation of state of the arts testing equipment by a donor agency. Similarly Chili Research Station is working without an in charge director from last several months. Growers expressed their dissatisfaction over the role of Agri-Extension Department.

According to a small grower from the area role of support agencies has not been affective so far. It was a a unanimous view in the validation workshop attended by representatives of various value chain stakeholders that there was an apparent lack of effectiveness of efforts and money spend so far. The prevailing situation was attributed to a lack of coordination among the support institutions and donor funded projects, resulting in duplication of efforts in many cases and lack of efforts in other equally essential areas to alleviate weaknesses or constraints affecting the chain competitiveness. Quality of technical inputs was cited as a reflection on the performance of extension services department. Effective management of projects was also cited as a weak performance area. Above all it is believed that due to lack of ownership and effective involvement by value chain actors many sponsored projects have not brought desired results in the past.

V. Conclusions and Recommendations

Conclusions:

Pakistan's agro-climatic conditions provide a suitable environment for the production of Red Chili, providing a comparative advantage as indicated by the sustained growth. Only 2.66% percent of total Red Chili production of the country is exported in spite of an established market demand for the Dandicut variety in several existing markets and potential in other promising markets due to its intrinsic product attribute of high pungency and color. Further export growth was constrained due to limited availability of chilies with acceptable level of Aflatoxin as per international market standards.

Chili value chain competitive position is weak due to several supply side constraints and weaknesses; (1) low yields due to limited genetic potential of chili varieties and poor farm management practices, (2) primitive drying process result in inconsistent product quality with high Aflatoxin, and undesired dark color and (3) weak direct linkages among growers and exporters result in uncertainty, high price fluctuations and low trust levels in the chain. Low profits for growers is further affecting production and quality as they generally believe that market does not offer sufficient reward for quality product.

In order to enhance exports of red chilies, it is imperative to reduce level of Aflatoxin below 20 parts per billion (ppb) as per WHO standards. Therefore, improving drying techniques and processes is a must.

It is however concluded that the desired improvements may only be sustainable though any supply side support interventions if is based on a market demand based systems. It is also concluded that the existing market system does not offer enough incentive to growers to put additional work for improving product quality. A disconnect in the chain exists as growers think that premium offered on better quality is not enough to reward extra efforts and compensate for additional costs incurred by them. On the other hand exporters are reluctant to purchase directly from the growers as they believe that purchasing directly increases their risks and transaction costs and make them uncompetitive on price. The processors/exporters end up procuring bulk of their demands through the middlemen/brokers in Kunri or Karachi wholesale markets.

It is concluded that lack of direct business contact between growers and processors/exporters and dominant role of intermediaries is responsible for the present situation where a significant flow of resources is moving out of the chain. Since the profitability of the intermediaries like the commission agents and/or the brokers do not depend as such upon the product quality as compared to the prevailing supply-demand situation (sharp seasonal fluctuations) they do not usually offer sufficient incentives for quality.

Whereas technically there are several solutions available and some of the growers have already started adopting the same with the help of agriculture extension staff of processors, the root cause of slow/lack of adoption is absence of any market incentive for improved product. It is therefore, concluded that promoting a quality based purchasing system is key to the success and sustainability

of any such efforts to improve drying practices in the cluster. It is imperative to create a pull for better quality (low Aflatoxin) product that provides sufficient economic incentive to the growers to adopt improved drying practices

Recommendations:

From the conclusion drawn in the preceding section, following recommendations are put forward for the consideration of the Agribusiness Project management.

- It is recommended that project works with leading chili processors, exporters and progressive traders to facilitate a "premium for quality" based purchasing from the growers to help creating a pull for "improved" quality chili. As the market leading buyers are already convinced and are willing to pay premium for "low Aflatoxin, consistent color chili" project should direct its support to enable "sufficient" premium.
- One way to support growers is to help them improve their production and drying related processes. This should be linked with a buy back arrangement which promises sufficient premium for those who produce as per agreed quality parameters with the buyers.
- In order to have a market demand based system, it is recommended that such an initiative is undertaken with the active support and participation of leading chili processors and exporters so that to create a pull factor for "an internationally acceptable product" they require for boosting their exports.

