



# Feasibility Study

## Project: Establishment of Cool Chain System under National Trade Corridor Improvement Program

For Option: Provincial Mix less Testing Laboratories

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Deliverable 2 Phase I

Infrastructure Project Development Facility

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# List of Acronyms

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BCR	Benefit to Cost ratios
BOO	Build Own Operate
BOOT	Build Own Operate Transfer
BOT	Build Operate Transfer
CA	Controlled Atmosphere
CAS	Controlled Atmosphere Store
CCC	Cool Chain Cell
CCS	Cool Chain System
CEO	Chief Executing Officer
CS	Cold Store
DCF	Discounted Cash Flow
DISCO	Distribution Company
DMAIC	Define, Measure, Analyze, Improve and Control
DSCR	Debt Service Coverage Ratio
EDF	Export Development Fund
EOI	Expression of Interest
F&V	Fruits and Vegetables
FAO	Food and Agriculture Organization
FCFE	Free Cash Flows to Equity
FCFF	Free Cash Flows to Firm
GDP	Gross Domestic Product
GOP	Government of Pakistan
HACCP	Hazard Analysis and Critical Control Points
HRD	Human Resource Development
IPDF	Infrastructure Project Development Facility
IRR	Internal Rate of Return
KG	Kilogram
KIBOR	Karachi Inter Bank Open-market Rate
LLCR	Loan Life Coverage Ratio
M Tons	Metric Tons
MINFAL	Ministry of Food, Agriculture and Livestock
MoC	Ministry of Commerce
NEPRA	National Electric Power Regulatory Authority
NOC	No Objection Certificate
NPV	Net Present Value
NTC	National Trade Corridor
°C	Celsius
°F	Fahrenheit
Opex	Operating Expenditure
P <sub>3</sub> / PPP	Public Private Partnership
PHDEC	Pakistan Horticulture Development and Export Company
PKR	Pakistan Rupees
R&D	Research & Development
RCC	Reinforced Concrete Cement
SEZ	Special Economic Zone
SPS	Sanitary and Phytosanitary Agreement
SPV	Special Purpose Vehicle
TA	Transaction Advisor
VFM	Value for Money
WACC	Weighted Average Cost of Capital
WHO	World Health Organization
WTO	World Trade Organization

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# Executive Summary

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Pakistan is an agriculture based economy and Horticulture plays a pivotal role in the economy by being the largest contributor to the National GDP and employing more than 40%<sup>1</sup> of the total labor work force of the country. Horticulture as a sub sector of agriculture plays a significant role in the development of economies and holds great potential both in terms of revenues through the export of horticulture products and socio economic benefits through creation of employment all across Pakistan in general and rural areas in specific. In Pakistan the role of this sector is relatively small when compared with its true potential. This is emphasized by the fact that only about 6%<sup>2</sup> of the total arable land is under horticulture cultivation despite having a higher yield per hectare when compared to agricultural crops.

In order to explore the true potential of this sector various studies have been carried out by Pakistan Horticulture Development and Export Company (PHDEC), an organization created with objectives to explore the potential of the horticulture produce including taking steps and measures to ensure creation of conducive environment through enabling policy/ regulatory measures; promote, expand and diversification of international markets; improve the Supply Chain System and to work for development of Value Addition industry. Since its inception it has actively been involved strengthening the infrastructure, marketing and promotion of the sector. It has projects waiting approval, some under study and a few that are undergoing execution.

It has been estimated that absence of post harvest supply chain (or Cool Chain System) is the limiting

factor hampering the growth and profitability, which in case of horticulture produce ranges from 20 % to 40 %<sup>3</sup> of production resulting in a financial loss of approximately US \$ 900 Million per annum. Isolated cool chain infrastructure facilities are available; however, the country lacks an integrated network of facilities that force a drawback to the benefits that the horticulture as a sector can provide to the national economy. These facilities are deficient in process and product standards and cannot meet the present demand which results in an imbalance between the demand and supply forces. In spite of all the drawbacks the existing system comprising of Cold stores, pack houses, refrigerated container yard and testing laboratories cannot meet the demand and caters to a very small percentage of the production. Moreover, Pakistani produce is in the lower range in most export markets and with punitive tariff and protectionism implementation of WTO, food security and ISO standardization the export levels would drop if the proposed facilities are not established.

To address the issue of post harvest losses and absence of cold supply chain and achievement of other objectives like increase in foreign exchange earnings, price stabilization in the domestic market, PHDEC envisioned establishing a network of post harvest supply chain facilities at a national level across the National Trade Corridor (NTC). For the purpose it contracted with M/s Arch Vision to conduct a pre-feasibility to establish the need for a Cool Chain System through studying the current domestic environment prevailing in the horticulture sector. The pre-feasibility derived the need for cold supply chain facilities including Cold Stores, Pack Houses, Refrigerated Container Yards and Food Testing Laboratories in strategically important locations including crop

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<sup>1</sup> Economic Survey of Pakistan (2008-09)

<sup>2</sup> Computed from the Economic Survey of Pakistan (2008-09)

<sup>3</sup> Study conducted by Anwar and Ibrahim, 2004

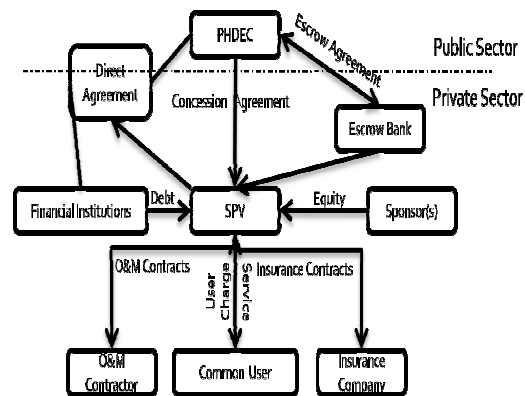
growing areas, main fruits and vegetable markets and export exit points which included air and sea ports. These facilities, which totaled 70 in number, were projected to cost PKR 7 billion and were assumed to be set up by PHDEC with funds to be provided by the Federal Government. For the purpose, a PC-1 for the project was prepared and presented to Ministry of Commerce. The fiscal constraints facing the government then, along with poor managerial skills in implementing large scale projects within the public sector reverted the project's implementation under a Public Private Partnership model for which Infrastructure Project Development (IPDF) was called in to facilitate PHDEC in marketing the project in an efficient manner – for which Anjum Asim Shahid Rahman Chartered Accountants – member firm of Grant Thornton International was contracted to act as the Transaction Advisor (TA) for the project.

