

POTATO VALUE CHAIN IN PAKISTAN



State Bank of Pakistan
Agricultural Credit & Microfinance Department
www.sbp.org.pk

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Preface

The value chain financing (VCF) is evolving as an attractive model of spreading the various risks in agri/rural finance among different fund providers. Keeping this in perspective, and to sensitize lending institutions about the potential business prospects in VCF, SBP carried out a research study to identify the potential agri. value chains in Pakistan through reputable consultants. The study highlighted various layers and players within different value chains in terms of activities, potential for investments, issues & challenges in strengthening VCF.

The desired research study and its findings' report were completed in December, 2014. The report provides a detailed assessment of six main value chains in the country: i) Potato, ii) Tobacco, iii) Beef, iv) Dairy, v) Basmati Rice, and vi) Aquaculture and Inland Fishery.

This report on Potato value chain in Pakistan is a part of that comprehensive report. Its basic aim is to enable financial institutions to more clearly understand the specific value chain dynamics and prepare their related strategy for increasing agri. financing thereto.

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Executive Summary

Potato Value Chain presents a robust economic sub sector in Agriculture similar to tobacco where despite being input intensive in nature, it has better rate of return for various actors and also it shows a significant growth in exports, overall area increase and its vital linkages with the processing industry. Its robustness is evident from the allied services sector growth of cold storages, transport, labour, packaging and processing food industry. Surprisingly, it is treated just like another value chain by formal financial sector in the country.

The direct drivers of growth in the sector are the primary producers and their technological advancement has been secondarily triggered by the growth in the processing industry besides sustainable demand in growth of export for both raw and finished goods. Other pulls in the growth has been exhibited by expansion of cold storages, cold chains and bulk hauling transport besides establishment of primary processing technology such as grading and packing plants by processors, growers, exporters and cold store operators. Area under production, local consumption, processing and exports: all show a steady increase and same holds true for cold storage expansion and allied services sectors such as logistics and cold chains supporting such growth.

Potato growing pockets in the country offer enormous opportunities for expansion in meeting the local as well as exports demands of table as well as processing potatoes and such diverse seasonality offers availability of fresh produce year round and almost all the provinces in the country. Such diverse growing pockets also offer opportunity for potato seed production which currently is being relied on imports.

Despite increasing input costs, potato cost of production offers a competitive edge within and across the regions for making Pakistan a hub of potato supply for both table as well as processing potatoes.

Informal sector has been proactive in driving finances for working capital, specially, for inputs, packing material, whereas formal sector requires appreciation and understanding of value chain and its entrepreneurial nature. Also, 90% of the chain comprises of SMEs which is way different than the subsistence¹ Agriculture. Formal sector has also been unable to devise products specific to value chain in order to meet specific needs of this value chain. This also holds true for other Agricultural driven value chains in the country.

¹ Subsistence Agriculture refers to growing for meeting own consumption with little or no commercial production.

List of Abbreviations Used

Agri. Business Support Fund	ASF
Agriculture Research Institute	ARI
Crop Protection Chemicals	CPCs
Federal Seed Certification & Registration Department	FSCRD
Gross Domestic Product	GDP
International Farm Comparison Network	IFCN
Khyber Pakhtunkhwa	KPK
Ministry of Food Agriculture and Livestock	MINFAL
National Agriculture Research Centre	NARC
Non Governmental Organizations	NGOs
Pakistan Agriculture Research Council	PARC
Pakistan Standards and Quality Control Authority	PSQCA
Small & Medium Enterprise Development Authority	SMEDA
United States Agency for International Development	USAID
United States Department of Agriculture	USDA
Value Chain	VC
Value Chain Analysis	VCA
Zarai Taraqiati Bank Limited	ZTBL

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Value Chain Overview

Potato represents a robust SME sector due to the enterprising nature of its core producers, higher return on investment and presence of growing processors undertaking contract growing, and transfer of state of the art technology in primary production (sorting, grading, packing, and bulk hauling and storage). Processors have also enabled introducing the processing potato culture by introducing low sugar and high solids potato seeds and production systems.

Potato value chain (PVC) in Pakistan has two significant end products and is evolving. Table potatoes are the most popular food items used by consumer for cooking main course meals whereas in processing, the sizable quantity is potato chips.

The small cottage industry of Potato Chips and Pakora (Fried Potato with gram floor) is fed by the product not used by quality manufacturers and its estimated quantity is 10% of the total potato used in the processing industry, which currently is around 120000 tons. These volumes go with the cottage snacks industry which makes a variety of snacks such as Nimko and roasted peanuts besides potato fried chips.

Potato VC mainly comprised of potato growers whom are the main drivers in the chain by starting the primary production from seed. The seed however is mostly imported from Holland and Scotland and then multiplied by most medium to large farmers. The multiplied seed is kept in cold storage and during the next season this locally multiplied seed is used to plant for stock to produce potatoes for markets. However, there is an exception that some growers directly plant the imported seed to get stock.

In case of processing potatoes, low sugars-high solids potato varieties are being imported since 2005 and multiplied by contract growing and kept in cold storage by the processor only to be issued to growers for chipstock production with an advanced buy back agreement with a pre-decided price. Processing has brought a revolution though gradual in introducing Good Agricultural Practices and international quality standards in primary production, handling, post harvest practices, sorting, grading, packing, and transportation. This also has added a great deal of value in storage and storage practices in introducing international best practices and food safety standards.



Table potatoes are marketed in the fruit & vegetable markets and there are different modes of sales. Buyer (Beopari) could purchase the crop while in field and paying around 10-15% advance to the grower. This is prevalent mostly with small holding grower, landless growers (Grow on rental lands) and also most prevalent in the mountainous pockets of Swat, Chitral and Northern areas where the holdings are small around 2-3 acres or even less.

These Beoparis (local Contractors) are connected with Big Markets in Islamabad, Lahore, Karachi, besides big potato markets in Depalpur, Okara, Gujranwala and Daska/ Sialkot. The Beoparis have sustained linkages with Arthis in the big markets which enabled them to get credit in kind for mostly

seeds and sometimes cash to be used for meeting needs of small farmers. Medium to large farmers close to big markets and or big potato markets take their produce to these markets where open auction is conducted by personnel of Arthis and on which a certain percentage of commission is charge to both buyer and seller. The buyers could be a Pharya (Whole seller-local); Ladhanya (Whole seller-for other markets) or an importer (from another country) or an exporter (local or based at Karachi).

Seed imports have to comply with phytosanitary regulation and Government personnel at port of entry check such requirements and only approved list of seed varieties are permissible under the law. Market committees at each big trading markets within the country, under Provincial law, which governs the markets and also levies a market fee on the trade.

The core functions of the value chain are crop production for stock and seed multiplication; Storage in the cold stores; processing by the processors for making finished goods (FGS); and Marketing of the fresh produce in local markets and exports and marketing of the FGs.

Regulatory Environment – Key Regulations Governing the Value Chain

Although most regulations are confined to processing function however import of seed requires proper documentation and Phyto-sanitary certification for the imported material and it is regulated by Phyto-sanitary inspection by Federal Plant Protection Department besides an approval from Federal Seed Certification and Registration Department (FSCRD), both headquartered in Islamabad but with regional offices and functionaries in all ports of entry to check and enforce regulations.

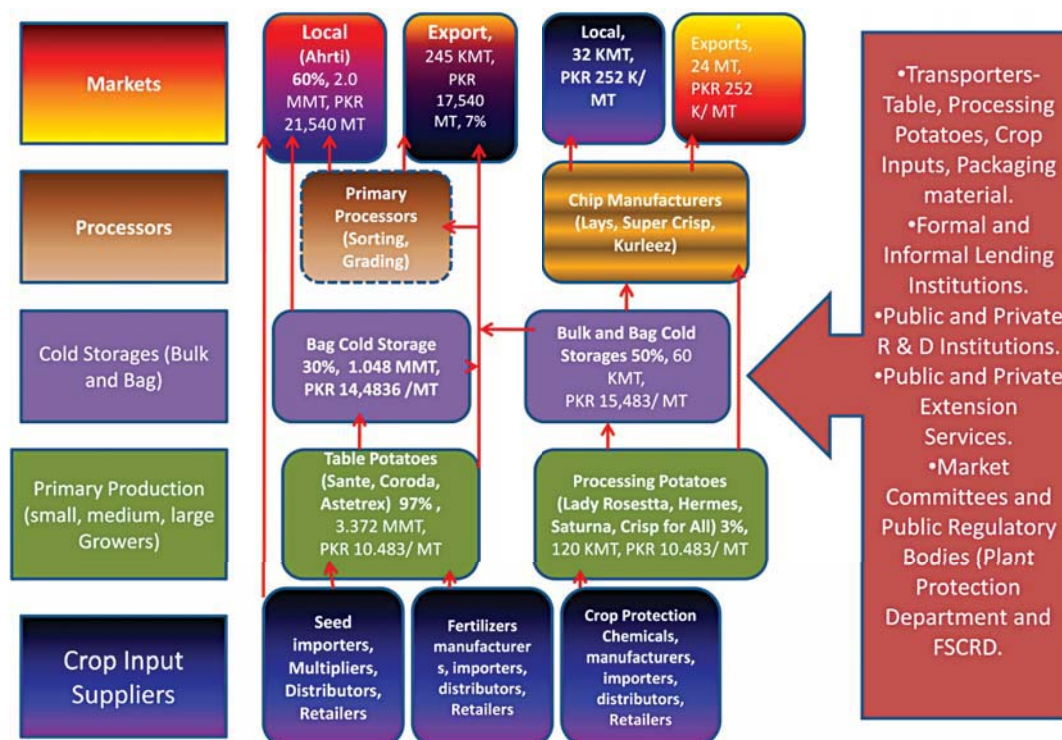
Specific marketing Acts exist for marketing of fresh produce stipulated under Federal and respective Provincial legislations and enforced by the respective functionaries of these line departments. Processors enforce their own indigenous quality standards and Pepsico has IPS standards (Improved Product Specifications) part of the Pepsico international best practices regime.

Broad Value Chain Map

Growers are the main drivers in the VC and then comes equally important, the Cold stores operators as around 30% of the table potatoes are stored otherwise the glut in the market would bring the prices terribly down and make the whole production cycle a futile exercise. Similarly, the major processors only process around 500 tons per day based on their maximum throughput. Therefore all the contracted volumes additional to daily throughput requirement are stored.

Input suppliers (localized dealers) representing importers of seeds, chemicals, etc, maintain their stock prior to the start of basal application and subsequent application of fertilizers and a variety of fungicides are kept in stores by growers to manage blight (fungal disease).

Potato Value Chain Map



VC Actors and Their Roles and Relationships

Input Suppliers

Seed, Fertilizers, Plant Protection Chemicals (PPCs), farm machinery, irrigation systems and fuel are the main inputs supplied by various vendors at their sales/ distribution points.

- Seed is being imported primarily by seed importers and most of the seed is multiplied to curtail the costs of production. Current end user costs are PKR 124/ Kg and after one multiplication (FG01) the costs may be brought further down by another multiplication (FG02).
- Total number of seed importers is around 15 and the imported quantity is around 2% of the total production quantity. These importers have no access to institutional Agri. Finance products for the imports however they get partially financed by some Growers, Arthis, Cold storage operators. Also, they do advance booking without fixing the price. The remainder is paid by recipient on delivery once the landed costs are ascertained.
- Fauji Fertilizers (FFC), Engro Fertilizers Limited (EFL), Daud Hercules, Ali Akbar Group (AAG), Jafer Brothers Limited, FMC, Syngenta, Bayer Crop Sciences, FMCs are the main Crop input suppliers and all have a well spread dealer and distributor network all across the country and are equally stretched in the core producing areas. Besides, there are importers of fertilizers and farm chemicals whom have their network in the area and connection with Arthis.
- Processor, such as Pepsico also acts as an importer of seeds which is extended as a loan to growers in a contractual arrangement. Such loans are without margin and interest and ensure provision of raw material for processing.

Producers

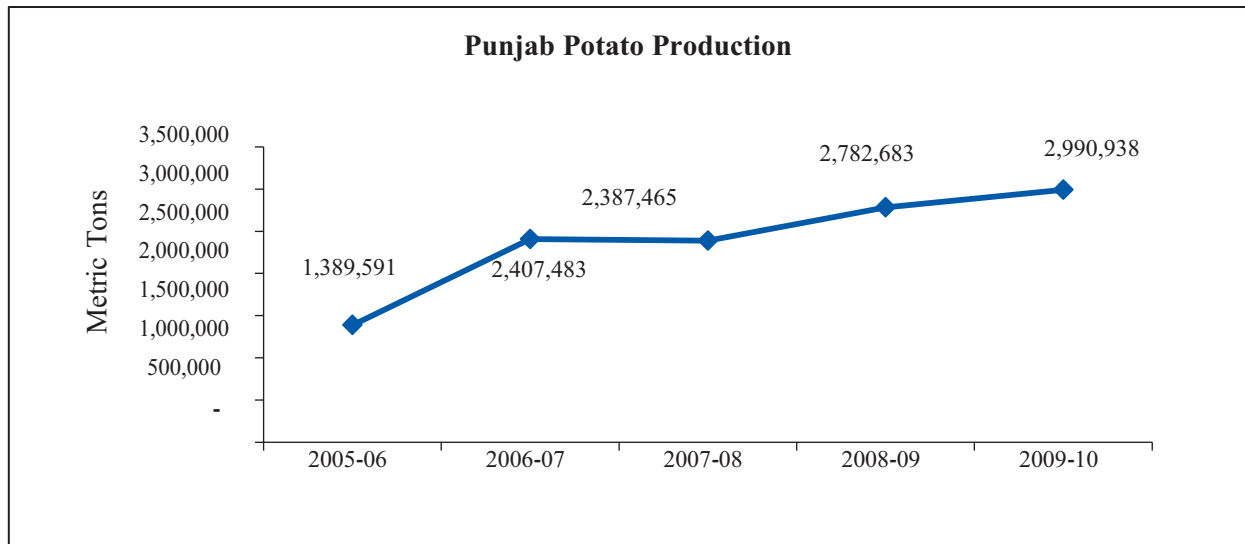
The significant producers are in the category of landholders between 25-250 acres (small growers 1-25 acres, medium 26-100 acres and large grower 101-250 acres). The holding could be fully owned and or partially rented. Major chunk of production lies in the central Punjab. This is also the period where the arrival from North and North West growing pockets in Soan Sakesar, Swat, Malakand, Dir, Chitral and Gigit-Baltistan Province dwindle.

