Research on agricultural value chains in Tajikistan

December 2011

Contents

List of abbreviation

AMFOT – Association of Microfinance organization of Tajikistan

DNJ – Districts of National Jurisdiction

CIS – Commonwealth Independent States

CPP – crop protection products; include pesticides, fungicides, herbicides, insecticides and organic crop protection materials

GBAO – Gorno Badakhshanskiy Autonomic Region, one of the 3 regions of Tajikistan, located in west.

ICCO – Inter Church Organization for Development Cooperation

I/NGO – international non-governmental organization operating in Tajikistan

IYP – international year of potato, 2008

Kg – kilogram

LLC – Limited Liability Company

MFC - Microfinance Centre

MFI – microfinance institution

PO – public organization

SKO bottles – type the glass jars with flat tined top (Standard bottle developed by Soviet for canning industry)

VC – Value Chain

VCF - value chain financing

Veg. – vegetables

000’ – thousand

Currency unit: 1 somoni equals 100 diram

Rate 1 USD = 4,7589 somoni as of December 20, 2011

Introduction.

Microfinance Centre (MFC) in frame of value chain finance project funded by ICCO hired LLC Harif to conduct survey of agricultural value chains in Tajikistan. Ten value chains were chosen: potato, onion, tomato open field, greenhouse tomato, apricot, grape, lemon, livestock breading for beef, melon and watermelon, honey. Those VCs were identified as the potential high value crops and this report covers products chain analysis and indentifies opportunities for VC financing.

Both primary and secondary information were collected and reviewed. The primary information served as the critical framework for analysis while the secondary information provided important inputs for understanding the context and rationality behind the status of value chain. The study project met and interacted. An initial literature review was conducted with all value chain representatives of the selected commodities including farmers, public and private sector, I/NGOs, input suppliers, service providers and representatives of MFIs and so on. Also, the support and regulatory structures were interviewed to assess their impact on the targeted value chains.

The main objective of the study is to understand the agricultural chains existing in Tajikistan and to identify potential opportunities to engage MFIs in the development of agricultural value chain financing in Tajikistan. The period of the study was November – December 2011.

At the central level tools like stakeholder meeting, interaction and analysis of secondary information were used for the study purpose. At the field level, the consultant held meeting with stakeholders, conducted key informant interview and group discussion. In depth discussion with key actors of value chain was also made on strengths, weaknesses, opportunities and threats of the respective value chains.

This study consists of five chapters. The first chapter describes the purpose, tasks, geography and methods of the study. The following chapter showing the list of existing initiatives supporting the development of the agricultural value chains in the Tajikistan, shown the programs which provided non-financial support and areas their operates. In chapter three we provided the definition of value chain and value chain financing which will help to user better understand that survey and make it maximum useful. The chapter four describes the current engagement of MFIs in financing VC. The following chapter five provides analyses of ten agricultural value chains as separate sub-chapters). Each sub-chapter has been designed to be a stand-alone product. These sub-chapters contain information about production volumes, specifications and seasonality. The role of various players in the overall supply chain system is considered. Transformation scheme of the product is submitted for each product at various levels, including packaging. We have also presented a global linkage analysis, export potential and market growth opportunities for each commodity. First subchapter about apricot includes fresh apricot, dried apricot and apricot for processing. Second VCA of onion, third VCA - tomato open field, than tomato in greenhouse, than melon

and watermelon, sixth VCA for potato, and following VCA for grape. The ninth sub-chapter is devoted to the marketing chain of cattle and beef. There we described and analyzed information on beef production, sale and slaughter of livestock, sale and marketing of meat. We are not shown the transformation meat into other products, since that industry is separate and has other problems and players. The last sub-charter we shown analyses honey and also involve the problems and issues facing VC. For each VC providing conclusions and where developed recommendations for Value chain financing were based on the identification of bottlenecks. Also as important intervention we proposed the transferring knowledge, which will make efficient value chain financing. Intervention according to the presented recommendations, by author's opinion, can help in rapid development of agricultural sub-sector industries and the whole agribusiness. These recommendations were based on the identification of bottlenecks. Intervention according to the presented recommendations, by author's opinion, can help in rapid development of agricultural sub-sector industries and the whole agribusiness.

Current report has 52 tables, 10 schemes, 6 diagrams, pictures and attachment.

1. Purpose, Objectives, Methodology and Geography of Study.

The main goal to that study was to understand the agricultural chains existing in Tajikistan and to identify potential opportunities to engage MFIs in the development of agricultural value chain financing in Tajikistan.

The objectives of the survey were:

- To identify non-finance supporters of VC from I/NGO and local service providers
- Evaluate the way in which financing can improve the scale of operations, value of produce, inclusion of additional players, strengthening horizontal and vertical linkages, etc

Methodology

Both primary and secondary sources were used for the study. Various publications and reviews, as well as material studies, data from the National Statistics Agency, Ministry of Agriculture, and the Customs Committee were used as secondary sources. The qualitative methods included in-depth interviews, site visits and observations. The information was collected from actors of the value chains including: farmers, beekeepers, Chairmen of dekhan farm associations, storage center operators and warehouse keepers, representatives of processing companies, wholesalers, retailers, and exporters. Also, the information was obtained from the chairmen of the State Agricultural Department of local administrations, representative of state veterinarian

controls, officers of State Agency for Standardization, and representatives of consulting firms, interviews with microfinance institutions and staff of other value chain projects.

Research Geography was the local markets, farms and enterprises of Dushanbe, Sughd and Khatlon regions and districts surrounding Dushanbe city. The various data sources were used to assess markets outside of Tajikistan.

Study Objectives. The main objective of the study is to understand the agricultural chains existing in Tajikistan and to identify potential opportunities to engage MFIs in the development of agricultural value chain financing in Tajikistan.

Current situation. The agricultural value chain research proposed here at the initiative of ICCO will discover the needs on various levels of the value chain organization and among different actors. Agricultural value chains in Tajikistan are already in the spotlight of several development projects. Value chain development projects of Frankfurt School and ICCO/Helvetas already provide support which aims at strengthening farming activities through training and extension service. Microfinance institutions are typically engaged in value chain financing by providing loans to agricultural producers. However, there are also some MFIs which serve processors (dairy, grain mill), input (seeds, fertilizers) producers and traders as well as procurement companies (see table below). These institutions managed to extend their services beyond the producers thanks to the external guidance and technical assistance.

Staffing. The study was implemented by 'LLC Harif' consulting company with Bakhtyior Abduvokhidov acting as a lead consultant.

Timeline. The consultants worked on that project from November to December, 2011.

2. Existing initiatives supporting the development of the agricultural value chains in the Tajikistan.

Dozens of projects are being implemented by various donors in Tajikistan in the last decade, in the area of agricultural development, business development or economic development of individual regions or specific areas of activity. These projects provide both educational and consultancy services for business representatives, including work with input dealers, producers, processors, wholesalers, traders, and exporters. These projects and donors provide technical support to value chain representatives.

Below we provide table which include the list of institutions and organizations providing non-financial support and financing to the actors of value chains.

Table 1. Institutions/organizations providing non-financial support and financing to the actors of value chains.

Institutions, Programs	***Donor***	***Geogra-phy focus***	***Interventions these institutions provide***	***List of VC supported***
DAI (Family farming project)	USAID	Khatlon	Improve FS through income generation, value chain support, productivity and nutritional practices. Project support all VC which develop on small household plots, mostly fruits and vegs.	All, horticulture, onion, potatoes, livestock
ACDIVOCA Productive Agriculture project	USAID	Sughd, DNJ, Western Khatlon	Productivity; fin. services; private sector capacity (extension by input supply dealers; BDS for processing SMEs)	Apricot, lemons, watermelons, onions, tomatoes & beef
Chemonics, Land reform project	USAID	Tajikistan	Market-driven land policies and legislation, Restructuring of farms, trainings thru the local PO	All
CNFA Farmers to Farmer, nodir.i@cnfa-tj.org, www.cnfa.org	USAID	Tajikistan	Free Ag. Consulting services from international volunteer experts. Providing consulting services.	Most on agribus., water mngt), horticulture, dairy
Mercy Corps TSEP	USAID	Asht and Isfara district Sughd, Shartuz district Khatlon	Social development, VC development, education in better food production and preservation techniques	Fruit and veg
DCA	USAID	Tajikistan	Credit guarantee program through the banking system, will be provided on amount 50% of loans for various VC players	All
TAFF	EU-IFC EBRD	Tajikistan	Provided over 30 mln USD loans. Now focusing on value chain analysis and extension services	Cotton, fruits and veg
GIZ	DFID/ GIZ	Northern Tajikistan	Fruit and vegetable processing and value chain development (esp. tomatoes) in Sughd, developing agricultural extension, forming technical assistance groups, financing for equipment, encourage oilseeds, soil erosion control, cross-border trade promotion, policy advice	Apricot, tomato, greenhouse, onion, apple, potato
	GIZ		Agricultural financial services	All
EBRD	EBRD	Tajikistan	Agricultural financial services, Support Business Consulting	All

			services	
BAS/TAM basptj@basp.biz www.tambas.org	EBRD	Tajikistan	Developing consulting services through the subsidizing/grant their services to SME, support on finding proper consulting Providing Technical Assistance to the companies through invitation professionals for consulting	All
IBD	IBD		Agricultural financial services	All
ADB	ADB			All, mostly cotton areas
AKDN	AKDN	GBAO	Support mountain societies on food security	All
ACTED	EU	Tajikistan	Creating agricultural cooperatives, agricultural and irrigation support, income generation, reforestation and pasture management	Horticulture, fruits and veg, livestock
Operational Mercy		RRD, GBAO	Microenterprise, agriculture, livestock. in Faizobod: Canning instruction, in Khorog: mushrooms, fruit drying, yak down products	Orchard fruit trees, mushrooms, yaks
CIDA	CIDA	Tajikistan	Land reform monitoring, brucellosis control and disease-free potato seed (FAO), ag reform and marketing in Sughd, research on water scarcity and drought studies, climate change adaptation	All
CESVI	EU	Sughd and West Khatlon	Prevention of water borne diseases through drinking water, developing farmer committees, land reform education, small business creation	Greenhouses, fruits and veg
EU	EU	Tajikistan	Producers and processors extension for improvement, ag extension, improved machinery, branding and packaging, post-harvest losses, food safety, livestock sector development	
FAO		Tajikistan	Establishing veterinary clinics, veterinary education, brucellosis control, disease control, pasture and livestock development, gender focused land reform, seed potato production, high-value horticulture crops and marketing, agricultural financing, crop forecasting and assessments, input and market information	Livestock, horticulture
Global partners Great Britain	DFID	Tajikistan	Tested improved feeding, cleaned irrigation canals, access to safe drinking water, soil	Milk, potato, fruit, wheat

			seminars, providing potato seed, fertilizer, fruit trees	
ICARDA		Tajikistan	Integrated feel/(livestock, feed, pasture) management	Livestock
IFAD		Western Khatlon	NRM, agricultural technologies and production services, agricultural finance, developing agricultural markets, policy development (livestock, feed, pasture)	Livestock
Helvetas	SDC	Tajikistan	Local market development project (links farmers with processors and local markets), bio product development.	Apricots, cu-cumbers, apple, tomatoes, cotton, lemon
Save the children		Western Khatlon	Women's savings groups, greenhouses, soil and agriculture extension	Greenhouse, veg
Oxfam		Khatlon	Greenhouses, drip irrigation, farmer marketing groups, land titling, irrigation rehabilitation	Greenhouse, veg, wheat
Hilswerk International	EU	Kurgan-tube,Asht, Isfara	Improving small and medium food processors	Apricot, Lemon
VSO		Tajikistan	dairy processing and management, value chain analysis	Dairy, wheat
GERES	EU	Sughd (Ayni, Asht)	Project aims to enhance agricultural income and to promote improved domestic energy solutions for vulnerable households in cold mountainous areas	All
DFID	DFID	Sughd	Program is to contribute to pro-poor growth in rural areas in Sughd Region. The project supports the development of business through the supply of business advice and credit. It also provides targeted support to local government, building its capacity to support the private sector and to improve the business environment.	All
GAFSP project	WB	Khatlon	Improving access to irrigation	All
IFC , Agribusi-ness Finance and Business environment project	EU	Khatlon	Provide training and intervention on improving business climate, provide access to loans, facilitate leasing and finance the equipment purchase	All, mostly cotton
GAA	EU	Sughd(Ze-ravshan valley)	Provide training and intervention on improving business climate, developed association of potato producers	Potato, livestock

The services offered by these donors and international projects are implemented by the projects themselves or using the capacity of consultancy firms and public organizations through which technical assistance is channeled to value chain players. Many of these

projects use local organizations as partners; others use their services on a one-off basis. Most of these local service providers have sufficient experience, know-how, equipment and human resources for fulfilling the tasks specified by the projects. A list of active local service providers is presented in Annex 1.

3. Definition of Value chain and Value chain financing.

Value Chain.

A Value Chain is an alliance or strategic network between independent enterprises, within a (vertical) chain of activities that competes on a specific market (defined by consumers and retail outlets) and to satisfy market demands. In more practical terms: an Agricultural Value Chain covers all activities from input supply, production, processing, wholesale and retail to the final consumers. An organization's competitive advantage is based on their product's value chain. The goal of the company is to deliver maximum value to the end user for the least possible total cost to the company, thereby maximizing profit (Porter 1985).

Value chain financing[1].

Value chain financing involves provision of finance for investment and liquidity purposes. Without tangible investments, the chain remains under-capitalized resulting in inadequate utilization of capacity and opportunity hence sub-optimal performance. In a USAID micro REPORT, Schiff and Stallard (2009) view value chain finance as financial products and services that flow to or through a value chain to increase returns on investment and growth and competitiveness of that value chain. On their part, KIT and IIRR (2010) state that value chain finance refers to financial services that are based on cooperation in the value chain. Value chain finance thus includes all actors and all types of financing. According to DAI (2008) it includes finance that is based on the relationship between two or more actors in the value chain, either directly (one actor provides credit to another) or indirectly (one actor obtains credit from a financial institution based on a sales relationship with another actor). An analysis of the entire value chain needs to be conducted in order to better understand the extent to which financing is a constraint, where in the chain it may be a constraint, and whether there are other pre-disposing conditions impeding the access and best use of capital (Jansen, 2007). Value chain finance must thus sustainably increase production, productivity, marketability and profitability. Ultimately chain actors, financiers and supporters benefit from an optimally functioning and properly financed chain. Apart from finance other needs exist within the value chain which calls for more support services such as BDS, technical assistance, capacity building and many more. The aim of these is to upgrade the chain.

[1] Financial services in Agriculture value chain Report: A study of five Kenyan sub-sectors Namely potato, dairy, coffee, extensive Livestock and domestic horticulture. May 2010, Oiko Credit

The transaction between the Input dealer until consumers request financial interventions, which help VC players be able to operate in condition of strong competition, and effectively puts consumers in control - they demand better quality produce at lower prices. Such produce can only be delivered if all actors in production work efficiently and cooperate effectively.

The idea of Value Chain Finance is very important, but should be developed in combinations of knowledge improvement and transferring know-how. The VCF help only under the reality that the relationship between producers and processors is no longer antagonistic (one tries to get prices up, the other tries to reduce prices), and collaboration bring synergy. Both groups should find ways to cooperate in order to compete with a Value Chain from another area or country and financing all activities which bring benefits to both players (like financing inputs to farmers through input dealer, or financing the increasing capacity of processors to be able process more raw materials and to increase quality and to reduce transaction costs. Goal of using VCF analyses to finding financial schemes/products are thus created in order to provide these assurances at all stages of the production process.

The VCF is an efficient tools for opening the bottlenecks and development production, processing and supply products for internal and export markets. More detailed about VC actors and need for their financing we provided below.

4. Current engagement of MFIs in financing VC actors.

Currently there are 122 microfinance institutions operates in Tajikistan[2], including 34 microcredit deposit organizations, 43 microlending organizations and 45 microlending funds. The quality and quantity of microfinance organizations is continuously improving, and so does the number of loans disbursed by these organizations. The entire microfinance sector is serving more than 550,360,468 somoni (MFIs AMFOT members) and 141,914 clients. According to AMFOT bulleting only top 13 largest MFOs in Tajikistan have more than 461,122,115 somoni loan portfolio between them, serving 115,973 clients.

All these microfinance institutions are typically engaged in agriculture financing, which is already high element of VCF. From other side MFIs finance agribusiness activity involved in supply inputs, seeds, machinery and processing operations by searching clients. Also MFIs finance construction and repairing existing warehouses and storages, finance the working capital for wholesalers and retailers of agricultural products. There are also some MFIs which serve processors (dairy, grain mill), input (seeds, fertilizers) producers and traders as well as procurement companies (see table below). These institutions managed to extend their services beyond the producers thanks to the external guidance and technical assistance.

[2] National Bank Web site provides names, contact persons, addresses and telephones of these organizations: http://nbt.tj/ru/banking_system/non_banking_institutions.php

Table 2. Disbursed loans by MFIs by sectors:

Direction of lending	**3-d quarter 2010**	**3-d quarter 2011**
Trading	45,96%	41,87%
Production	4,61%	4,19%
Services	9,99%	7,23%
Livestock, Poultry	16,37%	14,51%
Growing	11,13%	11,40%
Consumer loan	11,54%	19,87%
Migration	0,40%	0,92%
Total disbursed	37 mln. USD	50,8 mln. USD

Source AMFOT

Agriculture sector has perceptions of the sector as being “high risk” as well as challenges inherent in the various sub-sectors hinder flow of finance. The most sub-sectors are poorly financed with scarce specialized products. Due to declining productivity and production, excessive intermediation, inadequate storage and processing, disorganization among farmers and market uncertainties access to finance is limited. In spite of this some activities to finance value chain players are in place. According this table we can see that the amount of all loan disbursed for agricultural sector over 25% for all crops. MFIs are not named such lending as VCF for two reasons: first, funding is not performed with value chains in mind; that is, no one is thinking about removing bottlenecks in the development of specific links in the chain. And second, extensive approach is used to achieve the objective of increasing profit. So profit maximization and usage of available funds are tackled using the easy approaches – expanding coverage of the clients, covering new areas, new or existing businesses, enlarging active portfolio, etc. These MFO activities are also reliant on their external and internal obligations to maintain portfolio in the agricultural sector at a given level, or increasing the share of women, etc. The goal determines the objectives, objectives determine the approaches, and the work is usually done in the least difficult ways.

Targeted actions to finance value chains also give good profits for financial institutions and are the next stage of development, rather than simply concentrating on serving the region, expanding coverage, increasing portfolio and diversifying borrowers. It requires a more detailed analysis and intensive, rather than extensive development (going deep, not going wide).

Table 3: Examples of microfinance institutions engaged in agricultural value chain financing in Tajikistan

MFIs	Types of rural clients	Food production	Food processing	Inputs production	Inputs trade	Procu-rement
IMON	farming trade services other	dairy farms animal production grain, fruit/veg producers bee-keeping cotton other	dairy mill meat processing fruit/veg processing industrial plant processing other	seeds fertilizers machinery other	livestock machinery seeds, fertilizers	Yes
Madina	farming trade services	dairy farms grain, fruit/veg producers bee-keeping	dairy fruit/veg processing	No	machinery seeds, fertilizers	No
Arvand	farming trade	dairy farms animal production grain, fruit/veg producers bee-keeping other	No	No	seeds, fertilizers	No
Borshud	farming trade services other	animal production grain, fruit/veg producers bee-keeping other	No	No	No	No
Sugd Agro Serv	farming trade other	dairy farms animal production grain, fruit/veg producers beekeeping cotton other	No	No	No	No
Nov-Credit	farming trade services other	animal production grain, fruit/veg producers cotton other	No	No	No	No
Vakhsh Microfin	farming trade services other	animal production grain, fruit/veg producers beekeeping other	No	No	No	No

Source: MFC

The more efficient VC funding is, the better results can be received: improving the scale of operations, increasing value of produce, including additional players into VC, strengthening horizontal and vertical linkages, etc. This will ensure business development, improve the momentum and synthesis of value chain participants, a large

number of new players will appear. Using VCF at this stage is a strategically correct approach in the conditions where MFOs can increase their clientele and better utilize their capacity to facilitate the development of the national economy. According to MBB[3], the penetration of financial sector in Tajikistan is lower than in most countries of the world.

5. Agricultural VC in the country, in which microfinance can add value.

In accordance with the terms of reference, we recommend 10 value chains in which microfinance can add value by strengthening the operations of the actors between the producer and consumer. As per the criteria provided, all value chains presented include opportunities for development. Initially it was assumed that production of cotton was the best VC. However, we decided not to include the cotton value chain into this list, for the reasons below:

- A lot of analytical information has already been produced for this commodity, including value chain analysis;
- MFOs have little involvement in cotton production;
- Cotton is a strategic commodity for the country, and its value chain is under the patronage of the government and international investors;
- International donors pay a lot of attention to unfair profit distribution during the production and processing of cotton;
- The price of cotton is prone to fluctuations.

We have included ten products, which currently meet the criteria defined by MFC and also look interesting from our viewpoint.

- Relevant on Tajikistan
- Market potential (internal and external: Export oriented OR Import substitute)
- Market accessibility and stability
- Transparent market requirement
- Growth opportunity
- Outreach be farmers/ household involved
- Impact
- Enabling environment.
- Grow and produced in areas where MFIs provides their services

If necessary to expand the list, we would add production of apples, vegetables, and poultry farming. In our opinion, increasing production of wheat is not recommended, as our production cannot compete with Kazakhstan by quality, yield, price or any other parameter. Tajikistan imports most of its wheat from Kazakhstan, and we believe it is reasonable and each country must be using its competitive advantages.

[3] MBB - MicroBankingBulletin.

When describing and analyzing some of the value chains, we also touched upon some related directions and products. The problems and solutions described in this analysis are also applicable to other products. For example, a lot of issues faced by beef farming are also characteristic for dairy farming, while problems listed when describing the indoor production of tomatoes are similar for cucumbers or other vegetables grown in greenhouses. Production of dried fruit (apricot value chain) also has similar nature to production of dried apple, cherries, pears or raisins.

Table 4. Defined Value chains and its applicability for criteria of MFC.

№	Agricultural value chains	Presence of microfinance institutions in the area	Proximity to well developed main routes which facilitate transportation from producer to consumer	Potential impact of the added value on local development	Benefit from financing of MFIs
1	Apricot	Yes	Yes	Yes	Yes
2	Tomato	Yes	Yes	Yes	Yes
3	Lemon	Yes	Yes	Yes	Yes
4	Watermelon	Yes	Yes	Yes	Yes
5	Beef	Yes	Yes	Yes	Yes
6	Grape	Yes	Yes	Yes	Yes
7	Onion	Yes	Yes	Yes	Yes
8	Greenhouse production of tomato	Yes	Yes	Yes	Yes
9	Potato	Yes	Yes	Yes	Yes
10	Beekeeping	Yes	Yes	Yes	Yes

It should also be noted that characteristics of processing industry shown when describing tomatoes and apricots are also applicable to other products used by canning factories.

Below we describes 10 types of VC activities, describe the actors in value chain from producer to consumer.

5.1 Apricot Value Chain

Producers

During the Soviet era in Tajikistan was developed big plantation of apricot. Based on this plantations and development new Tajikistan produces significant quantities of dried fruits. The area of production of apricots in 2011 comprises about eight percent of global production and continues to grow (see the table below showing 7,3 % globe plantation of apricot was in 2009). The Tajik government has plans to increase both the planting and production of apricots by 50% through 2014.

Table 5. The globe production the apricot in 2009, by leader countries and their capacities.

#	**Country**	**area of production,** ha	**figures** in %%	**gross production, tons**	**figures** in %%
1	Turkey	59000	11,1%	695364	16,5%
2	Islamic Republic Iran	53107	10,0%	397749	9,5%
3	Uzbekistan	42000	7,9%	290000	6,9%
4	**Tajikistan**	**39000**	**7,3%**	**120000**	**2,9%**
5	Algeria	34119	6,4%	202806	4,8%
6	Pakistan	30206	5,7%	193936	4,6%
7	China	22349	4,2%	89890	2,1%
8	Italy	18400	3,5%	233600	5,6%
9	Japan	18000	3,4%	115200	2,7%
10	Russian Federation	18000	3,4%	53000	1,3%
11	Spain	18000	3,4%	97100	2,3%
12	Egypt	15000	2,8%	100000	2,4%
13	other 55 countries	165827	31,1%	1618993	38,5%
	Total	**533008**	**100,0%**	4 207638,00	**100,0%**

Source: FAO Stat and State Statistic Agency of Tajikistan

Table 5 showing that VC of apricot is very interested and has high potential for development. Especially, the VCF with combination with other tools could bring productivity of apricots with considering fact that the yield of apricot is too low in worldwide comparison.

Currently large scale production of apricots is concentrated Northern Tajikistan, in four districts in Sughd Region (Isfara, Bobojon Gafurov, Asht and Kanibadam). These districts, located in a part of the Fergana Valley with similar climate, are dominated by apricot orchards.

As can be seen from the table below, the largest areas of apricot orchards are present in Asht district – more than 11.1 thousand hectares. Isfara and Kanibadam come second, with 6.6 thousand hectares each. Bobojon Gafurov district comes in

fourth with just above 6 thousand hectares. These four districts have more than 89% of the total apricot orchards in Sughd Region (30.4 thousand out of 34 thousand hectares).

It should also be noted that in accordance with the approved government strategy, apricot orchards are to be increased to 40,781 hectares by 2014. The table above shows areas planned for new apricot orchards. Despite the 2010 plans of 3,100 hectares, the actual area of new apricot orchards was 3,888 hectares. Thus, we have reason to believe that the plan will be exceeded, and the orchard area (and subsequently the production of apricots) will increase by 25% in the next few years.

Table 6. Information on apricot orchards in Sughd Region, 2010

№	District	1960-2009		New in 2010		Total apricots, hectares, as of 01.06.2010
		Total Hectares of Stone Fruit	Total Hectares of Apricots	Total Hectares of Stone Fruit	Total Hectares of Apricots	
1	Ayni	561.3	505.17	41	36.9	542.07
2	Asht	10867.2	9780.48	1479	1331.1	11111.58
3	Bobojon Gafurov	6052.4	5447.16	661	594.9	6042.06
4	Ganchi	111	99.9	28	25.2	125.1
5	Jabbor Rasulov	324.9	292.41	351	315.9	608.31
6	Zafarobod	201.4	181.26	334	300.6	481.86
7	Istaravshan	191.7	172.53	10	9	181.53
8	Isfara	7186.5	6467.85	239	215.1	6682.95
9	Kanibadam	6879.8	6191.82	496	446.4	6638.22
10	Gornay Mastchoh	229.3	206.37	9	8.1	214.47
11	Mastchoh	38.1	34.29	315	283.5	317.79
12	Spitamen	483	434.7	343	308.7	743.4
13	Penjikent	380.1	342.09	14	12.6	354.69
14	Shahristan	79.8	71.82	0	0	71.82
Sughd Region total		33586	30227.4	4320	3888	34115.85

Source: Sughd Region Department of Agriculture

Table 7. The Plans to Establish New Orchards in Sughd Region for 2010-2014, hectares

	As of 2010	New areas					5-year total	Plan for the end of 2014
		2010	2011	2012	2013	2014		
Apricot	30,228	3,100	2283	1820	1720	1630	10553	40781

Source: Sughd Region Department of Agriculture

In efficient growing apricot the profit obtained per hectare of apricot orchard is much higher than that of other crops. Apricot is the main crop that supports household farming, particularly in Kanibadam and Isfara, Asht districts where this business is integrated in vertical chains, linking players from farmers to consumers in export markets. This extensive network requires regular supply of high quality product to be able to compete with other producers and processors.

Apricots and processed products are sold in the market in three categories:

- Fresh (early and seasonal);
- Dried (with and without processing in specialized facilities);
- Processed in canning factories and facilities.
  For all aforementioned products, both buyers and manufacturers are abundant in both domestic and external markets.

Nurseries

Virtually without exception apricot trees are budded on to seedling rootstock. Grafting is used. Tree rootstocks are expected to be virus free. Specialized fruit tree nurseries do exist, yet they are few and usually small. In country operates many private fruit nurseries. However, due to inefficient crop management, the condition of trees is poor and skilled technicians are scarce. Current demand for fruit nurseries are not fulfilled by the current supply.

The main problems for nurseries are:

• Poor planning and administration: nursery owners mix varieties and therefore they cannot guarantee the varieties they sell,
• Poor pest management,
• Poor irrigation,
• Planting trees too close together causing excessive tree elongation,
• Poor pruning of trees,
• No pruning of root systems,

In spite of those problems the nursery supply and production are available in country and growing.

Apricot Pricing

Apricot consumption volumes (both in fresh and in processed form) have significant potential for growth. The wholesale price of dried apricots in the domestic market is determined by the balance of supply and demand, which depends on the market environment in Russia.

Table 8. Prices for fresh apricots in Khujand by Month, 2007-2011, Somoni

	2007	2008	2009	2010	2011
January					
February					
March					
April					
May	3.00-6.00	1.50-2.50	1.50-2.50	2,50-5,00	3,00-5,00
June	1.00-5.00	0.50-3.00	1,00-2.00	1,00-2,00	3,00
July	2.00-3.00	1.00-2.00	1.00-2.00	1,50-3,00	3,00
August				2,50-3,00	4,00
September					
October					
November					
December					

Source: LLC Market Plus

As the table shows, apricots are present in the market for three months; for farmers, this period is reduced to one month only. The farmers can sell their product fresh – to merchants or to canning factories for processing. The third and the most commonly used approach are drying which extends the shelf life for apricots and makes them a commodity.

Factors affecting apricot pricing:

- Short life-cycle, cannot be stored for long periods,
- Apricot pricing is based on the Russian market
- Yield (for example, 2008 yield was the highest),
- Pressure on pricing via negotiations with canning factories.

5.1.1 Fresh Apricots

The Sub-sector Characteristics of Fresh Apricots

Early apricots ripen in May. This early variety is consumed fresh and is not suitable for drying. Initially this variety was expanded for demand of canning factories, but currently the purchase price of approximately 50 diram/kg. However, even with this low price not all canning enterprises are ready to buy the fruit due to low content of sugar, resulting in higher canning costs. Since a large amount of early apricots ripen within a short time, most of them cannot be consumed in the domestic market. With no cold storage facilities available to extend the shelf life, farmers are forced to send the apricots for processing to avoid them spoiling. In some districts this variety of apricot is fed to cattle, as the price offered by canning factories does not justify the costs of harvesting and transportation. During our research, we heard repeatedly that orchards with early apricots are being replaced with the varieties more suitable for drying.

Other than variety, apricot ripening time also depends on the climatic area. The most suitable climate for early ripening is in Kanibadam, then Asht and Isfara. The latest ripening time for apricots is in the mountainous areas, including Zeravshan Valley and mountain villages in Asht district.

Between the time when early varieties ripen and other types are ready, the prices of apricots rise in the local market. Thus, storage facilities can be used for selling products in this period[4]. Fresh apricots of later varieties are harvested in June and early July. In this period the population starts consuming the fruit actively and canning for winter. However, this period is short. To saturate the domestic market, apricots can be brought from the orchards located higher in the mountains. However, this type of apricot is not suitable for export in fresh form to Russia and Kazakhstan, as it cannot compete with the fruit arriving to the Russian market from Northern Kyrgyzstan, Southern Kazakhstan and the Caucasus, Europe.

Sale of fresh apricots has a great potential for growth and for higher profits, but growers and marketers are not experienced and skilled enough to run this type of business. This is a growing subsector, which needs support and expansion. Despite the

[4] At the moment survey is going the construction the cool storage facility for apricot in Asht district with support of Productive Agriculture Project, USAID.

challenges and lack of experience, many entrepreneurs attempt to export fresh apricots to the Russia. These risks are generously rewarded within two weeks. However, not all business attempts succeed, as apricots are a perishable product. When shipping fresh early apricots to Russia, entrepreneurs face such problems as high ratio of fruit getting overripe while in transit despite being transported in refrigerated trucks. The reason is that the fruit is loaded on trucks straight from the field without being cooled first and the vehicle refrigerator cannot lower the temperature in the middle of the fruit. To avoid this problem, knowledge needs to be spread among the farmers about the need to pre-cool the product before loading in the refrigerated trucks or railroad carriages. This pre-cooling, using either mobile or stationery refrigerated units, is a mandatory practice worldwide.

Shipping fresh apricots requires special knowledge of the preparation of fruit, including determination of the ripeness level, sorting, packaging, temperatures, and best practices of loading into the trucks to ensure circulation of cold air and methods of dealing with breakages of refrigerating systems in the trucks, a serious problem.

Some entrepreneurs provide logistics services to organize delivery of fresh apricots or other fruit to the Russian markets. Following the value chain volume of 1 truck of fresh apricot, $6,000 USD at the farmers' level turns into $30,000 USD at the retail market[5]. The difference of $24,000 USD includes the cost of crates, freight forwarding expenses, fuel, about $1,000 USD for customs clearance and paperwork in Tajikistan, the cost of shipment through transit countries, customs clearance at the Russian border, all expenses within Russia, and costs of entry and storage in the market. Thus, the cost of goods sold for early apricots in Russia are $1.80, with the retail price of Tajik fruit reaching $3 USD.

Fresh fruit can also be shipped via railroad, in refrigerated carriages. This type of transportation is particularly popular with fresh grapes.

Table 9. Export of Stone Fruits from Tajikistan, 2008 and 2010

	2008		2010	
	Tons	**Amount, 000' USD**	**Tons**	**Amount, 000' USD**
Total	**1985**	**1533**	**1701**	**1043**
Russia	1956	1515	1538	995
Kazakhstan	29	18	54	12
Kyrgyzstan			35	15
Ukraine			73	20
Other countries			1	1

Source: State Statistic Agency of Tajikistan

This table shows that more than 1,700 tonnes of fresh drupaceous (stone fruit) fruit are annually exported from Tajikistan with a total value of more than one million dollars. The export volume has been increasing for the last four years, even though it has not reached the 2004 level when more than 2,636 tonnes of fruit were exported. Most of the exports are shipped to Russia.

Packaging Fresh Fruit

[5] According Pulot Ashurov. He involved in exporting over 30% of volumes fresh apricot exported from Tajikistan.