This report – Feasibility Study which marks the end of the Transaction Structuring stage is the second deliverable to the transaction structuring phase in which the first deliverable was the Project Need and Options Report. This report besides establishing the need for the project itself identified 10 possible options through which the project could be rolled-out. These options were presented to the core group in a meeting held at the Ministry of Food, Agriculture and Livestock (MINFAL) and was chaired by the Additional Secretary of the same ministry where all members of Core Group on the project were present. At the end of the presentation the TA projected its recommendations which in order of its preference were (i) Consolidated less Laboratories (ii) Consolidated and (iii) Provincial Mix less Laboratories. A vote was taken and the Core Group unanimously selected the Provincial Mix less Laboratories option for project roll-out. Although the option selected represented the third ranked preference of the TA, the Core Group on the instance of TA selected a second option – Consolidated less Laboratories which would come into effect if the first option fails to achieve its objectives.

Evaluating the Provincial Mix less laboratories at the feasibility stage reveals it to be a complex challenge for implementation. This goes with the fact that projects execution under Provincial Mix less Laboratories would be done through creation of two clusters – Punjab – Khyber Pakhtunkhwa and Sindh – Baluchistan, restricting its nationwide application under a single umbrella, which given the current security situation of the country specifically with respect to SWAT district and

Waziristan (tribal areas) will put the bidder for Punjab-Khyber Pakhtunkhwa cluster at a disadvantage as it won't be able to set up facilities in these areas any time soon resulting in delays in possible cash inflows through operations. Moreover, from the legal perspective, the concession to be provided to the project company would have to be done through the provincial ministries approvals which are feared to cause project delays for one or both clusters - thus risking integration. Henceforth, keeping such bottlenecks in mind, the feasibility study for Option 2 - *Consolidated Less Testing Laboratories* has been prepared in case the stakeholders wish to adopt this option as the way-forward on the roll-out of the project. The said feasibility has been prepared and submitted independently to IPDF which may be obtained upon request.

Irrespective if the decision is taken to adapt the second option as the way forward, the CCS project is to be run through creation of a Special Purpose Vehicle (SPV). This vehicle which would be a legally independent company registered under the Companies Ordinance 1984, will be financed through the principals of project finance. Under this mode, the assets and cash flows of the SPV may be securitized to obtain debt however the preferred and recommended mode is to only securitize the cash flows only for debt servicing. This is supported by the cash flow strength of the project witnessed through the Cash Flow Water Fall Model which reflects the bankability ratios to be highly Debt Provider attractable. The payment mechanism of 'User Charge' for the SPV is recommended along with a stringent penalty mechanism and reporting framework. The basic structure of CCS Project SPV is pictorially depicted below.



The project, on base case calculations is expected to cost PKR for Punjab- Khyber Pakhtunkhwa

which offers a return on investment (NPV). The cluster of Sindh-Baluchistan containing lesser facilities is estimated to cost PKR with an NPV equaling. Incorporating all risks – that are identified and allocated to parties using a tailor made methodology (see chapter 3: Financial Assessment), increases the project cost to PKR for Punjab-Khyber Pakhtunkhwa and PKR for Sindh- Baluchistan where as the corresponding NPVs for the clusters fall to PKR and PKR respectively. For both base case and risk adjusted project costs, the overall cost is divided into 6 heads. These include Plant and Machinery, Building and Civil Works, Land Cost, Other Ancillary Equipment and other heads account which have a cost distribution patten percentage of 55%, 24%, 8%, 7% and 7% for Punjab-Khyber Pakhtunkhwa and 51%, 24%, 10%,8% and 7% for Sindh-Baluchistan respectively.

Even with lucrative financial indicators, the horticulture sector has remained neglected by the country's private sector, thus in order to attract private sector's participation in to the project, the institution (PHDEC) will need to ensure that government's participation through different incentives is established – which also will form the Public Private Partnership. These incentives, given below, are indifferent with respect to adaptability for the CCS Project however a common assumption has been taken facilities, which are to be established on land falling in premises of Civil Aviation Authority (CAA) – in case of air ports; and Ministry of Shipping and Ports – in case of sea ports, would require assistance of the government in acquisition under lease.

- **Incentive 1: Provide Land required for the Project** - Under this incentive, participation by the Government will come through providing land to the SPV. This may require (i) to identify, acquire and transfer relevant land to SPV under a lease agreement or (ii) to fund the purchase of land which is identified by the SPV.
- **Incentive 2: Provide subsidy on Electricity** – through this incentive the government can provide a subsidy on electricity tariff. Such a subsidy may be for 25%, 50% of the current tariff - both of which are analyzed in this report. However, the exact percentage tariff that may be subsidized is at the sole discretion of the government.
- **Incentive 3: Subsidy on Interest on Debt** – it is known that for establishment of Cold

Storages and attainment of Refrigerated Containers, PHDEC through Trade Development Authority of Pakistan (TDAP) provides debt at subsidized interest rates. Through this incentive, it is proposed that same facilitation shall be spread across the other facilities i.e. Pack Houses and Refrigerated Container Yards.

- **Incentive 4: Government Stands as Guarantor for the Loan** - In this incentive, the Government would be required to stand in guarantor for loan acquired by the private bidder. Such guarantee would vary with the amount of debt taken, which in initial years would be high as more debt would flow-in to the project. However, this would start to decrease in line with debt servicing. This package is argued to suit situations where the private party arranges for loan outside the country - making the lender secure.
- **Incentive 5: Provide Income Tax exemption in form of Tax holiday** - Under this the Government participation is through provision of providing income tax exemption on the income of the project as well as charging zero rating custom duty, sales tax and surcharges applicable on the project.
- **Incentive 6: Provide a Capital Subsidy of 25% on Total Project Cost:** this incentive has been proposed in wake of suggestions of the core group in various meeting held. The idea under this incentive is to share the debt burden of the project equally between the SPV and the GOP. However, the share of GOP will be contributed in shape of a capital subsidy at 25% of the project cost.