Table 1: Potato Production 2005/6 to 2010/11

Season	Area (000' Ha)	Production 000' Tons	Est. 000' Tons in storage	Est. 000' Tons in Processing	Production Per Ha	Processed % of total
2010-11	159	3492	1048	120	21.9	3.4
2009-10	139	3142	942	70	22.7	2.2
2008-09	145	2941	735	59	20.3	2.0
2007-08	154	2539	508	38	16.5	1.5
2006-07	133	2582	465	30	19.3	1.2
2005-06	117	1568	235	11	13.3	0.7

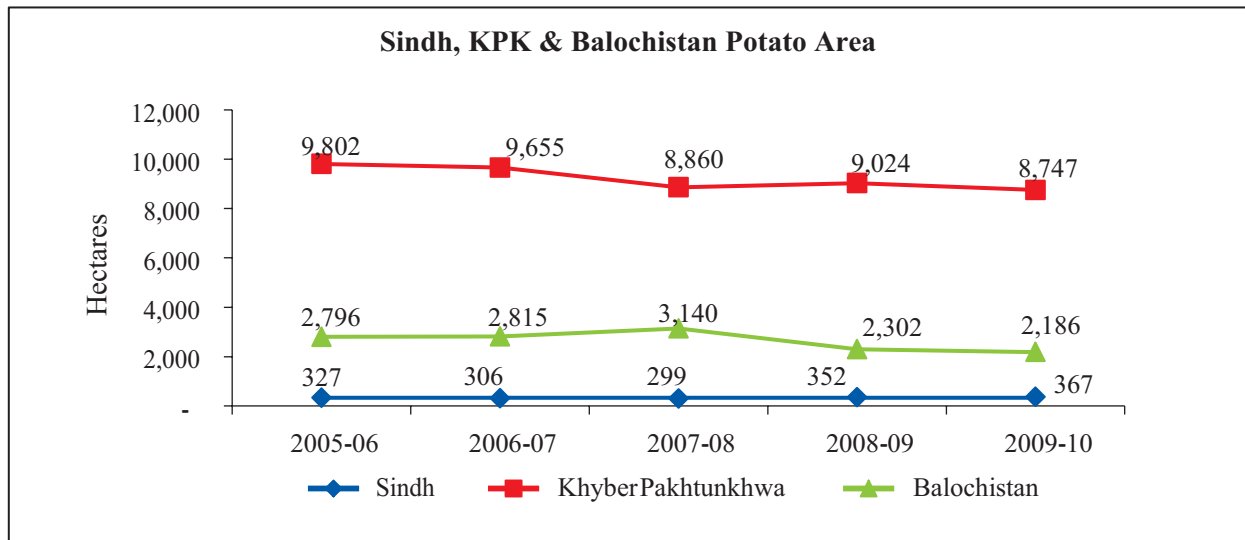
Growers in North and North-West have small holdings and are really dependent on the downstream market buyers (Arthis, traders, processors, etc) through Beoparis whom serve as conduit for bigger markets like Islamabad, Lahore, Gujranwala, Sialkot, Faisalabad, Depalpur, Okara, Multan, Hyderabad, Karachi and Quetta.

Figure 1: Potato Production Punjab



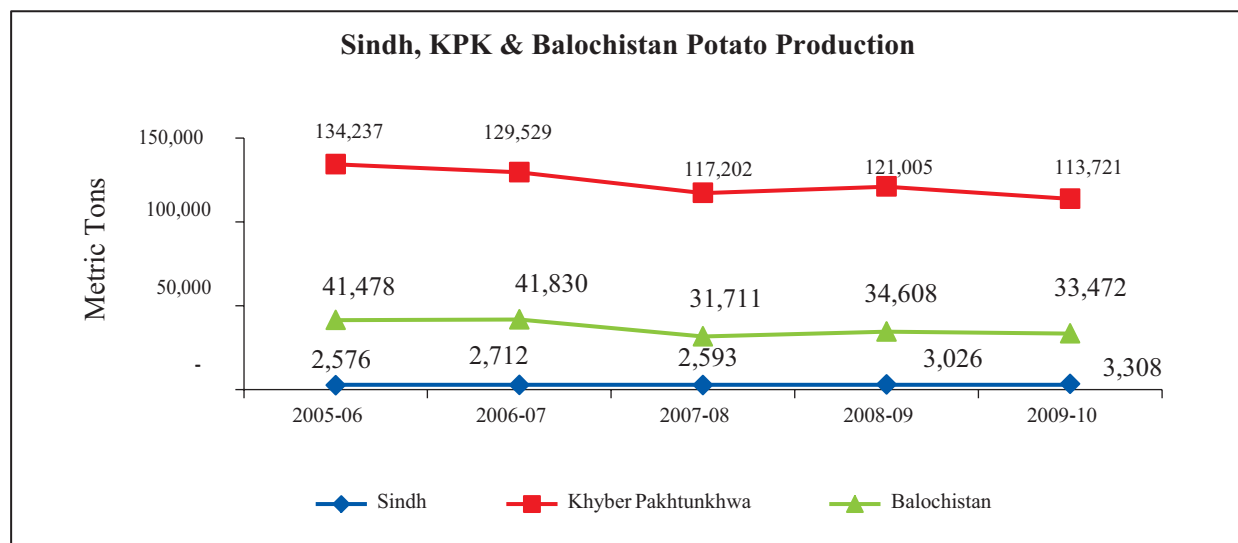
Source: Ministry of Food & Agriculture, GoP

Figure 2: Potato Production By Area in Sindh, KPK and Balochistan



Source: Ministry of Food & Agriculture, GoP

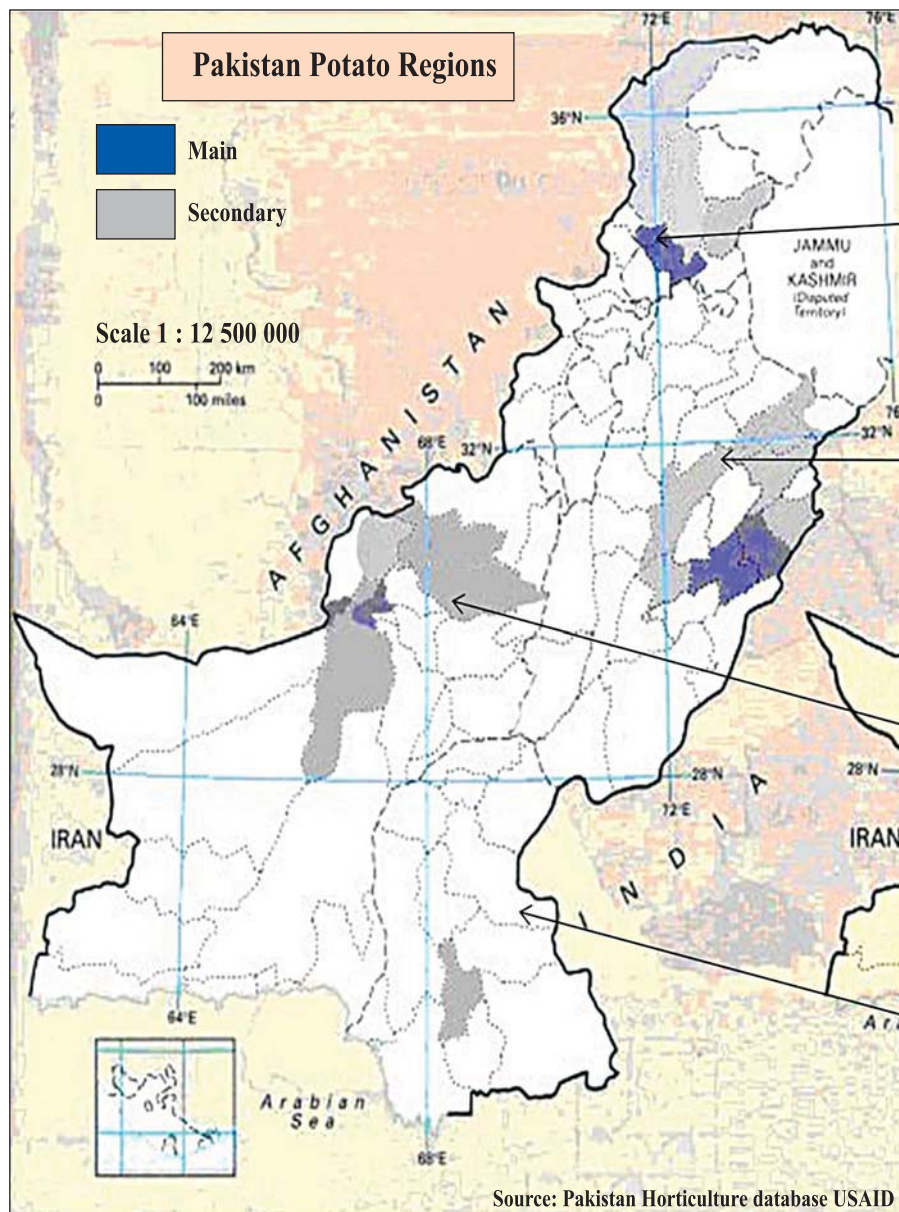
Figure 3: Potato Production in Sindh, KPK and Balochistan



Source: Ministry of Food & Agriculture, GoP

Growers in core potato areas practice a Maize-Potato pattern of cropping and contract growing in both the crops is taking firm roots in the value chain where processors such as Pepsico and Rafhan are active and give a good advantage against produce glut which in case of potato also ease pressure on cold storage for table potatoes and requires additional investment on part of growers and or volume buyers to rent cold store space which is around PKR 400 per bag of 100 Kg (PKR 4.0 per Kg including handling and transport in and out of storage).

Geographical Spread of Primary Production Area Pockets



Khyber Pakhtunkhwa	Major Districts
District	Production (Metric Tons)
Chitral	23,568
Swat	16,765
Nowshera	16,143
Mardan	9,127
N.W	7,439
Dir Upper	7,021
Bajour	7,005
Khyber	6,594
Other Districts	27,343

Punjab	Major Districts
District	Production (Metric Tons)
Okara	1,025,782
Kasur	403,101
Pakpattan	392,601
Sahiwal	373,921
Sialkot	96,088
Jhang	81,937
Khanewal	74,039
Lahore	63,379
Other Districts	271,835

Balochistan	Major Districts
District	Production (Metric Tons)
Killa Saifullah	10,676
Kalat	7,099
Pishin	6,050
Nasirabad	1,990
Ziarat	1,921
Barkhan	1,794
Killa Abdullah	1,681
Quetta	870
Other Districts	2,525

Sindh	Major Districts
District	Production (Metric Tons)
Khairpur	1,257
Naushero Feroze	877
Shikarpur	608
Nawabshah	81
Sukkur	76
Dadu	72
Ghotki	55
Jacobabad	-
Other Districts	-

Aggregators

Major organized aggregators in value chains are processors (120,000 tons for processing, cold stores operators, Growers and Exporters relying on 30% produced in stores).

Next to above mentioned categories of aggregators, Beoparis (Contractor, local buyer and seller) in small pockets and small growers gather produce by paying a small amount as Bai'ana (Advance) say 5% to each producer and pay in increments by selling loads in big markets through Arthis. These Beoparis get their cut from both side while supplying seed and cash for meeting the day to day needs of small farmers besides getting a small percentage from Arthis in providing business---more load means more commission for Arthis.

Exporters are yet emerging breed of aggregators whom now have establish direct linkages with growers in order to get their product graded at source besides implementing best practices and enhancing their margins in by passing the middlemen (Beoparis, Arthis, Market fee, and whole sellers). On the other hand growers also have enhanced margins where there is a direct linkage with exporters.

Processors

Significant processors in the country are Frito Lays (Pepsicola) and Ismail Industry, producing brands of Lays and Kurlaes with a variation of seasoning and end product. Besides there are other small manufacturers having brands of Super Crisp and homemade chips supplied to bakeries and convenience stores.

As a rule of thumb, four Kgs of Potatoes after processing make one Kg of Potato Chips. Any improvement in conversion leads to more productivity and profitability. It is also indicative of good practices, superior process controls and use of advance technology besides higher solids in fresh produce of a mature crop versus stored produce of over four months. With the exception of Pepsico, none of the processors have contract growing arrangements with the primary producers. These producers do the spot buying and are less quality stringent.

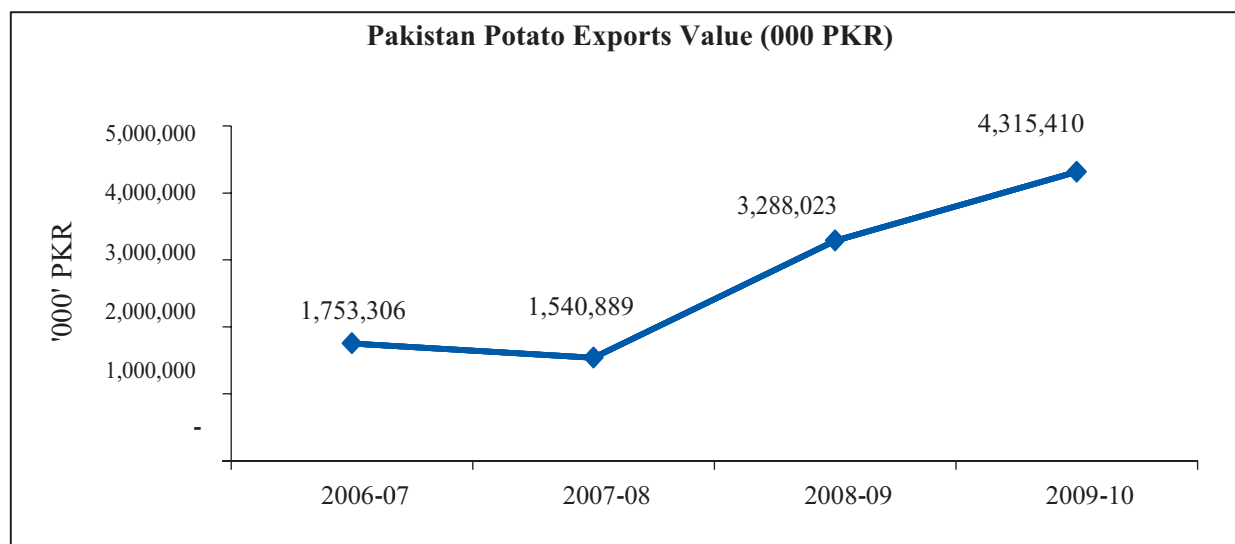
End markets/Buyers

The big trading markets in the Potato area are Depalpur, Okara, and Lahore due to high volume trading. Volumes traded for local consumption depend on the local demand/ supply during season and cold stored volumes during off season also traded in these markets. Amongst the consumer markets where loads from these producers markets are routed are Karachi, Lahore, Multan, Faisalabad, Gujranwala, Faisalabad, Islamabad/ Rawalpindi, Quetta and Peshawar.

Besides fulfillment of local demands of these markets, loads are rerouted for nearby small consumer markets of small cities and towns as well. The rerouting Phenomenon is also known as Ladhan.

Big processors like Frito Lays (Pepsico) have well established processes of procurement of Potatoes and seeds multiplication in a contractual arrangement. They also leverage their international presence in getting volume discounts from Seed suppliers abroad besides assistance in establishing new business in a country or region through technical help and training of growers and their own technical and field staff. They also have well entrenched distribution network and volume buyers like Metro.