To transport fresh apricots for export, they are harvested before full ripening to extend their storage life. If necessary, the temperature in the refrigerated truck can be adjusted, depending on the estimated time of arrival to the market. If the delivery is delayed, the storage temperature is lowered to +3 degrees. Wooden and plastic crates are used for harvesting and pre-cooling the apricots. Exporting in plastic crates is deemed too expensive, so wooden crates are used for shipment. The crates are produced from May to September, using local material – popular, not suitable for construction. Apricots are put in wooden crates covered with gauze, in two or three layers.

The export of fresh apricot from Tajikistan has very high potential and currently on young stage of development. And with considering that the only Russia (second largest importer of fresh apricot with 34,984 tons[6]), we could confirm that.

Considering our climate, exports of fresh apricots from Tajikistan can be substantially improved. This requires conducting detailed studies in the expected destination countries, with the emphasis on wholesale markets. It is also useful to attend thematic exhibitions.

The bottleneck in this segment is the demand for early fresh apricots which can be ensured by establishing export channels. The current absence of such channels and the lack of profitable domestic demand results in the apricots being fed to cattle. Prices offered by canning factories do not justify the cost of the harvesting and transportation of apricots. As a result, farmers often reduce the orchards with fresh varieties and plant other varieties which are more suitable for drying as the demand for dried apricots exists throughout the year. Increasing the export market and domestic demand for early apricots can result in increased farmers' revenue, which can also improve the profitability per hectare of existing orchards. If exporters guarantee the purchase at higher prices, the farmers will be willing to produce more early apricots for the market.

5.1.2.Dried Apricots

The Sub-sector Characteristics of Dried Apricots.

The dried fruit market has been established and developing over several decades; farmers have been studying the intricacies of this business in an attempt to earn more income. A large share of all apricots grown in Tajikistan is dried. The areas occupied by varieties that can be dried are increasing yearly, unlike the early varieties. Drying apricots helps farmers increase the storage life and manage this product in the market. Particularly the population of Isfara and Kanibadam consider this product a profitable investment, putting money in the crop during the season and selling as the price increases. The demand for this product is high throughout the year.

In addition to small "unorganized" middle men, which appear and disappear quickly, there are people (or groups of people[7]) who became famous in the local and national market over the last few years. Isfara is a major supplier of dried fruit to the

[6] FAO statistics, 2007

[7] Referring to groups of people, rather than companies, as these are not officially registered and are acting on the basis of certificates for private entrepreneurial activities.

Russian and Kazakh market. Dried apricots are purchased from farming households and city markets in Tajikistan, as well as trans-border areas in Kyrgyzstan and Uzbekistan, and batched by wholesalers at the markets in Isfara. Surh market is the largest market for dried apricots. From here exporters buy the product to be shipped to the target markets. Number marketing researches[8] conducted in the Russian markets has shown that almost in every Russian city, dry fruits are sold by representatives of Tajikistan. Apricots are exported weekly all year round, excluding summer months, when everyone is busy harvesting and drying the new harvest. At all levels the product is packaged in bags.

Moreover, for the purpose of retaining the markets some entrepreneurs are attempting to improve the packaging, grading and sorting processes. Most of the product is sold soiled and unsorted in bags. Dozen companies have opened since 2008 which process the product using the same technologies as competing countries using equipment imported from Turkey. They are packs the product in card box.

Quality dry apricot

Dried apricots de-pitted are called ***kuraga*** in Russian and ***kaysa*** in Turkish (the same name used in Tajikistan). Low quality kaysa and dried apricots (with stones) are used as part of compote mixes. The quality of dried apricots, and therefore the quality of finished product, is affected by the following factors:

- There are more than 40 varieties of apricots, and no large orchards grow just one variety; making the use of single technology and exposure of product to drying more difficult, the output will have different quality, which can result in more expense during sorting.
- Each farmer dries apricots using their own techniques which usually only differs in details; however, these details do not allow the product to have similar universal quality in further consolidation of the shipments and requires further sorting, grading, etc.;
- In most cases apricots are dried on road beds, on the ground and on stones. Often nothing is put under the fruit during the drying process, which makes the product unsafe and appearance is not attractive;
- When smoking apricots with sulfur, the duration and frequency of smoking varies; therefore, different batches can have different sulfur content on the surface.

As a result, the product sold in the markets is heterogeneous, varying not only in color (which is an indicator of the variety, ripeness of the product, duration of the storage and sulfur smoking), but also in taste, size and moisture content.

It is necessary to use the simple designs of solar dryers made by local carpenters for drying apricots. The system of artificial drying with electricity or extensive using solar energy can be also used. These methods will reduce the drying duration and the output will be not contaminated by dust and soil and will have an attractive appearance. Accordingly, the price of a product will be higher.

[8] Conducted by author in 2005, 2007, 2011

The export of dried apricots.

The export of dried fruit to the Russian Federation is one of the most important export items of agricultural produce from Tajikistan. Export of dry fruits in major was exported from Sughd province. We can see that the export volume is growing yearly. The small slowing the export in 2010 was connected with ban issued by Russia during over 3 month against Tajik dry fruit.

Exported dried apricots constitute most of this amount, in addition to raisins, dried apples, dried pears, plums and peaches.

In 2010 in Russia were imported 44815 tons of dry apricots[9], which is for 8% less than in 2009. The main supplier of dry apricot into Russia is Tajikistan with the import portion 60% of all market. In second place is Turkey, which provides 32% of all import of dry fruits into Russia. But the product from Turkey in value more expensive than product from Tajikistan, that why the leader in Russia on Value is Turkey with level of 47% of all import.

Table 10. Export of dry fruits from Tajikistan in 2003-2010, in tons.

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total dry fruits	50070	42661	44339	52310	57825	69488	78492	76316
Belorussia	282	382	561	767	1175	1618	1539	1596
Georgia							3	
Turkmenistan							63	36
Kazakhstan	36	19	62	163	204	231	471	6770
Russia	49485	42066	43489	51067	55878	66381	73943	63101
Ukraine	195	150	227	292	466	1115	1335	845
Uzbekistan							30	
Afghanistan	18			21		120		28
Iraq					46		810	3522
Iran		44			43	20	269	332
USA					13		11	11
China								17
Syria								12
Japan								3
Pakistan							18	43

Source: State Statistic Agency of Tajikistan

Russia has been the preferred market for exporting dried fruit from Tajikistan for several decades. The sales season for apricots lasts from September to April; after this season the sales volume drops by more than 50%. From July to August the entrepreneurs cannot make a profit, and often work just to cover the operating costs. Kuraga are purchased also by Russian companies in the wholesale markets in Tajikistan, processed, packaged in boxes and sold in the Russian markets.

Transportation

Dried fruits are exported from Tajikistan by railroad in separate or mixed shipments. Entrepreneurs offering transportation services for consolidated shipments are popular

[9] According Mr Timur Kazancev, director AS Marketing compony

and are called “carriage men.” They register the whole batch in their name, making all the payments and keeping records.

5.1.3. Apricots Processed by Canning Factories

The Characteristics of Apricot Processing

Another direction for processing fresh apricots in Tajikistan is to process them into juice. Canning factories collude to reduce the purchase price. As a result, the only apricots that are sent for processing are those that could not be sold fresh, as well as those that are not suitable for drying.

Table 11. Average Apricot Purchase Price by Canning Factories, in somoni, by Year

Item	2005	2006	2007	2008	2009	2010	2011
Fresh apricots	0,25	0,25-0,40	-	0,25-0,50	0,30-0,50	0,30-0,50	0,50

Source: LLC Market Plus.

The low prices are lobbied by canning factories[10] under pretence of paying taxes. Thus the farmers are forced to sell fruit below cost. In turn, the farmers provide the canning factories with the lowest quality raw product including apricots unsuitable for drying.

The export characteristics processed apricots

Most of the juice produced in the country is exported. In 2010, more than 1,56 million USD worth of juice was exported; most of this was apricot juice which is very popular among the population of Tajikistan and key export markets for juices – Kazakhstan and Russia. All of the fruit and vegetable juices were exported from Sughd Region.

Table 12. Export of fruit and vegetable juices from Tajikistan, 2006-2010

	2006		2007		2008		2009		2010	
	In tons	000' USD	In tons	000' USD	In tons	000' USD	In tons	000' USD	In tons	000' USD
Total	12905	3732	12581	4050	9 005	3 316	7001	2649	3825	1563
Kazakhstan	10121	2933	10410	3359	8259	3010	6302	2388	3472	1400
Russia	2571	734	2171	691	746	306,4	612	239	353	163
Uzbekistan	151	49								
Kyrgyzstan							96	22		

Source: State Statistic Agency of Tajikistan

The volumes exported by canning factories are reduced annually due to the deteriorated state of canning facilities, problems with raw materials, lack of crates, lack of packaging material, low product quality due to outdated equipment and technologies. The root of all problems in the canning industry is the absence of markets and lack of

[10] Fruit Industry of Tajikistan, except for a few new businesses, was created in Soviet times. Most enterprises are large-scale manufacturing, have old equipment and technologies, which are not capable of producing competitive products for both domestic and international. In Soviet times, most processed fruits and vegetables were forwarded to other Soviet republics, after the Soviet Union collapse the supplies declined sharply and production dropped to less than 20% of production capacity. The decline in production capacity is continuing, the equipment is unsuitable for modern production; little new investment is occurring and creditor debts are increasing. Many companies are on the verge of bankruptcy.

access to low cost financing sources. The companies also have problems with access to electricity and clean water.

Functions

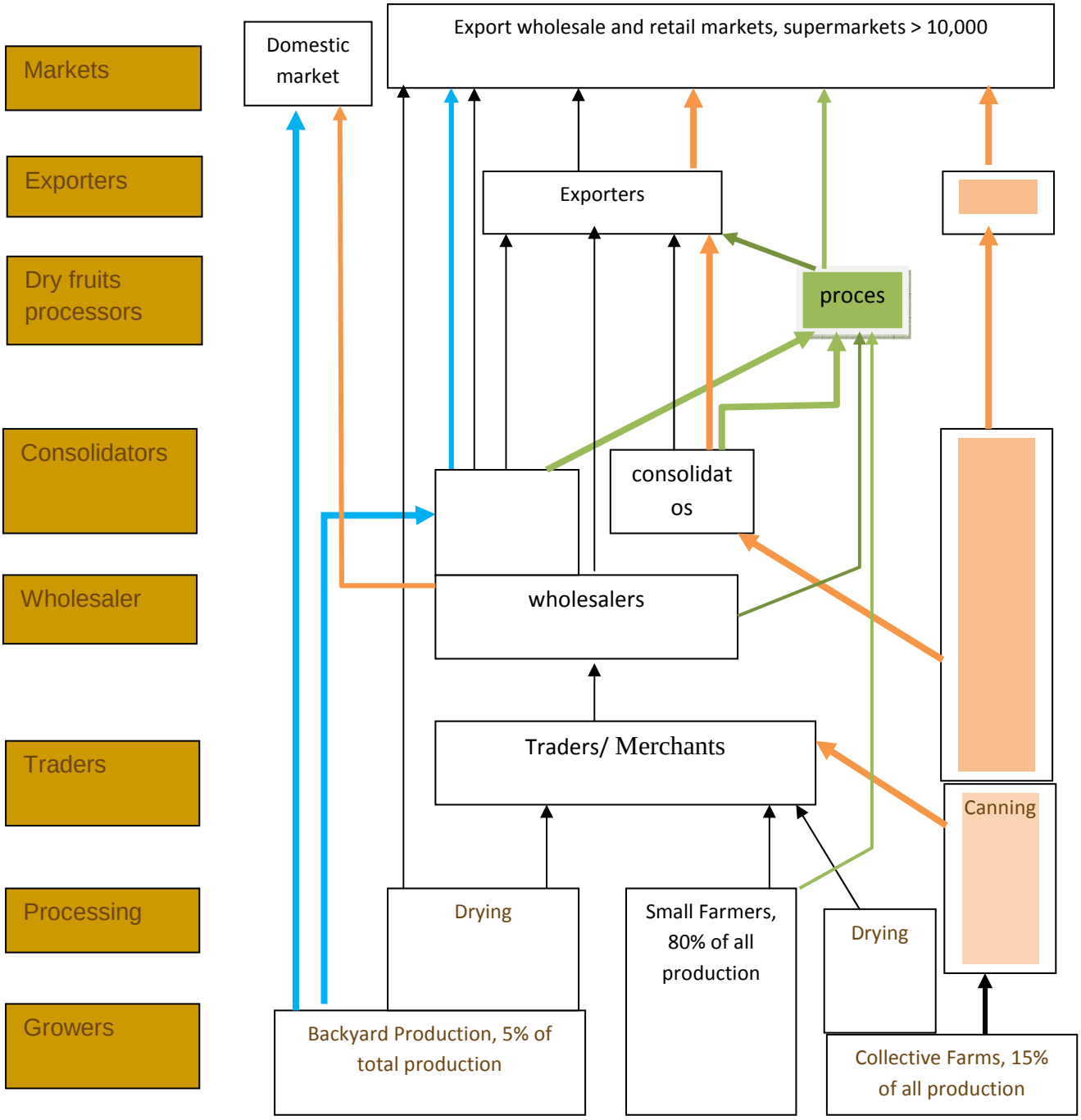
Players in the value chain are farmers, procurement organizations, processors, exporters, retailers and customers. The marketing linkages between them are shown with solid lines in the chart below.

- Farmers are represented by a large number of farming households. In recent years there has been remarkable progress in the production of apricots and this crop continues to bring profit to many farmers, despite the great increases in production. Qualitative and quantitative improvements in the production and marketing of apricots in recent years secured apricot-growing as a safe source of revenue for farmers, traders and exporters alike. The demand for apricots is traditionally high in foreign markets throughout the year. The lack of government interference in the value chain for dried fruit has made this commodity extremely free, regulated only through market factors, such as the balance of supply and demand.
- Farmers sell apricots in the fresh or dried form. The buyers of fresh apricots from the farmers are:
    1. Private merchants reselling apricots in the market;
    2. Exporters of fresh apricots;
    3. Companies performing deep freezing of apricots;
    4. Canning factories.

  However, the biggest channel for selling production by the farmers is selling dried apricots. Farmers do the drying themselves. These are sold in the market, both for individual consumption and to consolidators. Some farmers export dried apricots directly, using their own sales channels.
- Merchants. These buy dried fruit or fresh fruit from the farmers and sell them either in the retail market (fresh) or in larger markets (dried). They are the driving factors ensuring consolidation of goods around the main markets, where wholesalers, exporters and processors of dried fruit come to buy their inputs.
- Processors of fresh fruit. This group includes canning factories producing apricot juice. Often they sell their products directly or have established sales channels, which fail often due to quality problems.
- Consolidators and wholesalers. These entrepreneurs buy dried fruit from the merchants, consolidating shipments by color, variety, size and quality of the fruit. They mostly sell to exporters. These groups of entrepreneurs also supply inputs to the dried fruit processors.
- Dried fruit processors. These represent a group of companies, which started operation in the recent years, forming a new segment. They process dried fruit on special equipment, focusing on consumer demands (including cleanliness, hygiene and attractive packaging). They buy dried fruit from farmers, merchants, wholesalers and consolidators and sell to exporters. Often processors also play the role of exporters.

- Retailers are people who sell the product in the local markets and are working to satisfy the demands of the internal market, who own shops. Their number is stable.
- Exporters are entrepreneurs who have established contacts in the export markets. The number of exporters is stable. They ensure high sales volume and dictate the prices in the internal market.

Scheme 1. Value Chain for Apricots



The chart above has three types of colored lines representing various flows.

- The brown lines on the right show how the product of canning factories is sold. The product gets to the local market through merchants. Established channels are used for exporting the product.

- Blue lines show the flow of fresh apricots. This take place from May to July. This segment is strictly seasonal. Products are exported from May to June.
- Goods flows shown in black lines are the most independent and developed. They signify a complete cycle, from farmer to export. However, this segment is developing through processing dried fruit in Tajikistan. These flows are shown in green.

Opportunities for Value Chain Financing

Current situation analysis in the apricot market shows, that apricot are sold fresh, dried or in the form of juice. To develop the VCF for apricot production sector, we need to consider the internal growth factors as well as the bottlenecks that hamper faster development.

1. **Financing the production of apricots in line with the market requirements.**

- There is an urgent need to expand the orchards of those specific varieties that are best suited for drying.
- Preferential loans for creating new orchards and orchards rehabilitation;
- Short-term harvest labor loans
- Promotion of working capital loans for with interested dealers, financial institutions and buyers
- Micro-leasing and seasonal loans (pay as you harvest) to investment in irrigation systems
- Loan guarantees / direct financial support to farmers/ farm enterprises

2. **Financing the post-harvest treatment and storage**

- Introduction of modern technology, include aseptic packaging for producing apricot juice concentrates is needed;
- Purchase the processing equipment for dry apricot
- Construction the cool warehousing the export of fresh apricot
- Financing establishment transportation facilities to prevent loses and stabilize prices
- Building or renovating storage facilities for dry apricot,
- Building up working capital for export activities,
- Investing in drying equipment and technology

3. **Financing trading and export**

- Financing working capital for export fresh and dry fruits.
- Financing fresh apricot export activity. Tajikistan has market Opportunity: Early season fresh apricots with competitive advantage on export markets when international prices are high.

- Strengthen buyer (exporter/processor) relationship with farms to help facilitate flow of market information and possibly technical assistance and working capital financing.

Transferring Knowledge and know-how

- Technical assistance for farmers on proper picking, sorting, pitting and drying to reduce PHH losses
- Training for farmers on efficient use of chemicals and fertilizers for successful fight against pests and diseases is needed.
- Conduct trainings on advanced technology of orchard cultivation and use of small mechanization.
- Technical assistance on input use and application to prevent fungus and pest damage, plant protection
- Much attention needs to be paid to the issue of crop loss due to inefficient harvesting techniques, sorting, calibration, loss in storage and transportation;
- Provide training to use more progressive approach for apricot drying, including solar dry kiln systems, tunnel drying, as well as other methods of accelerating the drying process that will make the product appearance clean and attractive.

5.2. Onion value chain analyses

Onion production.

Onions are becoming a major crop in some parts of the country. A number of districts specialize in growing onions based on their geographical and climatic conditions. In Sughd Region this includes Istarafshan, Bobojon Gafurov, Spitamen, Jabbor Rasulov and Zafarabad districts. In Khatlon Region onion production occurs in Kumsangir, Kabodien, Shartuz, Bohtar and Pyanj and in the districts surrounding Dushanbe onion production occurs in Tursunzade, Shahrinau and Rudaki.

The following varieties of onions are grown in Tajikistan:

- Spanish onions are sown in December and harvested in late August – September. This variety of onion is used for storage in winter. The average yield is between 40-50 tons. The Spanish variety is mostly exported to Russia. Its advantages include firm bulbs suitable for transportation and market appearance.
- Dusti variety has higher yield – around 65 tons per hectare, but the major limitation is that the bulbs are soft and not transportable.
- Karotol (black willow) variety yields 70 tons per hectare with red or purple bulbs.
- White – is local variety yields 35-40 tons per hectare.

- Elita Express (harvesting April-May) is an early variety, sown in early September and harvested in April-May. – Average yields are 30-60 tons a hectare.

- Peshpazak (harvesting May) – is also an early variety sown in late September or early October to be harvested in late May to early June. Average yields are 60 tons a hectare. Two crops a year can be harvested, with the first crop sown in spring and harvested in June-July and the second crop sown in September and harvested in April-May.

- Sibir (harvesting May) – is also an early variety sown in late September or early October to be harvested in late May to early June. Average yields are 70 tons a hectare. Good for the export.

- Aldava (harvesting middle May) – is also an early variety sown in late September or early October to be harvested in late May to early June. Yields are could reach 90 tons a hectare. Good for the export.

- Kanaka (harvesting end of June) – is also an early variety sown in late September or early October to be harvested in late May to early June. Yields are could reach 70 tons a hectare. Good for the export and transportation.

Late varieties are divided into “September” and “December” onions. The September varieties are harvested in August and fully sold at harvest time. The December variety ripens in late September-early October and is stored for sale in the winter. Autumn onions also ripen in Shartuz in August, while in Uzbekistan they are harvested in September; early onions from Tajikistan are exported to Uzbekistan and Russia.

Early onions ripen:

- In end of April- early May in Shartuz district;

- In early June in Jabbor Rasulov, Spitamen, Bobojon Gafurov districts;

- In August – October: Zafarabad and Istarafshan districts.

According to producers, early sowing is more profitable, not only because of the earlier harvest but also because less irrigation is required.

Table 13. Gross Harvest and Yield of Onions in Tajikistan, 2005-2009.

	2005	2006	2007	2008	2009
Gross Harvest, thousand tons	188	199	217	235,6	272,0
Yield, tons per hectare	17	16,6	16,7	15,7	20

Source: FAO statistics

As shown in Table 13 total production of onions has increased 25% between 2005 and 2008 while at the same time per hectare yields have declined by nearly 8% indicating increased hectares devoted to onion production but lower production efficiency.

Increases in production of vegetables in Tajikistan, including onions, are conditioned by a number of factors, including:

- More land occupied by vegetables. 44,800 hectares were dedicated to growing vegetables in Tajikistan in 2010, a 34% increase compared to 2005. This became possible thanks to moving some of the land from cotton growing to other crops and lifting heavy restrictions on cotton production plans. Farmers used most of the land freed from cotton growing for producing onions, since these are considered one of the most profitable crops, with substantial demand available;
- Increasing yield by using more expensive, higher quality seeds, proper usage of fertilizers and agricultural machinery;
- Effective usage of pesticides and plant control chemicals;
- Improving farmers' knowledge on agricultural techniques;
- Increasing access to financing. Production of onions has relatively high-capital requirements, compared to other crops, and also requires large-scale spending at various moments during the growing season;
- Favorable climate conditions.

Table 14. Production, yield and area plantation of vegetables in Tajikistan in 2005-2010.

Indicators	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Area of plantations, thousand ha	33,4	35,8	39,1	37,2	40,8	44,8
Gross productions vegetables, thousand tons	718,4	759,7	835,1	908,2	1046,9	1142,6
Yield, tons per ha	18,7	18,7	19,0	19,9	20,8	20,6

Source: State Statistic Agency of Tajikistan

Post-harvest Operations of Onions

Onions harvested in Tajikistan pass several phases of post-harvest treatment which are performed manually. These phases include cleaning, trimming the ends, drying, sorting, calibration, peeling and packaging. Leaders of several farming households were interviewed to verify the state of processing technology used. The people performing these post-harvest tasks are mostly women who receive about $3,50 and two hot meals per day.

Packaging for onions

After harvesting and drying, onions are placed in string bags, from 22 to 30 kg each, before sales begin. String bags are imported from China, though previously they were brought in from Uzbekistan. Depending on the size and density of the bags, they fit 20, 22, 25, or 30 kg. The price is 60 diram per bag retail or 45 diram wholesale.

These bags can be purchased in the local markets. The season for selling onion bags in Dushanbe is from late April till June, and in Sughd Region – from June to mid-October.

Processing onions

At present, onions are mostly consumed in fresh form. Processing is virtually inexistent, even though in previous years large volumes of onions were dried and exported. Currently the processing of onions is no longer profitable, and the finished product cannot compete in the global market. Ukraine and Russia – traditional destinations for Tajik dried onions – have switched to Tajik and Indian manufacturers, who offer similar quality at lower prices.

Sales Channels for Onions

Many farmers sell onions straight from the field, preferably to the exporters (who purchase the product for loading onto trains) and/or representatives of storage companies who save the onions for winter. These two categories of buyers pay a price above average wholesale market price, but their requirements are also higher. They pay premium over the wholesale price if a large lot can be offered by one or several farmers. They also tend to come to the fields themselves and not use the services of middlemen.

The farmers prefer to sell the onions in large lots as this maximizes their earnings and saves the time they would spend in the market if retailing their product. Many farmers also try to hold the onions for later sales dictated by cash flow needs.

Shartuz is the first district to harvest early onions in late April making export from this region attractive. A group of exporters specializes in buying early onions in this district. Various branches of Tajikmatlubot and individual entrepreneurs from Istaravshan purchase large quantities of onions from this district.

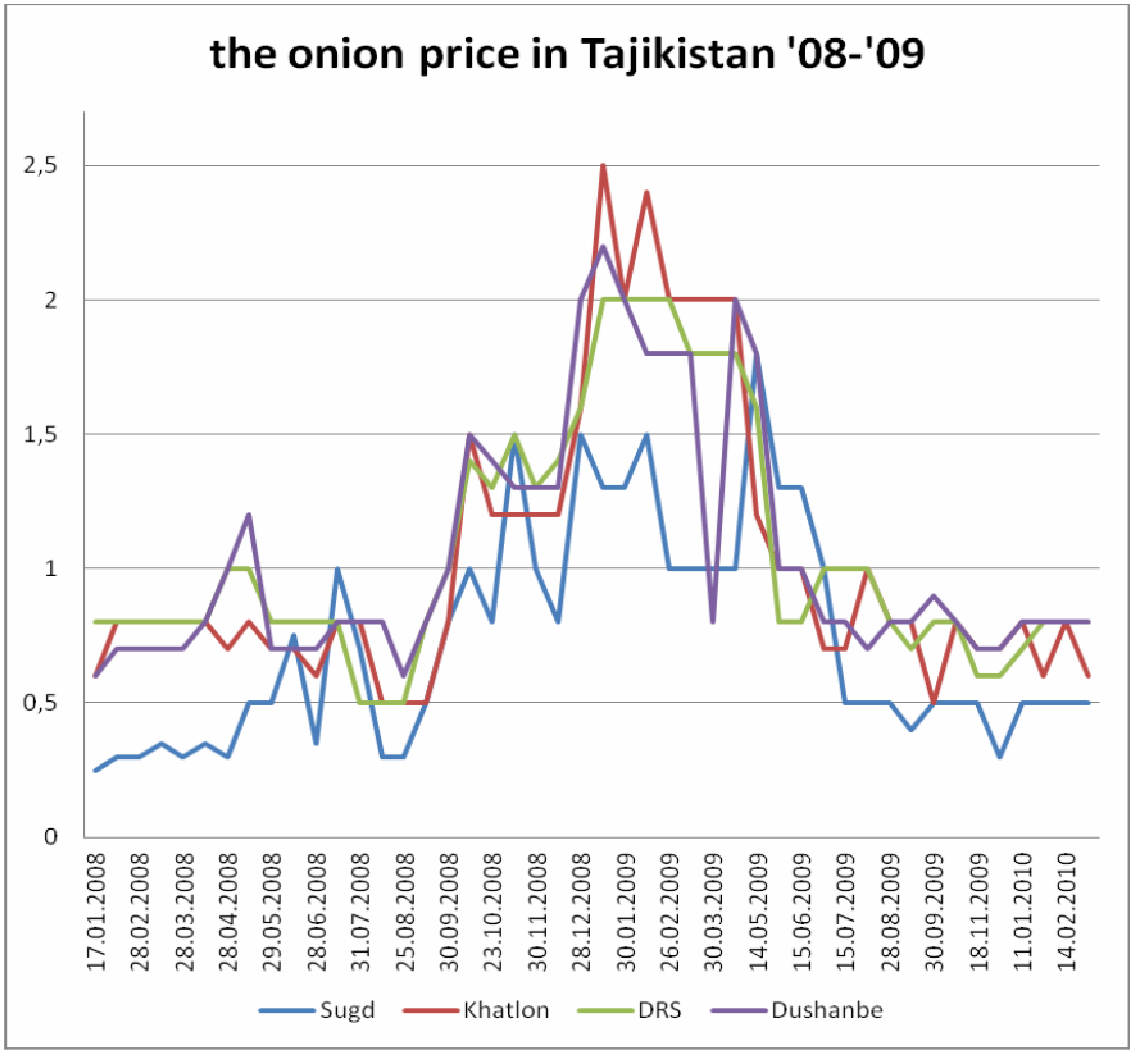
Entrepreneurs from Dushanbe buy onions in large lots, using special bags for exporting. The workers sort the bulbs by hand in the field using “templates” provided by the buyer. Usually the template equals or bigger than 50 mm in diameter. Smaller onions, which are not bought, are used in food by the farmers or sown for seeds. Farmers growing the variety of early onions have to sell it urgently – if they do not sell the onions from April to September, the prices will drop – late onions arrive in September and can be stored for winter.

Exporters to Russia have their “own” fields, which they finance, or where they have agreements with farmers in Tajikistan. Middlemen’s services are seldom used. Onions are also bought by entrepreneurs shipping the onions to towns and districts, as well as the center of the country; onions are also sent to Russia. An increasing number of entrepreneurial farmers are selling onions retail off season. The difference between wholesale and retail prices is approximately 20 dirams per kilo, which covers the transportation, sales cost and the salesman’s margin.

The chart below clearly shows the link between the proximity of the markets to the places were onions are grown. When considering the market environment for onions within the country, we can see large variations and differences. The prices are

traditionally lower in Sughd Region due to the fact that large volumes of onions are grown here and, unlike Khatlon Region, they are distributed evenly throughout markets. In Khatlon, on the other hand, the onions go straight from the field to export markets. Remarkably, the onion prices in Sughd Region grow sharply when the mountain roads open and large shipments start moving to Dushanbe and other Southern provinces. Another peak occurs in the autumn, before the roads are closed – when another peak of shipments takes place from Sughd Region to the South, to stock up for the winter.

Diagram 1. Wholesale Onion Prices in Selected Areas of Tajikistan, 2008-2009.



Notes:

- This chart shows wholesale prices for onions packaged in bags.
- Prices shown in the chart are not retail prices, and can vary depending on the growing location and sales location.
- The prices are averaged by regions, even though the prices within the regions can vary greatly, e.g., between Istarafshan and Isfara, or Shartuz and Kulyab;
- This chart does not show prices in Gorno-Badakhshan, as they are traditionally higher, due to remote location and lack of land for growing.

Besides, late (winter) onions are grown mostly in the North of the country and shipped to the South. The price difference is also high in spring and autumn, due to high cost of transporting and selling onions in the season when the mountain roads are

closed or traffic is limited. The difference in prices forces entrepreneurs exporting to Russia to buy onions in Sughd Region. For them, Northern part of the country is more favorable as the origin for export, due to lower price of the product compared to the country-wide average and a location closer to the destination markets. And since more than 95% of exports are shipped to Russia, Sughd Region is the preferred source for exporters. This explains the fact that most of the exports – over 90% – are sourced from Sughd Region.

Regarding the fluctuation onion price into local market, the high price levels are observed throughout the year in Shomansur market in Dushanbe, even in comparison with Giprozem market in the same city. This is due to the fact that onions sold at Giprozem are brought wholesale from other parts of the country, including Khatlon Region, Sughd Region (Istarafshan and Spitamen) and Uzbekistan (Jizzak, Begavat). Shomansur market offers onions at retail prices for the residents of the capital. Prices in Kurgantube and Shartuz are similar, sometimes increasing or dropping slightly.

Thus, we can conclude that when working in the onion business and having the necessary market information, a business can feasibly work to sell onions within the country. The business has to react promptly at the price fluctuations in the domestic market and distribute the product depending on the market environment, from the areas where onions ripen earlier to those areas that do not have any onions.

It is also obvious that absence of storage causes sharp growth of prices for onions in late winter-early spring. Heavy price increase – from 0.70 Somoni during the season to over 2 Somoni by the end of winter – makes import of onions from Afghanistan and Uzbekistan more attractive.

The overall trend of rising prices for onions is similar to overall price rise for first necessity food items, and has an obvious seasonal nature. Prices are the lowest in the harvest period, from September to January, then start growing. After reaching maximum in May, prices remain high until July, and then start dropping until September. The reasons behind the price increase are obvious:

- Reduced stock of onions in storage;
- Increasing exports to Russian Federation[11],
- Sharp lack of storage leads to price increase up to 300%;
- Constant demand for onions among the population, so people start stocking up on onions in autumn.

Another important factor is the purchase price from the farmers. The purchase prices in Tajikistan for onions grown in 2011 are high. For example, the price for September onions is 0.26 US dollars, or 0.19 Euros. For comparison, prices in August and September kept falling throughout August and September[12] for those manufacturers who supplied onions to the Russian market. Increasing supply in the market forced the farmers to drop the prices. The most significant drop was observed in the central and Southern parts of Russia. Farmers were ready to sell onions at € 0.07-0.09 per kg. The overall range of wholesale prices of garden onions at Russian farms were within € 0.08-0.14 per kg, with maximum prices at wholesale markets not exceeding € 0.20 per kg. That is, maximum price of onions in Russia was almost the

[11] More detail on this in the Chapter “Export of onions”.
[12] According to a review “APC-Inform: fruit and vegetables #33 of August 26, 2011”.

same as inside Tajikistan, which makes Tajik onions uncompetitive considering that it needs to be transported to Russia.

Export and Import

Requirements to quality are rather high. The product must be sorted, calibrated and packaged in string bags, which requires additional costs on the part of manufacturers. Tajikistan exports large quantities of fresh onions, mostly early varieties. Convenient geographic location and abundance of sunlight gives Tajikistan competitive advantage, compared to other manufacturers in the export markets. Tajik onions are higher quality, fully ripe and have better taste qualities. Onions are exported mostly to Russia; this is the primary and biggest market for the exporters. More than 90% of exports are shipped to that country, which is a traditional market. For example, in 2008 Russia received 98% of the onions exported from Tajikistan (see table). It should be noted that the majority of onions exported to Russia is grown in Sughd Region – the reason is a railroad going from here through Uzbekistan. Other export markets are Kazakhstan with 4.3%, Afghanistan – 2.8%, and Turkmenistan – 1.5%. Recently export to these countries increased by more than 300%. The geography of onions exports is also expanding to such countries as Georgia, Ukraine, Kyrgyzstan and Azerbaijan. Increases in production volume mean exports are increasing. For example, exports of onions from Tajikistan in 2010 exceeded 138.4 thousand tons – this is more than twice the amount exported in 2009, and the increase is even more significant when compared to 2008 figures. This shows that export market is far from saturation, and reserves are available. It should also be mentioned that in FAO statistics Tajikistan is listed among top 20 onion-exporting countries.

High export volumes prevented the price in the domestic market from falling and drove it upwards. If not for the export, we could again see the situation that occurred early in the beginning of this century, when the price per kilogram of onions dropped to 20 diram.

Tajikistan has big opportunities for increasing production and export of onions by increasing exports to existing markets, which are happily buying Tajik products, as well as expanding to new countries. But this requires additional marketing research in the current and prospective export destination countries, to identify market situation, seasonality and locate prospective wholesale buyers.