Although the selection of incentive(s) to be provided to the SPV will be at the sole discretion of the GOP, **our recommended model for the CCS Project is through formation of an Incentive Package consisting of the following**

- i. Facilitating in acquisition of land (under lease contract) for facilities falling in the jurisdiction of CAA and Ministry of Ports and shipping – common assumption taken for each incentive,
- ii. Provide income tax holiday in form of Tax Holiday - incentive 5
- iii. Government stands in as Guarantor for Loan – incentive 4

By sanctioning the recommended security package this PPP transaction would fall under the Built-Own-Operate (BOO) modality and would require the GOP to instruct the FBR in issuing Income Tax Exemption certificate to the SPV and simultaneously entering into a direct agreement with SPV and lender – for debt guarantee.

Alternatively and as suggested by the Core Group Committee, the GOP can sanction the same incentives however debt guarantee (incentive 4) may be replaced with GOP contributing 25% capital subsidy (incentive 6). Offering this alternate package would cause a shift in financing mode for the SPV from pure project to corporate finance or limited recourse financing. The PPP structure of the transaction would remain constant at BOO.

# 1. Introduction and Project Background

## 1.1 Overview of the Agriculture Sector<sup>4</sup>

Agriculture has traditionally been the most dominant sector in Pakistan's economy and even today it continues to be the its back bone with a large share of its Gross Domestic Product (GDP) driven by this sector. The share of agriculture in the fiscal year 2008-09 accounts for 21.8% of the GDP which has fallen from 24.9% since the year 2000-01. However in monetary terms and over the same period, share of agriculture sector in GDP has experienced growth of 33.2%.

**Table 1: Agriculture Contribution in Pakistan Economy**

Year	Value (PKR. Millions)	GDP (%)	Labour force Employed (%)
2000-01	903,499	24.9%	-
2001-02	904,433	24.1%	-
2002-03	941,942	24.0%	-
2003-04	964,853	22.9%	-
2004-05	1,027,403	22.4%	43.0%
2005-06	1,092,098	22.5%	43.4%
2006-07	1,132,041	21.8%	43.4%
2007-08	1,148,871	20.9%	43.6%
2008-09 (P)	1,203,308	21.8%	44.7%

*Agri. Statistics of Pakistan, MINFAL, 2007-8, Economic Survey of Pakistan 2008-09*

Agriculture and its associated activities provide employment opportunities to 44.7% of the country's labour force particularly in rural communities where an estimated 95% of the total employed population is attached directly or indirectly to agriculture. Recent data shows that agriculture sector employment growth was 2.52% over the preceding fiscal year and 3.95% since 2004-05.

Besides being the most labour intensive sector of the economy, the agriculture sector contributes nearly 40% of the foreign exchange earnings

<sup>4</sup> Data contained in this section is taken from *Economic Survey of Pakistan (2000-01 to 2008-09)*

through export of raw materials; semi processed and processed agriculture products including horticulture consignments of fruits and vegetables.

## 1.2 Horticulture Sector of Pakistan

Horticulture as an industry, occupies a significant place in agricultural economies all over the world however its contribution in Pakistan's economy is only modest. This can be emphasized by the fact that out of the total cultivated area only 6% is under horticultural crops and only 12% of agricultural GDP is contributed by horticulture. Although, its share in percentage terms' remains small, its productivity remains high with as many as 28 different fruits and 30 different vegetables being produced each year (see Annexure 1: List of Horticulture Crops). This is aided by presence of basic natural resources like diverse climatic zones, fertile lands, vast plains, and well-established irrigation system- all of which cater to a range of horticultural crops throughout the year.

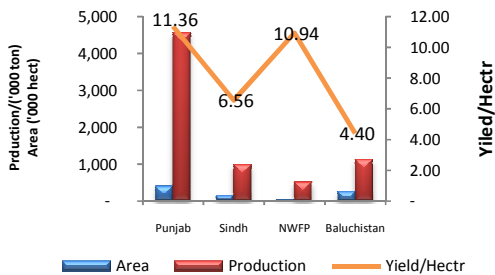
A considerable part of horticultural crop production deals with the small grower's community, possessing the holding from one acre to few acres. There are about 6.6 million farms in the country, 86% of which are between 0.5-5 hectares of holding and only 1% of the total farms are more than 20 hectares<sup>5</sup>.

In 2007-08, the total area under fruit cultivation was reported at 853,400 hectares where as 7,178,800 tons of fruits were produced in the same period (Figure 1). The average yield per hectare was recorded at 8.41 tons/hectare. Punjab province was witnessed to be the dominant province in terms of area under fruit cultivation with 400,900 hectares followed by Baluchistan (255,200 hectares), Sindh (150,100 hectares) and Khyber Pakhtunkhwa –

<sup>5</sup> *Agri. Statistics of Pakistan, MINFAL (2007-08)*

former KHYBER PAKHTUNKHWA (47,200 hectares)

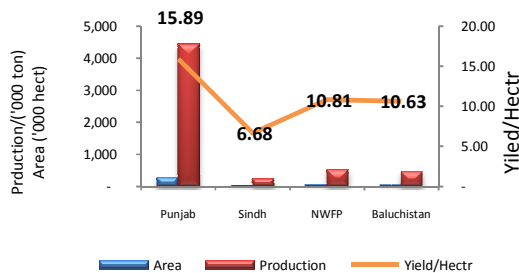
The production of fruits (Figure 1) was highest in Punjab province which contributed 4,556,200 tons of fruits followed by Baluchistan (1,122,100 tons), Sindh (984,100 tons) and Khyber Pakhtunkhwa (516,400 tons). The aggregate production of fruits in 2006-07 was 7,178,800 tons with major contributions coming in from citrus, mango and dates.



**Figure 1: Province Wise Area, Production and Yield of Fruits (2007-08)**

A large variety of vegetables is grown in all four provinces of the country however the most dominant vegetables in term of production include potatoe, tomatoe and onion. Like in fruits, Punjab province has remained the dominant in terms of area under vegetable cultivation with 279,600 hectares. The rest of the provinces have area under cultivation equalling 128,500 hectares which is significantly smaller in number compared to Punjab province.