Exports of table potatoes their quantities, values and destinations (countries) are given in the Table 2.

Figure 4: Value of Potato Exports

Source: Ministry of Food & Agriculture, GoP

Export values show an increasing trend and are demand/ supply dependent within the region. Higher numbers for Afghanistan, Sri Lanka, Malaysia and Iran indicate competitive prices for table potatoes.

Table 2: Exports of Table Potatoes by Country

Potato Top Export Markets 2009-10			
Country	Quantity (kg)	Value (000) PKR	Unit Price (PKR/kg)
Afghanistan	126,191,518	2,384,054	19
Sri Lanka	86,081,231	1,392,056	16
Malaysia	18,685,881	302,549	16
Iran (Islamic R.)	10,571,957	168,456	16
Singapore	2,155,125	37,121	17
Russian Federation	892,130	18,319	21
United Arab Emirates	212,936	2,811	13
Thailand	204,000	3,779	19
Other Countries	334,533	6,265	19

Source: Ministry of Food & Agriculture, GoP

Supporting Institutions

There are several institutions supporting the primary production part of the value chains.

National Agriculture Research Centre, Islamabad

Under the administration of Pakistan Agricultural Research council, a policy making body in Agriculture research, NARC, Based in Islamabad with laboratories, personnel and experimental farming area, provides leadership in research and development. Potato experts provide the expertise on production, post harvest and seed production. However, it lacks its orientation with emerging and changing business environment supporting the value chain.



Potato Research Institute, Abbottabad

Under the Provincial Agriculture Research Directorate and Department of Agriculture, Province of KPK, undertakes progressive research on Potato varieties.

Federal Plant Protection Department

Located in Islamabad and port of entries where the incoming seeds are landed. Under Ministry of Food Security, regulates the movement of Plant Genetic material (Varieties, plants, seeds, crop protection Chemicals, Fertilizers) movement within and outside the port of entries. It also issues Phyto-Sanitary certificates to facilitate the movement of such products across the borders.

Federal Seed Certification & Registration Department (FSCRD)

Working under the Administration of Ministry of Food security, FSCRD provides services in the Administration of Approved list of Plant varieties, Certification of varieties to be sold, issuing of certificates to incoming new varieties and maintaining a list of approved list of varieties. It has coverage across the country through its Provincial presence.

Provincial Agriculture Marketing Committees (MCs) of various markets

These MCs Govern the working of various Fruits & Vegetable markets across the country and levy around 1% market fee on the trading of the produce traded in those market. These MCs also coordinate with the area administration to regulate retail prices of the produce and in collaboration with the traders issue retail price lists of the produce on daily basis.

Potato Growers Society (PGS) of Okara

The PGS was established in order to facilitate small and medium growers in provision of quality potato seeds besides working for the promotion of potato culture and it's interests in the area. It is based at the core producing potato producing district of Okara has a membership of over 20,000 small to medium growers.

Input Supply

a) Suppliers and Other Participants in the Value Chain

Fertilizers manufacturers and importers: Fertilizer manufacturing initiated with (EFL) Engro Fertilizers Ltd (Exxon) putting up their first plant with a capacity of 150,000 Metric Tons at Dharki close to Sindh/Punjab border during 1968, followed by Pak American Fertilizers, Fauji Fertilizers (FFC), Daud Hercules and Fatima Fertilizers, increasing the countries Urea manufacturing and meeting the rising demands.



EFL later increased their capacity to 2.0 million tons and also put up a blended NPK fertilizers plant. Similarly, FFC put up a Phosphate (DAP) plant besides acquiring another urea plant. All these manufacturers have well entrenched dealer network and field personnel coverage in all the potential producing areas (Growers).

Beside these manufacturers, there are importers of various types of straight, blended and speciality fertilizers and their own distribution and dealer network. Depending on the demand/ supply scenario of the fertilizer industry, Government also augments shortage by importing and distributing through these manufacturing companies to avoid any shortage which affects the supply of such an important crop input.

b) Seed importers

There are no well established seed production companies similar to fertilizer industry in the country. However, Seed imports are undertaken by various small to medium companies and mostly it is imported from Holland.

There are fourteen small to medium importers of Potato Seeds reflected in the records of FSCRD. These importers are a total of 2% of the seed required by the crop. This means that most of the growers use seed multiplied repeatedly and kept in the stores for next season. Also, most growers, select seed from produce, put in cold store and use it for next year crop.

c) Plant protection chemicals bulk importers and suppliers

There are several Plant protection companies, manufacturers and importers in the country. However, Companies such as Syngenta, Bayer Crop Science, FMC, Ali Akhber Group (AAG) have a comprehensive coverage through their personnel and dealer network.

d) Farm Machinery manufacturers and importers

Most of the farm machinery manufactures and their dealer network have their presence in the core producing areas. Some plant machinery importers are located in Lahore and they import new as well used plant machinery to meet the demand of the value chain.

Growers mostly use the basic implements and machinery and tractors occupy the central position. In Potato culture, availability of cheap labour and lack of awareness of growers towards enhancement of quality and profitability through use of mechanical harvesters and tuber collector besides availability of credit on easy terms has somewhat hindered use of emerging technology by most of the growers.

e) Packaging material manufacturers and suppliers

Jute importers and fabricators of jute bags are the main packing suppliers. Recently, poly net bags are being introduced by processors of potatoes for better aeration and quality of the produce till its fresh consumption or storage and processing later.

Key Input Providers and Their Organization

In the farming area, there is a dealer network of all the critical input supplies provider in close proximity to farms besides companies warehouses and their stocks which the dealer could easily divert to growers--their customers. Similarly, all the fruit and vegetable wholesale markets have a strong presence of such dealers whom have linkages with Arthis and they supply inputs at the demand of Arthis to their customers.

Contractual Arrangements

Arthis also have an informal credit line with these suppliers and also profits earned on credit of input to growers are shared by them. These suppliers have company dealership and get secured credit from the companies on Bank Guarantees against securities but on very nominal mark up.

Crop Input Supply Chain



Delivery and Payment Conditions

Fertilizer and seed companies extend their products to dealers mostly on advance payment regime however, big volume buyers have revolving Bank guarantees for purchase of such inputs on nominal margins paid to the banks. From companies they get volume discounts which are partially passed on to growers on cash transactions only. In case of credit through Arthis which loans the inputs to growers for the crop, higher than actual price is charged to the growers account and deducted when the produce is traded in the market besides Arthis commission.

Quality Control Measures

Manufacturers and bulk importers maintain international best practices and enforce such practices in transportation, stacking and storage of inputs. Such practices are enforced through field officers on their dealer network across the country. Agriculture Extension Department ensures purity of the product through random sampling of the products on shelf for testing. In case of any malpractice legal action under the fertilizer act is enforced. The same applies to crop protection chemicals.

Input Supply Contracts

Input manufacturing and supply companies undertake dealership contracts after evaluation based on financial soundness, location of outlet, competition, area suitability and reputation of the dealer whom also have to ensure a minimum business transaction and first product order from the company. Product however is sold either on cash and or credit under informal agreement and sometimes a post dated check is obtained from the buyer as a security.

Companies pay close attention while appointing a dealer and enforce their formal contract through their well developed processes and policies through a field officer assigned for that area. In case of any serious breach of the contract, the dealership is cancelled and a new dealer for that area is searched and appointed. Some companies also appoint big volume buying growers as their dealer in the area. Such a grower mostly, represents a group of growers in that area.

Non-Financial and Financial Services Provided By Input Suppliers

Most of the input suppliers provide advances in the form of products to growers, either directly, or through Arthis based on their area of influence and networking in the area they are operating. Big volume buying dealers leverage the discounting (Deferred Marketing Allowance) in controlling the input supply markets in their area, region or even across the country. Having sound financial standing they also enjoy credit from banks on Bank Guarantees at lesser margins and use the liquidity to increase their supplier ability to other buyers in markets across the country. They are able to use discounts and supply product to other buyers on even less than Manufacturer retail price (MRP). Product is most often than not routed to growers through Arthis with even bigger margins.

Table 3: Mark up on Trade Credit on Fertilizers in the Informal Sector

Product	Dealer Sale Price	Grower Price on Credit	Margins	Profit for Crop % (4-Month Cycle)	Profit Per Annum %
DAP	4200	4800	600	14.29	42.86
Urea	1800	2400	600	33.33	100.00

Source: Actual Market rates and feedback from stakeholders.

The above table shows profit margins on fertilizers for Potato crop for a period four months. This does not include the discounts obtained from companies in big volume buying prior to the onset on potato season. Somewhat similar margins are in place for credit advances on seed for the crop to growers and Crop protection chemicals. Cash advances are also provided by Arthis to Growers within their network for the purchase of inputs and other operational expenses.

Besides financial services, these input suppliers are a conduit for technical services through the personnel of the companies in providing soil sampling and testing, disease monitoring and advice, crop and technical seminars and trainings and growers field days and product trials.

Existence of subcontracting

Volume buying dealers extend products to small retailers, sub dealers and Arthis, which ultimately reaches end users---the growers. Prior to the start of the season, product is supplied to small/ local players and end users through big dealers and volume buyers.

Logistical activities that are required to source inputs and supplies in the value chain

Extensive road network across the country has enabled companies to route their products anywhere based on the demand and crop through contractual arrangements with transport companies. These transporters are omnipresent. Big companies have their own fleets of vehicles with a carrying capacity from 10 Metric Tons to 60 Metric Tons. These transporters have container carrying vehicle at ports for imported inputs.

Companies have a group of approved transporters on their list besides dedicated fleets which are able to supply products in a timely and efficient manner. Companies undertake contracts on weight basis. Individual or group of growers bring crop inputs from local dealers using their own or hired vehicles mostly on tractor driven trolleys, donkey carts or pickup vans depending on the size of the load or proximity to the location of dealer.

The transport companies undertake a contract which has specific clauses to ensure timely delivery. En route insurance of cargo is recently introduced which ensures the safety of the cargo till it reaches its desired destination. Similarly, at local level, tractor driven trolleys, pickups, small carrier trucks between 5-10 Tons are used to transport inputs from warehouse to farm gate.

Extensive road network including motorway enables cargo to reach within 24-48 hours to the core growing areas and companies have placed strategically located warehousing facilities in such areas. Dealers also have warehousing facilities for maintaining their inventory and transit products for subsequent delivery against customer orders. With the exception of a few destinations in the North such as Kalam valley in Swat, Chitral and Gilgit-Baltistan and Federally Administered Tribal Areas (FATA), there are no significant issues of lead times and product availability.

Production System and Characteristics

Geographical Mapping of the Primary Producers and Flow Of Goods And Services

Crop	Planting	Harvesting	Area
Autumn: Early First	Aug-Mid Sep	Nov-Dec	Abbottabad, Mansehra, Mingora
-Early 2 nd	Ist week of Sep	Early Half of Nov	Faisalabad, Gojra, Jhang
-Main	Sep-Oct	Dec-Feb	Okara, Sahiwal, Sialkot, Kasur, Shiekhopura, Lahore, Jhang, Gujranwala, Toba Tek Singh, Faisalabad, Pakpattan, Khanewal, Gujrat, Attock, Narowal, Sargodha, Jhelum & Rawalpindi.
-Late	Mid Oct- Mid Nov	Jan-Feb	Nawab Shah, Sukkur, Naushero Feroze & Shikarpur.
Spring Main	Jan-Feb	Apr-May	Okara, Sahiwal, Sialkot, Kasur, Shiekhopura, Lahore, Jhang, Gujranwala, Toba Tek Singh, Faisalabad, Pakpattan, Khanewal,
-Late	Jan-Feb	May-June	Nowshera, Mardan, Swabi, Peshawar & Charsadda
Summer -Early	Mar-Apr	July-Aug	Dir, Swat, Kurram Agency, South Waziristan Agency, N. Waziristan Agency, Chitral, Abbottabad. Lower Hunza, Gilgit
-Main	May-June	Sep-Oct	Kalat, Mastung, Pishin, Killa Saifullah, Chagai, Loralai, Kan Mehtarzai & Ziarat. Kalam, Chitral, Dir, and Kohistan. Upper Hunza & Yasin Valley.

Source: Potato in Pakistan. A handbook (2).

Central Punjab stands out as the most potential pocket across the country in terms of area, production and average yields besides linkages with the major processors in the country under contractual farming regime and a bunch of very enterprising growers. However, pockets in KPK, FATA, Balochistan and Sindh also hold promise in having seasonality advantages and their proximity to big consumer markets such as Quetta, Karachi and Hyderabad. While Punjab seasons ends fresh supplies from other pockets partially meet the demand of fresh produce for end consumers.

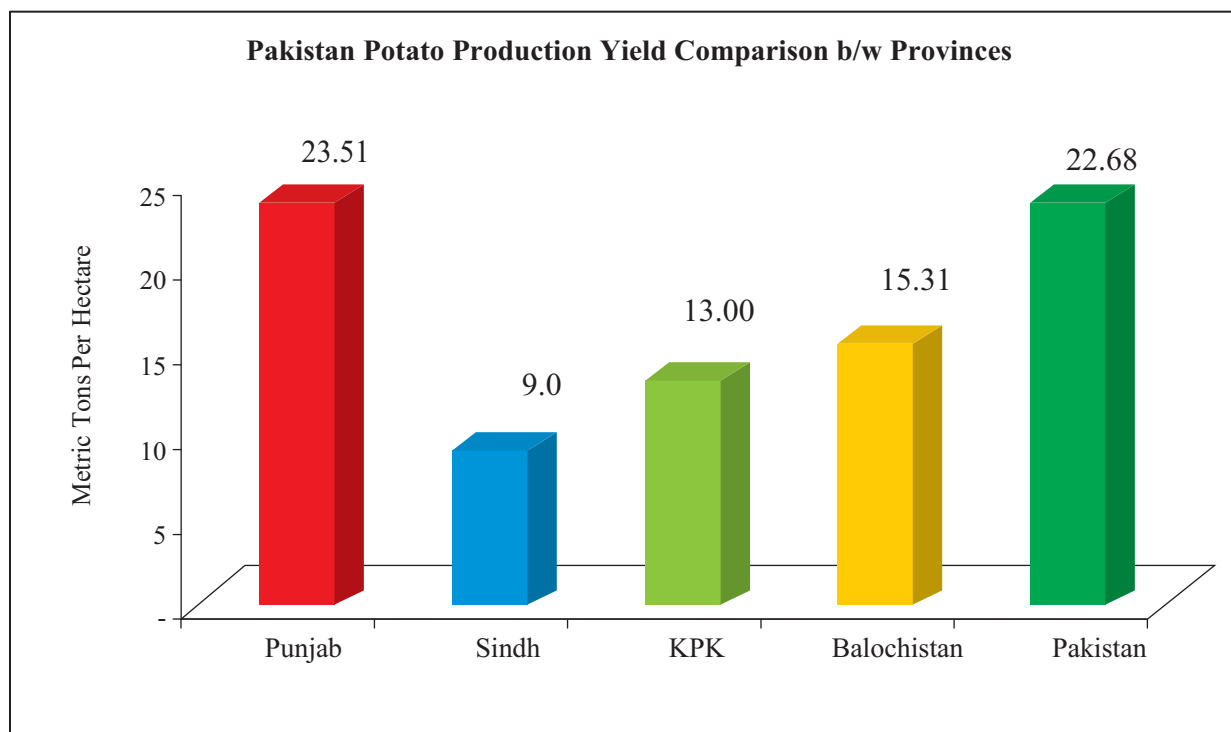
There are two main production systems in Potato VC, one is a formal contractual arrangement which though currently is around 5% of the total production however it's growths has been phenomenal due better margins for growers and assurance to processors for its raw material supply.