Table 15. Export of onion from Tajikistan by country of export 2006-2010 (in tons).

	2006	2007	2008	2009	2010
Total export	**35706**	**100412**	**59610**	**56605**	**138411**
Afghanistan				822	3968
Azerbaijan	-	-	-		2670
Kazakhstan	140	588	480	1260	5935
Georgia					265
Kyrgyzstan					2
Moldova	-	-	20		
Russia	34864	96 984	58808	53799	123311
Turkmenistan				374	2150
Uzbekistan	-	-	50	350	50
Ukraine	-	-	-		60
Afghanistan	678	2840	252		
Iran	24	-	-		

Source: State Statistic Agency of Tajikistan

Table 16. Import of onion into Tajikistan, 2006 to 2010, in tons

	2006	2007	2008	2009	2010
Total import	**382**	**1079**	**7829**	**26013**	**410**
Kazakhstan			120	470	
Kyrgyzstan	2	108	60	7	17
Russia			295	23110	
Afghanistan	124	671	7091	499	389
Iran	4		262	1406	
China	10	247	1		4
Uzbekistan	242	53			
Ukraine				571	

Source: State Statistic Agency of Tajikistan

However, the situation when production of onions is growing rapidly and the price charged by the farmers in the field is growing in parallel, cannot last long. To support the prices, businesses need to find new sales markets, including new export destinations, or push the farmers to reduce purchase prices. Currently the price of late autumn onions in September was no longer competitive in Tajikistan's main export market – Russian Federation. This means the situation must change. The farmers have received maximum prices, and further price growth is not justified, with the exception of price increases caused by more expensive inputs and fuel, or global increase in price of food products.

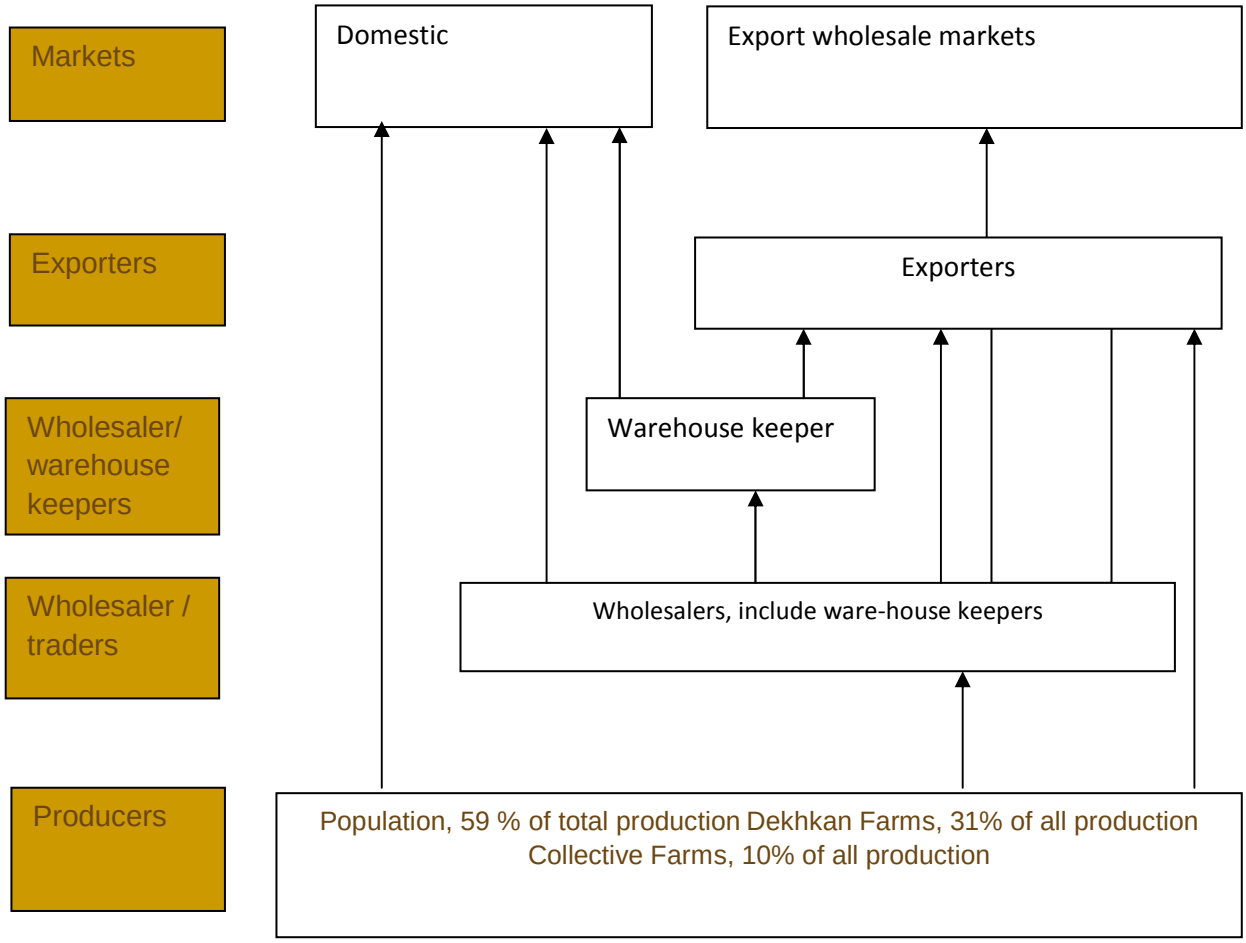
When analyzing seasonality of onions imports, we can see the pattern – onions are imported from Afghanistan off-season, when no onions are harvested and sold. Imports are highest in spring period, particularly in January-March, and in August – those times when stock is low and new harvest is not ready. This means that:

1. Domestic demand for onions in Tajikistan is not satisfied;
2. Onions produced by Tajik farmers cannot be adequately stored due to lack of storage facilities, skills;

3. Entrepreneurs are not interested in running the storage business.

Higher production of onions also helped meet the demand within the country in spring period, when Tajikistan was importing onions from neighboring states. The people started investing in storage facilities to obtain profits in the local market. This trend had a positive impact on import reduction. While the import of onions was increasing since 2006 to 2009 by over 300% annually, reaching the volume of 26,000 tons, in 2010 only 410 tons of onions were imported.

Scheme 2. Value chain for onion.



Transportation of onions

Onions are exported from Tajikistan mostly via railroad, from Proletarsk or Nau stations in Sughd Region. Main export destinations are Kazakhstan and Russia (Chelyabinsk, Orenburg, Ufa, etc.). Due to political tensions with neighboring Uzbekistan, exporters cannot send onions from other stations in the South of the country, such as Jaloliddin Rumi or Shartuz. When crossing the border, Uzbek customs unofficially do everything to obstruct and prevent passing of the goods. As a result, exporters have to rent trucks and take the onions to the North of the country (Proletarsk or Nau) and then move the product onto trains. This causes unnecessary expenses.

Competition

Tajikistan's main competitor in production of onions in the Central Asia is Uzbekistan. However, in 2011 Uzbek authorities significantly reduced exports of this commodity with the aim of keeping prices low at the local market. This ban on exports resulted in great amounts of onions being illegally imported to Tajikistan through the Uzbek border. These were later re-exported as Tajik onions, which positively affected export figures, despite distorting them.

Another large competitor for Tajik onions in the export markets is China – the largest grower of this vegetable.

In our opinion, the situation where price from farmers has reached its peak and is no longer competitive in the Russian market, is forcing Tajik exporters, and consequently the producers, to take the following steps:

- Reduce prices in the field by increasing yield per hectare. As we know, Tajik farmers on average get slightly more than 20 tons per hectare, while global practice shows that farmers in Europe and Asia can get more than 40 tons from the same amount of land, on average;
- Improving the packaging and sorting of the product;
- Improving the export infrastructure, including storage availability, which can help wait through seasonal price drops;
- Production volumes can be increased, and therefore the cost of production for the farmers can be reduced by using better inputs: high-quality seeds, better (and more properly used) fertilizers, sufficient amount of water, improving pest and disease control, storage, packaging and using more efficient growing technologies.

Key players' roles

Key players in the value chain are: farmers, procurement organizations, processors, exporters, and retailers. Marketing channels are connected in straight lines.

Farmers are represented by a large number of farming households. The number of farmers is expected to grow in the future, as a result of reduced influence of cotton on the allocation of arable land, among other things. Recently there has been a progress in the production of onions, and this crop remains highly profitable for many farmers over a number of years, despite steadily growing yields and production volumes. There are qualitative and quantitative improvements done in production and marketing of onions of Tajikistan in the past few years. Result of that change has shown that onion-growing remains a safe source of revenue for farmers, traders and exporters alike. This commodity is in high demand at export markets throughout the year.

In the case of private sales of onions for domestic consumption, producers sell onions in the field to middlemen. These buyers represent one of the following categories:

1. Private traders who resell onions at the market;

2. Representatives of Tajikmatlubot procurement organization, who own markets in various towns and districts and have the goal of providing people access to food products;

3. Wholesalers, who buy onions for storing or selling in small batches;

4. Exporters, who buy onions for shipping to export markets.

There is also an alternative distribution channel for onions – farmers take small batches of onions (several tons at a time) directly to the market and sell directly to end consumers, receiving a more favorable margin.

Exporters are those entrepreneurs who have established contacts in the export markets. The number of exporters is stable; some growth is fueled by exhibitions and intergovernmental agreements resulting in increased export of onions to certain geographical regions. Exporters maintain high sales volumes. Originally they bought the product from wholesalers; now they contact the farmers and sign the deals directly. They offer farmers a premium price for better onions, which makes them the preferred customers for the farmers. They collect onions from the fields and deliver to the consumers in the destination country.

Procurement organizations are mostly represented by storage operators. The main owner of such organizations is Tajikmatlubot (Consumer Union), which has branches in all districts of the country. In addition to this organization, recently entrepreneurs specializing in procurement and sale of onions have started coming to the market. Often these companies and entrepreneurs also play the role of exporters.

Wholesalers. These sell onions to the market in small batches, or store them for a long time, to sell off-season. These wholesalers also play an important role of “shuttle” entrepreneurs. They purchase onions in the areas where they are grown, and sell it to the areas where consumption prevails, including towns and markets near administrative centers. These are the people who deliver the product across the mountain passes or over the railroad when roads are closed. They use trucks providing freight forwarding services.

Retailers – these are people who actually sell the onions using their own stalls in the market. Their numbers are relatively stable.

Opportunities for financing value chain for onions.

Profitability and productivity of labor needs to be improved at each stage. This requires financing, in addition to knowledge.

Financing the production of onions

- Financing working capital for suppliers of chemicals and fertilizers, in order to facilitate farmers’ access to high-quality fertilizers and chemicals. To optimize

transportation and other costs, it is necessary to buy the goods in large batches, which implies large one-time payments;

- Stimulating production of early onions. This will allow to export the product and stimulate sales in the domestic market at the same time, as import substitution;
- Lending to farmers for growing and harvesting the product, as well as purchasing inputs;
- Providing access to water by building wells and purchasing water pumps, supplying water are important for production of onions;
- Purchasing tractors and machinery for precision planting of onions.
- loan guarantees / direct financial support to farmers/ farm enterprises

Increasing the efficiency of post-harvest product management

Growing large amounts of onions does not always result in higher revenue for the farmers, since not the entire product reaches the customer:

- A lot of attention needs to be paid to the issue of losing part of the crop because of ineffective handling during the harvesting, sorting, calibration, storage and transportation;
- Financing the construction and renovation of onions storage. Increasing the volume of production several-fold on a macroeconomic scale will not make the farmers richer, as there are no adequate storage facilities. Infrastructure building (including repairs and rehabilitation) is required for storing excess amounts of onions. Mass construction of storage for onions will level out sharp price fluctuations by offsetting lack of supply which currently results in sharp price increases off-season;
- Financing working capital for storage operators and procurement organizations;
- While price is an incentive to store (earn higher return), farms need the cash immediately and concerned about risk of holding onto production.;
- Finance for investment in a self-managed storage facility

Transferring Knowledge and know-how

- Knowledge on the leading experiences and technologies of onion growing;
- Transferring knowledge on disease and pest control
- Develop training on packaging, grading and sorting requirements in conjunction with partner exporters
- Introduction new variety onion seeds
- Financial Literacy – Understanding costs and benefits of BP inputs and equipment, and when/how to finance

5.3. Open field Tomato value chain analyses.

Tomato Production

There is substantial field production of tomatoes in Tajikistan with a wide range of varieties grown including: Volgograd, Novichok, Gifts of Volga, Yubileyny, TMTK (local variety), Gulkand (Uzbek variety), Bull's Heart, Royal, Finish, Progress, Agatha, Fish and Chiligi (local variety). In 2009 over 310,000 tons of tomatoes were produced in Tajikistan, the largest share of which was produced on small farms. In 2011 the yield of tomato declined very rapidly which bring to lack of tomato in local market.

More than 75% of all tomato produced are for canning. Tomatoes for local consumption in the off-season are grown in greenhouses where production is centered in Khatlon Region and will be covered by separate value chain analyses in this report. Tomatoes are a perishable product and not recommended for storing. From an economic standpoint, it is easier to produce tomatoes off season in greenhouses than to store.

Table 17: The production, productivity and area harvested of tomatoes in Tajikistan 2007-2009

	2007	2008	2009
Area Harvested (Ha)	11,500	11,300	12,000
Production (tonnes)	247,500	267,000	310,000
Yield (t/ha)	21,521	23,628	25,833

Source: FAO Statistic

The Northern Tajikistan has the highest level of tomato production. There has been much planting of tomato from soviet period, and Central Asia was traditional suppliers of fresh and canned tomatoes to Russia. In North is greatest concentration of tomato processing facilities, many of which are obsolete remnants of the Soviet era.

The main tomato production is located in Isfara district. The second largest production area was located in B. Gafurov district. These areas also have large tomato processing enterprises but they are mostly antiquated Soviet design.

In spite of close mass concentration of tomatoes farmers grow tomato in small plot and oriented for the fresh market. The production of tomato considered as very profitable. Some advanced farmers are able to get 80 ton tomato per hectare. It makes the production very attractive.

In general, the supply of quality tomato is very limited due to:
1. The farmer losing their income due to spoiling of their produced tomatoes negatively affecting the quality of the products
2. The value chain of tomato production, processing, transportation and distribution is not giving possible income to farmers (will be described below)
3. Farmers have limited access to quality certified inputs (seeds, fertilizers, CPPs) and have not access to modern technologies

However, farmers see tomato as an opportunity with great potential to improve their livelihoods.

Tomato Pricing Structure

The tomato pricing structure is vital for understanding farmers' earnings. The price structure in 2005-2011 is presented below as a representative example. The tomato producer's break-even cost ranged from 0,30 somoni/kg, while the retail market price for both the first and second harvest rose as high as 2,5 somoni/kg in retail markets during the peak season in 2011, and at peak harvest the retail price dropped to a low of 0,70 somoni/kg during the 2010. Consequently the wholesale price decreases during the season. Wholesalers, selling to small retail markets, receive a 20% markup – 60dirams/kg while retail markets sell for 0,80 somoni/kg. The price differential between farm gate and retail indicate significant increases in producer income are available from the producer taking a more active role in marketing.

Usually the price of fresh tomatoes changes significantly during the season, during peak harvest the price may drop to over 500% comparing with maximum price during the off-season. The highest prices are found in Dushanbe and big cities where consumption exceeds production. In southern Tajikistan the price of tomatoes is higher than in North with production consumed as fresh tomatoes due to the lack of processing facilities. The problem happened in 2011 when the retail price was around 2,50 somoni during all summer. It was unusual and cased by disease, bad yield and less area under the tomato production connected with previous low profit from tomato growing. As shown in Table 18 tomato prices are increasing on average each year, especially notable is the increased average price per kg during the harvest season.

Table 18: Monthly Prices in somoni for Fresh Tomatoes in Khujand, 2005-2011

	2005	2006	2007	2008	2009	2010	2011
January	3,00-5,00	2,50-4,00	2,50-5,00	7,00	5,00	15,00	15,00
February	4,50-5,50	2,50-4,00	5,00-10,00	8,00	7,00	12,00	11,00
March	4,00-5,00	5,00-8,00	5,00-8,00	8,00	7,00	10,00	12,50
April	5,00-5,50	4,00-6,00	4,00-6,00	7,00	6,00	8,00	10,00
May	2,50-3,50	2,00-3,50	2,00-3,50	5,00	5,00	6,00	10,00
June	0,50-1,00	0,50-1,00	1,00-1,50	0,50	2,00	1,50	2,50
July	0,20-0,50	0,16-0,75	0,50-1,00	0,40	0,30	0,70	2,50
August	0,20-0,60	0,10-0,50	0,50-1,50	0,70	0,40	1,25	3,00
September	0,40-0,75	0,20-1,00	0,60-1,50	0,80	0,40	2,00	2,50
October	0,60-1,20	0,50-1,50	0,75-1,50	1,50	0,80	2,50	3,00
November	0,75-2,00	1,00-3,50	1,50-3,50	2,00	1,25	4,00	5,00
December	1,00-3,50	2,00-6,00	4,00-6,00	4,00	7,00	10,00	6,00

Source: LLC Market Plus

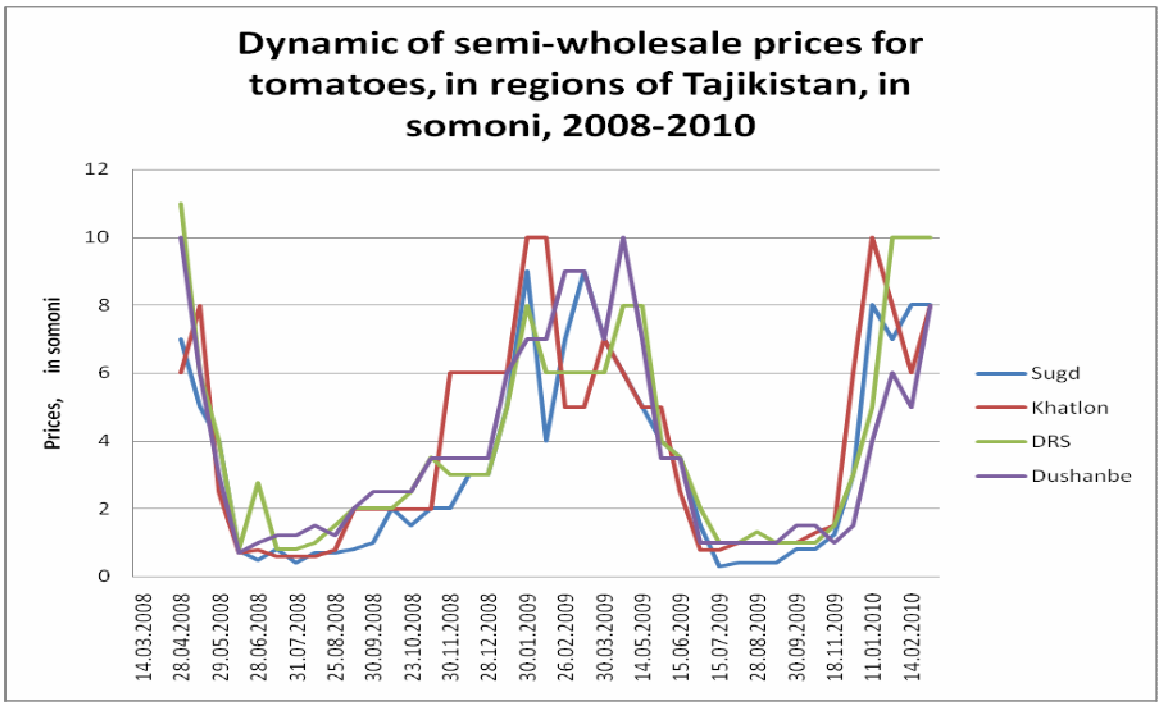


Diagram 2. Tomato Semi-Wholesale Prices in Tajikistan Regions in Somoni, 2008-2010

The diagram above shows the strong price fluctations throughout the year. The maximum increase is in tomato price occurs in the end of December and remains high until the end of April. The price can reach as high as 10 somoni off season and drop as low as 30 diram during the harvest season in 2008-2010.

The in previous 3 years the difference between maximum and minimum price of tomato was more than 500%. As shown, historically and every year tomato prices are lower in Sughd Region than other regions of Tajikistan.

In spite of the retail market prices shown in table 18 canning enterprises received Government support forcing farmers to sell tomatoes at prices below market price and below breakeven. A detailed description of prices paid for raw product used for processing is shown in the table 19.

Table 19: Processed Tomato Purchase Price and Cost of Production Comparison, in somoni

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Purchase price by canning factories	0,05	0.05	0.06	0.07	0.07	0.08	0.11	0.20	0.30
Break- even cost value	0.03	0.05	0.05	0.07	0.10	0.12	0.30	0.35	0.35

Source: Market Plus LLC

Prices vary widely but for processing are very low, often below cost of production. Producers concentrate on the fresh market where prices are higher. Although prices are rising they are outpaced by input costs.

Tomato processing.

All varieties of early and late tomatoes field produced are being sold in the local market. However, during peak harvest season quantities are larger than retail market demand. During this period the premium and medium quality tomatoes are sold retail, all others sold for processing. Processed tomato products include 5 production types: canning tomato, marinades, vegetable salads and spices, tomato paste, tomato juice, ketchups, tomato sauces.

Processing enterprises[13] have problems with raw material supply and product prices. For example one of the newest tomato processing businesses, Geha-Food, constructed with modern processing technology, has significant problems with raw materials supply forcing closure of this plant. The distance between the plant and main production areas adds significantly to the problem. But the main problem is absence supply from farmers to canning factories. Due to not attractive price from the canning industry farmers start to grow tomato which could penetrate the fresh market only significantly reduce areas of productions, and less orient to production for canings.

Each canning enterprise can process 25-30 tons daily on the average with most production focused on tomato paste. However, many are idle due to the difference between what processor is willing to pay and the price received by farmers from alternative sales outlets. Even with government support processors are operating at a much reduced capacity.

To demonstrate the problem the cost of production of 1 kilogram of tomatoes is estimated at 0.35 somoni (does not include cost if using hybrid seed and is based on an average production of 30 tons per hectare). Processors are offering between 0.30 and 0.50 somoni per kilogram in the Sughd region. Farmers will not sign contracts at this price as it is below the cost of production, or sign the contacts but not fulfill their liabilities. Farmers consider the canning industry as back point, where they can sell the bad quality tomato, or rotten staff which fresh market could not penetrate. However, the quantity of tomatoes available at peak harvest is higher than the fresh market can clear therefore providing some tomatoes for processing.

Processors who do operate do so with the purchase of inferior quality tomatoes which are processed into paste. The tomato paste is of low quality and difficult to market. The current processing situation is a downward spiral – purchase low quality raw product at artificially low prices; process into low quality tomato paste which is difficult to market; forces many processors into extreme financial difficulty; processors lack funds needed for investment consequently industry continues to decline; current technology and old equipment and packaging to not allow to produce the product with high efficiency and high quality.

Barriers to the development of the processing industry are significant and include:

- Low return on investment with current production system reduces the incentive to re-invest to upgrade technology; result: there is little or no investment in the processing sector.

[13] The problems and situations which described in this chapter are similar to situation with all canning industry in Tajikistan. Also that situation not reflected with company “Obi Zulol”, which in 2011 invested to new processing modern equipment and technology.

- It is not profitable for farmers to produce tomatoes for processing where the tomato prices are dictated by processing businesses and not by market forces. It is difficult for processors to pay higher prices for raw product as they are focused to sell to the lowest segment of the market which leaves little room for price negotiation.

Payment is a serious problem for farmers. Frequently they are not paid for raw product for as much as a year and often in barter goods, not cash. Because of the problems in obtaining raw product over one half of the processors work 6 months or less per year and even when working they are operating at a much reduced capacity, many averaging below 66%.

Processors face additional problems beyond low raw product supplies. They are:

- Low quality of production;
- Outdated equipment;
- High cost of credit;
- Lack of quality control throughout the supply chain;
- Narrow internal market;
- Irregular supply of raw materials and production; and
- Lack of long-term contracts for product supply.

The processing side will require significant investment before it achieves sustainability. Processors need to offer a higher quality product meeting consumer demand. To improve the processing industry outlook it is necessary to improve the produced output quality in taste, content stability, color, packaging and package. It is necessary to make substantial changes in the production and marketing sectors to change the status of existing and potential Tajik exporters. It is necessary to change the tomato production approach radically, and it should be started at the producer level. Processors must make contracts for the tomato varieties with long maturation periods, thereby ensuring raw materials for a longer time.

In addition there are considerable challenges to developing a sustainable industry around them, both from a production and from a market perspective. These include:

- **Supply issues** need to be addressed, such as raw product availability, quality and consistency of raw product, effective grading of product and appropriate inventory management of all components in the chain to minimize fluctuating demand/supply flows. Associated with supply is the question of sustainability and efficiency of wild-grown product and bush harvesting methods, which, while culturally extremely important, and should be fostered, are unlikely to be plausible as the only source of product in a commercially driven environment.
- **Sustainable and reliable linkage** between out growers and the farm is critical. Hence, providing necessary support including different inputs, trainings and demonstrative farming are all provided by the farm to create strong linkage. However, there is lack of trust and reliability on out growers, due to the fact that out growers divert and sold the expected product to the market creating supply gap on company’s planned delivery.

- **Not efficient technologies for processing tomato.** The current outdated processing facilities do not allow being competitive in world market and requesting the change the technologies and equipment.
- **Food safety and traceability**. This is a key area of concern from export development point of view, since in Tajikistan it is not considered as issue. Poor food-hygiene practices are prevalent at the production stages, resulting in variable raw material quality. Additionally, there was very little record keeping or traceability generally. But with support of some project in Tajikistan start introduction the ISO standards and Global Gap systems. This situation must be addressed in the current food business environment for product to be sold effectively and within current food safety guidelines.

- The expansion of processing plants could help to get market opportunity for out-growers.

Even with the problems described above several entrepreneurs have opened new, modern plants and are focusing on the sale of high quality products. They key opportunities of their activities that they need to develop different model of supply chain, a start to work with farmers from input supply and increase the efficiency of tomato production in term of volume and quality.

Tomato and Tomato Products Exports

Tajikistan is exporting fresh and canned tomato product mainly to Russia and Kazakhstan. The fresh tomato export are happening from Tajikistan during the pick season, and the average price for export price not exceed USD 0,36 per kg. Usually such export happens during July-August period. But the export volumes decrease each year, since the price for fresh tomato with quality applicable for export increasing inside of country and to farmers and trader more profitable to work in internal market.

Table 20: Fresh tomato exports from Tajikistan.

	Units	2006	2007	2008	2009	2010
Total from Tajikistan	tons	647	1282	369	112	170
Include to Russia	tons	617	1276	369	103	169
Total from Tajikistan	000'USD	121	257	104	41	42
Include to Russia	000'USD	133	258	104	44	42

Source: State Statistic Agency of Tajikistan

In most cases the exporters of tomato subsectors are canning enterprises or exporters who sell canned products outside the country. The main importing countries are Russia and Kazakhstan. Ninety percent (at times reaching 100%) of all tomato canned exports are from Sughd Region. Canneries sell and export products by themselves or through intermediaries. Most exporting of tomato products is done by the canning factory without the aid of exporters.

Table 21: Export of canned Tomato Products including Tomato Paste

	2006		2007		2008		2009		2010	
	In tons	000' USD	In tons	000' USD	In tons	000' USD	In tons	000' USD	In tons	000' USD
Total, include	3913	1466	2071	864	1250	845	2059	1415	874	625
Russia	3206	1210	1766	737	843	579	1720	1232	604	486
Kazakhstan	409	144	305	127	407	266	332	178	270	139
Kyrgyzstan	298	112								

Source: State Statistic Agency of Tajikistan

As shown in table 21 Russia is the main recipient of tomato exports from Tajikistan however, it should be noted that 2010 exports were lower than either years from 2006 to 2009. It is explained by fact that canning was not able to have supply by raw materials and finance their operations. The canning customers are the low and middle-income. The product is mainly selling in the two-liter bottles. Since Tajikistan produced product for low segment, the market share loosing is important but not critical factor as internal problems of canning factories in Tajikistan. The information about export activity of juices are convincing that fact (table 22).

Table 22: Canned Tomato, Fruit and Vegetable Juice Exports from Republic of Tajikistan, in tonnes

	2006	2007	2008	2009	2010
Total: Fruit and vegetable juices	**12905**	**12581**	**9005**	**7010**	**3825**
Kazakhstan	10121	10410	8259	6302	3472
Russia	2571	2171	746	612	353
Kyrgyzstan	62			96	
Uzbekistan	151				

Source: State Statistic Agency of Tajikistan

The tomato paste was the main product produced by Tajik canning. Kazakhstan and Russia are a major importer of tomato paste from Tajikistan. Those countries are importing tomato paste from China, Iran, Turkey, Hungary and Uzbekistan too. Tajikistan provides tomato paste in traditional glass jars with press on caps, a method left over from the Soviet era but not widely sought after currently. When producers from Europe, Russia and China offer twist off cap bottles which are gaining in popularity. Iranian and Chinese producers also supply tomato paste in tins. The Tajik tomato pastes in the SKO bottles can be found mainly in the markets, they are not competitive for store shelf space.

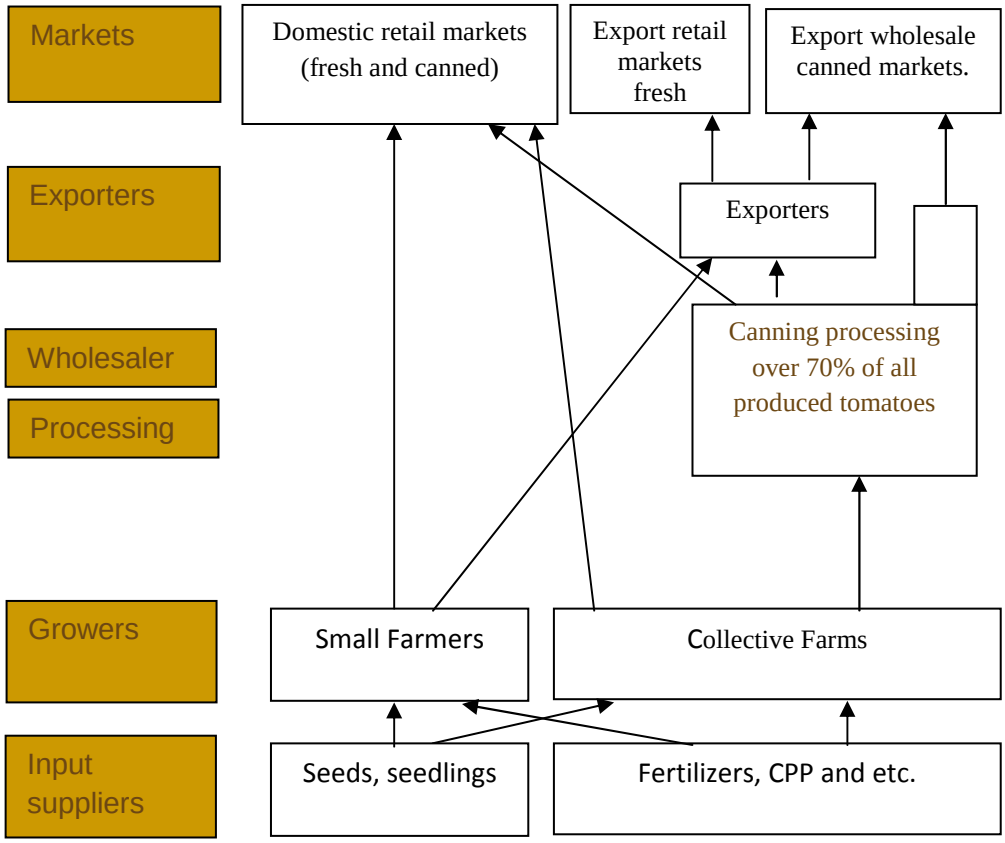
To increase exports Tajikistan needs to make substantial changes in the tomato processing industry:

- To produce products in volumes which are consistent and sustainable;
- To meet acceptable quality and stability criteria demanded by the market
- To learn how to work with partners for the benefit of all. Need to get closer to the market to eliminate costs and therefore increase profitability;

- Tajik exporters need to gain experience in regional markets before entering large international markets dominated by large companies;
- To improve packaging to meet internationally accepted standards;
- To create and actively use brand recognition techniques that differentiates Tajik products in the market place; and
- to grow more adapted tomato varieties for processing into tomato paste

Tajik processors must use all available resources to gain market share in this market including improved packaging, quality, pricing etc. In country became only few canning factories which could operate under new schemes and circumstances and still have room for opening new entities with high opportunities for new entities who would like to invest into that sector and get all market (internal and external).

Scheme 3: Value chain for Tomato (open field)



Tomato Product Imports

As canned tomato exports are decreasing, the imports of canned tomato products are decreasing too. The main supplier canned tomato product into Tajikistan is Iran. More than 1000 tons of tomato products were imported in 2008 and 2009, and in 2010 was imported 594 tons. Part of the reason decreasing the level of import canned tomato

product is import substitution production by small canings and household producers, which selling their products in local markets.

Table 23: Canned Tomato Imports to Republic of Tajikistan, in tonnes

	2006	2007	2008	2009	2010
Total import of tomato canned product into Tajikistan	590	338	1104	1009	594
Importing volumes from Iran	578	334	1015	1003	590

Source: State Statistic Agency of Tajikistan

Global relations have an impact on the existing tomato market of Tajikistan and its relation with the tomato canning products in Russia and Kazakhstan. In the global sense China and Iran became the major players of the tomato paste market and Tajik tomato pastes are losing ground because of poor packaging and quality. Tajikistan's only current advantage is low price but this is not sustainable as it does not return sufficient funds to the producer to warrant continued production.

Growth Source. The tomato and tomato products' situation analysis in the market shows that tomatoes are mainly going for processing and the wholesalers are mostly canning businesses. The narrow place for sector development is tomato processing with improved product quality.