In 2007-08, the country's vegetable production was recorded at 5,675,800 tonnes (Figure 2) with Punjab province proving to be the most lucrative producer of vegetables with 4,442,100 tonnes followed by Khyber Pakhtunkhwa with 527,600 tonnes which landed close to Baluchistan (467,800 tonnes) and Sindh (238,300 tonnes)<sup>7</sup>.



**Figure 2: Province Wise Area, Production and Yield of Vegetables (2007-08)**

<sup>6</sup> Agriculture Statistics of Pakistan, MINFAL (2007-08)

<sup>7</sup> Agriculture Statistics of Pakistan, MINFAL (2007-08)

It is evident from the above statistics that Pakistan is producing large quantities of fruits and vegetables. However, the bulk of production is marketed locally and significant quantities are wasted. These wasted quantities of crops, as revealed by a research conducted by Ibrahim and Anwar in 2004 and printed under the title 'Horticulture Education, Extension and Training System in Pakistan' estimated the loss to tune up to 24% due to four distinct reasons. The reasons along with percentage share were given as Careless Harvesting (3%), Rough Handling (4%), Inadequate Transportation (6%) and Poor Storage (11%).

The above high post harvest losses are mainly on account of insufficient packaging/grading and cold storage facilities along with absence of refrigerated transportation or collectively the Cool Chain System. However, if this sector is able to rectify the situation and improve yield gap (per hectare) and post harvest losses through better post harvest supply chain infrastructure and management then Pakistan will have a large production surplus to substantially increase the exports. Realizing this fact and through the efforts of Pakistan Horticulture Development and Export Company (PHDEC), the Government of Pakistan has declared the Horticulture Sector to be one of the priority areas for investment and through support from institutions like Competitive Support Fund, it targets to increase the current export level of around USD 150 million to USD 1 billion in a time span of 5 years.

### 1.3 Role of Pakistan Horticulture Development and Export Company (PHDEC)

Pakistan Horticulture Development and Export Company (PHDEC) has been created due to the enormous potential of Pakistan's horticulture products in the global market. In the absence of a single ministry or institution responsible for development at all levels of the horticulture value chain it was considered important to set-up PHDEC to uplift this sector, especially in light of the impact of globalization and WTO regime.. It envisions "**the vitalization of a dynamic and market driven horticulture sector, which is resilient, sustainable and responsive to meet the challenges of globalization.**" For PHDEC, this vision is to be realized through meeting of the following objectives:

- To create conducive environment through enabling policy/ regulatory measures
- Promotion/Expansion/Diversification of international markets

- Improvement of Supply Chain System including establishment of modern infrastructure
- To work for development of Value Addition industry

These objectives are focused to address and resolve problems and issues of the Pakistan horticulture sector through long term and timely interventions. Such interventions are further aimed at improving quality at key areas of the horticulture value chain, ultimately leading to a substantial increase in exports from Pakistan. Some of the main areas of intervention include:

- Encourage and facilitate the growers to “grow for exports”.
- Impart new technologies and techniques to growers and processors.
- Develop/implement export marketing strategies.
- Create an export orientated environment facilitated through procedures and quality standards through regulations and incentive schemes.
- Attract local and foreign investment.
- Facilitate in setting up of necessary material and quality infrastructure including inter alia cool chain system all over the country.
- Develop linkages and networking with relevant institutions i.e. R&D, banks, training/HRD, joint venture arrangements/commercial linkages with international companies, technology transfer, sub-contracting.

#### **BOX 1: PHDEC's Mandate**

**The overall mandate of PHDEC is to promote, regulate, co-ordinate and enhance the export of horticulture products for the economic well being of all the stake holders in the horticulture value chain. PHDEC's main thrust is to introduce Pakistan to the high-end international markets through strategic initiatives efforts along with integrated interventions and facilitation in all the sub-sectors of the value chain.**

*Source: PHDEC*

As an institution, PHDEC's human resource is divided between strategic, tactical and operational management. At the strategic level, there is the board of directors, chief executive officer and the chief operating officer. The chief operating officer looks after the tactical management (managers) for marketing, business development, technical, finance, administration and human resource. Following these are the lower management and field officers who are stationed in major cities of the country.

The reporting structure between the three levels of management is centralized which results in enhancing the work load of the CEO. This forces the CEO to be more involved in routine operational issues rather than emphasizing on the strategic planning and forecasting. This limits the ability of the institution to manage large scale projects however even with human resource constraints PHDEC, for small to medium sized projects, has been able to lead the way with respect to initiatives taken to strengthen the horticulture sector. This goes with the fact that it has 1 project approved, 7 in execution, 3 in approval stage from concerned authorities and 7 more under study. Moreover, it is implementing 4 projects in collaboration with other organizations.

PHDEC has budget allocation on an annual basis from Export Development Fund (EDF). This budget is released to cover operating expenditures and for implementation of small scale projects. Furthermore, the operating budget is utilized for providing salaries of staff, meeting office expenditures including utilities and stationery. For small scale project implementation, a development plan is prepared and submitted to EDF which then release funds. For large scale projects that go beyond the funds available with EDF, a PC - 1 is required to be developed and funds approval sought. Likewise, for CCS project, PHDEC initiated a PC-1 that was taken up by the Government of Pakistan through Ministry of Commerce.

Although PHDEC envisioned the establishment of a Cool Chain System, its lack of human resource, management capabilities and limited budget could not provide for a project which is to cost billions of Rupees.

#### **1.4 Project Background**

The concept of a well-equipped, modern and uninterrupted supply chain specifically for the horticulture sector is a common reality for most advanced nations around the world. However, this has been realized over a period of time and through the private sector for which facilitation was available in shape of presence of sound legal provisions, favorable trade agreements, stringent food safety regulations, efficient enforcement of Standards and Grades and availability of supporting infrastructure – factors that facilitate private sector investment.

Yielding high per capita incomes, such countries represent high end consumer markets and here the consumers are more conscious towards health, diet and food safety. As a result these countries have put in place stringent import protocols and regulations which have changed the way in which horticulture trade and competition is carried out internationally. However, the lesser developed countries including Pakistan are still in the progression stage towards adaptation of these competitive environmental changes and international agreements such as the Sanitary and Phytosanitary Agreement (SPS) under the World Trade Organization (WTO) umbrella. This agreement, amongst many other things, makes compulsory for member countries to attain a minimum food safety standard before making it eligible for import to other member countries. However, even before the introduction of the WTO agreement the horticulture sector of Pakistan has been subject to ordinary and sub-standard practices which have had a direct impact on the average prices its crop has been able to fetch from the international markets (see table below).