Primary limiting factor in the lower yields is the use of low quality seed which has lost its vigour due to lack of indigenous seed production companies development, appropriate cold chains, and technological know-how of the business.

Growers in the core producing areas of Punjab compared to other areas have adopted mechanical planting, and some have mechanical harvesting besides use of balanced crop nutrition and best agricultural practices. However, there is a great potential for going fully mechanized and using early warning systems for frost and blight. Also, potential for Global GAP certification could further improve product traceability a must requirement for exports to most of the countries.

Merely 2% of the imported quality seed is used but mostly it is multiplied to be used as seed in the following season and not as a stock to be sold in the market.

Following chart gives and an overall comparison of yield per hectare for both processing as well as table potatoes. Although there are no separate numbers are reported through official source however contract growers interviewed for the study and company sources revealed that processing potatoes have a higher average yield per hectare than table potatoes and this primarily is due to seed imported by the company and advanced for contract production and strict compliance by the company and its contract growers for maintaining international standards of production.

Figure 5: Potato Yield by Province

Source: Ministry of Food & Agriculture, GoP

Processing companies importing their own seed leverage their international presence in volume deals hence their contract growing has dual advantage better seed at lower cost versus other importers for which the growers have to pay 65% more than for processors.

Processing companies whom operate under contractual arrangement could undertake similar deals with other input suppliers leveraging their contractual arrangement reducing the cost of production further and enhancing yield and profitability across the processing loop of the VC.

KPK and Northern Areas have pockets which provide excellent opportunity for potato seed production due to lower disease pressure and ideal elevation and climatic conditions. The limitations however are smaller land holding and archaic farming practices. These pockets have been utilized to some extent for seed multiplication by some companies as well as Arthis network.

This is evident from the yield comparison chart above where core producing areas in Punjab have the maximum yield per hectares (ha) versus all the other Provinces and their respective pockets yet it is lower in yield versus other potato producing countries in the world.

Production Systems

Formal contractual farming system exists in Potato-Maize growing area in Punjab and recently getting grip in the North, North-West KPK Province (Kalam, Swat Valley and G-B). In Punjab, the only processor, Pepsicola International (PI) has stock as well as seed production contracts with growers with whom the company has invested in technology transfer, training, input supply and packaging material on interest free credit and procurement at farm gate. Companies started out with lavish margins to contractual growers and slowly and gradually withdrawn most of the incentives as their growers base increased over the span of the last five years.

The other processors only uplift the processing potatoes from growers on the basis of spot buying of lots rejected by Pepsicola, on strict quality procurement standards such total defects, sugar levels, and varieties for long term and short term storage, but a Rupee lower than the contracted price.

Potato varieties for processing or chips making are specific and low sugars these are exclusively imported by PI and multiplied at least once prior to stock production and both multiplication as well as stock production is undertaken under the contract production business models. The major chunk of the processing potatoes come from the core producing areas of Punjab (94%) whereas the remaining from the North and North-West (KP and G-B) despite a high demand from the North due to seasonality advantage and fresh usage development is slow paced and that's primarily due to slow development of such production system in that area.

The only difference in costs of production between table and processing potatoes is seed. Seed used in Table potatoes is multiplied for 3-4 generation to reduce costs and mostly small unmarketable size is kept in the store to be used next year use.

Contract with the company is insurance policy against uncertain market prices during the glut. The same on the other hand is true for processing companies that such an arrangement assures supplies to meet their fiscal targets of production and sales.

Growing for market could be further divided into two: one, using informal credit sources such as contractors (Beopari or local Agent); direct dealing with Arthis, or just independent growing. In all these types of arrangements, somehow things get connected with Arthis and its network of lenders which besides commissions lend on a very higher rate. This huge Gap has yet to be covered by institutional creditors---The banks.

Contractual Arrangements in Production

1. **Growers-Processors:** Well defined notarized contract on a stamp paper covering seed advances from processors and a post dated check for the amount of the advance. Here the amount of seed advance is insured to cover the risk of advance through company which has achieved a zero percent default in recovery of this advance. Although, processing company charges no mark up on this advance yet it entails in terms of lower cost of production for growers as well as proportionate benefit for the company in buying price in the contract.
2. **Growers-Local Contractor (Beopari):** There is no written contract and it's based on personal acquaintance and trust. Beopari is further connected with the Arthis of the nearest Market. Such types of informal contracts exist for small and landless growers.

3. **Grower-Arthi:** Medium to large grower undertakes such contract in which gap in the production finance is bridged by Arthi which is also connected with input suppliers and investors besides have a portion of its crop financed by the banks.
4. **Grower-Input Supplier:** Local input supplier also lends crop inputs though at higher rate and get pay back the principle and profits once the grower has sold his crop. This type is also common for small and or landless growers.
5. **Arthis and Input suppliers:** Both converge to lend it to the grower and share profits as well as risks towards the end of growing cycle of four months.
6. **Input supply companies-Distributors-Dealers:** Such contract is undertaken with secured credit under Bank Guarantees.
7. **Arthis-Whole Seller:** daily cycle of produce buying and selling in the chain and payback.
8. **Whole seller-Retailer:** based on daily or weekly payment schedule.

Technical and Quality Requirements

Local markets have no stringent quality requirements however the produce is traded on merit. Produce size, health and the quality does matters to buyers. Consumers also have preference in buying quality produce however there are no set criteria.

Processors have very stringent quality criteria and over the years their technical staff has trained the contractual growers how to adhere and achieve such standards. Size, frying test (for defects) and specific gravity tests for solids, sugar levels, all play crucial role in procurement.

Similarly, exporters have their own set criterion for procurement and grading which is dependent on the destination of exports. Countries like Sri Lanka has no stringent requirement however, buyers in Malaysia, Russia and Middle East have stringent standards of procurement.

Aggregation

Following matrix depicts aggregation in various nodes of the value chain.

Functions	Organization
Crop Inputs (seed, Fertilizers, Crop protection Chemicals)	<ul style="list-style-type: none"> Seed import is planned at least six months prior to its usage. Supplies are aggregated at various strategic store location near the growing area, prior to its dissemination. Similarly, other inputs either manufactured locally or imported are placed near the growing areas prior to planting season.
Primary Production (Small, medium and Large Growers)	<ul style="list-style-type: none"> Crop inputs are kept at least a week prior to initiation of planting. Produce harvested is sorted, graded and packed within or near the growers field and organized it's routing depending on market demand, processor contract and cold storage placement.
Storage (Cold Stores Operators)	<ul style="list-style-type: none"> 35% of the produced is organized to be stored either by grower, volume buying trader, processor, etc., into cold storage and routed for its usage based on demand.
Transportation (Transporters)	<ul style="list-style-type: none"> Produce from field is brought to a transit location in tractor trolleys and loaded into big vehicles depending on its destination---
Processing	<ul style="list-style-type: none"> Processors organize collection at growers field, receive directly at processing plants or routed to cold storages. Finished goods are placed in a warehouse and routed to distributors, dealers, retailers as per demand raised.
Markets	<ul style="list-style-type: none"> Local contractor organize its bought produce for sorting, grading, packing and routing for its required destination---- markets, processors, cold storages.

Key Risks in Production

Risk Matrix for various core functions and their crucial actors

Functions	Main Risks	Mitigation
Seed imports (Importers, Mega Growers, Processors)	<ul style="list-style-type: none"> Lack of appropriate seed import finance is the most limiting factor to import adequate quantity of seed import which currently stands at only 2% of total seed planted. 	<p>✓ Only processors due to better financial standing are able to leverage cost effective imports. There cost of imports is PKR 75 per Kg versus other importers which is PKR 100 plus. Better import finance package for seed importers in timely locking the volumes and getting volume based discounts and early bird advantage.</p>
Primary Production (Small, medium and Large Growers)	<ul style="list-style-type: none"> Lack of group lending for small growers on surety and higher margins through non institution creditors. Lack of revolving bank Guarantees for medium to large growers for purchase of inputs in a timely manner. 	<p>✓ Group lending for crop inputs for small grower groups through Potato growers society of Okara.</p> <p>✓ Revolving bank Guarantees for medium to large growers for crop inputs, cold storage for better leverage against fluctuating market prices.</p> <p>✓ Financial packages for purchase of farm machinery and primary processing: Grading and sorting equipment and small to medium cold storage at or near farms.</p>
Storage (Cold Stores Operator)	<ul style="list-style-type: none"> Obsolete and energy inefficient cooling technology Lack of Credit for improving all sub functions expansions, operations, etc Lack of humidification systems 	<p>✓ Credit packages for import of energy efficient cold storage technology.</p> <p>✓ Financing for new projects and expansion of existing packages.</p>

Transportation (Transporters)	<ul style="list-style-type: none"> No specialized vehicles for table Potatoes. Road conditions also deteriorate quality. Lower stacks of potato bags get weight of rest of the stacks and metallic base of the vehicle results in loss of 2- 3% of produce. No cold chains for table or processing potatoes. 	<ul style="list-style-type: none"> ✓ Financing/ leasing of Vehicles with better aerations and putting lesser stress on stacked bags. ✓ Project and operation finance for Introduction of cold chains---fleet of temperature controlled vehicles. Dedicated vehicles are available for Ice cream, milk and frozen meat. ✓ Only processor (Pepsico) has en route insurance of their loads.
Processing	<ul style="list-style-type: none"> Small processors using obsolete technology and procuring low quality processing potatoes. Crop failures. 	<ul style="list-style-type: none"> ✓ Financial package for Introduction of improved frying and packing technology. ✓ Investment in early warning and crop monitoring systems.
Markets	<ul style="list-style-type: none"> Lack of Access of credit to Arthi network which acts as a de facto bank for small to medium growers in fully or partially financing of inputs, packaging material. Besides provision of credit to Whole Sale dealer and small to medium contractor (Collector) 	<ul style="list-style-type: none"> ✓ Ahrti is the main driver in the marketing of farm produce. ✓ Arthis in medium to large markets range from 20-50 in numbers but they lack any appropriate financial packages to efficiently drive the market.

Financing of Production

Value Chain Financing Systems

There are two broad types of financing mechanisms exist in the value chain: Institutional through banks (Formal) and Non Institutional (Informal); Friends, relatives, Arthis, whole Sellers, Contractors, Cold Store Operators, Processors, Input Suppliers.

Growers prior to planting use a good portion of their previous crop liquidity for the purchase of inputs for new crop. Growers connected with Arthi system withdraw cash only on need basis hence make room for inputs for the next crop.

Arthi, Beopari, Pharya, Ladhanya, all are intertwined in lending and borrowing cycle in the wholesale market which includes bartering also. The crunch however is felt in the peak production as well consumption times while higher volumes are being traded. Limits from banks against securities come in handy during that crunch period.

Arthis depending on the volume of their business while interviewed revealed limits of running finance (RF) for their day to day trading—lending operations and same holds true for whole sellers.

Input supply dealers/ distributors on the other hand are using bank guarantees (BGs) for volume buying but most of the BGs these days are 100% cash! They use security bonds, Gold as well as pledging properties and negotiate to reduce cash portion of the security for BGs. These revolving BGs are useful and also used for the next crop.

Working Capital Finance

A good portion of landowning growers use passbook to borrow from banks using Term Finance products. Mostly the documentation is used for three years, whereas, landless growers are always dependent on Ahrti system for meeting their working capital requirement.

Cold store operators also use RF for during trading however they have a dire need for TF because the storage period for bag stores varies from 2-5 months and for bulk storage it is 3-6 months after harvesting.

Within the Ahrti system only Ahrti and whole sellers have access to financial products from the banks as they could provide ample securities. However, Beoparis, Pharyas and Retailers are always dependent on Arthis for their financial needs.

Fixed Assets Finance

Landowning growers get access to various financial products to finance buying tractors, ploughs, storage spaces, etc. However, landless growers use rentals for their implements needs or they depend on Ahrti system for such needs too.

Cold store operators and new entrants in the rural setting doing expansion do not normally have enough urban properties or other means of collaterals to get their project financed. They partially rely on the investors (informal lenders) at a very high rate. Some portion of their project could however gets financed through banks.

Unmet Opportunities For Technology/Quality Upgrades That Require Financing

Due to heightened demand of exports and processing potatoes, investment in technology offers great opportunities and such investments would require finances and only formal sector could cater to that.

- i. Primary processing also known as grading and sorting plants are needed by exporters which are present in Karachi as well as core producing areas of Okara District. Such plants do size grading, dust removal and packing at desired volume packs.
- ii. Emerging small seed companies using tissue culture and ELIZA labs to produce disease free quality seeds may require start up or project finance and working capital to develop this profitable yet beneficial business for the value chain.
- iii. Cold storage expansion, refurbishment, start ups are all lucrative as well as beneficial to the VC.
- iv. Transporters intending to develop cold chains which include fleet of temperature controlled vehicles as well as transit storage cold house and 'plug ins' for reefers. New reefer development plants. Also, bulk haulage of potatoes for processor and or exporters is yet another area of opportunity.
- v. Importers of new and old farm machinery, components of cold chains, reefer technology, seeds, specialty crop early warning systems, drip and sprinkler irrigation systems, grading and

processing lines are a few on the list of many would bring improvement and enhance profitability in the value chain.

Constraints to Financing of Producers Needs

Primary producers are backbone of the value chain yet they have to resort to financing their working capital needs through Arthi system. These potato growers are the most enterprising amongst all types of crop growers in the country raising a crop which requires the highest investment per acre.

Although almost all the Potato growers fall under the categories of SME but Banks have no way of categorizing and differentiating various types of growers. Also, Potato is a short duration cash crop and it requires 90-110 days to make it to the market. It's production practices keep them on their toes throughout the duration of the crop till it is sold, stored or send to processors.

For landowning producers the major costs in production are seeds (24%) and fertilizers (20%) without access to formal credit the producer has to pay hefty amounts in mark up to informal lenders (almost 50%). Cash advance on fertilizers for a 25 acre grower is around 400,000 PKR and for Seeds around 600,000. All together would require one million for these two crucial inputs would save him for paying 50% to informal lender. Lack of credit seriously undermines the production process. Whereas, for the growers producing on rented land have to pay PKR 40,000 per acre as an annual rental on the top of seeds and fertilizers.