Value Chain Financing Opportunities:

- Facilitate DCA programs for investment loans/ credit lines
- Promotion of investment lending with TAFF Partner banks, other FIs
- Promotion of working capital loans /lines of credit for processors
- Cash flow modeling with Best Practice inputs/equipment, and available financing option
- Processing/Packaging equipment financing
- Financing development efficient Smaller Factory with new technologies
- Financing input dealers to provide access to quality seeds, CPPs and fertilizers
- Short term financing labor for growing tomato
- Financing the investments to equipment purchase and technologies which will allow the production of different product types and will adjust the production of ketchup, sauces, tomato paste in aseptic packages and retail plastic packages;
- Financing the activities targeted improve quality, taste and appearance the product.
- Access to finance for improved inputs which increase yields for tomato production.
- Facilitation links among processors and framers and financing advance payment as part of contract or outgrower scheme at 0% interest for inputs. This is part of their cash flow as they are obligated to pay in any case
- Loan guarantees / direct financial support to farmers/ farm enterprises

Transferring Knowledge

- Financial Literacy – Understanding costs and benefits of Best Practice inputs and equipment, and when/how to finance
- Trainings farmers for appropriate use fertilization, soil testing and plant protection
- Training on agronomy on increase productivity of field grown tomatoes to decrease cost per unit;
- Dissemination of technique know-how at every stage from sowing to production and post-harvest management.
- Technical assistance on implementing quality standards for processing factories
- Market assessment and business development plans

5.4. Value chain analyses for greenhouse tomato.

We outlined the value chain for production tomato in separate topic since players for that value chain has different nature and working according different motivation and schemes. The production tomato in greenhouses separated as industry in Tajikistan few years ago. The information and analyses provided in these value chain analyses is applicable and could be used for cucumbers and other products grown in greenhouses in Tajikistan.

Production tomato in greenhouse.

Indoor production of tomatoes is a niche production, which has recently shown its attractiveness from the business viewpoint. Until recently, all off-season products were supplied to Tajikistan from the neighboring Uzbekistan. The farmers in that country, enjoying access to cheap natural gas, have strongly developed indoor production of tomatoes and cucumbers. Tajikistan has not received natural gas for the last 20 years, and heating the greenhouses with other types of fuel is not reasonable. However, in the last five years there has been an increase in greenhouse operation using solar energy. This development became possible as the country has a large number of sunny days. Currently Tajikistan is using a variety of greenhouse types.

The main activity in such greenhouses is fresh tomato production in off-season. It is developing and offers producer profit potential. In wholes Tajikistan there are increased investment activities in greenhouse construction for tomato production. Currently the greenhouse could be found in all districts of Tajikistan, but still farmers from some districts more advances in these activities than others. The biggest area of concentration of greenhouses observed nearby the main cities where the consumption of tomato high, as well as purchasing capacity of population..

Table 24: Location the greenhouse activity in Tajikistan

#	Region	Districts with high greenhouses activity
1	Khatlon	Rumi, Bohtar, Vakhsh, Kabodiyan, Shaartuz
2	Sughd	B. Gafurov, Spitamen, Mastchoh, Dj Rasulov, Kanibadam
3	DNJ	Vakhdat, Shahrinay, Tursunzade, Gissar, Rudaki

Source: survey

During the past five years the prices are growing during indicating tomato production in greenhouses cannot satisfy the internal demand in local market. A lot of tomato produced in Uzbekistan still coming to Tajik market. The lack of greenhouse tomato production to satisfy market demand offers an opportunity for farmers to enter off-season production through investment in greenhouse construction.

Greenhouses used in one area are usually different from those used in other areas. Tajikistan has sunk greenhouses, semi-sunk and above-ground tunnel moveable greenhouses heated only by solar energy. There are also some glass-covered greenhouses (as a Soviet legacy). However, the most common type is PET film-covered greenhouses, also using solar power for heating. Some greenhouses built using Chinese technology, which do not require heating and allow growing tomatoes and cucumbers at an area of over 1000 square meters, have become popular in the Northern Tajikistan. According to our observations, there are more than 50 greenhouses of this type in the North of Tajikistan, and they supply to the market a great amount of vegetables, successfully competing with Uzbek produce. The cost of this type of greenhouse is over 15,000 US dollars. With an average area of a greenhouse of 1000 square meters the farmer produces during the season 2 crops: about 8 tons of tomatoes and 10 tons of cucumbers.

The season for indoor tomato production lasts from December to May, when this business is the most profitable due to high prices. The peculiarity of tomatoes is that they have a short shelf life and thus are not recommended for storage, so economically it is more reasonable to produce the tomatoes indoor, rather than store them.

Cost of production

In the cost of producing tomatoes indoor, the biggest share belongs to the cost of film for covering the greenhouses and depreciation of capital expenditure on the greenhouse construction and irrigation. Another big costs to produce vegetables in greenhouse are labor cost, cost of seedlings, heating costs, and cost of polyethylene films to cover the greenhouse. Average grower spends good portion of money on labor every month until the end of exporting season. Some growers have complained that the cost of polyethylene films have gone up because of their poor quality. Poor quality films have to be replaced two times in a season or growers need to buy higher quality polyethylene films. Other expenses for production, include fertilizers, CPPs is less critical on amounts spent, but critical for access based on timing and quality. Thereby for purpose of financing greenhouse production farmer will have following expenses on:

- Construction of a greenhouse;
- Annual repair and replacement of a film covering,
- Ones per few years repair and replacement of carcasses, drip irrigation;
- Purchase of seeds or seedlings;
- Fertilizers and crop protections products;
- Heating (if needed);
- Cultivation;
- Service of irrigation system;
- Labor;
-Transportation.

In the greenhouse vegetable production, nature of the business requires growers to incur upfront expenses (more than 50% of total cost of production) before planting to purchase polyethylene films and seedlings. Due to the size of their operations, many growers cannot save their profit for the next season to cover their upfront expenses. Therefore, they are left with two options: either to borrow necessary funds or to buy those inputs on credit at higher price. Generally, growers use latter option due to lack of external financial resources at reasonable interest rate. Both these option could be used by financial institution for financing that VC needs.

Market Attractiveness

This industry is characterized by multitude of small-scale producers and relatively many buyers. Products are not differentiated and almost all the producers offer the same varieties of tomato and cucumbers, thou some producers start to grow tomato cherry red and yellow colors. Therefore, rivalry among the producers and bargaining power of buyers is high in this industry. Suppliers of main inputs - seeds and polyethylene films (plastics covers) - have also some degree of bargaining power over producers.

However, excluding initial investment in the construction of greenhouse, barriers to entry are somewhat high (especially for December and February planting). Main reasons as follow:

- Necessary skills for greenhouse production,
- Limited access to land
- Access to the engineers which will construct greenhouse with proper heating design.
- On average, it takes at least 3 years to acquire necessary skills for proper cultivation technology.

Distribution Channels

Producers market their output in the domestic market through retailers. Whereas exported products are sold to foreign retailers in the wholesale market channels out through consolidators and traders (exporters). There is some degree of vertical integration in the supply chain between producers and exporters.

Prices for greenhouse tomato

In general, the wide price fluctuations give support for greenhouse production during the off season. The price for tomatoes during the season is much lower than off-season, the difference in prices historically reaching up to 2000% in some years. Table 18 above (see VCA tomato), as well as Diagram 2 “Tomato Semi-Wholesale Prices in Tajikistan Regions in Somoni, 2008-2010”, show that tomato prices are at their highest from December to May. The price for greenhouse tomatoes during the last few years shows that the business could be profitable and attractive enough to justify money from the banks and MFIs, even with existing interest rates. The price during the previous season was over 2 dollars per 1 kg. This price level allows meeting the demands of the domestic market, which until recently has been supplied with Uzbek produce. Of course, given the current development of local production, it is still early to talk about complete substitution of imported tomatoes, but there is a certain positive development in this area. Indoor production of tomatoes off-season is a developing industry, and it is attractive for the farmers to invest in construction of greenhouses and switch to this crop. Price indicators show the need to use greenhouses for growing tomatoes in the winter and spring period and high profitability of this activity. However, the demand for such produce is limited by the demand of the domestic market.

Specific quality standards for fresh tomatoes

The main quality indicator of fresh tomatoes is that the product must be able to be stored for a long period and should have acceptable appearance. For example the tomatoes in supermarkets should be solid giving the impression of freshness.

Tomatoes are divided into three categories: Extra Class, 1st Class and 2nd Class. The Extra Class Tomatoes contain the highest quality standards and capture the highest price. According to answers obtained in focus groups, tomatoes of First Class are priced 10-30% more than those of Second Class. The difference of tomato prices of Second Class and Extra Class is of 20%.

Harvesting and cooling

An important stage in ensuring high quality of the product is harvesting the crop, sorting and cooling. World practice shows that all efficient greenhouses are equipped with cooling stations, which allow storing tomatoes for up to ten days, thus regulating the volumes reaching the market, and export necessary amounts of produce at specific intervals, meeting the demands of the market. As a result of Uzbek entrepreneurs lacking cooling systems, much of their product was lost in the Russian market, where it was delivered without sorting and partially overripe. We need to keep this experience in mind when developing our production.

Export opportunities

Central Asia has some natural advantages in the greenhouse production of tomatoes in the simple fact that its latitude is more southern create a window of

opportunity in the early season. Additional advantages consist of excellent soils, available water, low labor costs, climate and a good reputation for flavorful produce within the Russian and CIS markets. And currently Uzbekistan using those competitive advantages and Tajikistan should. However, our producers need to diversify the varieties and types of tomatoes being sold to meet specific customer and market demands. The major varieties of tomatoes produced in Tajikistan are traditional varieties, which limit market opportunities when competing with countries with broad access to new and improved varieties. There is a growing demand for cherry tomatoes, grape tomatoes, green house specialty tomatoes, and on-the-vine varieties that should all be considered for production in Tajikistan. A general improvement in the overall quality, condition, appearance, uniformity, and packaging of tomato export products is also needed to compete effectively in the market.

The value chain for growing tomatoes indoor has a large potential for exporting the produce to neighboring countries. Given the current status and development of this industry, this is not going to be much of an issue for the next ten years or so, but we must be prepared to meet the opportunity. One of the largest export markets for Tajikistan is Russia. Markets in Moscow alone sell fresh tomatoes imported from Uzbekistan, Netherlands, Belgium, Spain, France, Morocco, Senegal, Turkey and Israel.

Packaging trends.

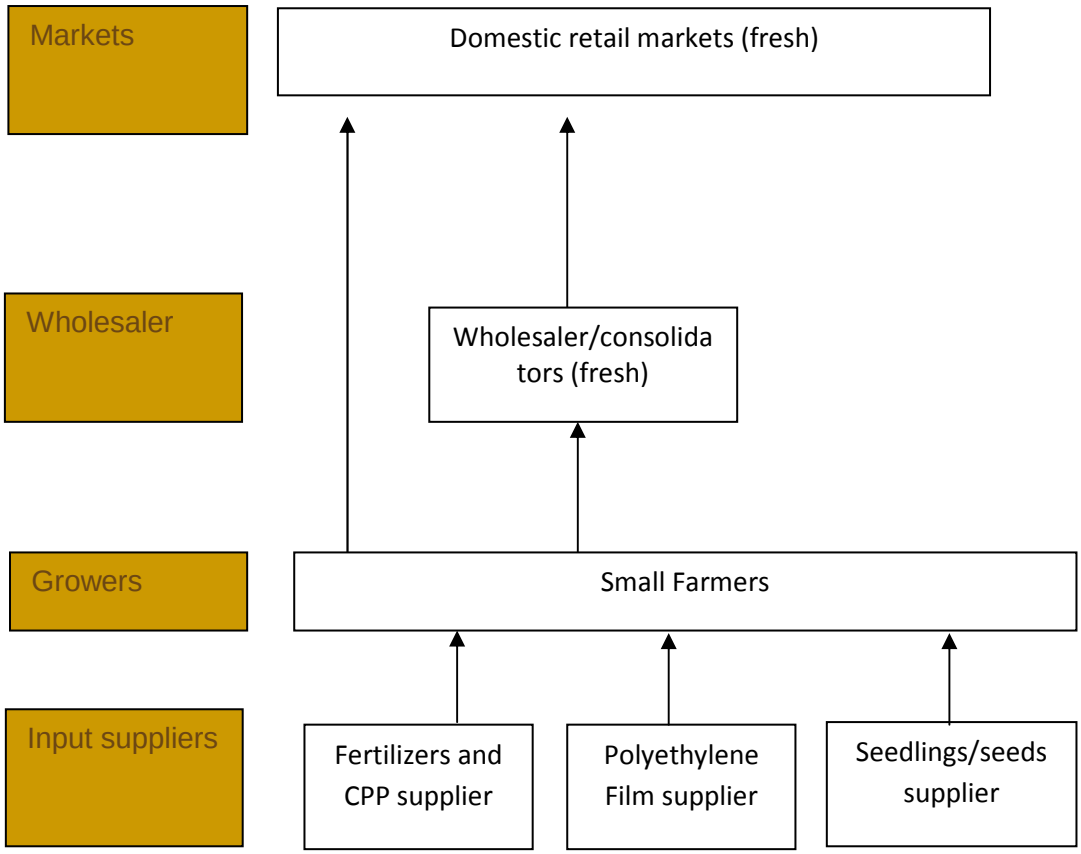
The main purpose of packaging is to keep the product in marketable condition, so the type of packaging depends on the type of product, which has to be protected from damage and presented at its best.

Packaging is seen as a key problem in the export markets. In general, Central Asian products still appear to have a reputation as flavorful and nutritious, according to recent market studies. Much of this is due to Central Asian tomatoes being shipped in low packing standards. This level of maturity ensures tomatoes with high sugar content and good flavor, but it reduces the shelf life if not transported and stored at the proper temperature. When tomatoes are not handled and packed properly it results in poor appearance, limiting their value in the export markets.

Unfortunately for experience from Uzbek growers showed that tomatoes have unsatisfactory traits and spoil too quickly when compared to Turkish tomatoes which can be stored almost 1 week, and the Spanish tomatoes which last 2 weeks in storage. Also, deliveries from Uzbekistan are not as frequent as needed. Improved shelf life is vitally important to wholesalers and distributors because it lessens their risk.

The general request for tomato packaging improvement is to assure protection during transit, cold storage and distribution of product. Also, priority is given to smaller packages that minimize handling and reduce distribution difficulties. Small packages allow for direct delivery or distribution to stores, and product can be directly displayed on store shelves in small packages. Tomatoes are shipped in plastic or cardboard boxes of 5-6 kg each. The produce is packed into trays by either the wholesalers or retailers.

Scheme 4. Value Chain for greenhouse tomato.



Payment terms

Most of the traders work with their suppliers on the basis of payment in arrears – usually 14 days after the delivery of goods. Therefore, the players must be prepared to extend credit to the retailers.

The functions of VC players:

The industry is slowly developing with a number of local participants; however, overall the number of active participants remains small. As with other agri-food industries, there are a specific groups or chain (network) of businesses involved, which include:

Input suppliers in that VC are few groups of suppliers which is not connected with each other.

- ***Nursery operators.*** These are the players who have good experience of greenhouse production. They use seeds to produce planting stock for themselves and for sale. Even though there are operators in the market who specialize in delivering planting stock, the main issue for these operators is access to high quality seeds. Currently greenhouse operators in Tajikistan are purchasing seeds from Uzbekistan, which are expensive and unsuitable. Others use seeds imported from China or the Netherlands. Lack of special greenhouse quality seeds is an issue.

- ***Fertilizers and CPP supplier.*** Существует необходимость развития поставщиков удобрения и CPP. Some fertilizers for greenhouse is different, than those which are used on open field. But due to lack of access farmers using the fertilizers which available in market. Lack of high quality green house fertilizers, pesticides. Some CPPs and fertilizers greenhouse operators supply from China.

Growers/producers. Producers are the farmers which involved into greenhouse production. Usually this is advanced farmers or entrepreneurs who would like to invest. Usually that group of people ready to risk with some capital. They became mature after year 3 of working with greenhouse production. The challenges of this group, that the knowledge and skills to obtain quality marketable tomato is not developed. Therefore general agronomists and growers weak in the area of greenhouse production, pest and disease control, and farmers have no understanding of crop protection whatsoever, as most beginners have never been involved in wide commercial production before.

Generally, producers market their outputs in the domestic market through the retailers.

Wholesalers. These groups of VC players have good connection with multiple farmers and with markets. These VC groups also work as consolidators which purchase from greenhouse operators small volumes and develop the wholesale batches and act as intermediates among the retailers and producers.

Markets. That group represent by retailers who sells in markets, distributors who work with shops and retails chains, Food service operators, including restaurants. The most volumes sold in city markets.

Other VC players. A very important part of this business is extension services, which are provided by agronomists, input dealers or other producers. This is related to the fact that one of the bottlenecks of greenhouse production is the lack of highly qualified specialists specializing in greenhouse business. There are some experienced people whose services are employed by all other players. Sustainable extension service providers are not available in Tajikistan.

Banking and microfinance institutions are very important players in this VC also. They provide seasonal loans.

In general above mentioned businesses operate as single-purpose enterprises, networks, vertically integrated operations and wholesale/merchandising enterprises. Only few of these businesses have an annual turnover of more than one hundred thousand dollars.

Growth source. The greenhouse production the off season fresh tomato market offers producer opportunities. It is open new markets for fresh products. This will increase production and investment in greenhouses, will expand its space and increase farmers' income. From the point of view the market it is demand for that product, and we need to

produce much more to substitute Uzbek imports with greenhouse production for off-season sales to domestic market.

Opportunities for Value chain financing:

- Financing Increased number modern greenhouses with larger scale production through the construction
- Greenhouse materials are made in China and require bulk purchase for multiple farms to deliver.
- Construction the collection and cooling facilities including pre-cooling pack house and trucks with cooling facilities to collect vegetables from out Growers.
- Cash flow modeling with Best Practice inputs/equipment, and available financing and storage options inputs to access inventory
- Financing Input Suppliers to development stock specialized inputs for greenhouse production.
- Long-term financing which doesn't require payments in the short-term less than 2 years until the business became profitable. It may also be too expensive to accrue interest during this start-up period.
- Financing transportation facilities to prevent loses and stabilize prices
- Micro-leasing and seasonal loans (pay as you harvest) to investment in irrigation systems
- Loan guarantees / direct financial support to farmers/ farm enterprises

Transferring knowledge and knowhow:

- Technical Best Practice Technology at each phase, from sowing to production and post-harvest management;
- Training on efficient usage of fertilizers and chemicals;
- Investment and purchase of equipment and technology;
- Knowledge aimed at production of high-quality produce with good taste and attractive look;
- Financial Literacy – Understanding costs and benefits of Best Practice inputs and equipment, and when/how to finance;
- Appropriate technologies which enable efficient greenhouse operation;
- Introduction of technologies enabling more efficient operation and higher yields;
- Technical assistance in opening new sales market outside the country for fresh produce. This will allow increasing production and investment into greenhouses; expand areas occupied by the greenhouses and increase farmers' revenue.

5.5. Melons, watermelons value chain analyses

Production of Melons and Watermelons

Melons and watermelons production is popular among Tajik farmers, especially when grown on irrigated lands and land that has been fallowed. Watermelons[14] will mature 10 to 15 days earlier when grown on fallowed fields compared to fields which have been continually used for watermelon production. Watermelons reach maturity in 70 to 90 days depending on variety planted, with planting beginning late March.

Hectares of watermelon grown have remained steady, between 11,500 and 20,950 hectares. The last 2 years the production of watermelons rapidly grown, when from 1991 to 2007 during 17 years has remained stable. The reason of growing the area of production became access to quality seeds and handling production and crop protection of melons, which was forgotten during decade due to disease.

Table 25. Hectares of Melons, Watermelons and Gourds Grown in Tajikistan

	2007	2008	2009	2010
In Tajikistan total	11118	11570	19313	20951
GBAO	16	18	17	16
Sughd	1953	2175	4024	4522
Khatlon	7962	8304	13932	15234
DNJ	1187	1073	1340	1179

Source: State Statistic Agency of Tajikistan

Table 26. Total Production of Melons, Watermelons and Gourds in Tajikistan (thousand tones)

	2007	2008	2009	2010
In Tajikistan total	254,2	285,3	424,6	482,4
GBAO	0,2	0,3	0,2	0,2
Sughd	35,0	37,4	55,4	63,0
Khatlon	212,0	240,3	360,5	409,9
DNJ	7,0	7,3	8,4	9,3

Source: State Statistic Agency of Tajikistan

Although the area under melon cultivation has increased significantly total production has increased to 482400 tons in 2010 from to 285,000 tonnes in 2008. Watermelons constitute the largest portion of the total and are increasing while production of other melons is decreasing. Table 26 shows that production of melons and watermelons in Khatlon Region in 2010 was more than 409,900 tonnes, 6.5 times more than the production of melon, watermelon and gourds in Sughd Region. Khatlon had 72,7% of the land devoted to melon culture (15,234 hectares) compared to 21,5% for Sughd Region and 5,6% for DNJ (Table 25).

[14] Here and after I will use the watermelons, but it is also reflect melons too.

Table 27. Harvesting of Melon and Watermelon Culture of Tajikistan (tons/hectare)

	2007	2008	2009	2010
In Tajikistan total	18,9	19,7	20,3	20,4
GBAO	11,7	15,4	15,3	14,6
Sughd	17,1	14,9	12,7	12,3
Khatlon	21,3	22,4	23,5	23,8
DNJ	5,8	7,3	6,9	6,8

Source: State Statistic Agency of Tajikistan

The growth of absolute volume of production for watermelons caused by increased area of plantation. There is no big changes happen efficiency and yield per hectare. Household plots receiving higher quality seed, are better managed, and plants according of new technologies giving them earlier entry into the market. Of the 64 districts of Tajikistan 9 districts accounts for 51% of the area under cultivation and 58% of the yield. There are 8 districts of Khatlon region (N. Hisrav, Vakhsh, Jilikul, Kubodiyon, J. Rumi, Kumsangir, Temurmalik, Shartuz) and one district of Sughd (Maschoh).

Storage

There is little commercial storage of watermelons with most sold within 20 days of harvest. Some specialized varieties do lend themselves to storing and are sold on a limited scale from harvest through March. There is no established commercial watermelon processing.

Dealers/Wholesalers

Most watermelon is consumed fresh and considered a seasonal product available from June to September. Most are consumed domestically however; a small portion is exported. Everyday around 100 trucks loaded with melon, watermelon and gourds are shipped from Gora-Uti area of Jilikul district starting from July to September. Watermelons are purchased by wholesalers directly from the field when they reach a weight over 5kg and range up to 25 kg. The small fruits as not purchased at same price. It is more advantageous for producers to sell watermelons in the 5 kg range as the price per kg is higher for current market; it is more beneficial for farmers to produce small melons and to sell per watermelon and not per kg. Watermelons must be sold as soon as reaching desired maturity as they continue to ripen quickly turning sour. Few producers have the ability to sell in the market where prices are higher. The lowest price paid for watermelons is in the south (Kurgan-Tube and Shaartuz) with the Dushanbe market receiving the highest price. Watermelon prices are increasing annually due to rising costs of production.

Each year the cost of producing watermelons increases due to increasing prices for fertilizers, fuel, plastic films. Also the cost for labor is increasing as is the cost of agricultural machinery. As an example the cost of plowing one hectare of land for watermelon production formerly was 100 somoni, it is now 300. Also the rate for tax for land and the cost of water increased.

Buyers of watermelons come from cities and districts, for example Khatlon region provides the market of Dushanbe “Giprozem”, Vahdat town, Gissar district, Kulyab zone. Watermelons from western Khatlon also supply all of Sughd Region. Caravans of trucks filled with watermelons pass through the mountains on their annual trek to Sughd Region. This continues until the watermelons of Maschoh district of Sughd Region ripen.

The diagram below shows average prices for 2008-2009 by regions. The price fluctuation shows the ripening of melons. They ripen in June in Khatlon Region and are available in the market through the end of January. Khatlon production first enters the Dushanbe and DNJ markets before filling the Khatlon markets as prices are higher in Dushanbe. Once the Khatlon market is served watermelons move north to Sughd Region where the price is higher due to transportation costs. Once melons ripen in Maschoh prices drop steadily. Prices in the Dushanbe market are more stable as it is the major market for watermelons. Sughd Region watermelon sales extend into the fall even though prices drop as Sughd has better late varieties and are able to store watermelons extending the season.

Watermelons are marketed uniquely as vendors set up stalls throughout the city. Watermelons are sold on street corners and along the highways as well as more traditional market places.

The most important factors affecting the increased sale of melons are:

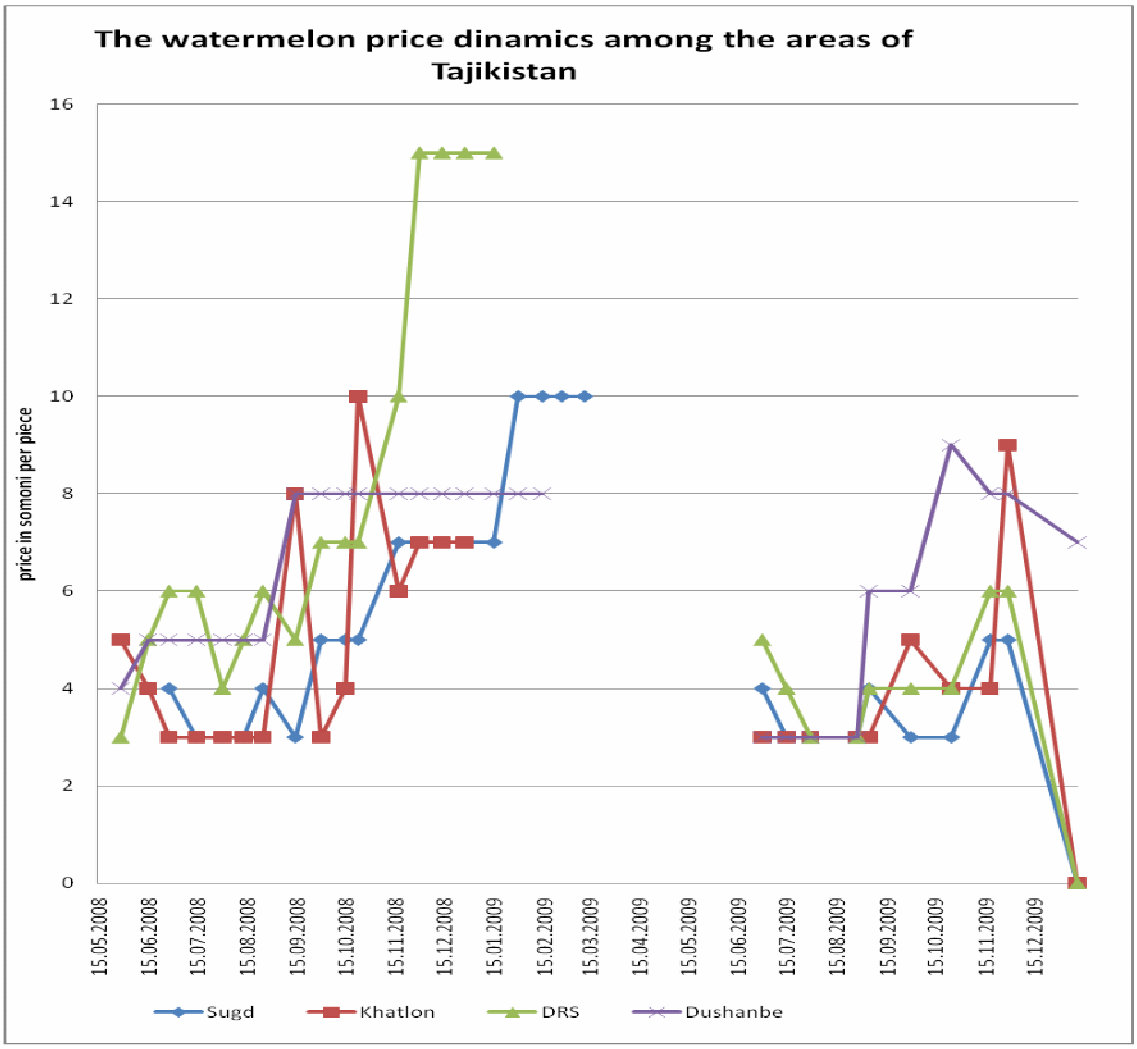
- Wholesale prices,
- Purchasing capacity of the population,
- Quality and freshness of melons,
- Seasonal availability,
- Appearance,
- Size.

Farmers use number of watermelons sold as the gage of productivity. An average yield is more than 12,000 fruits (3 harvests of 4,000 melons each). Farmers sell watermelons from the field from 1.20 to 4 somoni/watermelon, price depending on the season. Buyers come from Gissar district, Vahdat, Dushanbe (Giprozem), Tursunzade and Sughd.

Information from the Market

Little price information is available to producers who customarily rely on word of mouth information. Prices are set by the buyer and may vary between 20 and 50% from district to district.

Diagram 4. Dynamics of Watermelon Prices in Tajikistan for 2008-2009



Note:

- Current diagram shows the prices for watermelons averaging 3.5 kg.
- Prices shown in the diagram are wholesale, retail prices vary widely between markets.
- Prices are average for the region; prices within the regions vary widely.
- The diagram does not show prices in GBAO as the prices here are more dependent on transportation due to distance from market and do not reflect prices for watermelons paid to producers.

Exporters/Importers

Watermelons are exported to Russia, Kazakhstan and Afghanistan. As we can see in the table below the volume of export is not large, most melons are used for domestic consumption which is decreasing annually. According to the State Customs Committee s only 354 tonnes of watermelons were exported in 2010, which is just 0.1% of the volume of gross production. Transportation to Russia and Kazakhstan is by rail. Watermelons are transport in the bulk by placing 2 artificial wooden tiers, where fruits

are in 2 layers. One rail car can carry 30-40 tonnes of watermelons. According to railroad regulations for transportation of watermelons in refrigerator rail cars they should be on the boxes, 4 per box. A major difficulty in transporting watermelons is the high nitrates used by producers. The watermelons with high nitrate levels spoil quicker and do not reach the destination in an acceptable form.

Table 28. Export of Watermelons and Melons in Tajikistan, 2006 and 2008 and 2010

Country	2006		2008		2010	
	Tonnes	US Dollars (000)	Tonnes	US Dollars (000)	Tonnes	US Dollars (000)
Totally	990	146	507	121	354	37
Kazakhstan	25	3	-	-		
Russia	911	138	295	97	8	13
Afghanistan	54	5	212	24	342	23
Kyrgyzstan					4	1

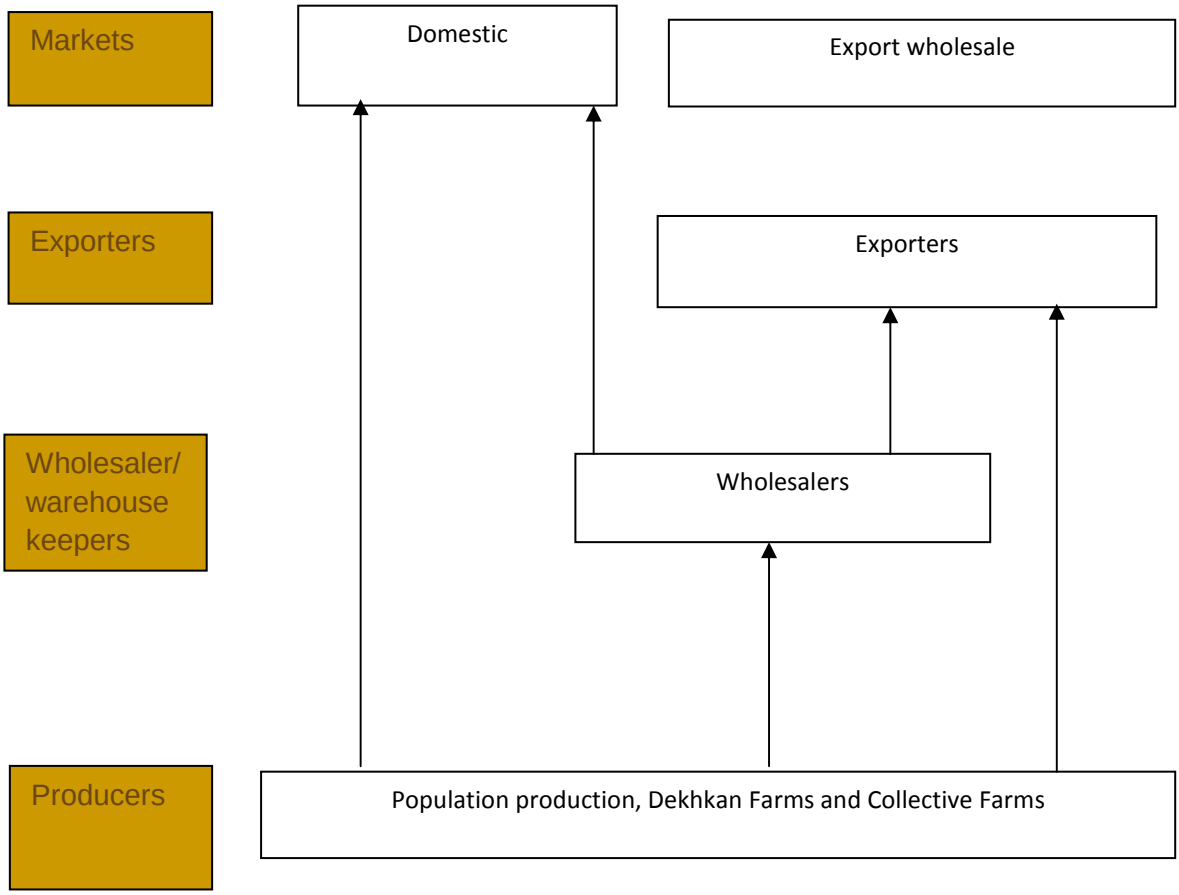
Source: State Statistic Agency of Tajikistan.

As we can see from the table 28 for exports of melon and watermelons small, the main volume was exported to Afghanistan. The export of melons and watermelons to Russia declined rapidly. It is connected with high the competition in Russian market and problems with transportation. The railway connection from Southern Tajikistan problematic due to problems with Uzbekistan as country transit which not allow the flow from this direction.

Functions.

- Farmers, procurers, exporters and retail sellers are the main players in the melon value chain, each linked to the other. The producer segment of the value chain is growing as more farmers realize the profit potential of watermelons and are shifting acreage to their production. The increase is also due to the breakup of larger farms and the reduction of restrictions on land devoted to cotton production, diverting irrigated land to melon production.
- Exporters are entrepreneurs who have contacts in the exporting market. The number of exporters is stable however; exports is decreasing, largely due to the problems with Uzbekistan.
- Retail traders are those who sell watermelons in districts and towns, trading in the markets and along the roads. Their number is growing.