**Table 2: Average Price differential between World and Pakistan Crop**

Crop	World Price (\$/t)	Pakistan Price (\$/t)	Price Gap Price (\$/t)
Citrus	492.8	290.6	202.2
Mango	861.0	315.2	546.0
Dates	671.3	489.7	181.6
Grapes	948.1	624.5	323.6
Apple	701.5	588.8	112.7
Apricot	692.9	381.7	311.2
Plum	761.1	392.6	368.5
Potato	358.3	148.6	209.7
Tomato	411.7	342.1	69.6
Onion	308.3	119.4	188.9

Source: FAO  
\*Prices are for 2005 which are the latest available figures

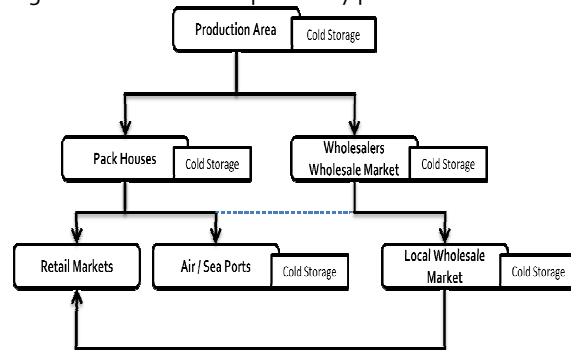
The sub-standard practices, specifically the use of open trucks instead of refrigerated transportation and absence of refrigerated storage, have over the years, been responsible for quality deterioration of crops before they reach their final punters. This deterioration of quality causes the production figure to lessen causing supply variations - leading to price fluctuations within the market due to supply and demand forces. Moreover, failure to follow industry best practices including failure to attain internationally renowned certification such as the Hazard Analysis and Critical Control Points (HACCP) has caused the international consumers to refrain from importing Pakistani horticulture products.

In light of the above and changes in international competition environment, Pakistan through its Horticulture Development and Export Company

(PHDEC) is campaigning to revamp its horticulture sector by enlightening the private sector to participate and profit from horticulture related activities – most significant of which includes the establishment of a Cool Chain System.

Before embarking upon the crux of this feasibility study, it is important to understand what a Cool Chain System is? Different texts have defined CCS as per their requirements as there is no rigid definition available of the term. However in the context of this project, a CCS may be taken to mean as 'Horticulture's Post-Harvest Supply Chain Infrastructure'. This infrastructure includes facilities such as Cold Storages, Pack Houses, Refrigerated Container yards and Testing Laboratories. The role of each segment of this infrastructure is distinct however their application is incomplete without one another.

This horticulture's post-harvest supply chain initiates at the growing areas where once the crop is harvested it is either stored on site in a 'Cold Store' or is sent to wholesale markets where they are picked by retailers and exporters. The crop that is intended to be exported is taken to 'Pack Houses' via refrigerated trucks which over lengthy journeys require parking facilities for stop over. These facilities are termed as 'Refrigerated Container Yards'. Once the crop is processed, a sample from the main crop consignment is sent over to 'Testing Laboratories' for testing of quality and content. Thereafter, the crop is exported via land, air and sea routes – depending upon the destination. The crop that is picked by the retailers is taken to domestic markets and if the need be they store the same in 'Cold Stores'. Such retailers also have the crop processed and tested before supplying them to larger domestic markets where the consumer's awareness with respect to quality and content is high. The above flow is pictorially presented below.



**Figure 3: Horticulture Supply Chain**

The specific role of each component of the CCS is highlighted below; however each component has one common feature i.e. to preserve the natural content of the crop leading to its value addition. This is also the objective of a good Horticulture Post-Harvest Supply Chain Management.

- **Cold Stores:** are storage facilities to keep the temperature of produce at optimal low temperature which lowers the crop's respiration rate and extends its shelf life. These facilities are normally made available at locations in such a manner that users at various stages of the supply chain are facilitated initiating from the production area and following up till the point where the commodity is either exported or consumed. Typically the areas include the 'Main Fruits and Vegetables Markets', 'Growing Areas' and 'Export Exit Points' like Airports and Sea Ports.
- **Pack Houses:** The role of Pack Houses is to provide better packing facilities to the producers of horticulture crops. Such facilities are equipped with grading, washing, waxing, drying, hot water treatment, and packaging facilities. These functions not only add value to the crop which facilitate in fetching competitive prices when taken to domestic and international markets but also protects the crop from external hazards including ingress of gas, light and water vapors, which can result in deterioration of colors, oxidation of lipids, and unsaturated fats, denigration of proteins and a general loss of characteristics sensory quality.
- **Refrigerated Container Yard:** The role of refrigerated container yards is to provide parking space for the controlled atmosphere (CA) container and refrigerated container or reefer (which is a shipping container used for the transportation of temperature sensitive cargo). These yards provide electrical power input that makes the CA and refrigerated container functional in maintaining the desired temperature. This facility is availed by containers for domestic and export purposes.
- **Testing Laboratories:** The role of Testing Laboratory in any CCS is to ensure that safety and quality of fruits and vegetables is met in line with standard food regulation requirements such as WTO, consumer protection and ISO standards. These laboratories are used for multipurpose testing like Soil & Water Testing, Examining adulterated materials, Food

additives, Pesticides residual, Aflatoxin level, Pest and Other Diseases in Plant/Fruits.

The above explained infrastructure has been identified by numerous sector experts to be the backbone for improving economics of the horticulture sector. In general, such infrastructure is capable of (i) Reducing the post harvest loss of horticulture produce during harvest and activities thereafter to an acceptable level along with improved quality and shelf life of the products; (ii) Price stabilization in the domestic market; (iii) Boost to the export volumes by increased production, quality control etc.; (iv) Entry into high value markets by maintaining quality and adhering to international best practices.