Potato Processing

There is only potato chips manufacturing established in the value chain for now and the significant processors are Pepsicola (Frito Lays) and Ismail Industries (Kurleez) brands. Former having international presence has a loin share in processing. However, there are small fryers in all the big cities covering the snacks market and supplying bakery network in the big cities.

Links with Suppliers

Pepsico being the big processors is linked to its growers under contractual arrangement for the raw material. That's a significant way of covering the risk of the business. They have recently opened up new supply centres in the North for two main reasons. One, to ensure fresh supplies, which have better conversions, higher solids and lower oil pick up versus stored product. Two, it has reduced risk of supplies in the 2nd half of the year.

Suppliers in return get an assured price regardless of the glut in the market and better risk coverage for their produce besides better margins. Other processor, like Ismail industries, pickup the left over produce contracted by Pepsico but not uplifted due to lesser quality. However, there is no contractual arrangement but the buying price per Kg is a Rupee lower than Pepsico. This is further beneficial to both processor as well as supplier as the price still is better than the glut market prices.

Small cottage industry fryers, supplying groceries stores and bakeries, have no set criteria of quality or contractual arrangement due to their insignificant size. They used to process high sugar potatoes prior to introduction of low sugar potato varieties by big processors. Such high sugar varieties have serious quality issues but it was okay to place their product as a 2nd tier brand. Now, these small processors lift the rejected loads of potatoes by big processors to meet there demand for processing and still get a better quality than high sugar varieties they were used to process.

Availability and Utilization of Processing Capacity in the Chain for Different Products

As already mentioned, the top processor is only Pepsico followed by Ismail Industries. The processed volumes for the last three years are given in the following table along with estimated gross revenues.

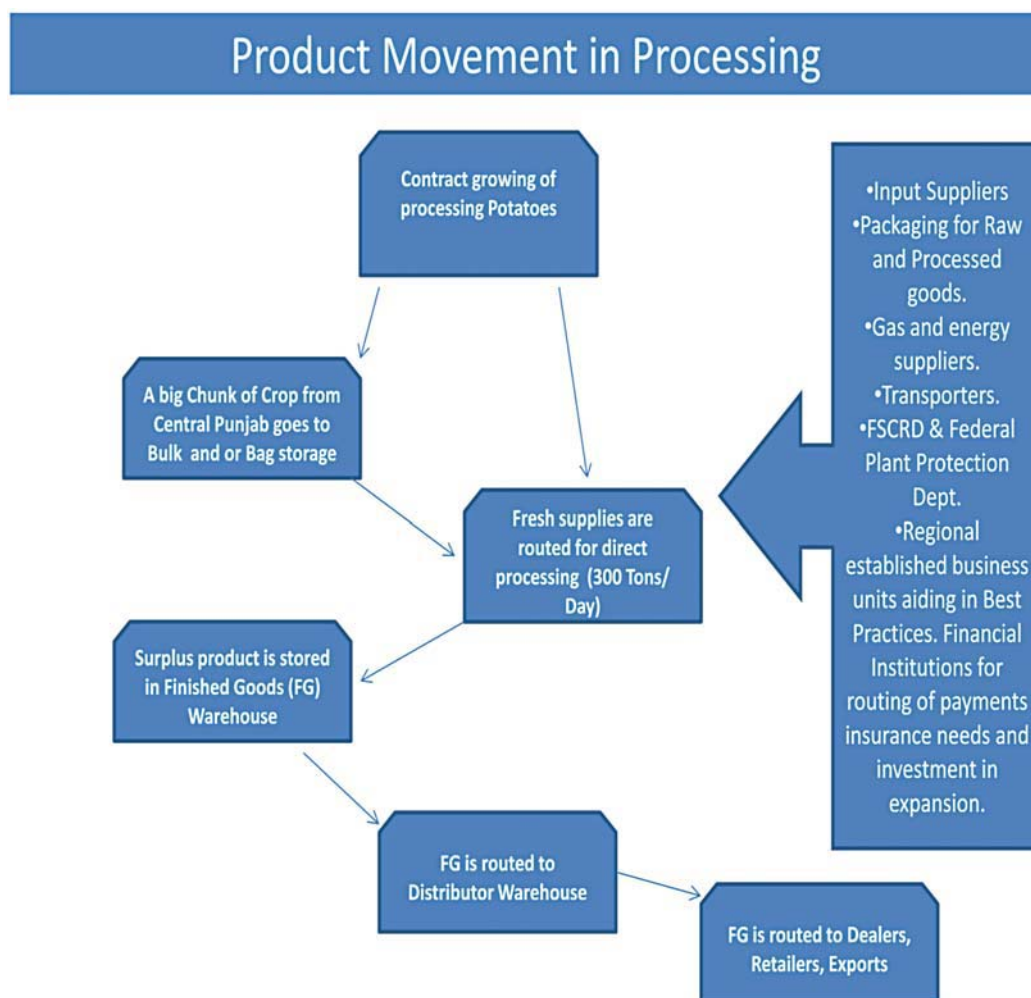
Table 4: Quantities and Revenues from Processing

Estimated Revenues from Key nodes: Primary production, Cold Storage and Processing					
Season	Area in 000' Ha	Production 000' Tons	Est. 000' Tons in storage	Est. Finish Goods produce in '000 tons	Est. Gross Revenues in PKR Million for Finish Goods
2010-11	159	3492	1048	34	34286
2009-10	139	3142	942	19	19444
2008-09	145	2941	735	16	15946

Availability and Use of Technology in Processing

Pepsico is using the most advanced processing technology which is their own patent. Other processors are using obsolete technologies so they cannot compete with Lays Brands in quality and preference by consumers.

Processing Throughput



Case Study of the Biggest Processor

Pepsico's Frito Lays operations started in 2005-06 by putting up a state of the art 30 million USD facility at Sundar Industrial Estate, Lahore. This facility has now being upgraded with the following capacities.

- Total Raw material (Processing Potatoes per day = 250 Metric Tons).
- Maximum through put per day = 70 Metric Tons of Finished Product.
- Total number of supplying growers in central Punjab---the core area is 100 growers.
- Total estimated growers in the North and North-West are around 2500.
- Total average exports to Afghanistan of finished goods are 50 tons.
- Annual estimated growth rate of the business is around 15%.
- By the year 2015, the company is expected to put another line and may be another processing facility in the South of the country (Karachi).
- This expansion would require to develop contract growing pockets in Sindh (Dadu, Nawabshah) and Baluchistan (Kalat, Khuzdar and Pishin Districts (see geographical MAP for these areas)

The 2nd in line, Ismail Industries (Kurleez Brand) has also put up its 2nd processing facility in Sundar

Industrial Estate with a small line having a capacity of Raw material to the tune of 50 Tons per day. Their strategy is to reduce freight costs in raw material and Finish goods and have a better coverage and margins in the central, North and North-Western regions of the country.

Financing Of Developments in Processing

Working Capital Finance

Big processors like Pepsico doest seems to have an issue in financing their working capital but during the peak buying period from Jan-Mar, they occasionally have a cash flow issue. However, small processors require working capital for purchase of processing potatoes and packaging material besides transport and warehousing. They also require cold storage space rental for their business security. The medium processors like Ismail Industry also require financing for working capital for purchase of processing potatoes, oil, packaging material, warehouse and cold storage rentals.

Fixed Assets Financing

Small and medium processors and start-ups require financing for imports of processing machinery, purchase pre processing bulk hoppers, grader, sorters, slicers, washers, and other related equipments to make a line.

Unmet Opportunities For Technology/Quality Upgrades That Require Financing

The following matrix depicts financing opportunities for technology upgrades in the processing value chain:

Categories	Opportunities
Big Processors	They are already advancing USD 4.0 million in the form of seeds to contracting growers. Financing in inputs, mechanical harvesters, sorters, graders and cold storage development and capacity enhancement. Also, new area development, and related irrigation equipment financing (drip & Centre Pivots systems). Cold chain and specialized vehicles for raw material as well as finished goods.
Medium Processors	Conditional financing should be tied to contract growing, Primary processing, Cold storage and self plantation (Business models already en vogue in China, Egypt, Saudi Arabia).
Small Processors	Start up and expansion financing, market access (local & Exports) and branding, cold storage rental and specialized vehicles.
New products in processing	Primarily the processing is confined to potato chips whereas there is an opportunities to use by products for starch making. Frozen Fries (French Fries) are yet another opportunity for local as well as export market. Estimated set up costs are PKR 40 million! Engro Foods Limited has a plan to initiate the frozen vegetable business and frozen fries will be inherent part of this new business under contract growing regime.

Constraints and Opportunities to Financing Processors Needs

The biggest constraints in financing of SME sector in processing are availability of ample securities and lack of appropriate products and mark up rates by the Banking sector. Also, the uncertainty in the energy sector is another constraint which is restricting growth of this sector.

The opportunities however exit for energy efficient processing technologies and introduction of renewable energy systems to power such processing. These renewable systems such as Geo-thermal, Solar, Wind and efficient heat exchanger could not be installed without appropriate long term financing regimes in place.

The financial institutions and central bank needs to realize the changing business environment both locally as well as globally to keep up with the pace of development.

Potato Markets

Following table gives the data on market size—local, exports and processing.

Table 5: Market Size

Area, Production, Storage, Exports, Processing volumes in '000' Tons						
Season	Area in 000' Ha	Production 000' Tons	Est.000' Tons in storage	Table Potatoes Exports in '000 Tons	Est. Processing Potatoes in 000' tons	Est. Potato Chips in '000 tons
2010-11	159	3492	1048	N/A	120	34
2009-10	139	3142	942	245	70	19
2008-09	145	2941	735	315	59	16
2007-08	154	2539	508	152	38	10
2006-07	133	2582	465	160	30	8

Agriculture Statistics, Processors, Field Estimates

Except for exports, there is a growing trend in for local market, storage and processing. These indicators are in line with the population growth as well as per capita consumption of potatoes as table as well as processed food.

Exporters have revealed this erratic trend is indicative of sustained quality requirement from various international buyers. This also offers an opportunity of investment in export oriented production practices including Global GAP certification which not only certifies the products for international markets but also provide information to all buyers internationally by inclusion in the list of the global suppliers.

A total of 3.4 million tons of potatoes were reportedly produced in the year 2010-11. Out of this quantity, around 1.0 million tons were stored, 120,000 tons and processed Refer to Value Chain Map. Potato production for processing has increased with an estimated average of 71% over previous years and the trend shows a steady growth.

Similar growth pattern are evident from the growth of the finished goods (Potato Chips). Therefore, the main driver behind this growth is the increased demand of finished goods by the end consumers. Also, there has been a significant increase in the export of finished goods which has increased profitability for the processors.

Market Channels

Both area and production shows an upward trend over subsequent years since 2006-07. However, exports show an erratic trend with a steady increase since 2006-07 till 2008-09 and dwindling afterwards and finally dipping to a merely 18,000 tons.

Table 1A shows volumes, values and destination for table potatoes whereas the value chain Map shows the breakdown of volumes and respective values at each node. 3.2 million Metric tons of table potato produced average PKR 10,482 whereas 63% of this volume sells generating a margin of PKR 4000 to 5000 MT in fresh sales.

Around 30% of this potato is stored and 7% exported to generate a value of PKR 14,483 per MT and PKR 17950 per MT, respectively. Potato Chips processed for local market and export generate a value of PKR 245,000 per MT.

All the nodes in the value chain: Primary production for table and processing potatoes, processing, exports of table and processed goods show a steady increase and holds promise for the overall growth of the value chain including cold storage and transports.

Key Stakeholders That Determine the Market Structure

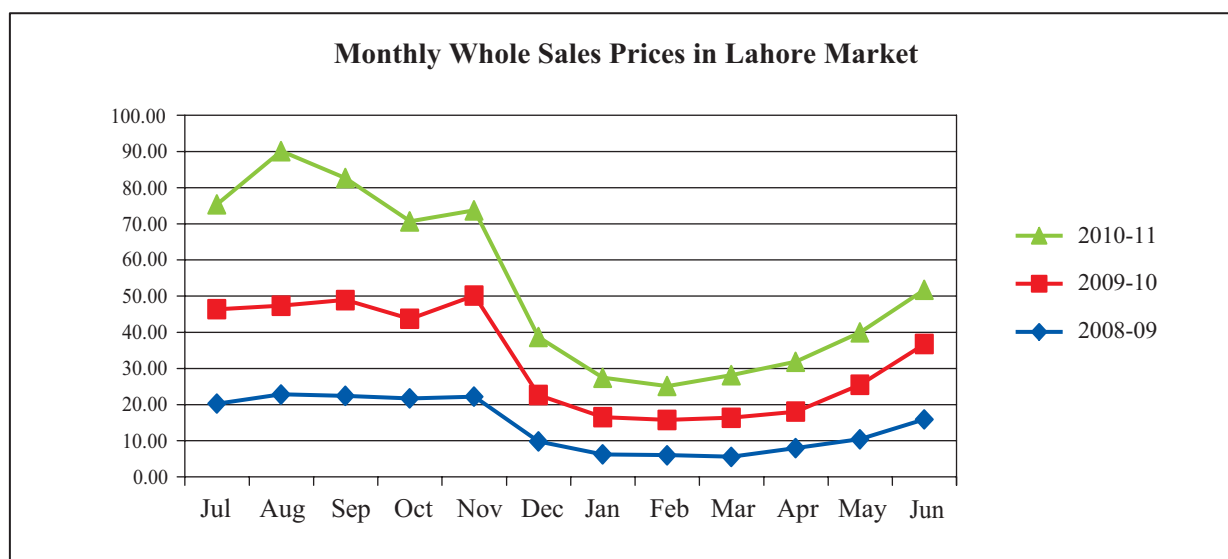
Prices of table potatoes are driven by the demand supply scenario in the market which is evident from the pricing trends of the wholesale markets as shown in the Chart (). However, whole sale prices are based on buyers demand and open bidding conducted by Arthis. The volume buyer then offers its produce for sales to retailers across the city and neighboring towns.

In contract growing, detailed cost of production working is carried out within the processing procurement team. Then it is negotiated with individual and group of farmers. The finance team of the processor then approves the buying price for the season and gets approval from management. This price is then announced in a group meeting of growers.

Market Risks

The biggest risks for the main crop have been frost and blight. Processors have introduced early warning systems for the monitoring of such threats which is gaining popularity with table potato growers also. Such systems provide accurate warning and growers resort to light ground water irrigation to combat frost and prophylactic sprays of fungicides to avert blight.

Figure 6: Monthly Wholesale Prices of Table Potatoes in Lahore Market



Source: Bureau of Statistics, Pakistan

Another threat for primary producers is the glut in the market where small to medium growers have to sell their produce in order to get liquidity to initiate the next crop and meet their operational expenses. Whereas, growers having sufficient finances put their produce in cold storages to look for better prices. The moment they meet their bottom line, they start selling.

The biggest risk for processors is the loss of crop and or availability of crop during the period starting mid October to mid December. Where crop in the core area is not available and full reliance on cold storage means more losses in production and less conversion. Such an issue is now being tackled with opening up of new growing windows in the North and North-West.