Scheme 5. Value chain for Watermelons and Melons.



Source of Growth. Watermelon production is increasing as producers perceive it to have better profit potential than other crops. Gains have been made in cultural practices raising average per hectare yields. Watermelons are a popular commodity among Tajiks and are consumed fresh throughout the hot summers. The potential for growth is the early products as well as increasing level of production melons, which usually imports from Uzbekistan.

Opportunities for financing melon value chain:

- Promotion of working capital loans for with interested dealers
- Cash flow modeling with Best Practice inputs/equipment, and available financing
- Financing the farmers of has better access to the seeds, fertilizers, pesticides, purchasing plastic film to improve growth characteristics.
- Equity and asset financing for development processing facility for producing candied fruits or fruit staffing for confectioner industry.
- Loan guarantees / direct financial support to farmers/ farm enterprises

Transferring knowledge.

- Improved Production Techniques. More attention should be given to providing technical assistance and dissemination of technical know-how at every stage from sowing to production and post-harvest management.
- Improved growing techniques for watermelons are needed by producers, crop protection issues.
- Work in the field of efficient fertilizer and pesticide use, including work to establish laboratories for testing soil and determine the fertilizer needs.
- To teach the farmers for proper use of fertilizers, pesticides, advanced technology, and environmental management.
- Financial Literacy – Understanding costs and benefits of Best Practice inputs and equipment, and when/how to finance
- Technical Assistance on appropriate fertilizer use to limit excessive nitrogen application which has health consequences.

5.6. Potato value chain analyses

Production

Potatoes are grown in Tajikistan since before the Revolution of 1917, and are currently present in all soil and climatic areas of the country. The main potato-growing area is mountainous and piedmont areas, where soil and climate are the most favorable for growing potatoes. They are grown in various soils, but the best yield is achieved at well-cultivated light and medium-textured loams. The lower soil density is at the tuber formation area and the better air access to the roots is, the higher the yield. Even though potatoes are grown over most of Tajikistan, its mass production is concentrated in piedmont and mountainous areas, over 1800 meters above sea level. Most potatoes are grown in the mountainous (Zeravshan, Rasht valleys – 1700 and 3300 meters above sea level, respectively) and piedmont (Ghissar valley – 700-800 meters above sea level). Potatoes are also grown intensively in Ganchi and Shahristan district.

Currently two early (Polyot, Narymka) and two middle-late (Lorch, Cardinal) varieties of potatoes are gown in Tajikistan. However, both agricultural production and private sector use dozens of varieties – from old, long-forgotten to new and little known ones. This is a result of purchasing seed potatoes from neighboring countries and importing it via international organizations. The Ministry of Agriculture recommends for growing the following zoned and promising varieties: Lorch, Narymka, Mona Lisa, Cardinal, Picasso, Polyot. Some EU-financed projects recommended using such varieties as Condor, Romano, Picasso, Diamant, Cosmos, Cardinal, Sante. The yield is around 45-60 tons per hectare.

The optimum temperature for growing and developing tubers in the soil is +15..+18 degrees Celsius, for developing the herb – +20..+25 C. The vegetation period

from sprouting to harvesting lasts from 60 to 150 days, depending on the variety and climate/soil conditions.

Average yield of potatoes grown in Tajikistan lies around 23 tons per hectare. However, in some districts, such as Upper Mastchoh, it reaches 37 tons per hectare.

Production of potatoes is growing steadily, just like the areas occupied by this crop. Last year, 31.8 thousand hectares were used to grow potatoes, with gross harvest reaching 760,000 tons – more than 100 kg per capita. However, this is still not enough – only 98% of the domestic demand is met. The rest has to be imported. As per the President's Decree, production of potatoes is to be increased to 1 million tons in 2012, by using more land and better varieties of this crop.

Table 29. Area plantation of potato, 2006-2010, thousand ha

	2006	2007	2008	2009	2010
Tajikistan	27,9	29,7	28,7	29,8	31,8
Gbao	1,8	1,9	2,0	2,1	2,1
Sughd	10,0	11,2	10,7	11,2	11,3
Khatlon	7,0	7,2	6,7	8,3	8,6
DNJ	9,1	9,4	9,2	8,3	9,8

Source: State Statistic Agency of Tajikistan

Table 30. Productivity yield, tons per hectare, 2006-2010

	2006	2007	2008	2009	2010
Tajikistan	19,9	21,8	22,6	22,3	23,0
Gbao	20,5	22,1	22,8	23,3	23,7
Sughd	19,7	23,1	24,1	23,8	24,7
Khatlon	18,3	19,8	21,5	22,4	22,6
DNJ	21,1	21,9	21,9	19,9	21,1

Source: State Statistic Agency of Tajikistan

Table 31. Gross production of potato, thousand tons, 2006-2010

	2006	2007	2008	2009	2010	2011
Tajikistan	573,7	662,1	679,8	690,1	760,1	800(plan)
GBAO	37,2	41,5	45,9	48,1	48,8	
Sughd	201,9	262,2	268,4	273,3	286,2	
Khatlon	135,2	147,7	156,7	197,0	209,7	
DNJ	199,3	210,7	208,8	171,4	215,5	

Source: State Statistic Agency of Tajikistan

More than 50% of all costs when growing potatoes are used to purchase the inputs (seeds, fertilizers, pest and disease control, fuel). This figure is higher for potatoes than for other vegetables.

Table 32. Production of potatoes per capita, 2005-2010

	2005	2006	2007	2008	2009	2010
Production per capita, kg	80.2	81.6	91.9	92.6	95.9	100.9

Source: State Statistic Agency of Tajikistan

There are zones in Tajikistan where early potatoes may be grown successfully. Soil and climatic conditions of these zones allow receiving 20-25 tons of the early potatoes harvest from one hectare. They plant potato before winter and get early yield in end of May- beginning of June. Growing of the spring potatoes has several advantages, among them are:

- short period of vegetation allows to make empty a field in June for further planting of other vegetable and leguminous plants (tomatoes, cucumbers, carrot),
- as the growing of spring potatoes takes place in spring period it requires only 2-3 watering during vegetation period weeding of weeds is done only one time per vegetation,
- the harvest is gathered before mass epidemic of Colorado beetle,
- the price for spring potatoes is higher than price for last year harvest,
- growing of spring potatoes ensures all-the-year-round delivering of potatoes to the markets.

Loss of potatoes in production

According to numerous researchers, the loss of potato harvest are growing each year in Tajikistan, due to a number of diseases and pests, reaching 23-29%, and up to 50% in some years. Potato beetles cause a lot of damage in Tajikistan, with losses varying from 18.4% to 44.7%, depending on the year and variety. In addition to direct losses of the crop, there is some reduction in the quality of the tubers, as a result of reduced output. This is caused by high-density colonization of the plants by pests in particularly vulnerable phases of its lifecycle – budding and blooming. A differentiated economic threshold has been designed for the harmfulness of potato beetle, which equals 1 imago and 1 larva per plant during the budding phase and 5 imago and 5 larvae per plant at blooming phase. In the colder areas this is not much of an issue, but in areas with warmer climate potato beetles destroys a substantial part of the crop. However, there are scientific discoveries that allow fighting the pest effectively. The problem is that farmers are unaware of them and have no access to pesticides.

Employment Characteristics

The field survey and interaction with the value chain actors indicate that a large number of small farmer are involve in potato production. In case of small farmers generally, household labor is utilized for potato production and post production management. The hired labor is used by medium and big farmers. In the post production and value addition activities mostly hired labor is used.

Input supply.

Inputs for potatoes include seeds, fertilizers and chemicals to protect plants against pests and diseases. This is a highly sensitive subject, as farmers have little access to elite seeds, often using the seeds the grow themselves, or buying cheap in the market.

Fertilizers are also scarce and not affordable for most farmers in the area. The reason is the absence of certified fertilizers in the market and their high cost. Since the farmers do not have enough money to purchase the fertilizers, they have to pay with their crop – two tons of potatoes per ton of fertilizer.

Plant protection chemicals are available in specialized shops, but the problem is that not all the farmers have the funds to apply them on time, so treated fields become infested quickly due to cross contamination from adjacent untreated fields.

Post Harvest Activities

Post Harvest Activities include Sorting and cleaning. Its occurs by farmers in the field. Wholesalers are not carrying out grading- potatoes of all sizes are sold in the same area. The commercial potato growers generally sell their produce immediately after harvest. Post harvest operations like curing, grading, packaging are not performed by the commercial growers. But the small farmers who sell their produce in the market generally carry out this function before bringing it to the market. In other cases the trader/assemblers carry out these post harvest operations (grading, weighing, and packaging) before transporting it to the market generally at farmers' premises.

Losses: At the farm level the losses are due to improper harvesting (cuts) and post harvest handling (lack of curing). The average loss at the farm level is about 4 - 5%. At the marketing stage the losses occur during retailing (5%). The losses can be reduced if the harvest and post-harvest practices are improved at the growers' level.

Packaging: Packaging is currently not being done.

Storage of potato

Most farmers have no storage facilities for harvested potatoes thus making them dispose them off as fast as possible which leads to post-harvest glut and subsequent low prices. Some group of the farmers interviewed had storage facilities. Since potatoes are consumed all year long and harvested only twice a year, it has to be stored in

specialized facilities. This is mostly done by large farmers and wholesalers involved in the process of procurement and sale of potatoes.

The problem with maintaining high crop quality is very important. During the research, many households mentioned they lost a lot of the crop in storage. Losses during storage are high: on average 30-40% of the crop is lost during harvesting, transportation and storage; sometimes the losses can be as high as 60%. During the interviews, farmers told us that all types of potatoes – for own consumption, for sale, and for planting.

Losses during storage are a major component in total loss of harvest. Often these losses are caused by the farmers themselves – as they do not treat the premises with chemicals between storage periods, use them for household needs, then clean up the garbage and place the new crop. This poses the risk of contamination or disease of the potatoes. A simple treatment is whitewashing the walls with drowned lime, adding blue-stone (2 kg of lime and 100 g of blue-stone for ten liters of water). Potatoes often become infected while still in the field. In this case, they will rot very quickly if stored.
Another cause of crop damage is frequent calibration of seed tubers conducted in autumn. This can damage the potatoes and pass the infection from bad tubers to healthy ones.

One more important factor affecting storage life of potatoes is maintaining differentiated temperature modes in different periods of storage, considering the quality of tubers. However, due to frequent blackouts in winter it is not always possible to ventilate the storage facilities properly.

Potatoes are often stored in the ground.

Potato Sale

Nearly all of Tajikistan's potatoes are consumed locally. Consumption is mainly in unprocessed form in homes and restaurants. The average annual per capita consumption stands over 100kg[15] (according of IYP 2008[16], Kyrgyzstan over 140, Kazakhstan over 100 kg). Since no grading or branding is done it is hard for consumers to choose the best potatoes. Quality issues are also a major concern for consumers. Potato trade needs to be professionalized to cater for the needs of increasingly quality conscious consumers.

Major markets include large urban centers. The potatoes are mainly sold via informal channels such as open air markets and stalls with little observance of prescribed standards.

Farmers in Upper Mastchoh live on barter trade, exchanging potatoes to other first-necessity times. Due to remote location of this district, villagers in this district have many problems. They cannot deliver their potatoes to other parts of the country, as transportation requires a lot of fuel and potatoes may not survive lengthy travel. High cost of transportation affects the sales price of the product.

[15] That figure also confirm by complex of facts: production per capita over 100 kg, some volume of potato imported, over 20% of population in migration.
[16] www.potato2008.org

Big traders purchase potato from commercial farmers who have scale of production and village level small traders who generally functions like collector. These traders are retailers of foodstuff and other goods of basic needs. However, big traders are specialized vegetable traders who function for wholesale markets and deals in big quantities. These traders generally sell there produce to the commission agents active in the wholesale markets.

The market is characterized by a large number of middlemen.

Processing

Potatoes in Tajikistan are not processed into potato chips, starch or frozen peeled and sliced potatoes (which are popular in Europe and Northern America). The reason is a lack of cheap potatoes and investment.

Import and Export of Potatoes

Tajikistan consumes more potatoes than it produces. Large volumes of potatoes are imported to Tajikistan every year. In the last three years the imports exceeded 25,700 tons p.a., going up to 27,500 tons in 2009. The main exporter of potatoes to Tajikistan is Afghanistan, from where more than 90% of the imported product originates. Other large importers include Russia and Iran.

Table 33: Import of potato, 2006-2010

	2006		2007		2008		2009		2010	
	000' tons	Total, 000' USD	000' tons	Total, 000' USD	000' tons	Total, 000' USD	000' tons	Total, 000' USD	000' tons	Total, 000' USD
Total import, Include	11,5	1779	25,9	4262	17,7	3009	27,5	5274	25,7	4,4
Afghanistan	0,7	147	22,0	3673	16,9	2907	24,0	4874	22,2	2,6
Iran	5,7	590			0,6	60	2,7	273	0,3	84
Russia	5,1	1037	3,7	506	0,2	39	0,7	88	2,6	1069
Germany									0,1	215
Netherland									0,3	343

Source: State Statistic Agency of Tajikistan

It is a pleasure to see that our country is starting to import seed potatoes from Germany and the Netherlands. The imports of seed potatoes from these two countries reached 489 tons in 2010, which is an equivalent of over 558,000 dollars.

Some scientists say that the shortage of potatoes in the country is caused by exports. As a result, the President imposed a ban on export of potatoes, which has been in effect since November 10, 2010. However, export volumes are miniscule, less than 1% of the imports (see table below).

Table 34: Export of potato, 2010

	2006	2007	2008	2009	2010
Volume of export, tons	6	280	0	358	273
Amount of export, thousand USD	1	46	0	68	48

Source: State Statistic Agency of Tajikistan

Functions in the Value Chain

Potato is one of the most important cash crops. Potato is grown in subsistence as well as commercial households.

Farmers

Three types of production system can be observed: I) Subsistence production, II) small scale commercial production and III) Large scale commercial production. Subsistence production is carried out for household consumption and produced in small quantities. The produce from the first category of farmers generally does not enter the market or enters in a very limited quantity especially in the local market. Small and large-scale commercial farmers sell most of their produce to various market intermediaries. The producers generally deal with traders and wholesalers (See value chain map).

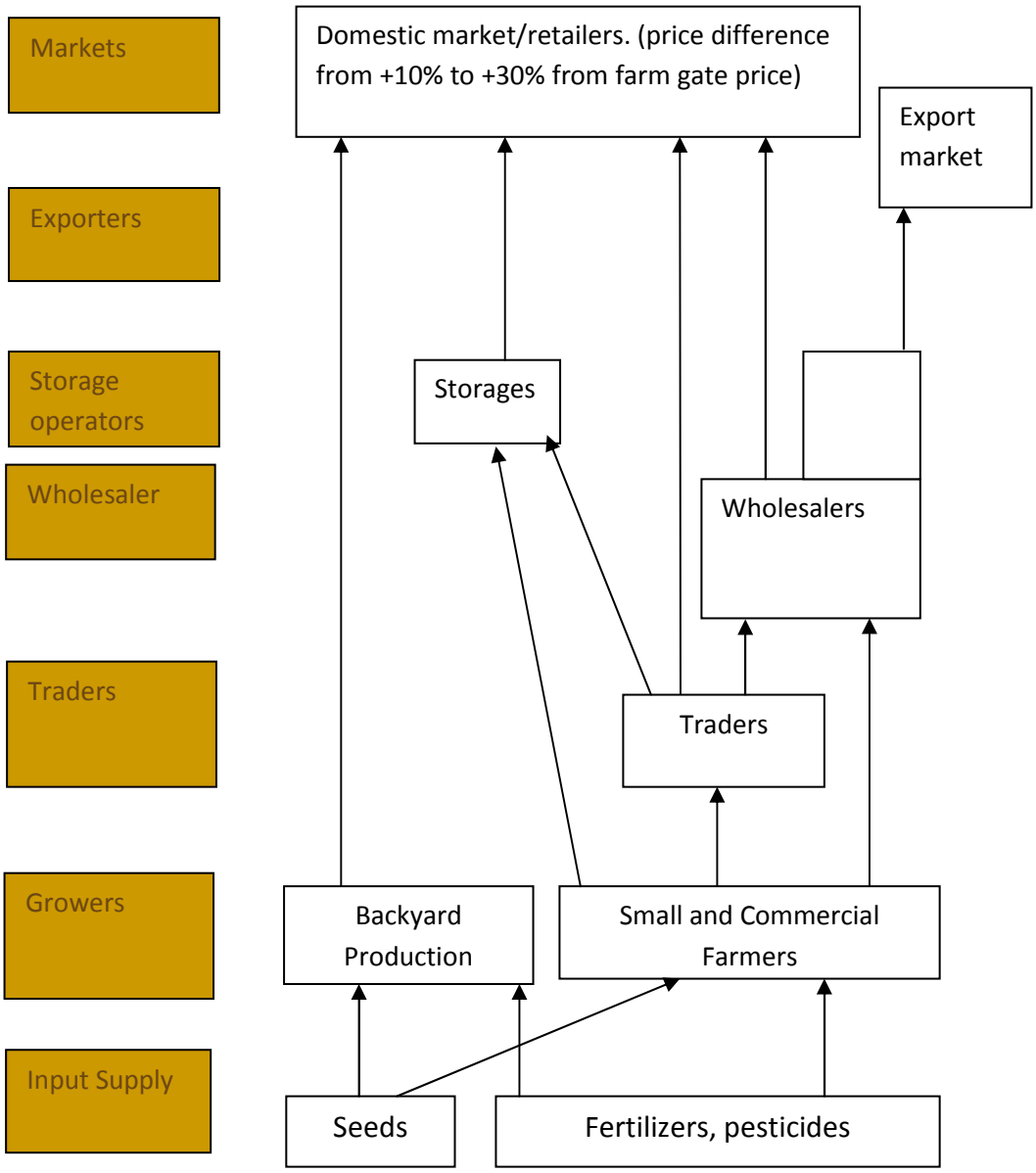
Traders

Small traders residing in the same village and producers are occasionally involved in potato marketing. These traders are frequent visitors of wholesale markets and keep good relation with producers and wholesaler. Generally they deal with small quantity at a time owing to their small amount of capital. To some extent, these traders are aware of price information and generally they do not take any risk of loss because only after knowing the assembly market price they make purchase in the village. Frequently such trader brings some foods and barter with small household for their potato.

Wholesalers

Traders purchase potato from commercial farmers who have scale of production and village level traders who generally functions like collector. These traders are retailers of foodstuff and other goods of basic needs. Generally they have permanent costumers/ farmers who occasionally purchase foodstuff and other requirements of daily need. However, such traders are specialized vegetable traders who function for wholesale markets and deals in big quantities. These traders generally sell their produce to the wholesale markets. Grading and packing function is generally carried out by the traders who buy the stock from the farmers. Grading and packing is carried out in the farmers field itself and paid by the traders. The grading and packing is carried out in the traders' premises.

Scheme 6. Value Chain Map for Potato



Transporters

These functionaries are just involved in the transport business and are not involved in the potato trade in any other way. However, in the hills farmers and small traders reported that they get market information through the truck drivers too.

Cross-Cutting Services Situation Analysis

1) Agriculture Extension, including pest management control

Currently no extension services are available to small farmers. Farmers have informal systems of information gathering (i.e. talking to neighbors, reading magazines etc.) Training on soil analysis, appropriate use of fertilizers, crop management and integrated pest management are all required for increased production.

2) Market Information

Although farmers have information (i.e. prices) on nearby markets where they have previously sold their produce, they have no information on those markets located farther away. Such markets are a potential source of sales and should be tapped into.

3) Financing (loans and leasing)

Lack of small scale financing for small potato farmers is a common obstacle to increased production. Loans and/or leasing would provide such farmers with the opportunity to access equipment allowing for improved production.

Wholesalers purchase volumes of potatoes from farmers which they will be able to sell within two days. The wholesaler then sells the potato to the retailer. Price differences on the whole and retail market are 10%- 30% higher than farm gate prices. Price differences in domestic supermarkets are 50% higher than farm gate prices.

Table 35**. SWOT ANALYSIS OF POTATO VALUE CHAIN**

Strength	Weakness
Resources: • Improved access to communication facilities • the climate suitable for growing potato • High potentials for growth (area and productivity) **Production** • Accumulated traditional knowledge and skills among the potato growers • New high yielding varieties are available wider adoption **Marketing** • Functioning traditional marketing linkage • Farmers are being united in groups to enhance that better market their produce • High number of market functionaries are actively involved in the chain • The supply is far below the demand (import substitution)	**Production**: • Lack of adoption of improved management practices • Diminishing seed quality, low use of certified seeds due to accessibility and costs • High incidence diseases • Lack of appropriate variety • Lack of quality control, The farmers are not aware of quality standards systems •Underutilization of inputs due to lack of sufficient finance •Lack of sufficient storage facilities and processing of long-life products **Business Environment**: • No or poor road (farm) • Lack of access to inputs – irrigation, fertilizers, credit, quality seed • Weak backward forward linkage • Lack of investment from private sector in processing and value addition activities

Opportunities	Threats
Production: • Potentiality to increase both area and productivity • Scope for potato processing industry (potato chips, French fry etc) **Business Environment**: • Government has identified potato as a high value income generating crop and the policies are supportive **Market**: • Scope of value added products (Niche product) • Big scope for import substitution	• Costly power sources and equipments for processing and cold storage facilities • Diseases may pose serious threat to potato Production. • Colorado bit is also a threat that require attention

Potato value chain financing opportunities.

- Financing through loan product development or leasing schemes the mechanization of production operation – ridge making, planting, harvesting
- Development of rural infrastructure including farm to market link roads, collection points, temporary shed for short term storage, grading, packing etc,
- Improvement of the input supply process to ensure that the most appropriate quantity and quality of fertilizer and pesticides are available, in addition to seed potatoes
- Improved short term storage facilities are required in the collection points and wholesale markets
- Improvement of relationships with financial institutions through discussions between the financial institutions (banks, MFIs), the seed suppliers and the grower. These discussions need to focus on rebuilding confidence among the participants throughout in the lending process.
- The production credit required to produce an optimal amount of potatoes for the season. Developing products like input credit with terms and conditions that the payment structure accurately reflects the actual cash flows from potato production (perhaps smaller, multiple installments would be better than one lump sum payment).
- Investment in cold storage, cold transport and
- Equity investment for potato processing of long- life products
- Guaranteed lending for purchasing the fertilizers, CPP and certified seeds
- Equity investment for contraction cold storage, establishing potato cooling and processing plants

- Asset finance/equipment leasing to purchase the proper transportation vehicles e.g. refrigerated trucks for distant markets
- Provision of finance for farmers to buy certified seeds
- Loan guarantees / direct financial support to farmers/ farm enterprises

Transferring knowledge and know how

- Adoption of appropriate variety suitable to location specific conditions
- Adoption of improved production management practices
- Knowledge and information on integrated disease and pest management, sustainable soil management/integrated nutrient management are the other key factors in successful production management.
- Introduction the standards of production, standards of quality control, standards of sale of seeds potato.
- Introduce and develop the system of certification seeds potato
- Link to quality extension services provision
- Provide training on water harvesting and management
- Farmers to be trained on basic financial management and payment via financial institutions in upgraded value chains
- Conducting trainings and implementing specific potato genetic diversity; focusing on the native potato varieties of Tajikistan

5.7. Lemon Value Chain Analyses.

Producers.

Tajik lemons are unique in international markets due to having different characteristics and taste than lemons from other exporting countries. The industrial scale of growing lemons in Tajikistan began in the 1940's. Currently, lemon production in greenhouses (trench fixed with earth walls and polyethylene film covering) is widespread throughout Tajikistan with 80% located in Khatlon Region. In Khatlon Region, lemons are intensively grown in Bokhtar district (former Lenin Kolkhoz) and in Kumsangir district (Rakhmonov Kolkhoz, former Jdanov Kolkhoz), Kolkhozabad district (Guliston) and Lower Pyanj.

Table 36: Total Lemon gross production, yield and area plantations, 2007-2009

Indicators	2007	2008	2009
Area Of Harvesting. ha	500	600	500
Productivity Yield, tons per ha	2,2	3	3
Gross production, tons	1100	1800	1500

Source: FAO stat

As it shown in table 36, more than 1,5 thousand tonnes of lemons were produced in Tajikistan in 2009 with lemon production concentrated in Khatlon Region. The productivity of lemons is different among the regions of Tajikistan and is dependent on the age of plants, maintenance of trees, pruning and fertilization. Some farmers can collect 15kg of lemons from one tree on average while others receive approximately 40kg per tree. Mutavali Soliev, Chief Agronomist for the Zonal Experimental Station of Subtropical Plants, reports that yields could be as high as 1,500 lemons per tree.

The cost of production of lemons is lower in comparison to other crops which are grown in greenhouses. However, it greatly exceeds the cost of production of fruits grown in the field. First households must invest in the greenhouse building and then on planting with three years between planting and economically viable yields. Further, as the plant bears fruits it starts to cover the expenses for acquisition of polyethylene cover, fertilizers, means of plant protection and payment for watering. During full production of lemons, the profit from selling lemons starts to repay the invested capital. Plant care does not take a significant amount of time.

Plants do not survive through the winter if not properly cared for. Freezing is a major problem as evidenced in 2008 when 70% of lemon greenhouses of Tajikistan suffered losses. Most of the plants were cut down and replacements are just now starting to bear fruit. Other problems exist in lemon growing including:

- High level of underground water,
- Struggle against parasites and diseases, There are no prophylactic treatment activities. Farmers start taking care of plants only after finding diseases.
- Out-of-date technologies for storing, and
- Poor quality fertilizers and pesticides

In spite of that problem production lemons is very popular and many farmers would like to establish that greenhouse production. During last 2 year it is became feasible and many new greenhouse was started.

Lemon pickers can collect up to 30 crates of lemons a day. They are paid on average 3-4 Somoni per crate. If the fruit are collected for a lengthy storage, they are cut with scissors, keeping the stalk on the fruit. This extends the lemon’s shelf life.

Commercial sorting and calibration service is not demanded, as lemons are sold by weight and the price depends on the average size of the fruit. Separating sorting, calibration and packaging into separate processes is not profitable at this stage of subsector development – as the markets ready to pay extra for this activity are not present yet. Before, this activity was performed by collection points, which delivered the lemons to the Republic of Tajikistan. Currently lemons are mostly produced for the domestic market, which is not ready to pay extra value for packaging. Calibration and sorting are performed by retailers as part of the pre-sale preparation. These processes are necessary if the channel for exporting lemons from the country is established. However, considering current production volumes, prices at farm level and the separation and independence of producers, this requires a lot of work. Prospective sales markets are Kyrgyzstan and Kazakhstan.

Analysis of existing lemon growing and marketing business shows that:

- All sellers are independent from one another;
- Growers' skills and experience of lemon growing vary;
- Some manufacturers do not have adequate storage facilities;
- Not all manufacturers are ready to risk their crop;
- Small production volumes per household;
- Consolidated production volumes are small;
- High concentration of growers in some districts;
- Manufacturers do not consider production of lemons as the main source of revenue;
- Price is formed on the basis of supply and demand;
- Due to historical tradition of selling from home, the prices are quoted EXW;
- Professional lemon growers who treat this crop as a key business are almost inexistent;
- Small batches are unprofitable for the farmers to transport to the market;
- Households have little interest in investing;
- Large number of pests and diseases are brought from neighboring cotton fields;
- Low productivity and profitability result in lack of interest by some greenhouse owners; to some extent they start re-equipping the greenhouses for growing cucumbers and tomatoes.

Processing

Currently lemons are not processed in Tajikistan with the exception of a small educational workshop for processing and packaging lemons in Kurgan-tube which was opened in 2009 "Limonparvaroni Bokhtar", which now has over 100 members.

Lemon Storage

Generally, lemon sales are conducted from the end of October until the end of December. Some farmers prefer to store and wait until May because prices increase to as much as 18 somoni per kg at the "farm gate." Lemons can be stored until July but their price and weight decrease in the summer.

On farm storage is considered to be viable by farmers as the requirements for storage are low. Most farmers store their lemons at the end of October in boxes and separate each lemon with paper and sawdust. The room must have adequate air circulation and the temperature should not change sharply. Sawdust is purchased from local sawyers for 200 somoni per car load. Boxes are available in local workshops. Some farmers prefer to store them in the dried sand. Others do not pick lemons from the tree until March believing they maintain a better quality and appearance, though they know that it will reduce the yield of next year. Some lemons cannot sustain cold. Middle and large size lemons with light-green or yellow peels which are collected in the beginning of October are the most suitable for storing. Temperature and humidity requirements are a function of appearance and degree of ripeness when entering storage.

Traders and Wholesalers

Farmers sell lemons fresh from greenhouses and from storage. The sales period runs from November through July. Customers come from Kurgan-tube, Tursunzade, Dushanbe and Khujand. In the past nearly 80% of the customers were from Uzbekistan and Russia. Currently 100% of the lemons are sold in Tajikistan. Traditional sales are from the farm gate. Producers do not actively market their product. Notification of the arrival of buyers occurs quickly through the local customers or local mosque. In the past buyers came with large trucks purchasing tons of lemons, now they come in cars and purchase small quantities. They bring their own boxes or order them from local foremen. Even when buyers come many farmers are at a disadvantage as buyers do not want small lemons which constitute 20% of the crop. There is a significant price differential paid farmers depending on distance from market centers.

Logistics of sales.

Lemons are delivered from the production sites in Khatlon Region to “Dekhkon” market in Giprozem district of Dushanbe, from where they are distributed to nearby markets. The produce is also transported to Bobojon Gafurov district of Sughd Region, to be distributed throughout the region through markets in Khujand.
Lemons grown in Sughd Region are also distributed through Panjshanbe – the Central market of Khujand. Thus, the prices in the central districts of national jurisdiction and in other markets are higher than in “Dekhkon” market in Dushanbe; respectively, prices in the towns and districts of Sughd Region are higher than in the Panjshanbe market of Khujand.
In previous years, lemons were transported until November 15 at most (until mountain roads were closed for winter), and stored in Sughd Region. Now the road through the tunnels is open around the year, so lemons are stored by the farmers. The connections within the business sector are well established (mostly based on relations of kin), and lemons are ordered by phone, according to the market demand. Transportation from the grower is made in small shipments (400-600 kg), using cars, is the most convenient, as fresh produce is delivered to the markets as demanded. This also eliminates the need to rent warehouses at the market where lemons are sold.
From the export viewpoint, it should be noted that Uzbekistan creates problems for sending goods by railroad from the Southern Tajikistan; however, borders in Sughd Region are more or less open. For this reason, produce for export to the CIS countries is prepared in the North before being shipped to the destination country.

According to state standard requirements, lemons are shipped in batches. A batch is any quantity of lemons of the same variety and the same size category, packed in containers of the same type and size. However, when the lemons are delivered to collection points or ranging/packing enterprises, the batches can contain any quantity of lemons of different sizes and varieties, in packages of all types and sizes.

Manufacturer's pricing

Pricing of lemons depends on quality, taste, appearance and aesthetic characteristics. If there is any dirt on the lemon's surface the price will be reduced. Farmers also stated that prices for lemons were substantially lower in 2009, 3 somoni/kilogram, while in 2008 the price was 8 somoni per kilogram. The research shows that the price for lemons has grown to 4.5 somoni which rises to as much as 12 somoni per kilogram when they reach the Tajik consumer. Prices for lemons are declining as supply increases. Imported tangerines and oranges also compete with lemons as the source of vitamin C, and have lower prices. Unlike some other fruit, watermelons as an example, lemons are priced on weight and not per piece, with each fruit weighing between 70 and 200 grams. Lemon pricing is set by the level of what the neighbor sold for and all of them waiting for customers. Lemon prices increase with the first frosts. Afraid of losing their produce due to frostbite, and due to absence of regular sales markets, the farmers sell their crop early in the season, before the frost strikes. Those who store lemons wait for higher prices and try to sell as high as possible.

Diagram 3. Lemon price diagrams in Tajikistan markets, in 2006-2008

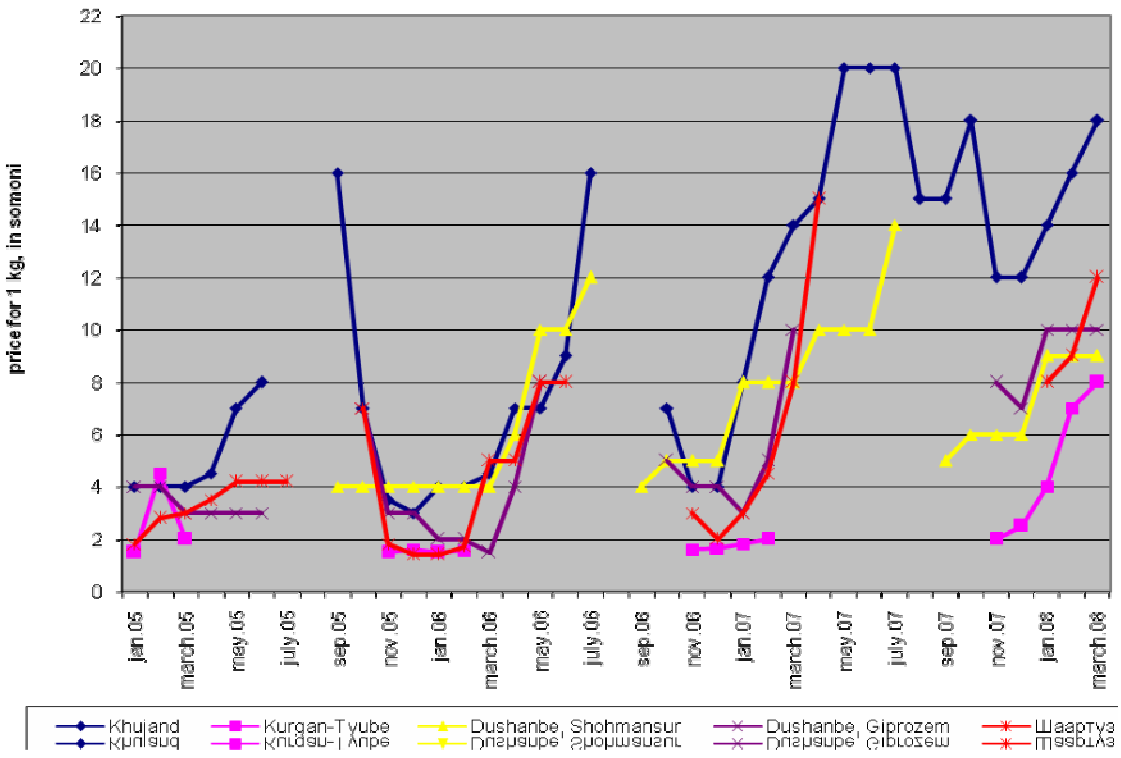


Diagram above shows the fluctuation and dynamics of lemon retail prices. The data is related to 5 markets of Tajikistan: 2 markets of Dushanbe- Shomansur which called "Green Bazaar" and Somoni which is Giprozem, the central markets of Khujand, Kurgan-Tube and Shartuz. Lemon pricing is highly seasonal. The price is lowest during harvest in November, raises little through January and reaches a maximum during summer months. The prices are highly dependent on supply and demand.