### 1.5 The Project

Keeping in line with its objectives (given in 1.3 above), the project has been conceived by the Pakistan Horticulture Development and Export Company (PHDEC), as a part of the National Trade Corridor (NTC) improvement initiative. For the purpose, PHDEC appointed M/s Arch Vision to conduct a pre-feasibility. Through this pre-feasibility study, M/s Arch by using production-mapping technique and survey identified areas of prime importance to serve as a model for establishing facilities falling under the CCS. These facilities which include Cold Storages, Pack Houses, Refrigerated Container Yards and Testing Labs were identified to be built near production areas, in major fruit and vegetable markets and in export exit points including air and sea ports. These entire facilities lie across the NTC which is likely to facilitate the functioning of the chain as most of the urban markets are located on the NTC; Most of the fruits and vegetable production areas are located across the NTC; and NTC infrastructure can be utilized effectively for cost reduction of transportation of produce to nearby markets as well as for export purposes.

#### Box 2: National Trade Corridor (NTC)

The NTC is an initiative of the Government of Pakistan (GoP) to create a growth-facilitating infrastructure with the objective to revamp the whole transport sector including ports, roads, railway, aviation etc. The framework of NTC takes a holistic and integrated approach to reduce the cost of doing business in Pakistan by improving the trade and transport logistics chain and bringing it up to international standards.

The areas along with facilities as proposed are as follows whereas the same is produced on the MAP of Pakistan in Annexure 2.

- **Cold Stores:** 23 independent cold stores are proposed to be built under the CCS project. These stores are proposed for 5 different fruits and vegetables at 9 production centers, 4 different fruit and vegetable markets and 10 exit point covering all major air and sea ports. These facilities are to be established as state of the art facilitation centers built around the prefabricated material with use of fork lifters for in-house transportation of commodities. These facilities will have compartmentalized storage i.e. division of total storage space into different temperature zones depending upon local needs. All these factors represent international best practices with respect to cold stores. The table below provides detailed information.

**Table 3: Proposed Cold Stores**

Location	Capacity (M Tons)	For Commodities
Chaman	1000	Fruits & Vegetable
Chitral	1000	Fruits & Vegetable
Faisalabad Airport	200	Fruits & Vegetable
Gwadar	5000	Fruits & Vegetable
Islamabad	5000	Kinnow, Apple, Potato
Islamabad Airport	200	Fruits & Vegetable
Karachi - Airport	500	Fruits & Vegetable
Karachi - Sea Port	5000, 5000	Fruits & Vegetable
Khairpur	5000	Dates
Kot Momin	5000	Kinnow
Lahore Airport	300	Fruits & Vegetable
Mardan	2000	Peach, Apple
Multan Airport	200	Fruits & Vegetable
Peshawar	5000	Peach, Apple, Potato
Peshawar Airport	200	Fruits & Vegetable
Quetta	5000	Apple & Vegetable
Quetta Airport	200	Fruits & Vegetable
Sargodha	3000, 1500	Kinnow, Fruits & Vegetables
Sukkur	3000	Dates & Other Fruits
Turbat	5000	Dates & Other Fruits
Waziristan	2000	Apple

In terms of benefit to the national economy, the proposed facilities are to take up the total capacity to 123,300 tons which is sufficient to facilitate 7.90% of the total production of 2007-08 (see table below). Although, the total capacity of these facilities will still be insufficient to cater for majority of production by leaving a gap of 91.10% however, post harvest losses caused due to non-

availability of appropriate storage facilities is likely to fall below the 11% mark.

**Table 4: Existing and Proposed Capacity of Cold Stores**

Qty ('000 tons)	Total
Fruits Production	7,178
Vegetable Production	5,675
Total F&V Production (2007-08)	12,854
CS - Installed Capacity	892
CS - Proposed Capacity	123
CS - Total Capacity	1,015
CS Capacity as % of F&V Production	7.90%

Source: Department of Agriculture & Livestock Products Marketing & Grading, MINFAL (2007-08)

Installed capacity of CS represent only the known facilities and are the latest available figures

- **Pack Houses:** 39 pack houses with cold storage facilities are proposed to be built for 8 different fruits and vegetables at major crop growing regions. Such facilities are designed to capitalize the immense potential of increasing exports, which currently stand at 4.9% of the total fruits and vegetables production for 2007-08 (see table 6 below). This will not only result in an influx of foreign exchange but also will make the produce eligible to be exported to high end consumer markets which have stiff grading and processing policies. Moreover, the establishment of these pack houses will result in reduction of post harvest losses pertaining to rough handling which currently stand at 4% of production.

**Table 5: Proposed locations of Pack Houses**

Location	CS Capacity	Commodities and Pack House Speed
Bhalwal	5000	Kinnow (20 t/h)
Chaghi	1000	Onion (10 t/h)
DI Khan	2000	Vegetable (5 t/h)
Faisalabad	2000	Vegetable (5 t/h)
Gujranwala	2000	Vegetable (5 t/h)
Hyderabad	1500, 1000	Mango (8-10 t/h), Onion (10 t/h)
Kalat	1500	Apple, Apricot (10-12 t/h)
Kasur	1000	Potato (10 t/h)
Khanewal	2000	Mango, Citrus & Vegetable (5 t/h)
Kharan	1000	Onion (10 t/h)
Kila Saifullah	2000	Apple, Apricot (10-12 t/h)
Loralai	1000	Apple Apricot (5 t/h)
Mandi Bhaudin	3000	Kinnow (5 t/h)
Mastung	2000	Apple (5 t/h) & Grapes
Mirpurkhas	1000	Mango (8-10 t/h)
Multan	3 x 1000	Mango [3 x (8-10 t/h)]
Muzafar Garh	2 x 1000	Mango [2 x (8-10 t/h)]
Okara	2 x 2000	Potato [2 x (10 t/h)]
Pak Pattan	2000	Potato (10 t/h)
Panigur	5000	Dates (4 t/h)
Peshawar	3000	Apple (5 t/h)
Pishin	2 x 2000	Apple, Apricot, Peach & Grapes(10-12 t/h)
Quetta	2000	Apple (5 t/h)
Rahimyar Khan	2 x 1000	Mango [2 x (8-10 t/h)]
Sahiwal	2 x 2000	Potato [2 x (10 t/h)]
Sanghar	1000	Onion (10 t/h)