Lack of proper crop insurance is yet another threat to cover financial losses in case of crop failures. Processors however have initiated coverage of their seed advances through insurance. Crop insurance has yet to be undertaken in the value chain however the opportunity exists for both primary production and the processing business as discussed with the stakeholders. Processor, PI already undertakes insurance for seed advances of USD 4.0 million to cover the risk of this amount extended as credit. Also, they are keen to insure contract production volumes with their produces and built this cost in the cost of production.

Above all, financing of the Agriculture by banking sector is based on a generalized approach and this primarily is due to lack of policy framework and specific nature of products to be properly communicated to the customers. The credit packages needs to be oriented basing on value chains rather than merely crops, livestock and poultry. Similarly, there should be categorization on the basis of contractual and non-contractual farming besides global acceptability of suppliers on the lines of certifications. If a processors could extend USD 4 million advances in the form of input finance with a record less than 1% default rate, why not financial institutions design their products with effective market communication and branding strategy to seize such opportunities. They could also recover their advances in collaboration with the processors while procurement is being carried out.

SWOT Analysis

	Strength	Weakness	Opportunity	Threat
Profitability	Contractual growing, leverage through cold storage and sales in lean period, easy and cheap availability of farm labour.	Credit availability on easy terms through bank than informal credit on higher rate with no securities	Best Practices, and lower cost of production through credit availability on comparative advantage.	Climatic: Frost and Blight in core producing area.

Stability	Potato-Maize Pattern: Both contractual.	Lack of revolving crop based credit avails from banks.	Novel products to support value chain growth.	Higher lending rates by non-institutional creditors
Growth	Good quality land, ambient water supply and growing conditions. Sustained volumes and margins of Processors and contract growers.	Inadequate policy framework for institutional credit and reliance in informal lenders at a very high mark up.	Institutionalize credit for all players of the value chain, including contractor, input suppliers, Arthis, Whole seller and Retailers of both Table potatoes and finished goods.	Lack of appropriate securities of various players for institutional credit.
Regulatory Environment	Market committees, Provincial Government Agriculture Departments, Processors Quality Assurance Teams, Regulatory bodies at port of entry.	Besides market committee fee, no taxes levied on the produce. No regulation of Private lenders, such as input suppliers, Arthis, contractors, wholesaler	Rational taxation regime, regularization of informal lenders, Development of Levies on produce trading, processing and exports.	Political upheaval on land reforms and taxation as most of the legislators are big land owners.
		and Retailers of fresh produce.		

Job Generation	VC has a great potential of growth---more job creation both skilled and non skilled in area expansion, yield enhancement, technology interventions and credit extension on easy terms, processing and exports holds promise.	Lack of capacity for indigenous industry like seeds, slow improvement in cold storage development and cold chains. Reduction in trade restrictions to countries like India	Seed companies start-ups, grading, sorting, packaging and frozen fries industries, self cold storage facilities to SME growers. Crop insurance to cover crop failures.	Massive crop failures to poor and disease infested seeds.
Geographic Focus	Development in North, North-west for seasonality advantage.	Primary produces lack technical and financial capacity. No credit for SME on easy terms.	Credit on easy terms at all the nodes of VC. Regularization of informal lenders (Arthis, input suppliers, investors, cold store operators.	Bring margins down for the core areas.

Economics

Scope of Operation

Table 6: Estimated Revenue at Key Nodes

Estimated Revenues from Key nodes: Primary production, Cold Storage and Processing							
Season	Primary Production 000' Tons	Est. 000' Tons in storage	Est. Finish Goods produce in '000 tons	Est. Gross Revenues in PKR Million for Primary Production	Est. Gross Revenues in PKR Million for Cold Storage	Est. Gross Revenues in PKR Million for Finish Goods	Est. Gross Total Revenues excludig Services
2010-11	3492	1048	34	75207	4803	34286	114296
2009-10	3142	942	19	54766	3244	17500	75510
2008-09	2941	735	16	39663	1568	12757	53987

Source: Consultant's estimates based on published data Department of Statistics, Pakistan

Above table shows total revenues of primary production, storage and finished goods. Overall growth of the value chains shows a 51% growth in revenues over 2009-10. Primary production, storage and finish good, are all exhibiting progressive growth and growing at a rate of 37%, 48% and 96%, respectively.

Sources of Inputs, Major Buyers

Crop inputs are locally manufactured except phosphatic and potassic fertilizers being imported. Similarly, seeds are imported and locally multiplied and re multiplied to minimize costs.

Table 7: Use of Fertilizer and Cost

Estimated use of Fertilizers and its value in PKR Million				
Season	Area in 000' Ha	DAP (50 Kg Bag) usage	Urea Usage (50 Kg Bag)usage-	Total Value
2010-11	159	3188	51008	54196
2009-10	139	2632	39473	42104
2008-09	145	2030	24360	26390
2007-08	154	1929	19290	21219
2006-07	133	1535	12276	13811

Source: Estimated from Department Statistics published data.

Fertilizers usage in the value chain is given in the above table show an overall increase in value as well as quantity. Increase in quantity is attributed to increase in area rather than per unit use. Increase in area under production is around 15% whereas increase in value is to the tune of 28%. This clearly indicates inflationary trend over a period of one year, however, per unit use remains the same. The inflationary trend in this input could also be due to inadequate availability of institutional credit and enhanced reliance on non-institutional credit (Arthi, input suppliers & investors).

Cycle Turnover of the Commodity (Cash Conversion Cycle)

Following matrix depicts the cash conversion cycles at various nodes of the value chain:

Functions	Organization
Crop Inputs (seed, Fertilizers, Crop protection Chemical)	<ul style="list-style-type: none"> Seed imports a 4-6 months cycle starting from volume planning to ordering, opening of L/C, receipt of shipment and delivery to growers. From importers to dealers and to farmers the payment cycle on cash is 2-3 months with advance payment. Whereas, on credit, it might take 4-5 including planting, harvesting and sales of the crop. Fertilizer cycle on cash is from ordering to delivery to its final users and it takes 15 days to a month. Whereas, the credit cycle takes 3-4 months for duration of crop and its sales to market. Crop protection chemicals follow somewhat similar cycle.
Primary Production (Small, medium and Large Growers)	<ul style="list-style-type: none"> Small and medium growers sell most of their loads in the market at lesser margins, in order to pay back credits on inputs to non-institutional Creditors (NICs). Growers under contract with processors are in a better position and have better cash flows as their pay back from processors are based on weekly payments. Therefore having better liquidity they use cold storage space as leverage against market glut. Cash cycle here is 3-4 months in which seed advances are adjusted against produce procurement.
Storage (Cold Stores Operators)	<ul style="list-style-type: none"> Cold storage space for processors undergoes a monthly payment cycle. Whereas, for market potatoes it takes 4-6 months. Therefore the operators are in dire need of operational finance to meet their needs.
Transportation (Transporters)	<ul style="list-style-type: none"> Transporters under contract work on weekly payments whereas without contract on delivery of goods.
Processing	<ul style="list-style-type: none"> Processors in procurement run a 3-4 month cycle with producers whereas, the end buyers have an arrangement on invoice to invoice basis.
Markets	<ul style="list-style-type: none"> Grower-Arthi and Grower-Contract cash cycle on borrowed inputs continue for 3-4 months. Arthis mostly keep large portion of cash in this cycle from growers and extend cash to grower on need basis. This extra liquidity enables Arthis to have a daily or weekly cash flow with wholeseller and similarly the whole seller-Retailer cash flow.

Cost of Production

Primary Production—Growing table and or processing potatoes: Detailed component wise costs were validated and presented here in which Seeds and Fertilizers account for 40%. Looking at higher costs per acre it becomes imperative to have a viable credit at terms in single digit as the profitability here though is averaging around 24% but majority of Growers selling in the glut season only are able to get 9-10% and sometimes no profits for that part of the selling period during which the produce is coming to market from all direction. Inputs (Fertilizers and seeds) borrowed from Arthi even make the costs of production higher. For example, Bag of Urea selling at cash for PKR 1800 per bag is charged as PKR 2400 in credit (33.33 % for a period of four months of growing cycle). Similar margins are charged by other input suppliers extending credit to individual and or group of growers. The credit is extended through Arthi is without any guarantees and Arthis have dual advantage in getting commission on produce sold through him in the wholesale markets. The cost of production is detailed in Table 8 below. (Source: Growers in the core producing area of Okara District, Punjab.)

Table 8: Cost of Production for Table and Processing Potatoes

Growing Cost / Acre	2010-11	2009-10	2008-09
Land lease/crop	17,500	17,000	14,000
Land Bed Preparation	7,000	6,900	5,000
Sowing Charges	2,500	2,000	1,500
Irrigation	1,600	1,300	1,000
Seeds (PKR per Kg; 1200 kgs per acre)	24,000	21,600	18,000
Seed Treatment (Monserine)	3,000	2,700	2,200
Weedicide	3,500	3,100	2,500
Fertilizer - Urea (4 Bags/ Acre)	6,400	6,000	4,800
Fertilizer Basal - DAP (2 Bags/ Acre)	8,000	7,600	5,600
Inputs transportation	1,000	800	500
Application-Fertilizer	1,000	800	500
Farm yard manure	8,000	6,500	5,000
Harvesting	4,000	3,200	2,800
Plant Protection Measures	7,000	6,500	5,000
Diesel Cost for 15 Sprays	1,000	800	700
Seed transportation Cost	6,000	5,200	4,000
Earthing up	2,400	2,200	1,500
Digging	1,000	800	700
Packing/Filling	1,500	1,200	900
Total Cost Per Acre	106,400	96,200	76,200

Growers using rented land or partially rented, getting credit on fertilizers, chemicals and packing material are at the receiving end as their cost of production is even higher than what is shown in the table above. They also lack securities required for institutional credit yet they are the most productive and enterprising.

Gross Sales Value/Revenue

Table 9: Revenue at Key Nodes in the Potato Value Chain

Estimated Revenues from Key nodes: Primary production, Cold Storage and Processing							
Season	Primary Production 000' Tons	Est. 000' Tons in storage	Est. Finish Goods produce in '000 tons	Est. Gross Revenues in PKR Million for Primary Production	Est. Gross Revenues in PKR Million for Cold Storage	Est. Gross Revenues in PKR Million for Finish Goods	Est. Gross Total Revenues excluding Services
2010-11	3492	1048	34	75207	4803	34286	114296
2009-10	3142	942	19	54766	3244	17500	75510
2008-09	2941	735	16	39663	1568	12757	53987

Source: Department of Statistics

Gross sales value for the value chain, covering Fresh, Stored, and FG is given in the above table and gross total revenues for the year 2010-11 PKR billion 114 which are a whopping 51% increase over the 2009-10. Similarly, for 2009-10, total revenues are PKR 76 billion showing an increase of over 39% versus the previous year.

Similarly, this phenomenal growth in revenues for the value chain could be attributed to the growth of revenues in the FG which is 95%.

Export revenues though showed an erratic trend how these average around PKR 2.6 billion for the last three years and holds promise in investment in new primary processing (grading, treatment, packing and cold chains including cold storages).

Net Margin

Following table gives a breakup of net margins for actors in the primary production which is by far the predominant activity in the value chain.

Table 10: Net Margins in the Potato Value Chain for Various Actors (PKR/kg)

	2010-11	2009-10	2008-09
Grower (Fresh)	2.26	1.79	0.04
Grower (Processed)	4.02	3.83	4.79
Grower (Stored)	5.33	4.31	3.59
Cold Store Operator	1.00	0.72	0.63
Beopari(contractor)	0.21	0.18	0.14
Ahrti	1.24	1.08	0.86
Whole Seller	1.30	1.93	2.74
Retailer	4.12	2.71	2.14
Market Fee	0.22	0.18	0.14
Transportation	0.80	0.50	0.45
Cost at Farm Gate	10.48	9.67	7.71
Consumer Fresh	20.63	18.04	14.22
Consumer Stored	23.49	20.38	17.63

Source: Growers in the core producing area of Okara District, Punjab Province.

Margins for contract growing is higher and assured but is lower than stored product which is not sustainable and depends on demand/ supply. Mostly growers do not have additional resources to invest in storing and getting leverage in off loading their product for sales while the prices are higher. This opportunity usually is cashed by Ahrti, Whole seller and other investors whom even might be outside of the value chain. Some investors just watch the demand/ supply and pricing trends and jump in the value chain to make a quick buck as it is true with all the other trading businesses and real estate business.

Table 11: Margins in the Value Chain

Margins in Mil. PKR	2010-11
Sub Functions	PKR Mil
Grower (Fresh)	4414
Grower (Processed)	304
Grower (Stored)	4950
Cold Store Operator	928
Beopari	402
Ahrti	3826
Whole Seller	4029
Retailer	12754
Market Fee	666
Transportation	2793
Total Margins	35066

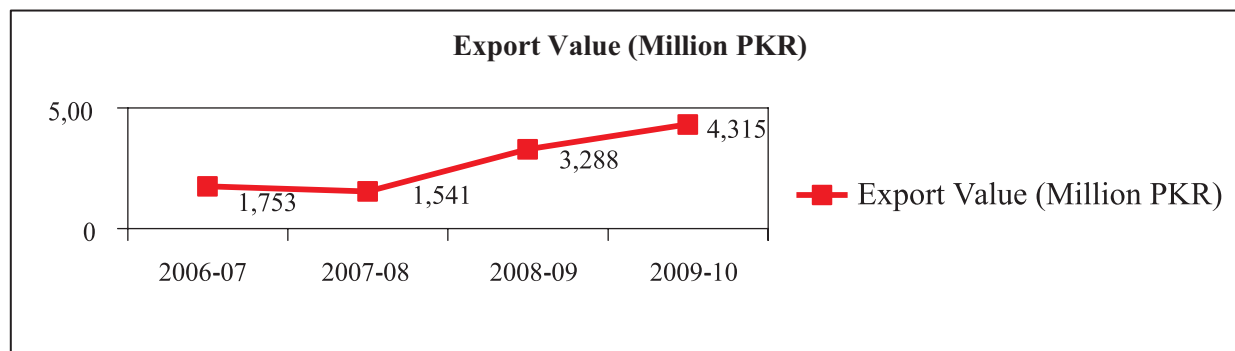
(Source: Consultant's Estimate based on field investigations)

PKR 3.5 billion margins highlight greater opportunity area for lending where Growers and Arthis are already availing institutional credit through limits from Banks at 18% or higher rate but the scope is limited and it needs to be rationalized by bringing in innovative products. Only large growers having higher equity in the form of land are able to get institutional credit whereas they get lending from banks for 1/7th the value of their land.

In contract growing, one processor, Pepsico, is advancing 4 million USD in the form of seed without any appropriate security to the contracted growers in the form of good quality seed. These contracted growers could be advanced loans for buying other inputs which will resolve their cash flow issues for the next maize crop which is also mostly contracted by Rafhan Maize products. This would also enable them to increase their profitability by using cold storage and leveraging for opportunity of price hike once the glut is over.