Lemon pricing is highly seasonal. The price is lowest during harvest in November, raises little through January and reaches a maximum during summer months. The prices are highly dependent on supply and demand.
As it shown on the diagram 3 prices for lemons are highest in Khujand and the lowest in Kurgan-Tube. Due to lower production in the north of Tajikistan most lemons are imported from the south. The higher prices in the north are largely due to transportation expenses. In Kurgan-tube lemons are sold mostly by households and are grown around the city (Bokhtar district). The same differences can be observed in retail prices of Dushanbe and Khujand markets during the spring. To make the prices more stable lemon greenhouses should be built around the city center.

Lemons could not take a niche in major markets because of their low volume and prices. The Mediterranean and Latin American lemons are the most saleable in traditional markets. For example, the amount of Turkish lemons increased in November 2006, decreasing of prices to 17.5-18 rubles for a kg in Moscow and St. Petersburg. But in Tajikistan the farm gate price of lemon was more than $1 or 25 rubles for a kg. According “Citrus fruit, fresh and processed, annual statistics” the world wholesale price for good quality lemon in Europe equal 0,90 Euro, in USA 1,6 USD and in China 0,80 USD include shipment to the main ports.

Cost of lemons

Obviously, the main barrier to export is the high cost of lemons sold. According to data obtained during the interviews with representatives of PO “Gamkhori”, the cost of producing lemons (excluding depreciation of the greenhouse and labor invested) is 1.40 Somoni per kilogram in Bokhtar district and 1.80 Somoni in Kumsangir. The price is not based on market factors but rather on the fact that the goods are not perishable and are produced in small batches, therefore there is a high chance of selling the batch to the next buyer.

Current price kept high since most of produced lemon consumed by local population which ready to pay that price. According the statistic the production too low, and per capita became less than 200 gram lemon per year.

Lemon Packaging and storage

Lemons are packaged depending on the estimated storage time, sales market and the time needed for transportation. If the lemons are to be immediately sold at the markets in Dushanbe, they are picked rather carelessly, then stored in bulk, without lining and ranging, into PET bags or banana boxes17. If the lemons are intended for delivery to Khujand or for storage, they are carefully packed in wooden crates, lined with sawdust, PET film and paper. Usually fruit packed in cardboard boxes are delivered by cars, while wooden crates (up to 30 kg per crate) travel in big trucks.

[17] According to merchants, banana crates can be reused three times.

Lemon boxes differ from other kinds of boxes as the inside should be smooth. Customers take wrapped lemons from farmers after agreement on price and receipt of partial payment. Most of the households have scales. A wooden box contains from 30 to 35 kg of lemons on average and banana boxes contain 20-28 kg of lemons covered by films. There are also some farmers which prepare stock for wholesalers. To keep lemons for a longer time it is necessary to store them in wooden boxes filled with sawdust. Lemon sorting is made according to the "patterns" of hen's eggs. Usually customers do not buy smaller then current sizes.

Proper storage is a problem in the lemon industry, more appropriate storage is needed. As Bakhridin, a Khujand wholesaler says: "it is profitable to work with lemons but it is necessary to have improved storage. Household growers exit lemon production after experiencing cold winters while professional growers are much more adapted to climate changes and stay in business."

Prices rise between 200 and 800% in May providing support for construction of appropriate storage facilities. In addition we can see (diagram 3) that prices can rise as much as 1000% by the time lemons reach the consumer which adds credence to the producer playing a more active role in retail marketing.

Storage is done by those farmers that are ready to take risks. Lemons are stored until June. Methods used are cheap and do not require electricity. There are two type of storage methods for lemons: on the trees (some fruit are not removed during the season) and in crates. Lemons collected in crates are placed in special rooms or dugouts. The fruit are not sorted by size. As soon as storage is opened, all lemons have to be sold immediately. The risks of storage are high and obvious, but they are generously rewarded. The following risks are particularly noteworthy:

#	**Name of operation**	**Risk**	**Opportunities for risk management**
1	Storing on the trees	Trees spend a lot of resources for keeping the fruit fresh, and as a rule have lower yield for the next season	Growers remove lemons from half the trees and leave about 50%, thus improving yield for the next season.
2	Storing in crates, in roofed storage	High temperature in spring and early summer	Using air conditioners[18]
		High loss in case of rot	
		Absence of certain sales markets in spring and summer	
		Incorrect placement into storage results in crop loss	
		Low temperatures in winter cause the fruit to freeze	
3	Storing in specialized	In addition to point 2, absence of packaging materials when the buyers	

[18] Usage of air conditioners and cooling equipment is limited, due to problems with electricity supply. As of this research, at mass harvesting season, strict energy savings were in effect and electricity was supplied only nine hours a day.

	facilities, in bulk, without crates	arrive (crates and sawdust are not as easily available in spring as during the harvest season)	

Lemons are usually stored by the growers. Sellers do not risk putting their fruit in the storage due to the following reasons:

- Uncertainty that the lemons were not damaged during picking and transportation;
- Uncertainty whether too much fertilizer or plant protecting agents (including fertilizers) was used, which affects the product's shelf life;
- Uncertainty whether too much chemicals were used to wash the fruit after picking (usually detergent solutions are used).

Lemons are very difficult to store. In the first two months, up to 30% of the fruit can be lost due to rotting or shrinkage. Those who do take the risk and store their lemons usually win and get a good profit margin. In 2009, lemons in Kumsangir were priced at 3 Somoni a kilo, while in July they were sold after storage at 40 Somoni per kilogram at the markets in Dushanbe, or 30 Somoni at the farm level. This difference of over 1000% covers and justifies the investment into this activity.

Export of lemons

Lemons of Tajikistan are mostly demanded in countries of Central Asia, Russia and these countries have become the main customers (See Table 37). Lemons inside of the country are being distributed in Khujand, Dushanbe, and Tursunzade. Export of lemons to Uzbekistan (Denav, Tashkent and Namangan), Kazakhstan, Kirghizstan and Russia is going through Tursunzade border (Sari Osiyo). There is a large amount of contraband lemons which is being exported illegally. Farmers sell lemons for 4 somoni per kg, the cost of lemons in Dushanbe is 10 somoni per kg and in the Uzbekistan market it is 20 somoni per kg.

Table 37: Lemon exports from Tajikistan (in tonnes)

	2006	2007	2008	2009	2010
Export of Lemons (in total)	**229**	**36**	**417**	**264**	**628**
Kazakhstan	34	-	108	76	21
Kirghizstan	-	-	15		18
Russia	160	26	2	1	17
Uzbekistan	9	-	228	187	552
Turkmenistan	-	-	64		
Afghanistan	26	10	-		
Pakistan					20

Source: State Statistic Agency of Tajikistan

The results of the current tables 37 show that most lemons in Tajikistan are consumed by Central Asia (inside country and in export). Export of lemons increased in 2010 with

export totaling 628 tonnes. Tajik lemons are highly demanded in Bishkek and Alma-Ata, a result of the Soviet era but there are some problems related to irregularities of delivery lately. During off-season in Tajikistan available lemons come from Spain and Argentina. There is a big difference between them regarding taste and the thickness of the peel. Lemons from Argentina and Spain are calibrated, cleaned, have stickers, labeled boxes. Tajik lemons have different sizes and are just collected in boxes. Retailers sort them.

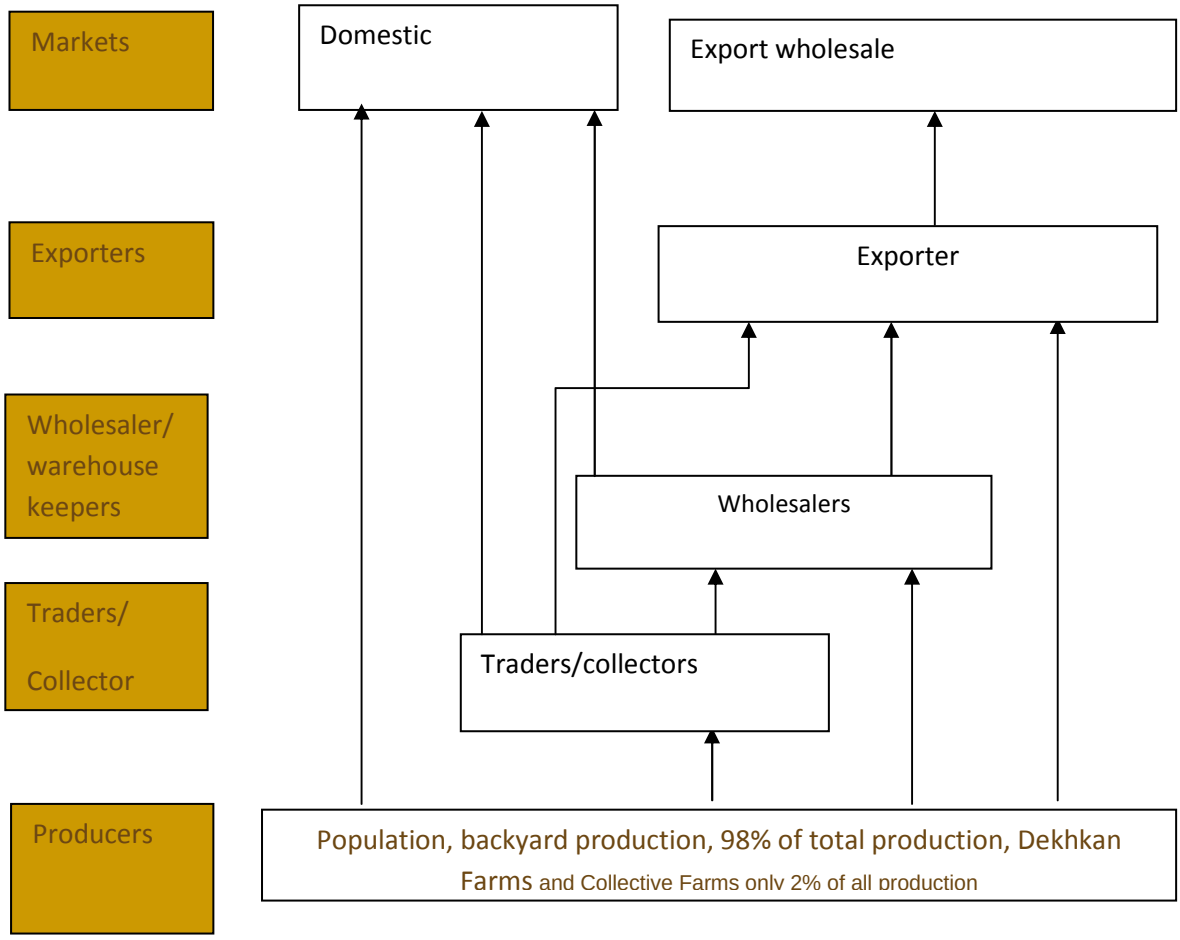
Functions of value chain players.

The production volume of lemons can be increased and the price from farmers can be decreased by improvement of nursery stock and inputs (quality seeds, quality and quantity of fertilizers, sufficient volume of water) and improvement of pest and disease control. However, lemon production is not the main activity of households' therefore encouraging investment will be difficult.

Farmers, procurers, exporters and retail sellers are the links of the chain. Marketing channels have direct lines between farmers and exporters, farmers-suppliers-exporters, farmers-wholesalers-traders or farmers-suppliers-wholesalers-traders. (See the diagram below)

- Producers are represented by large number of farming households, concentrated in areas of cultivation. The number of producers is increasing because of breaking up of large farms into the smaller units. The number of new investments in lemon greenhouses is increasing as lemons gain popularity as an alternative source of income.
- Exporters are entrepreneurs who have contacts in the exporting markets. The number of exporters is stable.
- Importers are physical persons from bordering countries who buy lemons from exporters and wholesalers.
- Suppliers and traders are farmers and wholesalers who store lemons and sell them in the most profitable season.
- Retailers are those who have sales outlets to sell the lemons and buy them from suppliers and wholesalers. Their numbers are stable.

Scheme 7. Lemon Value Chain



Lemon value chain financing opportunities

1. **Lemon Production**

- Financing through long-term loans for greenhouse construction, storehouse building, packing direction support and lemon calibration is also an important condition for the value chain development of lemons.
- Financing schemes which allow the supply and distribution of fertilizers and pesticides. That could be done on collaboration with farmers and input dealers. Designing a special loan product: The proposed lending scheme includes opening a credit facility for the shops related to farmer groups. Manufacturers receive goods from the shop, while the shop presents the purchase agreement and issue order to the bank for obtaining the funds. The loan will be registered to the client for whom the credit line has been opened. Loan payment could be scheduled for period as the crops are being sold.
- Financing by working capital agricultural input shops, which will offer Seeds (include nursery, seeds for onions and melons, tomato and cucumber); Certified fertilizers; Certified chemicals for plant protection; Diesel fuel; Supplying greenhouse films for multiple year usage.

- To provide farmers with input materials (such as plastic films which they could use more than many years and that would give an opportunity to save on long-term prospect).

2. Financing to Strengthening Marketing

- For creation of successful lemon exportation system in Tajikistan there is a need to build a system of calibration and sorting. It is also necessary to create facilities for lemon packing under exporting organization's requirements and to provide the fast delivery according to export requirements (special boxes and labels). It is necessary to create this system close to export centers which are in Khatlon region.
- Creation of storage system and industrial scale storage that would buy in and store the lemons for a long period. Such a facility could be used for consolidation/storage lemons.

The transferring Knowledge and now-how

- Introduction and adapting best practices and technology for efficiently lemon production and crop protections techniques
- To work for effective use of fertilizers and pesticides
- To conduct trainings for storage lemons, and decreasing loss and shrinkage ratios in case of proper storage;
- Processing off-grade lemons. As the lemon business develops, there will always be off-grade or small fruit that do not meet the state standart and market requirements. These will be priced low, making processing more feasible.
- Technical Assistance on facility design and storage upgrading
- Understanding costs and benefits of storage and delayed sales, and when/how to speculate

5.8. Grape value chain analysis.

The choice of grapes for value chain analysis is explained by the fact that this is a fast growing sub-sector. The volumes of production are growing annually; this growth is described in detail below and in the report provided. Grapes are interesting both from the aspect of their export potential (since the majority of finished product are exported to the CIS countries) and from the internal market point of view. Grapes are a traditional product, with existing infrastructure that has mostly been destroyed during the civil war and financial crisis in the 90-ies. Grape growing in Tajikistan has many centuries of history. Even in the Soviet times Tajikistan was famous for its sweet grapes, raisins and wines. However, at the moment the quality of finished products is far from perfect, due to violation of technology, insufficient maintenance and financing.

Producers.

Grapes are a popular agricultural product, grown everywhere and by everyone. Since the end of summer till late autumn this is a regular product in the menu of every Tajik family. 193 varieties of grapes[19] are grown in Tajikistan. The most popular ones include:

- Wine varieties: Bayan-Shirey, Rkaciteli, Soperavi, Muscadine pink, Muscadine white;
- Early table varieties: Zarrina, Khujandi, Chilagi, Doroi, Avshon;
- Table varieties: Huseini, Kadu Khujaini, Tagobi, Raisin black, Raisin white, Taifi pink, Javs, Nimrang, Victory, Fox tail.

Wine-growing is developing slowly, due to total chopping down of vineyards when passing the Dry Law in the Soviet times, civil war, general poverty of the people and lack of investment into this sector over many years. Grapes are grown all over the country, excluding Gorno-Badakhshan Autonomous Region (see table 38). Industrial production of grapes in Sughd Region is developed in Bobojon Gafurov, Istaravshan, Ganchi, Penjikent districts and in Chkalovsk. In the Districts of national jurisdiction, grapes are grown in Ghissar, Vahdat, Rudaki, Tursunzade and Shahrinav districts. In Khatlon Region: Vahsh, Vose, Baljuvon, Sovetsky, Moskovsky, Lower Pyanj, Rumi, Fahrobod, Kumsangir, Kuybyshev.

Table 38. Vineries area in Tajikistan, thousands hectares

Hectares	2006	2007	2008	2009	2010
Tajikistan (all ages)	49,7	36,2	35,4	35,7	37,1
Tajikistan (fruit-bearing ages)	*31,7*	*32,8*	*31,9*	*31,4*	*30,5*
Sughd Region	13,1	13,4	12,7	12,6	12,1
Khatlon Region	27,2	13,2	12,8	13,0	13,9
DNJ	9,3	9,6	9,7	10,1	11,1

Source: State Statistic Agency of Tajikistan

The table above showing that the vineries area (include the area under fruit bearing ages) is reducing annually. Farmers are not able to manage vineries due to financial problems and due to lack of knowledge. Most of them left to migration.

According to Table 39, “Productivity vineries yield”, yield per hectare is higher in Khatlon Region (about 5,1 tons per hectare), while in the Districts of National Jurisdiction and in Sughd Region it is some more than 3 tons per hectare.

Table 39. Productivity Vineries yield, all categories of farms, tons per hectare

Hundred kg per hectare	2006	2007	2008	2009	2010
Republic of Tajikistan	3,6	3,6	3,7	4,4	4,1
Sughd Region	3	3	2,9	4,1	3,7
Khatlon Region	3,5	4	4,6	4,8	5,1
DNJ	3,5	3,7	3,3	4,1	3

Source: State Statistic Agency of Tajikistan

[19] Academy of Sciences of Tajikistan, Tajik Soviet Encyclopedia, page 208.

Below we provided the gross collection of grape by regions and by type of growers.

Table 40. Gross collection of grape in Tajikistan, in thousand ton

The regions	2006	2007	2008	2009	2010
Tajikistan	**107,2**	**116,9**	**117,9**	**138,7**	**124,3**
Sughd	34,7	36,3	33,9	44,8	37,0
Khatlon	46,3	51,5	58,0	61,1	61,2
DNJ	26,2	29,2	26,1	32,6	26,0

Source: State Statistics Committee, FAO statistics.

Table 41. Production agricultural products per capita, in kg

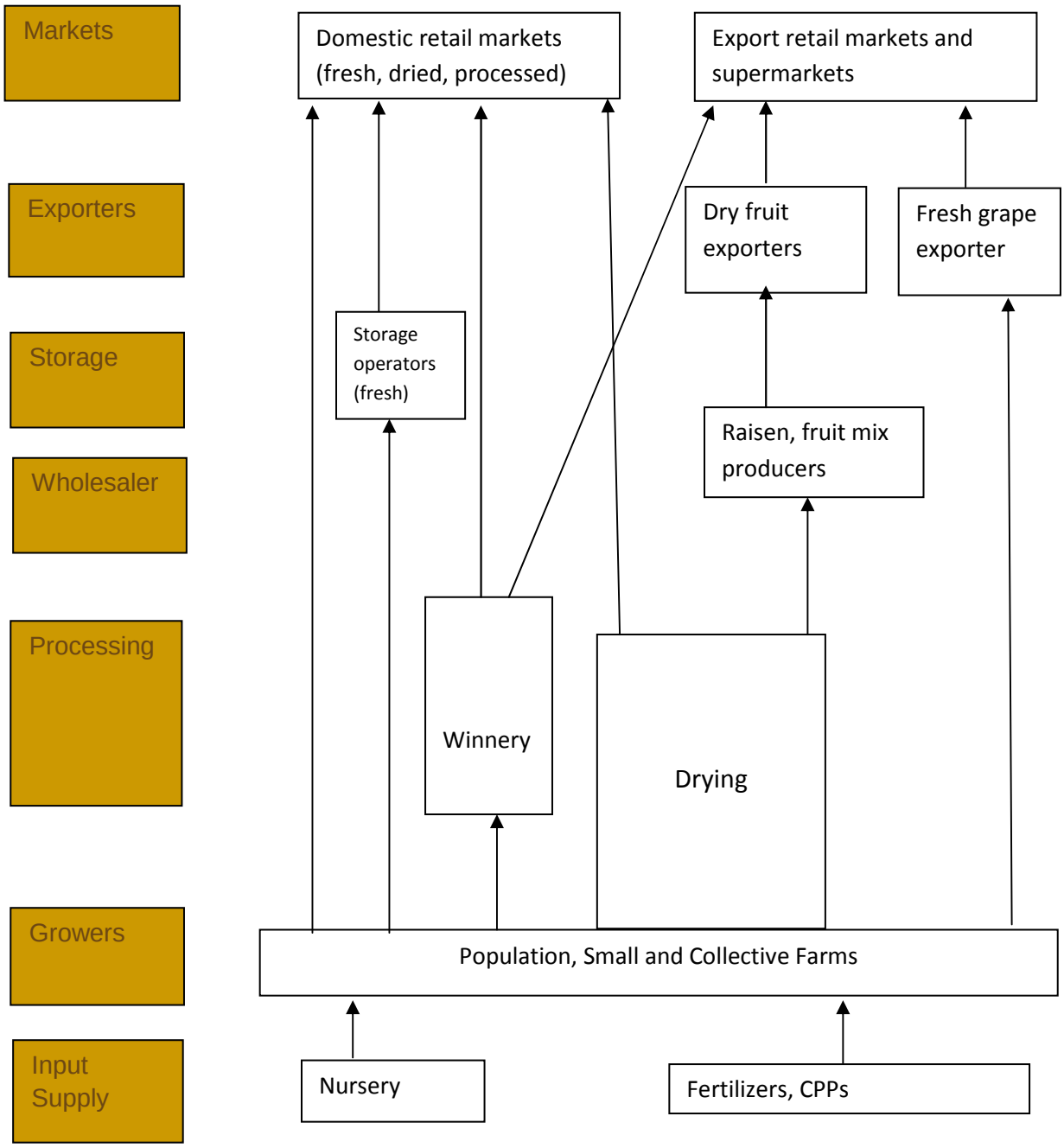
Name of ag. Products	2005	2006	2007	2008	2009	2010
Grape	13,1	15,0	16,2	16,8	19,3	16,5

Source: State Statistic Agency of Tajikistan

From table 41 we can make conclusion that the volume of grape increasing well. When considering the volume of grapes production (Table 40), you can see that more than 124,3 thousand tons of grapes were produced in 2010. Detailed analyses show that almost 75% of all grapes produced in Tajikistan is produced by population, and only 25% was produced by dekhkan farms. The average yield per hectare on population equal 8,8 tons per ha, when the average on country reported as 4 tons per ha.

Inputs do not play such an important role in grape growing as in other sectors. Plants are not dusted due to absence of specialists and knowledge, as well as lack of chemicals. Water is supplied by strict schedule. Seedlings are bought from farms. Fertilizers are purchased at local markets. Winery growing state research institute exists in Bobojon Gafurov and Istaravshan districts, which provide services for all wine and grape industry. The institute has experimental lots, where new varieties are being tried. They can also sell seedlings if necessary.

Scheme 8. Value chain for grape.



Functions. The population is the primary grower. As mentioned earlier, the majorities of grapes are consumed fresh, at the local or export markets as early varieties. However, farming households, population and collective farms dry some of the grapes into raisins. Raisins are sold either individually or as part of compote mix for export to the Russian Federation and to other CIS countries. Another part of grapes produced is shipped at reduced prices to wineries. Wineries sell their products independently or through mediators to the local markets and for export. Raisins are collected at the wholesale markets through a network of buyers, and then purchased for export purposes. It is interesting that raisins, as well as dried apricots, are purchased by ethnic Tajiks,

residents of the importing countries, then distributed through a large retail network. So whole value chains mostly handled from bottom to top by Tajiks.

Vine production. Tajiks have been considered skillful winemakers since ancient times. There are a number of wine factories in the country. After the privatization, all wine factories were registered as joint stock companies with large plantation of grapes. Workers at the factories are paid small salaries, or are given the product instead of money. The following kinds of brands wines are produced in the country: Tajikistan, Ganchi, Taifi, Orzu, Aral, Gulgun, Rohati Jon, Isfisor, Cabernet, Muscat, Rkaciteli, Saperavi, Morastal, Bayan-Shirey, Kagor. Export of wines is currently complicated due to Uzbekistan imposing restrictions on transit of alcohol products through its territory and a deposit requirement. Therefore all sales are oriented at the fast-growing local market.

In addition to wines and juices, various types of ***dried*** grape products (Sultan, Germien, Obi Jush, Ishkori, Oftobi, Sabza raisins) are of particular value. About 25-30% of vineyards are used for growing “sultan” or “kishmish” raisins. The amount of dried fruit exported is shown in Table 10; separate investigation is required for obtaining more detail on the issue.

Storage. It is known for a fact that the country does not have enough storage facilities. Late varieties are stored at home. They can be stored like this for several months. In winter, by New Year time, the demand for grapes at the local market is at its highest. Optimum storage temperature for grapes is 0 to -1 degree Celsius, with 90-95% humidity. These conditions cannot be achieved in the current state of storage facilities. Only late table varieties of grapes are put in storage for 4-6 months: October, Nimrang, Taifi pink, Late Vira, Shabash.

Wholesalers in dry grape market are the entrepreneurs who have close collaboration with the exporters.

Export.

The main period of export of fresh grape starts from September, the dried grape exports during the whole year. The Tajikistan’s export of fresh grapes is reducing during last few years. Though the in 2006 to 2009 the average annual export volume was almost same (2006 - 12726 tons, 2007-13228 tons, 2008-11945 tons and in 2009 – 12376 tons). It is explain that Tajikistan has same group of exporters which work in same volumes, some time by differencing the countries of export. In 2010 was decreased export to Russia for 7000 ton due to political problems. The grape as other perishable fruits transports by truck or in railway refrigerated trucks. According the international agreement the transportation costs through the railways had discount 50% from the rate in Tajikistan and Russia, and 40% from the rate on territory of Uzbekistan and Kazakhstan.

Table 42. Export fresh Grape from Tajikistan

Countries of import of Tajik grape	2008		2009		2010	
	In tons	Thousand USD	In tons	Thousand USD	In tons	Thousand USD
Total	**11945**	**4787**	**12736**	**3596**	**4716**	**1929**
Kazakhstan	14	13	32	11	296	116
Russia	11153	4619	10808	3203	3821	1618
Ukraine	7	2	30	9	14	5
Afghanistan	411	62	514	102		
Pakistan	334	58	826	154	557	139
Belorussia	26	33	68	76	6	9
Georgia			44	26		
Iran			52	14		

Source: State Statistic Agency of Tajikistan

The problem of reducing export of fresh grapes from Tajikistan has few causes:

- Undeveloped and declining export infrastructure (roads blocks by Uzbekistan, not availability the auto truck which could transport the fresh grape, lack of railroad trucks and problems with the railroad transportation thou the boarder)
- Degradation the plantations along the countries.
- Poor quality of packaging
- Poor presentation product and loosing the traditional market

The consumers of Tajik grapes in the export markets are the people with high income, since grapes are exported to more favorable market niches. At the local market grapes are consumed by everyone. The particular feature of value chain for grapes is that more than 50% of grapes are produced and consumed by the population in fresh, dried or processed (wine) form. The entire population of grapes growing districts is involved in its production, since this is a traditional crop for many households. The consumers of wines, as well as raisins, in the export markets, are the people with average and low income level. They purchase the goods mostly in the markets.

The quality of Tajik raisins is inferior to that of Afghan and Uzbek raisins; therefore our product is mostly used as a component in compote mixes. The situation of production and export with raisins is identical to the dried apricots value chain. However, the primary competitors here are manufacturers from Afghanistan and Uzbekistan. Like apricots, raisins are transported in bags, have problems due to lack of calibration, purity, packaging and sorting. Target markets require high quality goods, Tajiks are losing what have traditionally been their markets, and the niche is increasingly occupied by Turkish, Chinese and Iranian manufacturers.

The grapes sector is growing despite all the issues. Increase in fruit prices at the local market added momentum to this growth by making the production of grapes more profitable. There is a tendency for business consolidation and establishing sustainable delivery chains.

Sources of growth. Growing grapes are not demanding and does not require large investment, except investment on start-up activities on developing new fields and developing irrigation infrastructures. The economy of the majority of households in Tajikistan is tied to this sector. Revenue from selling grapes and availability of grapes as a source of food is a factor for growth.

Value Chain financing opportunities:

- Financing to development enterprises on processing raisins to operate in accordance with the European quality standards. The products would be processed, sorted, washed, calibrated and packaged.
- Opening (or financing opening) storage facilities
- Credit for both growers and agribusinesses as working capital
- Working capital to input dealers to provide better access of farmers to input, include pesticides, fertilizers, sprayers, irrigation systems (like drip irrigation)
- Long term financing developing and reconstruction new vineyards with new grapes varieties.
- Construction of new cool storage facilities, and to substitute the import of grapes from Uzbekistan to Tajikistan during off-season, which has better packaging and look, and shelf life.
- Providing access to adequate packaging
- Loan guarantees / direct financial support to farmers/ farm enterprises

Transfer of knowledge and know-how:

- Integrated pest management methods, learning new agricultural spraying application technologies.
- Agricultural extension for early varieties, irrigation and cultural practices
- New technologies harvesting and post-harvest operations
- Implementation of new methods of processing and drying.

5.9. Beef value chain analyses

Characteristics of Bovine Production

The following analysis is of the beef marketing chain and its potential for development. The analysis begins with beef production and carries through the marketing of primal beef cuts. It does not include processed meat marketing or the sale of by-products (primarily hides). Animal husbandry in Tajikistan is a major agricultural activity. Table 43 shows the number of cattle in Tajikistan from 2007 through 2010, rising 11% with a

2010 total of 1.9 million head. The highest number of cattle is found in Khatlon Region with nearly 794,913 head or 42% of the total.

Table 43: Total Number of Cattle in Tajikistan by Region (000 head)

	2007	2008	2009	2010
Republic of Tajikistan	1702,5	1799,5	1830,0	1896,9
GBAO	96,5	101,6	101,6	103,6
Sughd Region	498,9	503,7	505,4	510,7
Khatlon Region	695,6	743,7	756,4	794,9
Districts and towns of Republican subordination	412,1	450,6	466,6	487,7

Source: State Statistic Agency of Tajikistan

Cattle production is, although spread throughout Tajikistan, concentrated in several districts:

- Districts Surrounding Dushanbe: Gissar , Vahdat, Rudaki, Tursunzade districts;
- Sughd Region: Gonchi, Penjikent, B.Gafurov districts;
- Khatlon Region: Bokhtar, Yovon districts;

More than 90% of all cattle are raised on household plots with only 10% of production raised by agricultural businesses or farms. Successful livestock production for quality beef depends on breed, genetics, health and general management. The major indicator of successful beef production is weight gain which should average 500-700 grams day with a minimum of 400 grams per day. To achieve this rate of gain feedstuffs must be rich in protein and energy. Factors limiting profitable beef production in Tajikistan are:

- Breed,
- Quality of forages (the main portion of the diet),
- Milk production for nursing,
- Housing
- Overall health and appropriate vaccination program,
- Animal hygiene and cleanness of facilities.

Each factor will be discussed separately below

Breed. Tajik cattle are mixed breeds containing genetics from: local mixed breeds, Chernopestraya, mixed Brown Swiss, Angus, and brown-Carpathian. Artificial insemination is being used throughout Tajikistan to improve genetics with semen imported from the US, Canada, Germany, Russia and Holland. Tajikistan has its own center for artificial insemination and breed improvement with branches is several locations around Tajikistan. Also the local stations for animal insemination use local breeds for insemination. The Tajik price per insemination is 20 somoni (3.5 USD) which covers the cost of insemination with the semen purchased through many different grants.

Forage. Tajikistan has a lack of quality forage for beef production, significantly limiting this industry. Some producers have access to hay, alfalfa, corn and oilcake (a by-

product from production of cotton oil). Other by-products used include wastes from beer and wine production and from the canning industry. Most cattle are forced to graze depleted pastures, stubble fields or roadside ditches. Feed supplements and concentrates do not exist or are priced out of range of most farmers. Feeding management is also poor due to lack of training on the part of farmers. The acres of hay grown in Tajikistan are decreasing annually with no rehabilitation pastures and hay fields evident. The low demand, either because of lack of knowledge or lack of finances, for forage products has led to a lack of imports furthering negatively impacting the use appropriate feedstuffs. Farmers need an intense educational program to instill the need for proper forage production and feeding in order to raise the quality and quantity of beef produced in Tajikistan.

Table 44: Forage and Concentrates Available as Cattle Feed in the Local Markets

Hay and Straw	Forage concentration	By-Product Feeds
Alfalfa hay	Cotton cake	Bard barley
Wheat straw	Corn	Bard wheat
Rice straw	Barley	
Corn straw	Rice bran	
Sorghum straw	Wheat bran	
Rabbs	Schroth cotton	
Motley grass	Soybean meal	
Silage	Sunflower meal	
	Cotton husks	

Hay straw is predominate feed source in Tajikistan. It is a poor quality feedstuff being predominately fiber with little or no other nutritional value contributing significantly to the poor quality of beef production. Most commercial farms do use limited amounts of concentrates, primarily cotton cake followed by pumice oil, wheat bran and rice bran. Lack of feed from local production and the growing demand is satisfied through the feed imports. Feeds are imported mainly from the major trading partners of Tajikistan – Kazakhstan and Russia. Imported feeds do not provide the complete picture of available feed stuffs. In addition to imported feeds a large quantity of wheat and barley are imported for alcohol and beer production in Tajikistan. The by-products of alcohol production (brewer's grain) are available and make excellent cattle feed.

Water is another prime requirement of raising profitable beef cattle but one ignored by Tajik farmers. Cattle are frequently left for hours in high heat without access to water severely limiting their ability to gain weight at an acceptable rate. Most pastures are without a water source.