Sheikhupura	2000	Vegetable (5 t/h)
Sialkot	1000	Potato (10 t/h)
Swat	4000	Peach, Apple (10-12 t/h)
T.T Singh	3000	Kinnow (5 t/h)
Zhob	2000	Apple Apricot (10-12 t/h)

**Table 6: Export Statistics of F&V**

2007-08	Tons
Fruits Production (2007-08)	7,178,000
Vegetables Production (2007-08)	5,675,800
Total Fruits and Vegetables Production	12,854,600
Total Export of Fruits and Vegetables	634,200
Percentage Exports	4.9%

▪ **Refrigerated Container Yard:** Keeping in view the distances from sea port to market and linkages with other countries through which the flow of fruits and vegetables will take place, 2 locations have been identified namely in city of Karachi and Lahore for the establishment of refrigerated container yards. The selection of these two locations is primarily based keeping in view the reasons mentioned above, where by a parking and charging facility will be provided to refrigerated container in order to ensure that the horticulture produce during transportation along the NTC are preserved at optimal temperature and no deterioration can take place during transportation either in shape or shelf life or quality of the produce.

Apart from the above, the project also envisioned establishment of 6 testing laboratories in production areas however, the idea of its establishment under a PPP framework was opposed by members of the Core Group on CCS. Thus these facilities will be established by the public sector alone. By and large, the above explained facilities within the CCS project are designed to achieve as many as six key outputs. These outputs, listed below, are explained in detail in chapter 6: Project Management.

- Ensure availability of service throughout the natural harvesting period of the products
- Ensure safety of consignments
- Ensure a constant throughput
- Facilitate the common user in determining the appropriate standard requirement for export
- Ensure following international best practices for processing
- Ensure unbiased availability of service to common user

### 1.6 The Need for Public Private Partnership

The initial concept was to roll out the project with funds to be provided by the Federal Government, however due to fiscal constraints it was agreed to implement this project through a Public Private Partnership modality. This decision, partially driven by financial constraints, was also driven by the fact that PHDEC does not have enough manpower and technical expertise to build, develop and implement such complex large scale project. Moreover, due to the complexity of the project and with each component of the CCS required to be established simultaneously, it was felt that having the project to be rolled out by the Public Sector alone might result in pace of investment being slower than expected leading to cost overruns and time delays. Moreover with uncertain cash flows with the government the integration of the project would be at risk which would hinder the achievement of project objectives. Apart from the above, there were other general arguments favoring the implementation of the project under a PPP. These included the following

- Improved service delivery by allowing both sectors to do what they can do best. Government will be involved in setting policy and serving the public interest where as private sector takes responsibility for functions such as operating and maintaining the facilities.
- By taking advantage of private sector innovation, experience and flexibility, PPP can deliver services more cost-effectively than traditional approaches.
- Reduce public sector risk by transferring to the private partner those risks that can be better managed by the private partner.
- Deliver capital projects faster, making use of the private partner's increased flexibility and access to resources.
- Make better use of assets. Private sector partners are motivated to use facilities fully, and to make the most of commercial opportunities to maximize returns on their investments. This can result in higher levels of service, greater accessibility, and reduced occupancy costs for the public sector.
- On the other hand the private partner will have an edge in shape of public sector participation which could be in the shape of assets, cash and non cash contribution. The various modalities are discussed in the later part of this report.

Hence, for the reasons mentioned, need for a Public Private Partnership (PPP) was felt as the most appropriate mode for implementation of the CCS via Infrastructure Project Development Facility (IPDF) which will facilitate the implementation of the project in a planned and organized manner under its defined PPP guidelines.

**BOX 3: Infrastructure Project Development Facility (IPDF)**

Infrastructure Project Development Facility (IPDF), an independent company established in 2006 under the aegis of Ministry of Finance, Government of Pakistan is mandated to facilitate development of Infrastructure Project through Public Private Partnerships (PPP). Any PPP transaction with IPDF has to passed through two phases, one being the Transaction Structuring in which project need assessment is determined, economic and financial viability evaluated and assessment of various modes of Public Private Partnership models is carried out. The final stage of this phase is the preparation of project feasibility study. The second phase - transaction implementation – requires marketing and procurement of the project, after which the project is brought to a financial close.

## 2. Need and Options – a Recap

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### 2.1 Need and Options Background

As part of the agreement between Anjum Asim Shahid Rahman –Transaction Advisor (TA) and IPDF, a project Need and Options Report was prepared. This report contained the methodology for recognition of Key Market Players that would be attracted to the project of this magnitude and based on the findings it identified 10 different options under which the project could be rolled-out.

Each of the identified option was made subject to evaluation criteria, based on qualitative and quantitative factors, after which they were ranked in order of TA's recommendation. This report was submitted to IPDF and presented to the Core Group on the CCS Project, which at a meeting took a vote to select the preferred options for project Roll-Out.

The key aspects of 'Need and Options Report' are provided below to rejuvenate the information passed on - in that report. However, the complete report is delivered to IPDF and can be obtained upon request.

### 2.2 Identification of Potential Market Players and Project Roll-Out Options

Brain storming sessions and group discussions were held with industry personnel to identify categories that would gauge the interest of potential market players and investors. This process led to identification of two broad categories under which project execution could be expected. These categories included 'Geographical Proximity' and 'Area of Expertise', details of which are as under

- **Geographical Proximity:** as the facilities envisaged under the CCS are spread to all

corners of the country, it was important to identify potential investors who would be willing to take up this project without negative preference towards geographical dynamics. Hence, we identified two sets of potential investors which were as follows

- a) **Corporate Giants:** these would include large corporations that have global presence and experience in operating and managing wide spread projects.
  - b) **Medium Sized Corporations and Investors:** such category of investors would be interested to invest in ventures in territories known to them.
- **Area of Expertise:** Such investors and market players were categorized to have no preference with respect to geographical remoteness or closeness of the facilities however their preference was foreseen to be driven by their own area of expertise which and included the following:
    - a) **Product Specialist:** such market players and investors were identified to be specialists in a particular product range and would have a preference to invest and operate in only those products that they are familiar with. It was assumed that such investors and market players would be interested in projects with similar features.
    - b) **Business/Service Line Specialist:** unlike product specialist where the entity is an expert with respect to a particular product line, business/service line specialists were categorized as masters in a particular business/service line.