The export data of the fresh and stored produced shows that though the volumes dipped a bit in the last year but the margins showed an upward trend. Due to the better margins the top exporters are enthusiastic about enhancing their primary processing of sorting, grading and packing and cold storage for sustaining and upward trend in volumes by meeting quality parameters of the international markets.

Figure 7: Exports of Table Potatoes (Million PKR)



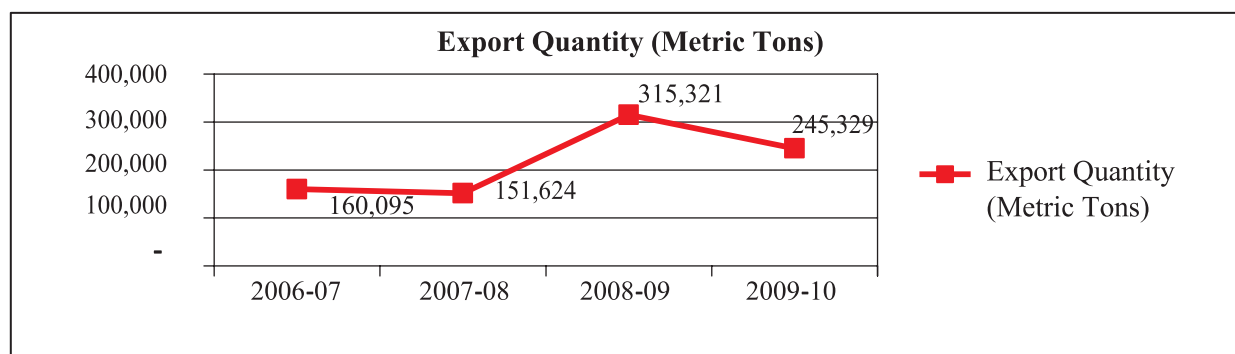
Source: Bureau of Statistics, Pakistan

The investments and financing opportunities are promising if the desired financial products are offered as development finance on easy terms. Exporters indicated their interest in Islamic finance in enhancing the capacity of processing and grading plants for exports.

Similar interventions in Citrus and Mango value chains have shown proven improvements in the value chain in enhancing capacity, quality and exports.

Our cost of production has a definitive advantage within and across the regions. Quality interventions and certifications like Global GAP could make us further competitive and accessible in the global trading ultimately enhancing our exports revenues and margins.

Figure 8: Exports of Table Potatoes (Metric Tons)



Source: Bureau of Statistics, Pakistan

Financial Sources

Majority of primary production players, resort to indulge in non-institutional credit sources for financing their fixed costs and capital investment due to cumbersome procedures, documentation and lack of understanding of Banks for credit.

Arthi though seems to get only 6% on the produce traded in market but have other sources of margins for advancing crop inputs and cash for growers to meet their operational costs. In this business is most often than not is conducted in collaboration with crop input supply dealers. As the following table shows the kind of margins are earned by non-institutional creditors from growers.

Table 12: Fertilizer Profit Margins through informal Credit

Fertilizer Profit Margins on Credit 2010					
Product	Dealer Sales Price	Grower Price on credit	Margins	Profit for Crop % (4- Month Cycle)	Profit Per Annum %
DAP	4200	4800	600	14.29	42.86
Urea	1800	2400	600	33.33	100.00

Sources of debt financing and their terms/conditions (collaterals, interest, loan terms, etc)

There are two distinct groups as already mentioned. One is institutional through banks and the other is non-institutional.

The non-institutional sources are Processors for contract growers, Arthis and input supply dealers. The needs for liquidity in the market to some extent are also provided by investors outside the value chain (private investors?)whom provide finances to Arthis, growers and input supply dealers and get a bite out of the pie.

One of the leading processor indicated that they have advanced USD 4 million in seeds to contracted growers without mark up to be adjusted in the procurement of the produce. This strategy not only enables the processor to drastically reduce their COGS but it also translates into their Net Operating Profit. The strategy also enables the primary producers to enhance their profitability along with their cash flow to move into another contract arrangement with another company for the following Maize crop (Rafhan Maize Products). Such contracted growers also get contracted for value added contract seed production in both of the value chains and it's significant to analyze both as the cash flow from both the chains cross over each other in a symbiotic way.

Access to Finance

Financing of Working Capital at Each Node of the Value Chain

The following matrix describes the input supply financing of various actors in the value chain:

Functions	Financing arrangements
Crop Inputs (seed, Fertilizers, Crop protection Chemicals)	<ul style="list-style-type: none"> ○ Seed importers work on advance payment and a portion of the total order say 20% is received from dealers against their order. Similarly, dealers book orders of grower by getting 20% of advance. The remaining amount is paid on delivery of order. Seed importers also have limits from Banks and some have reported to get import fiancé from 12%-15%. ○ Fertilizers dealers have revolving bank guarantees for 3-4 months for purchases.
Primary Production (Small, medium and Large Growers)	<ul style="list-style-type: none"> ○ Large growers get limits from the bank for their operational costs and purchase of crop inputs. ○ Small to medium growers get crop inputs on loan from Arthis whereas Arthis loan these inputs in collaboration with dealers to growers and margins are around 100%. Small to medium growers have no option as it is difficult for them to get loans from banks. How do they finance their inputs?...savings? Friends and family?
Storage (Cold Stores Operators)	<ul style="list-style-type: none"> ○ Cold store operators also get limits from bank on around 18% plus for operational costs which is further extended to growers and traders whom use the storage space. ○ Processors also have rental agreement and they pay in advance for their stored produce.
Transportation (Transporters)	<ul style="list-style-type: none"> ○ Transporter only use finance for leasing new or used vehicles. They use both banks as well as investors in the market at higher rates as lack of awareness and proper securities are not available.
Processing	<ul style="list-style-type: none"> ○ Processors extend seeds as an advance to grower without mark up which is adjusted while procuring the stock.
Markets	<ul style="list-style-type: none"> ○ Local contractor uses Arthis money for booking the produce from growers. Arthis and Whole seller have credit arrangement with each other. ○ Retailers get credit from Arthis and Whole Sellers. ○ Arthis get limits from the banks to partially cover their business. They get inputs from supply dealers and hence share the profits with them once the crop is traded at the market.

Financing Products Available and Used

There are various products available in the market through banks but it seems there is no effective communication strategy to approach customers for such products. Ironically, such products are only available on the websites of the banks whereas the primary producers in the rural areas have no access to internet but to mass media which is Television and Radio. There are hardly any projections of such products on the mass media. Here are a few examples:

http://www.askaribank.com.pk/agriculture_banking.php#

<http://www.nbp.com.pk/KisanDost/KDBenefits.aspx>

http://www.mcb.com.pk/agriculture/default_2.asp

http://www.mcb.com.pk/agriculture/grower_finance.asp

<http://www.bankalfalah.com/zarie/index.asp>

All the products have no information on mark up and it is not possible for the common man to understand. On the other hand, financing from non-institutional creditors in each market are offered though on higher margins but no cumbersome and lengthy procedures are required.

Terms of Finance

Institutional lending: Term of finance for Agricultural credit by banks under the revolving credit scheme is for three years and required documentation once as per the policy. However, mark-up rates are fixed by commercial banks as per their own fiscal plan and there is no restriction from SBP. The norm however is KIBOR + whatever rate the bank charges.

Mostly of the growers, Arthis, and cold store operators however indicated that bank charges 18% plus 2% insurance and 1% processing charges. The same holds true for seed and PPC importers with the exception of one seed importer whom was able to get import finance from KASB at 12-15%.

Focus group meeting conducted with growers, exporters, Ahrti, revealed the constraint in getting access to finance through banks. Growers were getting a total 21% against 1/7th the value of Agricultural land pledged. Other players also get financing from banks on similar conditions. The group also indicated over 30% of the crop is in the cold storage but there is no facility available on the hypothecation of the stocks which worth millions of Rupees. They leverage the storage for a better market price. Therefore, the loan should take into the account the storage period also. This strategy of storage though saves them from the glut in the market however it create serious liquidity issue and hinder the operations of the next crop---Maize.

The group also highlighted that the banks in the higher management cadre should have people having the sector background and a thorough understanding of the ground realities and terms of finance should rather be based on the crop cycle and liquidity of the customer.

Constraints in Using Existing Financing Products

Financing products with different brands names are available with various banks but the feedback from the market reveals there is no effective market communication in place regarding the awareness of such products targeted towards the customers. On the contrary, input supply companies have an effective communication plan, crop specific literature and market development and technical personnel in the field to actively provide services to their customers.

(Customers are also unaware of any Islamic financial products offered by Banks majority of customers however showed interest in using such products if available).

The informal sector, on the contrary does not require that kind of communication strategy as they have become an inherent part of the value chain and the customers have interaction either directly or through their agents in the field.

Role of the Arthi System in the Potato Value Chain

Arthi is the uncrowned King of the wholesale market. Running the whole show from open bidding to advancing growers input needs and enjoying highest ever ROI in advancing despite high risk lending to growers.

In input financing the profits are shared so are the risks with input suppliers. The product flow shows that 90% of all the produce coming to the market goes through Arthis on which they charge 6% and this has no risk whatsoever as it requires no investments.

The data shows Arthis gross income is around PKR billion 4.0/per cycle? Per what quantity?.Please cross reference this to the data concerned. This amount is partially used to Finance crop inputs which may easily go up to a total of PKR billion 1.5. The remaining gap could be easily filled by banks in at least a quarter to meet the Arthis financing requirement for crop input finance.

Financing of Fixed Capital

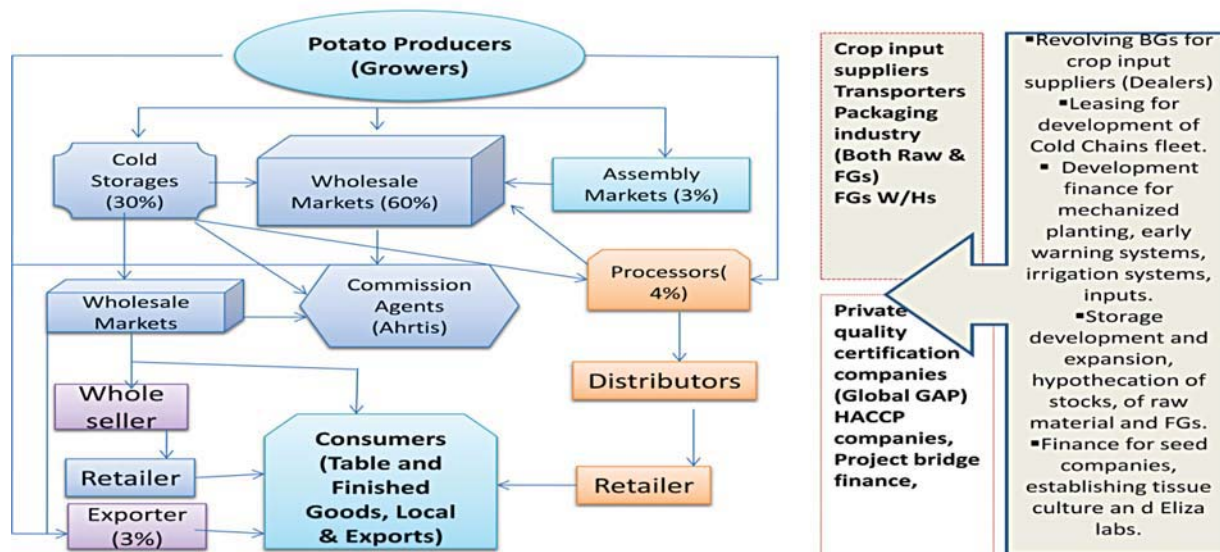
Majority of the stakeholder interviewed regarding different financing products and they were completely oblivious of any specific products for the value chains. Surprisingly, they only talked about the limits for which the security was their valuable land. The same was true for Arthis and seed importers. The biggest cold store operator whom was also a seed importer said that he is not aware of any product available to assist his expansion plans for cold storage. The biggest exporter/ Arthi/ Grower and contract grower said he was using term finance/ limit for partially meeting his operational expenses at 21%.

Banks websites are however decorated with all kind of products for which none of the evidence was found while interviewing Growers, Arthis, Processors, exporters, cold store operators and input suppliers. One of the leading cold store operator whom also had contractual storage obligation with a leading processor, said that he applied for a cold store development scheme from state bank, which he ultimately had to relinquish because of red-tapism and cumbersome and irrational process in which the bank asked for invoices for the work which was yet to be undertaken.

Reviewing the SME bank website one could find hardly anything of substance and the security required to get an SME loan is an urban property. How could one doing business in rural area has access to urban property to be pledged as a collateral. The crux of all this however lies in the way ZBTL operated in which political influencing and loan write offs has deteriorated the Agriculture finance market and deterred other commercial banks to develop any meaningful products and yet to do any meaningful business in this potential sector.

Opportunities for Value Chain Development Finance

Finance required at various Nodes of Value Chain



Looking at the above actors within the value chain the kind of value these are generating ((Refer to VC MAP for value generated)), makes a potential case for development of viable and sustainable products. The links are highlighted in the schematic above where types of finances required are indicated.

Value Chain Actors Who Can Effectively Support the Potato Value Chain If Provided With Access to Financial Services

Lead processor is already extending advance to growers in the form of seeds to the tune of USD 4 million with less than 0% recovery issues as disclosed by the financial controller of PI Check and adjust. Finances in this part of the value chain for input supplies could easily get adjusted at procurement and routed back as a recovery.

Arthis are another faucet of the value chain where innovative products could be supportive of the value chain and recoverable. They could also act as an agent for bank for his area and could work on certain percentage or profit sharing basis in extending finances to growers and responsible for recoveries.

Similarly, cold storages could be facilitated through hypothecation of stocks and this node is responsible for 35% of the total primary produce.

Lastly, exporters which also have primary processing, could be another crucial node where appropriate packages could yield tangible and sustainable outcomes.

External Factors That Could Increase the Risk of Lending In the Value Chain

Natural calamities, like floods, disease epidemic such as blight and severe frosts are the potential risks for the primary production part of the value chain. However, there are early warning systems and remedies are available for frost and disease. Also, a crop insurance mechanism could be made mandatory just as insurance of beneficiaries and loaned amount could also increase the security of the loan.

Enabling Environment

There are various formal and informal actors/ institutions which play supportive role in the value chain.

Provincial and National Research and Development Institutions and line Departments

All the Provinces have well established R & D institution. After passage of 18th amendment to the constitution which resulted in devolution of power to the Provinces, most of the support functions are vested in the Provincial R & D and their line departments.

There are exclusive Potato Research Institutes in the Provinces which have active varietal screening and germplasm testing and maintenance program. For production, comprehensive guidelines are available to primary producers in the form of booklets and pamphlets for production and best practices and such information is available at very nominal cost. There are soil and water testing laboratories at district levels and for a small fee these laboratories provide testing, analysis and guidance services.