Herd Health. The Tajik State Veterinary Services tracks animal diseases and has offices throughout Tajikistan for careful monitoring of animal health. This structure carries out the control of epizootic conditions in the region and provides regular reports to the state government and other parties. Tajikistan also has a National Association of Veterinarians which provides both preventative and treatment veterinary care. Several veterinarian consulting firms have recently opened and are providing for fee services to farmers. Veterinary care is important as Tajikistan is a country which has a number of

highly contagious diseases in cattle which cause a public health concern-brucellosis, tuberculosis, leptospirosis, telerioz, rabies, and foot and mouth disease.
Vaccines for preventable cattle diseases are supplied by both government and private enterprises. While some vaccines are available legally there is a considerable contraband market for vaccines coming through Kyrgyzstan. Although contraband vaccines and medicines are available on the black market for as much as 30% lower in price there is no quality control and many of the products are substandard and do not meet their intended purpose. In addition sellers of contraband medicines are not trained veterinarians and cannot provide accurate information on their use.
In an interview with the entrepreneurs engaged in the sale of medicines and vaccines to veterinarians, the majority fear government regulation and operate in a shadow economy. They have a stable set of clients and are not interested in growing their business or meeting current regulations for the sale of vaccines and medicines. At present, there is no effort to move businesses out of the shadow economy to one that is regulated and providing quality vaccines and medicines nor is there any effort to produce vaccines in Tajikistan under controlled conditions.
There are several reasons for the lack of interest in an improved vaccine and medicine situation in Tajikistan and lack of supply into Tajik market:

- The high cost of registration,
- Complicated license requirements,
- The need for translation of instructions into local language,
- The narrowness of the Tajik market,
- A price increase by more than 18% due to VAT and customs duties,
- Inspection by the large number of regulatory agencies.

Housing. Cattle housing in Tajikistan commonly consists of a lean-to or rough structure with poor ventilation and damp conditions. F. Kuzibaev, Director of Zoovetkonsulting, estimates that over 70% of cattle housing does not meet basic standards of animal husbandry. Many farmers do not pay attention to housing and do not keep premises clean leading to disease and parasites. Stalls must be cleaned of manure frequently and clean bedding provided to provide a dry environment. Buildings must be well ventilated to remove ammonia build up which can lead to respitory diseases. Also it is important that the animals have accesses to the outside (sunlight) as cattle convert sunlight into vitamin D, a much needed vitamin for milk production. Cattle require additional care during pregnancy and birth requiring a well lit, clean, dry calving area and proper feeding. Many of these factors are not considered due to lack of knowledge and/or finances causing low beef production from unhealthy animals. Many farmers do not follow elementary rules of housing the animal.

Economics of Meat Production. The ratio of return on investment in beef cattle production ranges from 20 to 40% depending on the labor, skill, care and feed. Most small farmers who purchase cattle at the market for fattening receive an adequate income and use cattle as a form of banking, selling animals when funds are needed. However, it is more attractive to investors to place money in a deposit account in a bank

under a stable 20% per annum interest[20] than investing in livestock production. This lack of investment has lead to the poor state of animal husbandry in Tajikistan.

For small households the current method of beef production also allows production of some dairy products adding to rural food security while using cheap feed sources however, this production method does not lead to successful, profitable beef production.

Fattening. The study found that a large number of farmers are using micro-credit at 30% interest rate for the purchase and fattening of cattle. Loan funds are used to purchase alfalfa, corn and waste dairy products. The high interest rates for the purchase of feeds keep the profitability of cattle rearing low, requiring more attention to home grown feeds.

Typically, cattle brokers who buy and sell animals for fattening require 200 somoni profit driving the price of cattle out of the reach of many farmers. Fattening is usually carried out within 100 days and requires approximately 400 somoni for feed, 100 somoni for labor plus the original 500 somoni for the purchase of the animal. Fattened cattle usually sell for approximately 1,200 somoni leaving a 300 somoni profit potential for the farmer.

Sales of livestock.

The sale of livestock is carried out at regional cattle markets. Slaughter houses are the major factor in the market, setting price, with brokers purchasing cattle for the slaughter house. Some slaughter houses also fatten their own cattle. Animals are sold by live weight, either estimated or, in some cases, through the use of scales. The live weight is multiplied by the estimated dressing percent (usually 50%) to arrive at a price for meat produced. Because of poor nutrition it is rare for a higher dressing percentage to be used.

Cattle sell done by per kg live weight. Some farmers weigh their own animals are able to negotiate on price however; the butcher depresses price as much as possible based on potential market earnings. If the auction trades fairly the butcher pays the price for the animal and receives, as profit, the head, including the tongue, skin and internal organs (lungs, hearts, livers, kidneys, spleen and fat). In the countryside, with the absence of scales, it is difficult for farmers to receive a fair price, a situation that could be corrected by the use of animal weight tapes as was the case in Kyrgyzstan. The distance from markets also plays a role in rural farmers receiving less per animal.

Another feature of the value chain of beef meat is the fact that butchers themselves purchase lean cows and fatten them, selling the carcasses through the local market.

In the past a separate group of dealers collected cattle from remote villages and transported them to regional markets closer to population centers. The cost of transportation is added to the cost of beef raising prices in the southern markets.

[20] Currently few Banks and MFIs offer deposit products with 20% annum.

Large butchers control the price of beef and are the central figures in the value chain. These value chain players locate livestock in remote areas, slaughter and sell the meat through retail outlets. Retail butchers and meat merchants are more likely to invest in the beef industry as their portion of the value chain does not require investment in raising livestock. The second level is the intermediaries and speculators, and the third levels are farmers. As the rule, intermediaries are very experienced and know the market conditions accurately.

Seasonal sales of livestock

The price of the meat rises after the beef price rises in the market, usually because of a lack of slaughter animals. In the price analysis for meat, it can be seen that usually the meat price fluctuates most in July.

The largest cattle sales occur in the spring, autumn and winter. Also, a large number of cattle are bought and slaughtered during the religious holiday of “Idi Qurbon.” Cattle butchers, traders and those who buy cattle for fattening are permanent customers from spring to winter. In the late autumn and winter the population independently prepares the meat for the winter.

Meat production in Tajikistan.

Beef meat production has grown in recent years in Tajikistan but is still lower than production in first year after the collapse of the USSR, when, with a twice smaller population, production reached more than 40900 tonnes. As shown in table 45 meat production has risen to over 25100 tonnes in 2007 and 2008, up from 30300 tons in 2009.

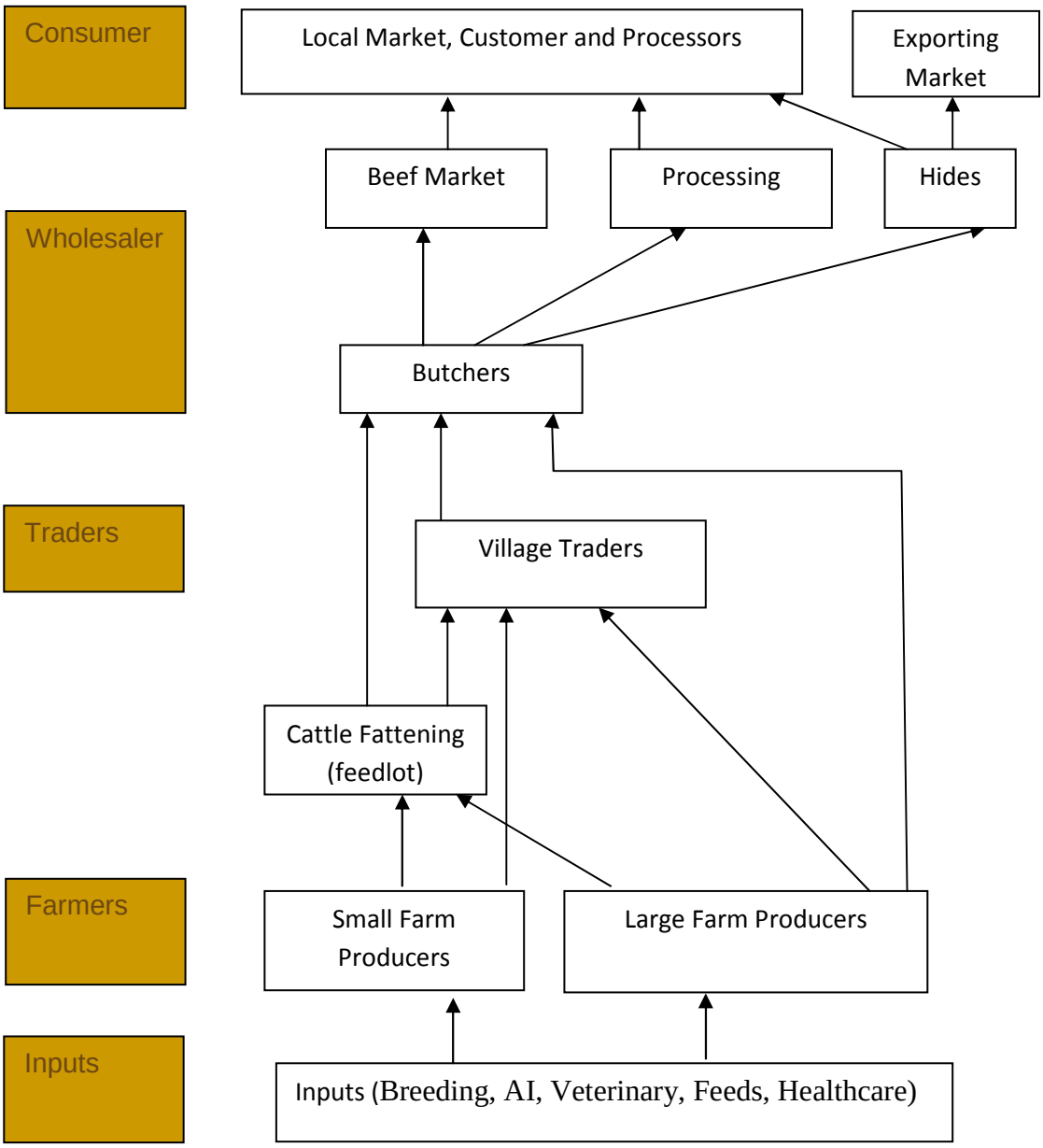
Table 45. Production of slaughtered beef meat in Tajikistan, 2007-2009

Indicator	1992	2007	2008	2009
Number slaughtered, heads	356600	143000	142000	173200
Beef Meat produced, tons	40900	25200	25100	30300

Source: FAO stat

The production of meat not cover the need of internal consumption and Tajikistan purchase frozen meat of buffalo from other countries.

Scheme 9: Value Chain for Beef



Beef Slaughtering.

Beef slaughter is carried out in slaughterhouses. Cattle are slaughtered as all ages and degrees of fattening. Because of poor feeding animals require as much as 5 years to reach market weight whereas many countries slaughter animals 2 years old and younger. According to Kashkuloev, chairman of veterinarian association: "If the overseas cattle beef breeds slaughtered up to 2 years, in Tajikistan, cattle can survive for 5 years before the slaughter.

Butchers have good practical skills for slaughter and cutting carcasses; in most cases the profession is inherited. They know how to cut a carcass, which parts are tender and which are tough. However, they have no theoretical skills and academic

understanding of the processes. Currently meat is not cut to specific preparation purposes (roasts, steak, ground meat) however; it is possible to increase the meat consumption if more precise cutting was employed. This activity can be carried out in supermarkets, and then, when buyers are accustomed, can be extended to meat markets.

A number of registered slaughter houses are operating in the Lenin district, Tursunzade district, Hissar district and Dushanbe. However, in most cases, slaughter is conducted in the unregistered facilities, usually at the residence of butchers or in specially designated areas. Currently slaughtering is done in poor sanitary and hygiene conditions. Most facilities are not suitable in terms of sanitary norms and rules, however; veterinary services still provide permission for slaughter. During this research slaughterhouses were visited in which there was a total lack of sanitation, raw brick walls and lack of special equipment. Proper slaughter conditions were non-existent. Sanitation, water supply, cleaning, disinfection and ventilation were lacking in all facilities. In addition, the butchers do not observe the basic norms and rules of personal hygiene. Despite slaughter in unsuitable conditions a certificate of slaughter inspection can be provided by local veterinarians stating that the animal complies with all norms. Slaughtering begins early in the morning. Veterinarians inspect the animal before slaughter, measuring the temperature of the animal, and then give permission to the slaughter. Also a certificate is issued that states the animal was slaughtered in the veterinarian's presence in accordance with veterinary standards. Typically, slaughterhouses charge 30 somoni per animal which includes the cost of veterinarian inspection.

Slaughter houses have declined in efficiency since the Soviet era. Currently, equipment used is rudimentary and not efficient or sanitary. Frequently, sick animals are slaughtered along with healthy animals and the meat undifferentiated.

There are no specific regulations or plans for the construction of a centralized slaughter house, butchers resist such consolidation. Cost of transport to centralized facilities would raise the price of meat as would centralize veterinary and sanitary inspections. However, construction of such facilities is the only way meat quality and safety can be raised.

Improved health and sanitary standards are needed and should be developed by State agencies and implemented through veterinary services. Regulation is necessary but considered a burden. The following agencies and/or individuals are involved in the regulatory and permitting process for new slaughter house construction:

- The chief veterinary doctor of the district,
- The chief sanitary doctor of the district,
- The committee of environment protection department,
- The chairman of the district (if land withdrawal is needed),
- Director of inter-veterinary laboratory,
- Fire-prevention service, and
- Power grid.

Because the majority of the population of Tajikistan, including both meat consumers and butchers are Muslims it is necessary to consider the religious requirements of slaughter.

Marketing of Meat.

Marketing of meat and meat products is not developed in Tajikistan. Marketing of meat considers four factors:

- Commodity for general use,
- Generic product non-branded,
- Value added products, and
- Products with value add cost of a brand.

Currently, all meats in Tajikistan are selling for general use as a raw production. There exists extensive opportunities for brand and process meat product development adding value to meat products. Branding is another opportunity as there currently are no identifiable brands. Currently, meat purveyors market beef as a commodity and have not yet realized the opportunities presented by improved quality and consistency.

Meat Sale

Meat sales are through local stalls along the roads, trade centers and markets. Often, the butcher is the retailer, handling product from purchase at the livestock market through slaughter then retail sale. There is also consolidation of several meat stalls under the control of one or several butchers who employ sales people for selling the meat. The role of these meat sellers is carcass cutting and meat sales. Butchers, who have control over several sale points, are the people who control the prices in the market. There is no wholesale meat market as most butchers do not want centralized wholesale sales to occur.

Before the carcass is cut, a veterinarian provides a certificate of inspection following slaughter. Usually, a veterinarian takes 800 grams of meat for analysis. Analysis preparations are centralized in regional laboratories. However, butchers recognized that current inspection is superficial.

If the farmer slaughters cattle himself (to save money or as a forced slaughter), the meat will be brought to the morning market and sold to meat traders at wholesale prices. Sometimes in the morning, such carcass can be resold between several businessmen, from one to another and each will add a margin. Usually, the meat does not have a certificate from a veterinarian certifying slaughter inspection.

Seasonal sales of meat occur between July and September. The lowest amount of meat sold occurs during the winter, which is associated with the procurement of cattle for meat, among the population

Butchers may actually lose money on the sale of meat if the it is not sold quickly due to shrinkage and stall rental costs. The profit of the butcher consist of the following

variables Up to 1 somoni from a kg of meat sold, liver and fat, and also revenues from sale of the head, skins, gut fat, tail and heart.

There is no system of wholesale purchases of meat on a permanent basis in Tajikistan, as in other developed countries. In developed countries, supermarkets and meat production are the wholesale markets with a daily demand for several tonnes of meat. The level of purchases of meat by supermarkets and processing industry is growing in our country, and in the future the supermarkets can be linked with current farmers or butchers.

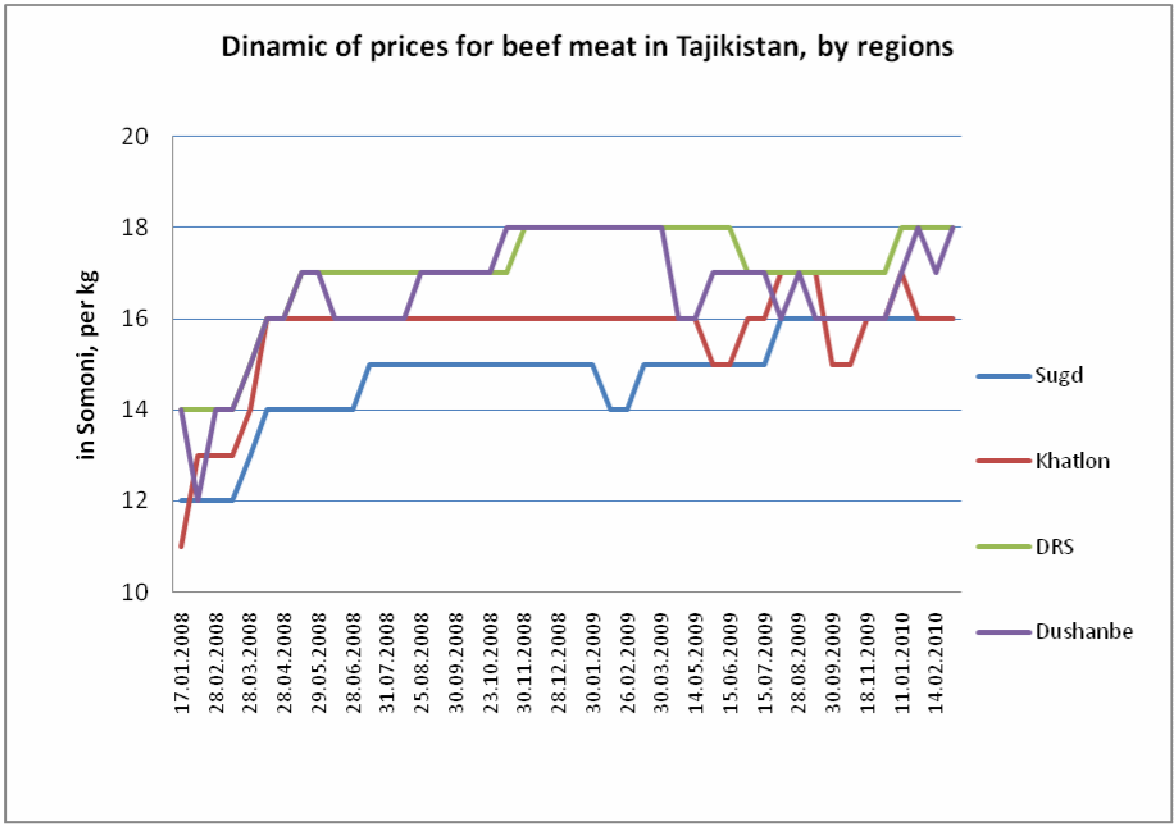


Diagram 5: Average Beef Prices by Regions in Tajikistan, 2008-2010

Meat Price.

The meat and meat product prices are increasing yearly. The following table shows the prices of beef for 11 years (2000-2011). As shown, the price increased more than 6 times from 2000 to 2008. Over the past year the total growth was approximately 50% per year. This growth is largely the cause of inflation and devaluation of the currency, lack of forage.

Table 46: Average Beef Price (end-of-year price, somoni/kg.)

	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011
Beef	2,62	6,68	6,64	7,60	10,00	12,44	15,67	18,00	18,00	27,00

Source: State Statistic Agency of Tajikistan

Despite such rapid growth in price per kg there is a significant difference in regional prices. As it shown in the diagram below, the lowest price for beef is observed in Sughd Region[21], the highest prices are in DNJ and Dushanbe.

Import of Frozen Meat

Because of the lack of meat in internal market, Tajikistan imports frozen meat to satisfy demand. During the last few years, a large quantity of frozen beef has been imported from India, Iran, Turkey and Bahrain. Totally more than 4,000 tonnes of meat valued at 2,53 million USD was imported in 2010. The main meat exporter to Tajikistan is the UAE, exporting 2.6 million tons in 2010. Other countries exporting frozen meat to Tajikistan are Afghanistan, India, Turkey, Iran and Poland.

Table 47: Imports of Frozen Meat, 2010

	Tonnes	Total, thousand USD
Total	4008	2536
Afghanistan	16	10
India	821	517
Turkey	100	63
UAE	2573	1611
Iran	435	195
Poland	36	125

Source: State Statistic Agency of Tajikistan

The volumes of import frozen meat are growing each year.

Quality and Accountability

Beef is one of the most perishable products, as it contains an abundance of all nutrients needed for growth of bacteria, yeast and mold. Therefore, the meat can spoil quickly if there are no measures taken for the prevention of contamination by microorganisms. Refrigeration is the major method of reducing bacterial growth in meat however, is nearly totally lacking in Tajikistan. Meat is hung in display windows with no refrigeration presenting a product that is likely contaminated.

Fresh Meat

Fresh meat is inspected by veterinarians before and after slaughter. Sanitary control authorities inspect facilities once per year. The lack of a rigorous inspection system leaves meat and meat products susceptible to contamination along the value chain.

It is unlikely any businessman will undertake the investment required to improve slaughter facilities without legislative support. Adherence to normal regulations concerning sanitation and epidemiological control will continue to be observed haphazardly, frequently leading to the consumer purchasing an unhealthy product and eliminating any possibility of export.

[21] The lowest however, it is not included in this study as it is outside the Project region.

There are no cattle recording system in Tajikistan. Meat is brought in from rural villages as well as imported from Kyrgyzstan and Uzbekistan through mountain passes with no identification of who raised the beef or where it came from. In cases of animal disease there is no ability to trace the source and implement corrective measures leaving the public susceptible to disease and illness. Problems of diseased meat have occurred in the recent past. In 2008 meat infected with anthrax was found in the market of Isfara. The disease outbreak caused deaths in several villages, including those who bought the meat, butchers and owners of the cattle who sold it. The meat was identified as coming from Kyrgyzstan but the initial supplier could not be identified.

If all current sanitary and hygienic regulations we implemented immediately no meat would be available for sale, a politically unacceptable circumstance. Consequently an intense campaign, with government support, to construct new slaughter facilities are needed, once constructed strict enforcement of rules and regulations applied. A main improvement needed immediately is the provision of meat cooling and storing facilities, a major step in improving meat quality and healthfulness.

Sanitation

Strict adherence to sanitary regulations is one of the key factors in producing and marketing quality meat. It is necessary to disinfect all equipment according to international and local standards, a practice not currently followed. Measures such as PH balance should be checked at slaughter, after evisceration and cooling to ensure a healthy product. If the oxidation degree of meat has increased, it indicates that the slaughter facilities are in poor sanitary condition.

Because of the poor and unsanitary conditions of the meat industry in Tajikistan it is unlikely that export has any potential.

Table 48: SWOT Analysis of the Beef Production

Strengths	Weaknesses
• Sufficient number of butchers and meat shops to meet consumer demand • Sausage processing has started to develop • Sufficient labor force	• Low meat consumption per capita • Slaughtering and meat operations are conducted under poor sanitary conditions • Lack of specialized meat processing equipment • Inadequate veterinary inspection and services • Lack of motivation for veterinarians to react to problems in proper time • Significant price pressure due to imports from neighboring countries (Uzbekistan and Kyrgyzstan) • Lack of information on markets, supply and demand and consumption of meat and meat products • Poor marketing infrastructure • Farmers have a low level of knowledge on feeding cattle and herd management. • Weak infrastructure (including roads) • Low productivity of existing breeds • Low productivity of existing pastures and haymakers • Low level of management • Lack of genetic improvement. • No understanding traceability[22]

Opportunities	Threats
• Restore the production and export of canned meats • Increase in meat production through the control of diseases and increased number of livestock • Improve and update the sanitary standards used in industry • Increase the number and effectiveness of training programs throughout the value chain • To improve quarantine stations and strengthen veterinary services • Import substitution activities for imported frozen meat • Improvement of quality control and regulatory agencies • Development slaughter-house according the sanitary and hygiene rules	• Lower demand due to declining economy and purchasing power of consumers • Dumping of meat products by neighboring countries • Natural disasters limiting feed supplies • Diseases

Limiting factors to the growth of the livestock and meat industries are:
• Lack of experience and skills in producing rapid weight gains;
• Lack of knowledge of modern animal production methods;
• Restricted feeding of animals during fattening;
• Poor feed quality and expensive feeds;

[22] Traceability is established for an attribute when information about that particular attribute is systematically recorded from creation through to marketing. For example, for beef meat complete traceability would include the ability to identify the genetics (via DNA tracing), feed sources, animal husbandry techniques, method of slaughter, etc (Clemmens 2003).

• Poor using the concentrate feeds;
• Weak financial position of the farmer;
• Lack of quality feed production in Tajikistan, little protein feeds are produced;
• Not efficiently using of pastures and lack of infrastructure;
• The housing condition of animals do not meet sanitary standards;
• Lack of knowledge of farmers about the meat breeds, genetics and/or herd health.
• Absence of specialized abattoirs

The value chain is dominated by large butchers who determine demand in the market. They are the central figure. The second level is the intermediaries and speculators, and the third levels are farmers. As the rule, intermediaries are very experienced and know the market conditions accurately.

Beef Production Value Chain Financing Opportunities.

- Purchase of superior breeds e.g. fast maturing
- Short-term loans for cattle breeding
- Working capital loans for production (feed, fodder)
- Finance activity of farmers and households on growing, harvesting and storing of feeds used in beef production,
- Create modern meat storage facilities ensuring the use of refrigeration,
- Support the construction and developing the slaughter houses according sanitary and hygiene norms.
- Funds are input dealers involved to supply cattle feeding, Premix Feed / Fodder supply
- Financing construct new, modern slaughter houses
- Provide access medicinal supplies.
- Linkages farmers and slaughter facilities with higher-end retailers to supply Tajikistan quality beef products.
- Investment in slaughterhouse facilities and equipment
- Financing improving housing condition of animals to meet sanitary standards
- Financing farmers who growing feeds and forage
- Loans to Purchase of inputs e.g. feeds
- Construction of a biogas plant
- Equity investment to establish feed manufacture plants or distribution facilities through the livestock breading farms
- Equity Investment in disease-free and fattening centers
- Microcredit to purchase of preservation and value addition equipment e.g. freezers, electronic scales and minces
- Loan guarantees / direct financial support to farmers/ farm enterprises

Transferring Knowledge and know-how

- Education and extension on feed and fodder
- Education and promotion of beef genetics and/or herd health.

- Financial literacy on cost/benefit analysis to investment in inputs (feed, vaccinations, etc)
- Put more emphasis on providing technical assistance for raising livestock including increased knowledge of feeding, health, maintenance and care of animals.
- Increase awareness and use of artificial insemination to improve breeding efficiency and genetics
- knowledge of modern animal production methods
- Feeding quality and expensive feeds systems, benefits analyses

5.10. Honey value chain analyses.

Production of honey.

Beekeeping is one of the sectors in agriculture that was supported by the state in the Soviet times. Since acquiring independence, the support for this sector in Tajikistan has been discontinued. However, in the last few years there has been a new momentum in developing beekeeping. The basis for development in this sector is the Law of the Republic of Tajikistan #51 “On Beekeeping”, dated December 8, 2003. Another important factor contributing to the development of this industry is the support voiced by the President, and his attention to the development of the sector.

Honey was a well known product of the region with distinct characteristics of flavor and color that are well known and appreciated by consumers in CIS and neighboring states.

The most well adapted and productive breeds of bees in Tajikistan are Carpathian, Italian and Caucasian. However, currently only local populations of Carpathian breed are common in this country.

Tajikistan is conventionally divided into three specific beekeeping areas: **semiarid-oasis** zone, **piedmont** and **mountainous** zone.

- **Semiarid-oasis zone.** Honey plants are represented by fruit trees, cotton, melons, meadows and pasture lands. Honey season lasts from March to July. The yield is between 3 and 5 kilograms per hectare;
- **Piedmont zone.** Honey plants are represented by the labiates family, boraginaceous, leguminosae and the mallow family. Honey season is shorter, from May to June. The yield ranges from 0.5 to 2 kilograms per hectare;
- **Mountainous zone.** Honey plants are nut-bearing forests, mixed herbs and shrubs, ferula and hawthorn. Honey season lasts from June to August, with the yield ranging from 0.3 to 1.7 kilograms per hectare;

According to different estimates, **70%** of cotton and cotton-flower honey and **30%** of various alpine and meadow honey is harvested in the country. The sources for alpine

honey are blue cornflower, blueweed, yellow melilot, sainfoin, emeritus, clover, sunflower, etc. Beekeepers do not pay attention to the grades of honey and often move to cotton fields after collecting meadow honey. This results in a mixture of cotton and flower honey. The beekeepers would be able to make a 50/50 mixture of cotton and alpine honey if there is a demand.

When buying local honey in the market, it is hard to determine its source. Imported honey is sorted by types, without mixture. Currently neither beekeepers nor consumers are ready to choose varieties of honey, but this is only a matter of time.

Currently more than 4000 honey producers are operating in Tajikistan, serving over 180,000 bee families. The largest number of bee colonies – more than twice as much as in Sughd or Khatlon Region – is in the DNJ. The table below shows data on the number of bee families as of end of 2010.

Table 49. Bee hives quantity in Tajikistan, 2005-2010.

	1991	2005	2006	2007	2008	2009	2010
Tajikistan	61570	64829	95427	118648	134480	140042	180657
Dushanbe	2822	--------					
GBAO	4590	4265	4818	5609	5830	5462	6397
Sughd region	15563	9282	15731	29307	32532	21483	49629
Khatlon Region	19563	13098	26078	29803	32189	39854	40099
DNJ	19032	38184	48800	53929	63929	73243	84532

Sources: State Statistic Agency Tajikistan.

Volume of honey production depends heavily on weather conditions. However, certain trends can be observed. The information on honey production volume in Tajikistan, broken down by all categories of farms, is shown below. As you can see from this table, honey production is growing year after year. Particular growth has been observed since 2006, when the yield was good and the industry was once again considered profitable.

Table 50. Production honey in Tajikistan, in tones.

	1991	2005	2006	2007	2008	2009	2010
Tajikistan	595	1520	1686	1975	2060	2704,2	2968,6
Dushanbe	27	----					
GBAO	45	63	69	78	101	110,3	112,7
Sughd region	151	956	967	1055	1059	1063,2	1158,1
Khatlon Region	189	118	256	320	383	481,5	521,5
DNJ	183	383	394	522	517	1049,2	1176,3

Sources: State Statistic Agency Tajikistan.

As can be seen from Table 50, honey production in Sughd Region is by far greater than that in Khatlon, Gorno-Badakhshan and districts of national jurisdiction.

This is explained by difference in climate and terrain, as well as usage and training on new practices, skills and knowledge for beekeepers. Besides, the average yield per bee family in Sughd Region was more than 61 kg in Sughd Region, reaching over 100 kg for the most advanced beekeepers. These results work as the best advertisement for the industry, making it attractive for investment and lending.

Table 51. The productivity of one beehives in Tajikistan, kg

	2005	**2006**	**2007**	**2008**	**2009**	**2010**
Tajikistan	23,5	17,7	16,6	15,3	19,3	16,4
Sughd region	14,8	14,3	13,9	17,3	20,2	17,5
Khatlon Region	10,3	61,5	36,0	32,6	49,5	23,3
DNJ	9,0	9,8	10,7	11,9	12,1	13,0

Sources: State Statistic Agency Tajikistan.

The average yield of 61.5 kg a year per bee family, as obtained by beekeepers in Sughd Region, is a good benchmark for all players, and if Tajikistan can reach these average figures, then we will be able to improve return on investment.

According to the official statistics, almost 3000 tons of honeys were harvested in Tajikistan as of the end of 2010; most of this amount was consumed in the domestic market. This means about 400 g for each resident of the country a year. This figure is much higher in other countries, measured in kilograms.

The main type of honey harvested in Tajikistan is cotton honey. The yield per bee colony depends on a number of factors, the main of which is the experience of the beekeeper; other important factors include climate changes in various areas, frequency of moving between various locations, feeding the bees, and the financial position of the beekeepers (which affects their mobility). During the research beekeepers noted that the yield is getting worse year after year. Some of the reasons mentioned were as follows:

- Reduced cotton sowing area;
- The quality and yield of cotton in Tajikistan is declining. The impact of this crop on bee production is substantial, as it is the main crop for producing honey. Low cotton prices, lack of farmer interest, problems with supply of high-quality seeds and fertilizers, availability of water and machinery, as well as lack of agricultural technology, strongly impact the quality of fields and cotton yield;
- Dry spring in mountainous, piedmont and steppe zones;
- Bee diseases:
    - Foulbrood – infection of bee larvae;
    - Nosematosis – protozoal parasite developing in bee stomachs;
    - Varroatosis – tick affecting larvae and adult bees;
    - Diarrhea.

- Attacks by common bee eater (bird eating bees and causing great damage to beekeeping sector).

Usually honey collecting season begins in the second half of March; in the South of Tajikistan the season starts in early spring (see seasonality data in Table 52). Mass harvest starts in April-May (fruit trees, etc.). Caligonum, wild alfalfa, poppies and bean caperbush start blooming in arid and semi-arid areas; tulips, almonds, hawthorn and cherry plum in the mountains. False acacia and fruit trees – in oasis areas. Also, in April beekeepers must look for new place to collect honey, as the yield in oasis areas is dropping rapidly. As days get warmer and amounts of nectar and pollen increase, bee families grow quickly. At this time, additional comb foundation needs to be prepared – six frames per bee family. Honey yield ends in late August – September. In the first or second ten days of August beekeepers conduct final honey loosening and take measures to grow strength of bee families for the winter.

Beekeeper must monitor nectar weight increases in the control family on a daily basis, discard old frames and melt them into wax. Father families are marked for growing drones and inseminating young autumn-born females.

In September, bee houses are taken to wintering grounds or to residual nectar-bearing plants – these may be melons or yulgun bush. These can have enough nectar to support the bees during winter. During this time, the beekeepers seal all cracks and slots in the bee houses. The bee houses are thoroughly insulated against cold (using canvas, pillows), entrances are reduced. If food is not sufficient for the winter, some of the honey, candy (mixture of honey and sugar powder) or sugar syrup is left for winter; however, this feeding is a forced measure.