Proposed Interventions:

In order to enable desired outcomes and impact as per TAP objectives and donor goals, a critical factor to ensure success is a strong ownership of value chain actors and their active participation during the designing, as well as implementation phases.

a) It is proposed that a value chain working group or platform is facilitated and deployed to spearhead facilitation and coordination needed for the improvement of chili value chain. The proposed mechanism should promote frequent interaction among the value chain participants to make them realize importance of collaboration among themselves. The facilitation mechanism should enhance level of trust among chili value chain participants and should pave a way for better cooperation among them for mutual benefits. The value chain working group or the platform should serve to perform functions of a dedicated chili value chain development entity. TAP should draw upon some good practices available locally and internationally. Role of Board of Malaysia and some Sector Management Companies (SMCs) may be further studied to carve out an effective strategy implementation mechanism. The working group or platform may however enable that support interventions are sustained beyond the life of project. Since the TAP work plan already includes concept of a value chain platform, appropriate measures may be taken to put the concept into reality.

b) A support intervention for improved drying processes is proposed for small growers. The proposed improved drying program should entail:
   - Training programs on post harvest handling and drying of chilies.

- Training programs to improve awareness on product quality aspects, food safety concerns of consumers in domestic as well as import markets.
- Technical assistance to fine tune standard operating procedures (SOPs) for chili harvesting, handling and drying.
- Support provision of geo textile sheets to enable "fungus free" drying on farm.

c) A support intervention for improved drying processes and technologies is proposed for medium/large growers or other chili value chain related interested enterprise. The proposed improved drying program should entail:
   - Provision of small, energy efficient dryers and grinders on cost sharing basis in the cluster to enable small scale processing in the cluster.
   - Technical assistance to fine tune standard operating procedures (SOPs) for chili harvesting, handling and drying.
   - Training programs to improve awareness on product quality aspects, food safety concerns of consumers in domestic as well as import markets.

d) Improved drying program should also be augmented with a farm improvement initiative. The farm improvement program should entail:
   - Training programs on Good Agriculture Practices to build growers' capacity in farm management.
   - Training programs on post harvest handling of chilies.
   - Training programs to improve awareness on product quality aspects, food safety concerns of consumers in domestic as well as import markets.
   - Technical assistance to fine tune standard operating procedures (SOPs) for chili production.

In addition to the prioritized interventions keeping in view of project life TAP may also consider supporting initiatives identified in this report through the proposed chili working group. The consultant recognize that in order to enhance chili value chain competitive position in the long run, value chain constraints discussed earlier may need several other interventions to either improve upon existing level of services or "removing" irritants that inhibit performance of value chain participants. For instance government of Sindh attention/support is required to facilitate a more conducive wholesale market system in place.

- Effective support of public research is required to develop improved chili varieties.
- Active support of public and private sector universities is needed to create knowledge and code of practices for chili production.
- Government of Sindh, department of agriculture intervention is required to enable effective extension services to chili growers.
- Similarly coordination with SMEDA may enable "fast track" completion of common facility drying project at Kunri enabling mechanical drying of chilies in hygienic conditions. Project may consider working with SMEDA in this regards. Project may also consider working with
- TDAP to draw upon substantial resources the agency has for promoting international trade and facilitating establishment of market linkages.

- Work with Chili Research station to enable a functioning laboratory at the station to enable a cost effective but reliable testing service for chili growers and buyers in the chili production cluster. This may enable help reduce the incidence of toxins at the drying stage.

Since discussions on business model or implementation strategy for proposed interventions are beyond the scope of this assessment, it is suggested an effective implementation as well as monitoring and evaluation system is put in place by TAP management to ensure achieving desired outcomes and impact as per its targets and donor objectives.

Annex A:
List of Sources, List of Interviews and List of Validation Workshop Attendees

a. Studies and Knowledge Sources:

Sr. #	Study/Literature
1	Chile peppers and mycotoxin contamination: Problems and solutions Final Report for the Agribusiness Project. Dr. Robert C. Richardson
2	Diagnostic Study Red Chili by SMEDA
3	Inception Report Red Chili Cluster Study by SMEDA and Government of Sindh
4	District wise area and production of Chili Crop, Government of Sindh
5	Aflatoxin contamination in chilies by Science Direct
6	Permissible Aflatoxin Levels in Different Countries by FAO
7	Fruit / vegetables and condiments statistic of Pakistan 2011-12
8	Policy Analysis on the competitive advantage of the food processing sector by CSF
9	District wise area and production of chilies crop
10	Economic Survey of Pakistan 2011-12

Sources Consulted:

International Portal on food safety, animal and plant health (IPFSAPH) **:** www.ipfsaph.org
International plant protection convention – IPPC **:** https://www.ippc.int
The world trade organization for animal health- OIE**:** https://ippc.int
The world health organization WHO **:** https://www.who.int
Codex alimentarias-CAC **:** https://wwwcodexalimentarius.net
Convention on biological diversity- CBD**:** https://www.cbd.int
Food and Agricultural organization – FAO**:** https://www.fao.org
United Nations Industrial Development Organization (UNIDO)**:** https://www.unido.org
International organization for standardization (ISO)**:** https://www.iso.org
Pakistan standards & quality control authority (PSQCA) https://www.psqca.com.pk
International Trade Centre – Market Access Map-UNCTAD/WTO**:** https://www.intracen.org
The United Nations development program (UNDP)**:** https://www.undp.org
United States department of agriculture (USDA)**:** https://www.usda.gov
International Trade Centre – Market Access Map-UNCTAD/WTO**:** https://www.intracen.org
The United Nations conference on trade and development (UNCTAD)**:** https://www.unctad.org

b. List of People Interviewed:

SR#	Name	Designation & Organization
1	Naveed Hussain	Chili Grower, Kunri
2	M. Ramzan	Chili Grower, Kunri
3	Qazi Muhammad Soomar	Chili Grower, Kunri
4	Gull Muhammad Chandio	Chili Grower, Kunri
5	Kavil Ram	Chili Grower, Kunri
6	Shoukat Arain (DO	Ex DO Agri Extension, Umerkot
7	Om Parkash	SAWFCO, Umerkot
8	M. Khan	SAWFCO, Umerkot
9	Shoukat Ali Arain	Technical Expert and Researcher
10	Haji Ubaid Ullah	Trader, Exporter
11	Muhammad Arif Sheikh	Mgr, Quality, R&D
12	Syed Muhammad Emanullah	Mgr, Quality Operations
13	Muslim Raza	Provincial Chief SMEDA, Sindh, In charge Chili Processing Project
14	Shahid Hussain	Manager Mechandise, MAF Hyper Markets Pakistan
15	Mujeeb Rashid	Managing Director/CEO Mitchell's Fruit Farms Limited, Lahore
16	Mehdi Mohsin	Director, Mitchell's Fruit Farms Limited, Lahore
17	Asif Zia Khan	Regional Manager, Raaziq International, Logistics and Supply Chain Management
18	Khalil Ahmed	Manager Project, Ammizia Logistics and Warehousing, Lahore
19	Shahjehan Hasmani	Manager Project, SAFWCO
20	Rashid Y Raja	Agricultural Marketing Specialist, US Department of Agriculture, Islamabad
21	Muhammad Javed Afzal	Manager Trainings, SMEDA, Lahore

Note: Contact coordinates of participants are available with the consultant

.

c. List of Attendees Chili Validation Workshop

Attendance Sheet
Validation Workshop with Stakeholders of Chili Value Chain
September 28, 2013, TAP Regional Office, Karachi

Sr. No.	Participant Name	Designation/Organization
1	Mukesh Kamar	Commission Agent
2	Zohair Azam	A.O
3	Nadir Hussain	Grower
4	M. Alam	A/O Agriculture Extension
5	Mike Schwartz	DCOP -TAP
6	Ch. Usman Ali	JAA consultant
7	Lajpal Dhirani	Exporter of red chili
8	M. Aleem	JAA consultant
9	Sami Ullah	Red chili trader
10	Somo Mal	Vegetable Specialist
11	Shaukat Ali	Chilies Specialist
12	Ayesha Gulzar	TAP-ASF
13	Qazi M. Sarwar	Grower
14	Ch. Murtaza	Grower
15	Azhar Bhatti	Pakistan Organic Farms
16	Shahjahan Hashmani	Project Manager SAFWCO
17	Hamza Hassan	TAP - JAA
18	Tahir Munir	CEO Kevlaar Pvt. Ltd
19	Matt Brown	TAP - JAA
20	Dr Hamid Jalil	TAP - JAA
21	Marcos Arocha	TAP - JAA
22	Derald Smart	TAP - JAA
23	Ejaz Malik	Pasban Soap Ltd
24	Asad Zahoor	JAA consultant
25	Gulafshan	TAP - ASF
26	Salman Ahmed	TAP-ASF

Note: Contact coordinates of participants are available with the consultant.