Each Provincial Agriculture Department also has Market committees (MCs) to regulate and administrate marketing services in collaboration with District Administration. These MCs also establish the daily retail prices which the retailer has to display at their outlets. The MCs levies 1% as market fee on trading of the produce.

Federal Seed Certification and Registration Department (FSCRD) under the Ministry of Food Security regulate the local and imported seed varieties. For imports there is an approved list of varieties and any new variety has to be tested prior to its approval and inclusion in the list. The list is revised on annual basis for inclusion and exclusion of varieties. However, there is no variety protection law in place to protect the intellectual rights of any particular variety and in case of Potatoes which is propagated vegetatively it's difficult for companies to maintain their seed stock as there are chances of pilferage and loss of business.

Fertilizer Act of the Federal Government is comprehensive in its coverage to regulate manufacturing, movement, import, export, quality and testing procedures. Provincial Governments have also promulgated the Act at Provincial level. The enforcement is through Agriculture Extension Department.

Private Sector

Private Organizations such as, Engro Fertilizers, Fauji Fertilizers, Fatima Fertilizers, Daud Hercules, not only provide quality products but their technical field personnel provide technical services to enable produces in streamlining their production operations. Similarly, Plant protection companies, such as Syngenta, Bayer Crop Sciences, FMC, Jafer Brothers, Ali Akber Group and 4-B, also provide good quality product through their extensive dealer network as well as technical services through their field based operatives for good production practices.

Semi Government organizations such as Agribusiness Support Fund (ASF) and Pakistan Horticulture Development and Export Company (PHDEC) under their mandate facilitate producers in adopting new technology, assisting in training for certified production (Global GAP) and promotion for Exports.

Services

Although service providers are covered to a greater extent in the enabling environment and other chapters, however, various services providers are covered and discussed in the following matrix:

Service Providers	Services
Cold Storage Operators	For both, processing and table potatoes, 35% of produced goes to the cold storages on space rental. There is an association in the core producing area which at the start of each season sets a rental for storage. It's a significant business service and processors, growers, exporters, volume traders simply cannot have their businesses work without such services. These services providers are an inherent part of the value chain.
Transporters (Ordinary, Bulk & Cold chains-Reefers)	Input supplies as well as raw material and finish goods movement requires a robust transportation systems. Increase in overall volumes in the value chain has resulted in an increase in transport companies as well as improvement in services. Cold chains however are an opportunity area where investment is required similar to dairy and meat value chains for increasing service delivery.
Input supply companies Providing Technical Services	As part of marketing services, various input supply companies maintain proactive outreach programs servicing the technical needs of the end users of their products, by providing free soil and water testing, conducting field trials, crop seminars and informational crop and product specific literature. The services here are targeted, updated and result oriented and has earned reputation amongst all the stakeholders. Processors also provide field trainings to contract growers in production, food safety, sorting, grading, post harvest practices to reduce losses and improve quality besides early warning system through a weather station and crop modules for combating disease and frost. They also provide input loan in the form of seed advance without interest.

Public R & D and Outreach Organizations	Public R & D and Outreach Departments also provide similar services but they are not organized and result oriented. They lack commercial touch and producers are yet to have their confidence in their advice and guidance. Their approach is generalized and not market specific.
Semi Government Organizations: ASF, PHDEC & SMEDA	<p>ASF under its new project supports post harvest interventions such as grading, packing export and cold chains by matching grants. Their grants range from USD 5000 to 1.5 million.</p> <p>PHDEC also promotes exports oriented efforts by primary produces and assist them in value addition through data, access to market info, etc.</p> <p>SMEDA has done comprehensive market based studies, feasibilities to assist producers, processors and other stakeholders in bringing more value to their production systems.</p>
Informal Lenders	These Arthis, Whole sellers, Beoparis and other investors which though outside the main stream value chain however have significant impact on the cash flow by filling the gaps in liquidity of the actors---mainly growers. They are in the high risk high margin for their loans for the crop cycle (3-4 months).business and charge dearly.
Formal Lenders	Financial Institutions is discussed in details as follows:

Financial Institutions

Agricultural land under the passbook system, urban/ rural property, commercial property, Defense Saving Certificates, Special Saving Certificates, Gold & Silver Ornaments, Personal surety, hypothecation of livestock and other assets e.g. motorboats / fishing trawlers, etc. are generally accepted by banks as collateral. However, it's the sole discretion of the bank to accept or reject any of the above collateral as a security.

Conclusions and Recommendations

Prior to providing recommendations on the products it is imperative to prioritize crops/ sub sector amongst the whole Agriculture sector based on merit, risk, recovery and profitability. Also, it is important to scrutinize individuals on the basis of background checks, per acre yield, etc for a pre-credit assessment.

Recommendations for Financing Products Most Suitable To the Potato Value Chain

For coverage of all the crucial functions and actors in the value chain and suitable products the following matrix is presented. The recommendation here is to finance the contract growing of processing potatoes, related transportation (both bulk haulage and bagged transport), crop inputs (seed, CPCs and fertilizers).

Functions/ Actors	Products
Crop Inputs Suppliers: (seed, Fertilizers, Crop protection Chemicals (CPCs))	<ul style="list-style-type: none"> Seed imports: Import finance for seed imports in the form of L/C between 12-15% (Already offered by a commercial bank). Seed Company: Project finance for Start ups, expansions, processing storage and marketing. Fertilizer: Revolving BGs for four months against 75% equity in rural or urban property and the remaining on cash to registered dealers of EFL, FFC and other good companies. CPC: Similar as Fertilizers for companies like Syngenta, Bayer Crop Science, FMC, Ali Akbar Group.
Primary Production (Small, medium and Large Growers)	<ul style="list-style-type: none"> Seed and Fertilizers loan for four months to growers or group of growers landowners (5-25 acres) against passbook which is renewable without further documentation for at least two crop cycles (Potato-Maize), preferably at KIBOR+5%. Isn't this what is happening at present? Landless growers working on rented land to be given crop input finance under surety of land owner or on two personal guarantees. Medium to large land owning growers to be given Revolving TF for crop inputs and the range for inputs: seeds and fertilizers to be calculated for 50-250 acres based on the size of their land against passbook and the loan should be 75% of the current market value of their land.
Storage (Cold Stores Operators)	<ul style="list-style-type: none"> Cold storage space for processors to be prioritized for working capital finance as they get paid by processors on monthly basis against marked lien and contract with processors at an appropriate rate. Such as KIBOR+6% Project finance for start-ups, expansion, remodelling for energy efficiency, renewable energy, and import of parts. Advances against hypothecation of stocks.

Transportation (Transporters)	<ul style="list-style-type: none">o Leasing on cold chain development, refrigerated vehicles, reefers, and vehicles for bulk hauling.
Processing	<ul style="list-style-type: none">o SME processors to be advanced for working capital for procurement of raw material, expansion, import of additional lines, cold storages, against appropriate securities.
Markets	<ul style="list-style-type: none">o TF for Arthis for crop input advances (4-6 months and revolving).o Export finance for the potato and FG exporters on favorable terms.o Project finance for primary processing plants (Graders, cleaners, packers).

Recommendations for Effective Contract Farming (Out-Grower) Financing Schemes

Potato contract growing, historically, after Tobacco contract growing is the most suitable nexus for lending in an agricultural value chain. Pepsicola international, has evolved successful contractual growing regime and has achieved a zero default against their seed advances of USD 4 million. They have since 2005-06 minimized their risk to business by investing in technology, good quality seed and assured procurement price which ensures better margins to growers against the glut.

Commercial lending for crop inputs, such as fertilizers, CPCs, machinery and cold storage spaces for contractual actors could be a start for commercial banks to devise products suitable to the needs for these SME growers.

Product could be devised using a tripartite agreement involving Pepsico, grower/ cold store owner and the bank and recovery is made through the Processor once procurement is completed. Contracted transporters could also be financed for their need in this node of the value chain for bulk haulage vehicles, reefers and other cold chain components.

On similar lines, other value chains which cross over potato value chain, such as maize could be considered for similar types of financing where Rafhan Maize products undertakes contractual growing with same and or different group of farmers.

List of Stakeholders Consulted

Sr #	Actor	Category/ Profile	Address
1	Dr. Khalid Farooq	Enabling Environment	R & D, Head of Potato Research, Vegetable Section, NARC, Islamabad
2	Mr. Amjad Awan	Input supplier (Seed, CPC, Fertilizers)	Babu Ashiq Seed Company, F & V market, I-11, Islamabad, 0321-5232414
3	Mr. Awais Khan	Ahrti and whole seller	F & V market, I-11, Islamabad,
4	Mr. Haji Rasheed	Ahrti	Babar Rasheed & Company, F & V market, I-11, Islamabad, 0300-5304876
5	Ch. Muhammad Arshad	Ahrti	Imran Saqib & Company, F & V market, I-11, Islamabad, 0306-4346791
6	Ch. Waqas Akbar	Ahrti	Punjab Commission Shop, F & V market, I-11, Islamabad, 0300-5011605
7	Haji Rehmat Ali	Ahrti	Manna Sons, F & V market, I-11, Islamabad, 0333-5115920
8	Mian Sanaullah Daula	Mega Contract, Ahrti, Exporter, Seed importer, High roller investor.	Ghousia Commission Shop, Potato Market, Depalpur, Distt. Okara. 0300- 695-3916
9	Ch. Shafique Ahmed	Contract grower, seed producer, Contractor.	Depalpur, District Okara. 0300-6959475
10	Mian Saeed Watto	Contract grower, seed producer	Depalpur, District Okara. 0323-9001111
11	Babu Khalid Mahmood Siddiqi	Cold storage operator, Seed importer, ice factory owner, high roller investor	Depalpur, District Okara. 0300- 4100173; 0444540210
12	Mr. Shoaib Raza Khan	Agri Mall owner/ Operator, Crop input supplier (Big Distributor of all crop inputs)	Zai Agri Complex, Depalpur, District Okara.
13		Biggest Ahrti of Potato heaven	Malik Brothers, Depalpur, District Okara..
14	Ch. Maqsood Ahmed	Ahrti, Vice President Potato growers Society,	Okara.

		Seed Distributor, Editor of Kissan Wing	
15	Dr. Ali Azhar Rao	Champion Progressive contract grower for Potato and Maize, Cold store owner, Potato variety researcher, seed producer.	Depalpur, Distt. Okara. 0322-7474139
16	Dr. Ashfaq Rao	Potato Expert, Incharge Quarantine Dept.	Plant Protection Dept. Lahore. 0333- 4372636; 042-36818403
17	Mr. Tariq Rasheed	Mega Contract grower of stock and seed potato in Kasur; Farm Machinery importer, Crop early warning system practitioner.	Pak Belgium Agri Pvt. Ltd. Lahore. 0300-8499445
18	Mr. Tariq Masood Khokar	Agro Field Manager, Contract growing expert and procurement of processing potatoes.	Pepsicola International Pvt Ltd. Lahore. 0302-8485710
19	Furqan Ahmed Syed	GM Snacks, Head of Processing Potatoes Business.	Pepsicola International Pvt Ltd. Lahore. 03008485886
20	Mr. Irfan Ghani	Financial Controller Snacks Business.	Pepsicola International Pvt Ltd. Lahore. 042-35871913
21	Ch. Adeel	Bag and Bulk stores, Bulk hauling contractor and cold store contractor for Pepsico.	Depalpur & Lahore. 03008433825
22	Mr. Ali Irshad	Progressive Contract Grower	Daska, Distt. Sialkot. 0300-4335388
23	Brig. (R) Ahad Muzaffar Shah	Progressive contract grower	Kasur, 0300-4948620
24	Mr. Gulbaz Afaqi	President Soan Valley Organization	Soan Sakesar. 0301-8603202

25	Col. Zaheer	Potato grower	Kasur. 0300-5001222; zaheer161@ymail.com
26	Mr. Saeed	Arthi	F & V Market, Lahore, 0300-4913073
27	Mr. Mansur	Arthi	F & V Market, Lahore, 0300-840-4319
28	Ch. Shams	Arthi	F & V Market, Guranwala,
29	A.Q Khan Durrani	Exporter	Durrani Associates, D-25, Block-6, F.B Area, Karachi. 021-36349491; info@durrani-associates.com
30	Mr. Imtiaz Hussain	Exporter	Imtiaz Enterprises, 2 & 3, new F & V Market, Super Highway, Karachi. 0333- 2111495, info@imtiaz.biz
31	Ms. Jane Aster	Quality Assurance Manager, Exporter	Roshan Enterprises, B-51 Rizwan Society, Main University Road Karachi, 021-34691665-7, roshan@roshan.com.pk
32	M. Naveed Anwer	Export Manager, Exporter	IMTIAZ ENTERPRISES (BRC, IFS, ISO 22000, ISO 9000 & HACCP Certified Co.) No. 2 & 3, Karachi Market New Sabzi Mandi, Super Highway Karachi, Pakistan Phn: +92-21-36870453, 36871660
33	Mr. Saud Ahmed Pasha	Director Agribusiness Development. Potential Contract growing company.	Engro Foods Limited, Harbour Front Plaza, Karachi. 0300-831-3262
34	Khalil Ahmad,	Business Development Manager, Seed importer, Wholesale distributor of crop inputs in the North	Western Agri Products Pvt Ltd, Blue Area Islamabad; khalilahmad33@yahoo.com , 051-2605658
35	Mr. Nasir Iqbal	Zonal Manager North, Fertilizer manufacturer, importer and Distributor.	Lahore. 0300-2017241
36	Mr. Saeed Iqbal	Planning Manager, Fertilizer Manufacturer, Distributor	Lahore. 0300-3110085
37	Mr. Tari Harni	Wholesale Fertilizer Distributor	Depalpur, Distt. Okara. 0300-6959622

Bibliography

- 1 Muhammad Khalid Bashir and Muhammad Azam, “Credit and the Agriculture Sector of Pakistan”. Agriculture: Challenges, opportunities and options under free trade Regime.
- 2 Nasrullah J. Malik Potato in Pakistan. A hand book. 1995. Pakistan Swiss Potato Development Project.
- 3 Paul Wooster. Development of a national potato seed strategy..
- 4 Winfried Manig. The Importance of the Informal Financial Marketfor Rural Development Financing in Developing Countries: The Example of Pakistan.
- 5 Sarfaraz Khan Qureshi and Akhtar H. Shah. A Critical Review of Rural Credit Policy in Pakistan. 1992. The Pakistan Development Review. 31:4 Part II, PP 781-801
- 6 Saima Ayaz etal. Role of Agricultural Credit on Production Efficiency of Farming Sector in Pakistan. 2011. A Data Envelopment Analysis. Pakistan Journal of life and social sciences, 9(1):38-44
- 7 Naushad Khan etal. 2011. Review of past literature on Agriculture Credit in Rural Areas of Pakistan. Sarhad Journal of Agriculture. Vol.27, No.1.
- 8 J.U Ahmed. 2011. Services Rendered by commercial Bank: A customer Oriented Evidence From State Bank of India. Vol.1, No.-2.