In the subsequent months, until a new season begins, bees are monitored every two weeks using a rubber hose inserted into bee-house entrance, spare empty combs are sorted. Backup bee-houses and accessories are repaired, wax is replaced with comb foundations. Next, beekeepers make up a plan of activities for the next year and analyze the yield from the past season.

Starting end of February – beginning of March, beekeepers' work intensifies. They have to review the bee yard and prepare for the new honey collection season. The season starts in March in Sughd Region and a little later in other areas. The yield depends on the bee yard, the strength of bee families, location and weather, and usually lasts till the end of October. Honey is pumped using centrifuge – this is called centrifugal method.

Table 52 shows the calendar of beekeepers' seasonal activities. Analysis shows that feeding is performed mostly until May-June. Breeding begins at various times in various districts. This allows preparing bee packs in one district before starting the same activity in another one; this can be done until June.

When analyzing the production of honey and the data presented in below table, we can make important conclusions for the purpose of marketing honey and secondary products. Honey is sold throughout the year, bee families and bee packs –

from March to July. Bee queens can be sold from April to May. Comb honey is available in July and August. Bee bread and royal jelly are available from April till the end of July, while bee venom can be ordered for delivery in May-July. Almost all beekeepers are relatively free from November 15-20 to February-March. Beekeepers sell bee packs, but the demand for them is very low. These are purchased by local beekeepers or exported to Kazakhstan and Russia. All beekeepers sell the bee packs, but buyers aren't numerous.

Secondary products of beekeeping are: flower pollen (bee bread), royal jelly, apitoxin (bee venom), propolis, and bee packs. Wax is the biggest by-product of beekeeping. Such products as bee venom, propolis, bee bread and royal jelly can be produced if there is enough demand and buyers. For now, most beekeepers do not have equipment or knowledge to produce products like bee venom or bee bread. As mentioned in Khujand, provided sufficient demand, each beekeeper can produce up to 10 kg of bee bread, 250 g of royal jelly and 1 kg of propolis. Cotton honey is collected in areas where there are large areas under cotton, as well as in Uzbekistan (using bee houses placed along the border). Mountain cotton is collected in mountainous and piedmont areas.

Currently, before setting up a trailer with bee houses at a plot of land, beekeepers pay the land owners a fee for usage. Before, the price per trailer was 100 Somoni; now land owners demand 300 Somoni, or set the rent based on the amount of honey collected. If the fee is not agreed, beekeepers are not allowed to the land. Meanwhile, in the Soviet times, beekeepers were paid 5 rubles for each bee family.

Another issue related to stationing the bee yards is crossing of bee routes and bee yards, and insufficient distance between the bee yards. Farmers allow several bee yards to be placed within several kilometers from one another, even though the rules require the minimum distance of six km.

The issue of bee yards requires the Association of Beekeepers to work with farmers, government bodies and organizations working with farmers, through the media, on the role of bees in pollination, and it is also necessary to increase the role played by beekeeping in agriculture.

Table 52. Seasonality in beekeepers operations.

	January	February	March	April	May	June	July	August	September	October	November	December
Repairing on inventory	X	X										X
Wintering	X	X								X	X	X
Extra nutrition and treatment	X	X	X	X	X	X					X	
Breeding		X	X	X	X							
Audit (include needs assessment)			X	X								
Growing queen bee				X								
Apiary			X	X	X	X	X	X	X	X	X	
Honey flow				X	X	X	X	X	X	X		
Swarm					X	X						
Expansion of bee hives				X	X	X	X	X				
Preparation to wintering									X	X	X	
Treatment against insects and diseases									X	X	X	
Purchase/Expenses												
Sugar		X	X	X	X				X			
Bee Queens				X								
Sales/Incomes												
Bee Queens				X	X							
Honey	X	X	X	X	X	X	X	X	X	X	X	X
Comb honey							X	X				
Bee-bread				X	X	X	X					
Royal jelly				X	X	X	X					
Bee-hives colonies			X	X	X	X	X					
Apitoxin (bee venom)					X	X	X					

*Source: B. Abduvohidov. “Market survey subsector of honey production and other bee-products in Northern Tajikistan”, 2007

Inputs

An important factor for productive beekeeping is the delivery of high quality inputs and easy access to them for beekeepers. To obtain good honey, ideal conditions need to be created for the bee families.

Bee queens. Bee queens are imported from Transcarpathian region (Western Ukraine) or Russia (Moscow or the Krasnodar Territory). Existing channels use Uzbek intermediary companies, though it is also possible to import directly. The demand for Carpathian breed of bees is high. Russian beekeepers work mostly with the Carpathian breed, and so do the Tajik beekeepers. A survey conducted among the beekeepers has shown that they pay up to 30 dollars for each bee queen brought from Uzbekistan. Tagged bee queens are imported from Russia to Tashkent, then to Begavat and finally to Spitamen. When importing the bee queens, it is necessary to check their adaptation to the local climate. Considering the imports are performed by private entrepreneurs, there are no statistics available for this sector. Now some beekeepers are ready to buy a bee family for 200 Somoni. It is important for beekeepers to update the bees' genes regularly.

However, this is quite expensive, so the beekeepers agree to purchase the first generation – a reproduction from the imported purebred bees.

Leading beekeepers can work with other breeds of bees; everything depends on which breed is demanded in the market and which breeds the beekeepers are ready to buy. The leading beekeepers buy bee queens once every two years, as breeding stock. Beekeepers in Khujand have good breeding skills and they are ready to breed and sell the bees.

Frame bee houses. Bee houses are produced of shaped timber (mostly silver fir) and consist of the bottom, walls, honey chamber, under-cover, cover, frames and diaphragms. There are several types of bee houses: long hives and multiple-storey hives. They are also differentiated by the number of frames, which varies from 10 to 24 pieces. In Tajikistan, the most common type is 12-16 and 20-24-frame long hives.

Bee colonies. A proper bee colony consists from a queen, drones and working bees. The bee packs are divided into four-frame and six-frame ones. Two frames for sealed brood (1.2 kg of bees, one laying queen no more than two years old) and two honey and bee-bread frames, 1.5 kg for each frame. The six-frame bee packs contain four frames with sealed brood and two with honey and bee-bread, for a total of 1.6 kg of bees.

Accessories are supplied from Uzbekistan, Russia and Ukraine, where there is a wide choice, but the problem is these accessories are not always available and affordable for everyone. Each town that has a large number of beekeepers also has some suppliers of medical supplies and instruments for beekeeping. Most of the accessories used today are from old supplies, badly in need of upgrade, and this is becoming a problem for all beekeepers in Tajikistan.

Honey centrifuges. There is a high demand for honey presses suitable for extracting honey using centrifugal force.

Accessories and boxes are purchased from local craftsmen. The demand for boxes is extremely high. The most common ones are 12-frame boxes for one family of bees.

Wire and comb foundation are sourced in the domestic market, as well as imported from Kyrgyzstan. Currently the beekeepers' associations have equipment for producing comb foundation.

Aluminum cans are in short supply, they are sold by pieces. Beekeepers need metal wire and plastic containers for honey. The container must be made of food-grade materials and have strong handles. Currently beekeepers buy certified barrels in the market.

Beekeepers also need fumigators, brushes, face nets, knives and many other accessories.

Medications and veterinary medicines. There is a stable demand for such medicines as bipin, flucin and oxalic acid. Pest control is used at various times, depending on the disease and location. The price of chemicals for treatment varies substantially depending on the place it is purchased at. Medications are also imported from Uzbekistan, while originating in Russia.

Honey packaging process.

Packaging is one of the biggest weaknesses for the honey industry in Tajikistan. Currently the honey is packaged in aluminum cans, 35-40 kg each. These cans have extremely long history and are not suitable for long-term storage, due to oxidation. In the Soviet times these cans were produced at Tashkent Aviation Factory, and now they are imported by private entrepreneurs from Russia. They are not very convenient, but they have no alternative available. The supply is short and for most part the cans have been used for over 20 years.

Another type of packaging is to pour honey into cardboard boxes lined with PET film. When honey is stored in a cool room, it is crystallized and remembers the shape of the box. Then it is sold in bricks in the local market. This type of packaging is used primarily for cotton honey. Far and large, all cotton producers and beekeepers sell their product in the local market in plastic or glass containers – jars ranging from 0.2 to 3 liter capacity (see Picture 3). Often honey is sold in glass jars not specifically intended for this product. These are glass jars used for canned vegetables, often with original labels still attached. In some European countries (primarily Germany, Czech Republic and Turkey), special food-grade plastic buckers with twisted tops with the capacity of 25 kg are used for both domestic and export market. These containers are beginning to arrive to Tajikistan, and the demand for these is unmatched by supply.

Industrial packaging in modern and specialized containers for honey is not present in Tajikistan. The main obstacles for expanding production are financial problems and high cost of beekeeping accessories (boxes, carts, frames, etc.). Besides, the cost of collecting honey and maintaining bee yards have increased lately. It could be helpful to get loans for this purpose in lending organizations.

Domestic market for honey.

The production of honey in Tajikistan is mostly aimed at meeting the needs of the local consumers at the domestic market. The current demand for honey in Tajikistan is moderate, in our opinion. Traditionally, honey consumption in Tajikistan is associated primarily with medicinal purposes, rather than nutritional value, and this explains the low unit consumption levels.

According to the information on honey prices in the country's markets, in the last two years the prices increased by 20%[23]. The price of honey today is varied between 20 and 30 Somoni per kilogram, or $4.20-6.20. However, analysis of supply at the markets has shown that prices can vary by as much as 100%, depending on the quality and variety of the product. It is obvious; however, that cost of production does not allow selling any cheaper than the prices indicated above. It is economically reasonable that higher yield per bee family means cheaper prices, since higher output means lower fixed cost per unit of product sold.

Results of research at the domestic market for honey in Tajikistan have shown that the distribution system for honey and its secondary products is chaotic and random. Each beekeeper sells his/her product in whatever way they find more comfortable: some sell directly at the markets, some distribute their honey for consignation, others distribute honey through acquaintances.

When the local people buy honey for consumption purposes, they look for the cheapest product. More often than not, cheap honey results from feeding the bees with sugar syrup, not from processing pollen. Another substitute is fake honey – a mixture of honey and boiled sugar, which is sold under the name of "artificial honey", or "shini".

[23] www.agroinform.tj

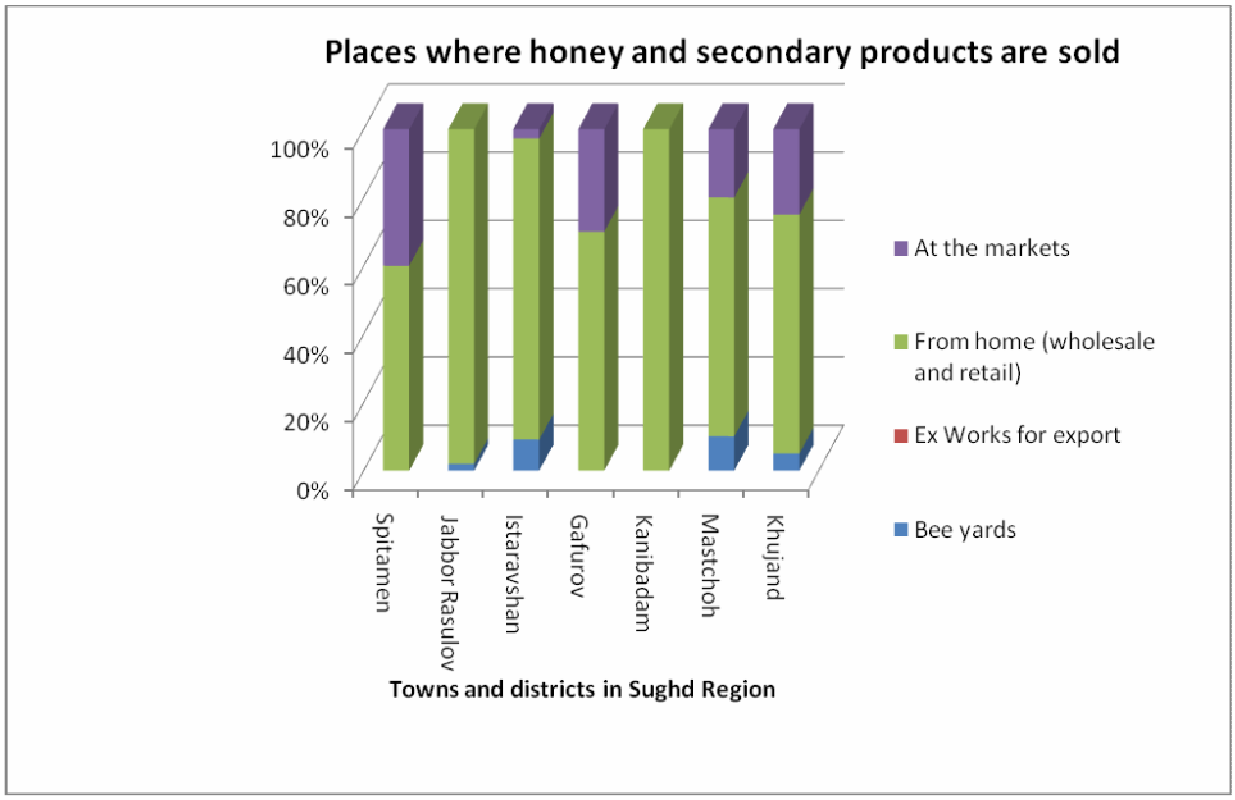


Diagram 6. Places where honey and secondary products are sold, based on surveys conducted in Sughd Region

Diagram 6 clearly shows that most of the product is sold by beekeepers from home, whether to wholesalers or retailers. Beekeepers are reluctant to take any effort for selling. More than 70% of the honey they produce is sold from home, via wholesale or retail channels. Some of the product is sold right off the bee yard. This gives them enough funds to cover operating costs associated with running the bee yards. A little more than 20% of the honey is sold at markets, and even then it is not sold by the beekeepers but offloaded to merchants who specialize in this product and have market stalls.

The reasons for low honey consumption and the tendency to substitute it with sugar-based products are as follows:

1. No scientific information on the benefit of natural honey and beekeeping products;
2. Lack of packaging and equipment for small-scale packaging of honey;
3. Honey is a relatively expensive product (compared to sugar);
4. Low purchasing power of the population;
5. Presence of fake honey (made from sugar) in the market;
6. Irregular quality of honey in batches.

Export of honey

There is a growing demand for honey in the international market with world honey consumption increasing to over a million metric tons a year. Only a tiny part of honey produced in Tajikistan is exported, even though some attempts to study the markets and

establish connections for exporting honey are being made. Judging by the production and export figures for 2010, only 2.5% of the total honey production was exported, which leaves a lot to be desired. Tajikistan's honey exports are mainly to the Russia. Prospects for honey in the domestic and international markets are positive due to growing consumer awareness of its nutritional benefits as a natural food, as well as its medicinal and cosmetic value.

Table 53. Export of honey from Tajikistan

Years of export	Total honey export from Tajikistan		Direction of export
	Quantity, tones	Amount, thousand USD	
2008	48	103	Russia – 100%
2010	75	195	Russia – 100%

Source: State Statistic Agency of Tajikistan

However, currently the reason behind lack of external sales markets and low export potential of the product lies in the following issues:

- Absence of control on excessive use of sugar feeding;
- Honey is not refined and not filtered;
- Bad presentation of the product (packaging, looks, certification);
- The honey currently produced is multifloral, so it is impossible to make a batch with unified color, taste and other physical and chemical parameters;
- Lack of a brand that would guarantee quality;
- High price in the internal market, as a result of low productivity.

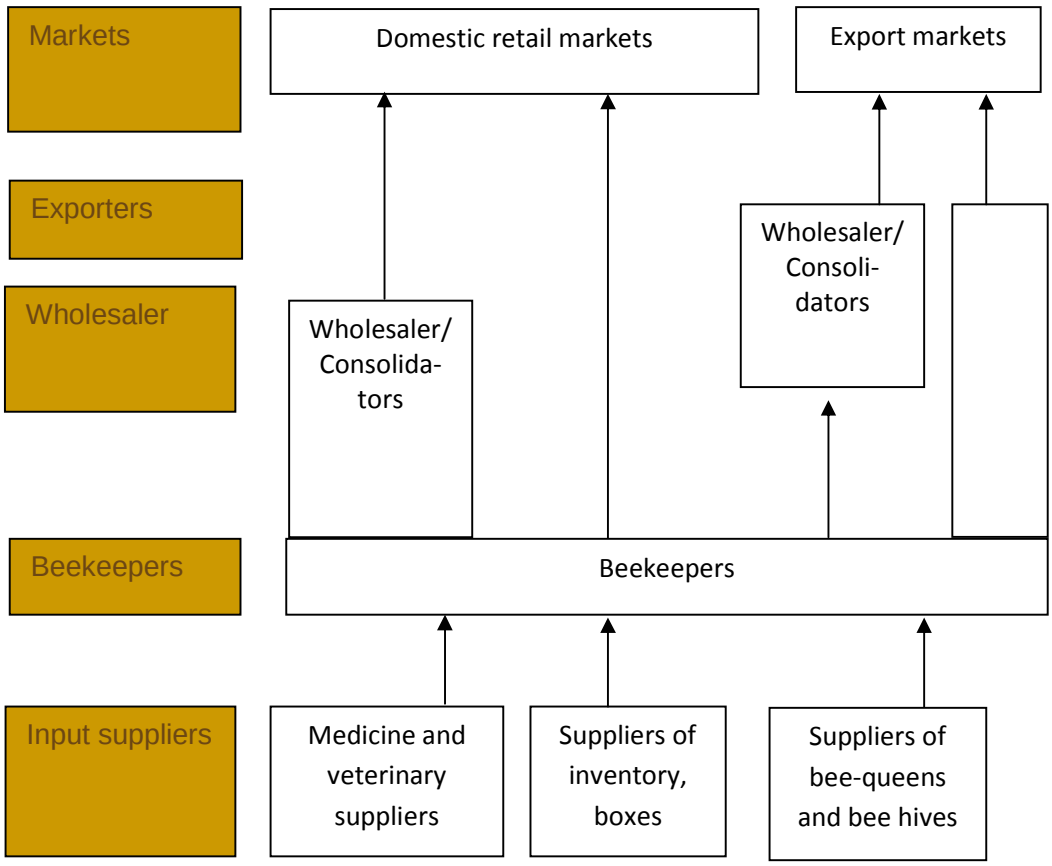
The solution to most of these problems is to establish production terminals. The beekeepers' work will be made much easier by opening company outlets selling natural honey, providing access to the necessary accessories and veterinary medications, disseminating knowledge and information.

Function of value chain players

Beekeepers. The principal actors in the honey value chain are the beekeepers. They keep domesticated bees in wooden hives or bee hives for seasonal production of honey and secondary products. Honey production was limited to a few months of the year, using mainly the pollen from mountain flowers and cotton blossoms. The extracted honey was sold in raw (unprocessed) form at 15-30 somoni per kg, primarily to the population. There is no food processing company which processed the honey, packaging and sale throughout Tajikistan, and for export.

Traders. Honey marketing agents: There are now a number of local entrepreneurs engaged in the purchase and trading of honey from village producers. They provide immediate payment to beekeepers for honey, arrange every aspect of honey procurement including transport, interact with beekeepers. They also ensure payment according to the quality of honey.

Scheme 10. Value chain for honey and other beekeeper products.



Beekeeping firms, such as “Orzu” beekeeping firm located in Istaravshan. It has 20 beekeepers and 700 bee families and has been established by entrepreneurs and the manager of a group at the Association of Beekeepers in Istaravshan. This is a private company whose main goal is commercial activity; it mostly exports bee packs, imports and sells beekeeping accessories, in addition to actually collecting honey. Private entrepreneurs are also engaged in commercial activities in the area of beekeeping.

Wholesalers. There are large players in the market, who historically had good connections and now work on exporting honey and bee products. One of the largest is Potrebsoyuz organization, as well as some representatives of the beekeepers’ associations.

Beekeepers' associations. These organizations exist in each district. They are also present at regional and national level. The work of these associations at a higher level is minimal, but at the district level some of the associations are very active. Management and coordination of beekeeping activities leave a lot to be desired. The government provides little to no support to beekeepers' associations and communities, or to the beekeepers themselves. Associations largely play a formal role and do not help solve the problems faced by beekeepers. Though bee-keepers associations was developed for working and implementation following functions and objectives:

- to facilitate bank linkage of member associations

- to develop the market for honey

- to train and build the capacity of beekeepers

- to supply inputs to beekeepers in the region and other agencies outside the state

- to follow up with relevant authorities to enable the registration of beekeepers' associations

- to engage in policy advocacy, such as addressing the sales tax issue

- publication of a beekeepers' directory.

The primary role of the associations is to support members through the collective sale of honey.

Service providers

• Providers of beekeeping inputs: include makers of wooden bee hives and wax foundation sheets; suppliers of bee colonies, and sellers of medicines for the control of bee diseases.

• Banks and MFIs: provide loans for beekeepers and input suppliers.

• Moneylenders: informal financial service providers are the main sources of credit in rural areas and usually offer credit to borrowers including beekeepers at a monthly interest ranging from 2% to 5% depending on whether or not there is collateral.

• Other service providers: include transporters, suppliers of tins for storing honey and telecommunications service providers amongst others.

Opportunities for honey value chain financing

- Financing the organization of terminals for honey collection (pumping and dispensing operations) and packaging;
- Financing production of packaging;
- Supporting the production of "breeding stock" bees in Tajikistan;
- Establishing a breeding nursery;
- Financing the suppliers of inputs for beekeeping, including accessories (containers).

- Facilitating the establishment of honey processing plants and a testing laboratory. Developing such plants in areas let the consolidate the high volumes of honey and process with further export
- Finance input dealers to provide access for quality medicines for disease control by beekeepers
- Developing financial schemes among suppliers of sugar and beekeepers for increase access to the sugar during the year
- Financing the modernization the technical base and inventory for beekeepers;
- Linking beekeepers, honey processors, honey traders and (later) the associations of beekeepers to local branches of (national) commercial and regional banks
- Beekeeping income is seasonal, resulting in a negative cash flow during July-September when bees are fed sugar syrup to substitute for nectar that is otherwise unavailable.
- Financing expenses for migration.
- Facilitating the establishment related facilities such as beehive manufacturing, beehive foundation sheet making and small equipment suppliers
- Finance and bank credit for entrepreneurs for starting or expanding beekeeping
- Financing other value addition in raw honey at the local level through processing.
- Loan guarantees / direct financial support to farmers/ farm enterprises

Transferring know-how to bee-keepers

- Trainings on Basic beekeeping
- Introduction world best practices on beekeeping and adopting this knowledge
- Introduction the methodologies which maximize the yield of beehives and with high quality
- Skills in beekeeping management and disease and pest control
- Training of extraction of by-products
- Publication of a book in Tajik (local language) on how to start a bee-keeping enterprise
- Training of bee-keepers to develop entrepreneurial skills, cooperative management, book-keeping, conflict resolution and negotiation skills
- knowledge of scientific bee management, disease control in bees, honey extraction methods, quality parameters in honey and hygienic storage of raw honey
- capacity building of beekeepers association to male them proactive in their approach

Summary and Conclusions

The study sought to conduct a rapid value chain analysis and to establish the supply and demand of financial services, opportunities, challenges and linkages and to recommend suitable financial products at both wholesale and retail level for further development. Owing to diversity of the sub-sectors multiple methodologies ranging from desk studies, surveys, case studies and depth interviews were utilized. The team did a fantastic job given the very short time frame for this work. However, much more remains to be done. Other issues left to explore include further examination of end market potential, and more detailed focus on financial product design. The banks and financial institutions do seem to need further support in terms of better understanding the value chains, analyzing their potential and the role of financing in upgrading. Also, the banks and MFIs need further support in learning to assess the cash flows of their clients and incorporating this information into product design.

Financing needed to further develop information and communication technologies and improved logistics. However, the need for financing for these particular activities was not explored during this review. With large Russian, Turk, Iranian and Kazakh firms currently active in these services there may be some opportunities for franchising, leasing, and other forms of within value chain financial support. These are service areas which will benefit the economy overall and which will aid firms and producers in making more informed choices about what to plant when and how to sell in order to get the highest return.

Much of the financing needed is also not value chain specific and unique for all. Medium and long term credit is needed across the all value chains to support better packaging, storing, and transporting. MFIs need to provide loans linked to Producers/Agro inputs Dealers /Wholesalers/Processors to increase extension services. Currently the extension services in country mostly oriented for donor support and in initial step could be used by MFIs.

Generally all sub-sectors are poorly financed and the ratio of penetration finance services low. Banking institutions start to think about linkages with extension services, but still not developed. Supporting all actors of value chain are important, include collectors and middlemen. Mobilization of farmers, access to finance, input optimization, technology upgrade and modernization, increasing storage and processing, market development and improvement in extension services are cross-cutting recommendations for all sub-sectors.

Financial products are needed to help farmers' access process and market their produce. Financing proper inputs (quality seeds, CPPs, fertilizers) and irrigation, store, a cold chain and long life product processing can greatly stabilize the sub-sector and benefit farmers. Processing is also limited despite increasing market opportunities. The sector is linked as required by law and integration is gathering pace. Financing access to improvement in processing technology and retail business practices are critical to the sub-sector.

We hopes that value chain analyses conducted in this survey will lead to development appropriate financial products and the products will respond the needs of

targets group in each value chain. One valuable lesson was the need to take into consideration how financing, or lack thereof, affects the overall competitiveness of the value chains. In particular, when household financial flows are not taken into account the competitiveness of the value chain is compromised, and the economic benefits to the producer are reduced. Poorly designed or not proper applicable financial products will result in producers either defaulting on their loans, because cash is needed for other more urgent expenses (e.g. inputs for counter-season crops or family expenses), or producers will be forced to sell their crops at sub-optimal prices (during the glut at harvest time).

Appendix 1. List of local service providers in Tajikistan for VC players

Name of the company, status, name of director	Address, contact information	Services for VC players
"Agro Donish", PO, Umed Kasymov	Dushanbe, Rudaki Ave., 44 Phone: (+992) 93 585 88 88 agrodonish@gmail.com www.agrodonish.tj	Institutional and organizational development; designing training modules and programs for agricultural development; conducting round tables and forums; providing agricultural consultancy; joining consultancy organizations on the issues of agricultural development
"ISD Consulting", LLC, Rakhmat Khakulov	Dushanbe, Rudaki Ave., building 64, apart 24 Phone: (+992 37) 221-55-05, info@isd.tj	Financial management, training and recruiting, project development and implementation, promoting goods and services
"Kamolot 1", LLC, Farzona Tilavova	Dushanbe, Somoni ave., building 105/5, apart. 18, Phone: (+992 90) 798-24-74, Infokamolot1@gmail.com	Management in accordance with the requirements of international standards ISO 9001, ISO 22000, ISO 17025, ISO 14001 and Kaizen production management model.
"KIS" Consultancy and information network, PO Negmat Mirzoev	Dushanbe, Sh. Rustavelli str, 35, Phone: (992 37) 227 58 80: 2215873. Fax (992) 2510112. nemirzoev@yandex.ru; jalolovaziz1984@yandex.ru	Consultancy and information services in agricultural sector, extension service, trainings
KIS branch in Khujand, Abdumajit Kayumov	Khujand, str. Qori Noiyzi, 15, Phone: (+992 3422) 2-74-33 ain.khujand@mail.tj	
National Agricultural Education Center, Rustam Kudratov	Dushanbe, str. Giprozem 16 Phone: (+992 37) 4450333, 4450444 Rus.kv01@mail.ru	Design and implementation of new business models; conducting scientific research works; training (microfinance, leasing, insurance and collateral); editorial activities

Rushdi Dekhot, PO, Khasan Temirov	Dushanbe, str. Buhoro 2A, Brachnes in Kurgantube, Khujand, Rudaki district settlement Somonien. Phone: (992) 935112332, 935012097 rdn-tajikistan@hotmail.com	Legal consultations on land law
Agency for Supporting Develop-ment processes, International PO, Jamshed Kayumov	Khujand, str. Lenin, building 20, apart. 34, Phone: (+992 3422) 60362, 45320, (+992 92) 7175559, office@agencynau.tj, www.agencynau.tj	Agricultural, social and economic consultancy services
Association of Scientific and Technical Intelligentsia, PO, Malika Boymuradova	Khujand, str. Shuro, 30, Phone: (+992 3422) 6-24-32, (+992 92) 780-64-24, office@asti.tj, www.asti.tj	Educational trainings, courses, social and marketing research, consultancy services
Association of Professional Agricultural Consultants “Zarzamin”, PO, Anvar Khashimov	Khujand, str.K.Khujandi, building 181, Phone: (+992 3422) 4-35-26, (+992 92) 777-64-66, zarzamin63@mail.ru	Technical and business consultations in the area of agriculture, conducting research and soil analysis
“Business Consulting”, LLC, Azizullo Avezov	Khujand, str. K. Khujandi, 166 Phone: (+992 3422) 6-73-73, (+992 92) 777-78-78, info@businessconsulting.tj, www.businessconsulting.tj	Financial management and analysis; marketing and conducting marketing research; strategic and business planning; designing and implementing corporate trainings and seminars; agricultural and business consultancy
“Bogparvar”, branch of state research institute of gardening and vegetable growing, Abdullo Soliboev	B. Gafurovskiy district, settlement Michurina, Phone: (+992 918) 210672, Rustamjon2000@bk.ru	Organizing training and consultations on marketing and conducting marketing research, personnel management in agriculture (vegetable growing and gardening), strategic and business planning; consultations in the area of business and property evaluation; production and sale of saplings and seeds
Jovid, International Charity Public Organization, Ramazon Nurmamadov	Chalovsk, str. Oplanchuka, 1 «А», Phone: (+992 47) 448-93-67, 4488516, (+992 92) 7741661, Icpo.jovid@gmail.com, www.jovid.tj	Agricultural, social, economic consultancy services, legal and financial consultations, production and processing agricultural produce, etc.

ZooVetConsulting, PO, Sattor Abdulloev	Khujand, str. K.Khujandi, building 2a, apart. 75, Phone: (+992 3422) 4-02-56, (+992 92) 773-86-16, Fazliddin_k@mail.ru	Individual consultations to private farming households on feeding and keeping poultry and cattle
Market Plus, LLC, Ikrom Rabiev	Khujand, str. Lenina, 85a Phone: (+992 92) 707-01-02, (+002 3422) 6-24-32 info@marketplus.org www.marketplus.org	Consultations on marketing and conducting marketing research, locating new sales markets, consultations on strategic and business planning, engineering consultancy, selecting and sourcing equipment, technology and packaging materials
Saodat, PO, Manzura Sultanova	Khujand, str. Firdavsi, building 121, apart. 26, Phone: (+992 3422) 67703, 62481, www.saodat.tj, ngo-saodat@hotmail.com	Agricultural, social, economic consultancy and legal services, organic farming
"SugdAgroServ", OJSC, Abdusattor Khaydarov	Khujand, str.B. Boboevoy,2 Phone: (+992 3422) 6-72-11, 6-70-50, (+992 92) 777-02-88 office_sas@mail.ru; office@sastj.com www.sugdagroserv.com	Marketing and consultancy services, wholesale and retail trading in agricultural materials, including seeds, fertilizers, chemicals, spare parts; logistics services; freight forwarding services; agricultural machinery rentals, field development services
"SugdAgroServ Consulting, PO, Mahinahon Suleymanova	Khujand, str.B. Boboevoy,2 Phone: (+992 3422) 6-36-08, (+992 92) 773-84-14, office@agroinform.tj, www.agroinform.tj	Agricultural consultancy services; marketing information portal; placing advertizing in our information products
Ehyo, Farhang va Tarakkiet, PO, Marina Safarova	Khujand, 13 micro district, building 67, apart 19, Phone: (+992 92) 701-91-96, (+992 3422) 2-78-55, 2-03-96, marina_icaehio@mail.ru, ica_ehio@yahoo.ca	Conducting trainings, research, retreats in various sectors, facilitating round tables, forums and conferences, community mobilization using participatory technology, preventing economic conflicts
"BioTech", association for producing potato seeds, Nusratullo Saidaliev	Muminabad district, settlement Khanatarosh, Phone: (+992 98) 543 66 90, Bio-tech@mail.ru	Production of potato seeds, virus-free potato seeds, conducting trainings, consultancy services

MMC/ATAS, agricultural training and consultancy center, PO, Gaffori Tolibzoda	Kulob, str. Dj. Rasulova, 105, Phone: (992 83322) 2 04 64; 2 04 65, mmk.atac@mail.ru	Conducting seminars and trainings for farmers, consultations on small farm management; designing training modules; conducting social and economic studies; training consultants and trainers
Mehrangez, PO, Sharofat Umarova	Bohtar district, settlement I. Somoni, str. I.Sino,15, Phone: (+992 444-39-34), 93-587-96-25; mehrangez2003@mail.ru	Agricultural, social and economic consultancy services
"Hamkori baroi Tarakkiet, PO, Mahmadzamon Sulangov	Kulob, str. I. Somoni, building 107, apart 6, Phone: (+992 3322) 22486, smahmadzamon@yahoo.com	Consultancy services in the area of agriculture, teaching farmers on the seed business and organizing seed farming for vegetable crops and potatoes
"Khushai Zarrin", Association for producing wheat seeds, PO, Sattor Abdulloev	Muminabad district, str. Chavonon, Phone: (+992 918) 37 98 46, Khushai zarrin@mail.ru	Production of wheat seeds, conducting trainings, consultancy services and technical services
Association "Gifts of Nature of Tajikistan", PO, Maysara Boboeva	Isfara, str. I. Somoni, 62, Phone: (+992 92) 776-29-06, dary_prirody@mail.ru	Consultations on growing and sales of agricultural produce (dried fruit), conducting analysis in agricultural sector
Harif, LLC, Bakhtiyor Abduvokhidov	Khujand, str Khakim Karim, building 55 apart 8, Phone: (+992 92) 770-4522 abakht@mail.ru	Trainings and consultations on marketing and conducting marketing research, branding, locating new sales markets, engineering consultancy, selecting and sourcing equipment, technology and packaging materials, implementing Global Gap, standards ISO 9001, ISO 22000, HACCP system, Kaizen (Lean production) management module
Silk way consulting, Khafiz Mulodjanov	Dushanbe, Rudaki ave., 57 Phone: +(992 37) 2272016, 227200, Mhafiz01@gmail.com	Consulting on Seeds, Nursery, Planning

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