Based on the above characteristics of different market players and investors, we identified 5 primary options that would satisfy expectations of each. These options, presented in table 7, were assessed on financial grounds which revealed Testing Laboratories to be financially unviable segment of the CCS. Thus, in order to improve the financial status of the project as a whole, testing laboratory segment was excluded from each of the primary option to form a new option – secondary option. Therefore, the total number of project roll-out options increased from 5 to 10:

**Table 7: Project Roll-Out Options**

	Option Identified
Geographical Proximity	1. Consolidated Project
	2. Consolidated Project minus Testing Labs
	3. Province Wise
	4. Province Wise minus Testing Labs
	5. Provincial Mix
	6. Provincial Mix minus Testing Labs
Area Expertise	7. Fruit Belt Wise
	8. Fruit Belt Wise minus Testing Labs
	9. Activity Based
	10. Activity Based minus Testing Labs

### 2.3 Assessment of Options and TAs Recommendation

In order to evaluate the identified Roll-Out options, an assessment criteria based on quantitative factors and qualitative factors was established under which the following aspects were looked at

- **Quantitative Factors:** these included evaluations through investment, bankability and government standpoint using free cash flows method based on equity (for shareholders) and project (for government). The specific tools used for evaluation included the following:
  - a) **Investment Appraisal:** was done through calculations and results under the Net Present Value Technique, Internal Rate of Return and Project Payback Period.
  - b) **Bankability Appraisal:** was achieved through scrutinizing the financial forecast of the project with calculations for Debt Service and Loan Life Coverage Ratios and Project Loan Life Coverage Ratio. All

these factors looked at the ability of the project to service its debt requirements.

- c) **Government Appraisal:** included calculation of the concession term i.e. the minimum time frame for the project during which institution's participation, through the government, would be required to keep the project financially operable. Moreover, Cost to Benefit Ratio was also looked at.

- **Qualitative Factors:** took into account factors that would influence the decision making about a particular option, however such factors were considered to be subjective in nature and wide ranging thus primary consideration was given to the following:
  - a) **Integration and Synergy Effect:** as the components of CCS are interrelated, development of all components together, it was assumed that synergy would be created if a roll-out option could provide an amalgamation between different segments of the project.

- b) **Monitoring by the Institution:** This aspect looked into the ease of managing the concession agreements by the institution hence as a rule, lesser the concessions, the easier it would be to monitor.

- c) **Market capability and appetite:** This factor looked into the ease of the project to attract renowned international players and have the requisite scale to make the project bankable. Projects having a larger scale were assumed to be more marketable than others.

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On the above parameters the three soundest options for adaptability to the CCS Project were recommended. These options, tabulated below, were argued to derive best qualitative and quantitative characteristics.

**Table 8: Recommended Options**

1. Consolidate Less Labs
2. Consolidated
3. Provincial Mix less labs

## 2.4 Core Group Meeting and Selection of Roll-Out Options

A meeting of the Core Group on the Cool Chain Project was held in May, 2009 chaired by Additional Secretary Ministry of Food, Agriculture and Livestock (MINFAL). The objective of the meeting was to select the most appropriate options for rolling-out of the CCS Project. Hence, a presentation was given by the Transaction Advisors at the end of which a vote was taken and 'Provincial Mix less Testing Labs' option was chosen as the preferred strategy for project roll-out. However, on the instance of the TA a second option namely 'Consolidated less Testing Laboratories' was also included as a possible means of marketing the project. Although the preferred option of 'Provincial Mix less Testing Laboratories' is to be marketed first, in case of lack of private sector interest at the bidding stage would revert the project's roll-out under 'Consolidated less Testing Laboratories' option.

The minutes of the Core Group Meeting are annexed to this report as Annexure 3.

## 2.5 TA's Comment on the Selected Option

For the selected option of 'Provincial Mix less Testing Laboratories', two Projects would be rolled-out under two clusters namely Baluchistan-Sindh and Punjab-Khyber Pakhtunkhwa. With each cluster having its own size, market and cost structure it is envisioned that these clusters would be taken to the market at the same time but as separate projects. On the contrary and if required, under the 'Consolidated Less Testing Laboratories' option the project is to be rolled out as a single venture specifically targeting large scaled corporations / investors.

The exclusion of testing laboratories segment from the project was unanimously agreed upon on grounds that service of this stature requires to be implemented under the public sector alone. Moreover, it was agreed that this segment would bring more credibility if implemented and operated by the public sector.

Evaluating 'Provincial Mix less Testing Laboratories' option's adaptability as a roll-out strategy has brought to the forefront certain arguments that are likely to hinder timely roll-out of the project. These arguments, which are elaborated below, are likely to defer the roll-out by a considerable length of time.

- a. The present situation in the country with respect to War on Terror (particularly in the North West Frontier Province) will hamper roll-out of Punjab-Khyber Pakhtunkhwa Cluster. The bidder for this cluster will be at a disadvantage compared to the bidder for 'Sindh-Baluchistan' cluster as the revenue stream to be generated though Khyber Pakhtunkhwa province would get delayed. If, for instance, the project is rolled-out under a consolidated framework, the bidder can phase project roll-out according to the political and social environment. This means that facilities in more stable provinces of Sindh and Punjab can be established first followed by facilities in, at present, the troubled provinces of Khyber Pakhtunkhwa and Baluchistan. From financial perspective, the loss / delay in revenue stream for these provinces can be compensated from establishing facilities first in the more stable provinces giving the private bidder financial respite.
- b. From the legal perspective, the division of the project into two clusters would make the project a regional / provincial level venture. This implies that legal requirements including approval of the security package would need to be obtained from the Provincial Governments and there exists a likelihood that obtaining a uniform security from all provincial governments becomes impracticable and if not then the exercise would become time consuming – causing a delay in project implementation. On the contrary, the Consolidated less Testing Laboratories option would be implemented as a federal level project requiring approvals and procedures to be based on the criteria's of the same, making it more practical and implementable on estimated roll-out timeframe.

Based on the above arguments, we as Transaction Advisors would like the stakeholders to adapt the 'Consolidated Less Testing Laboratories' option as the way-forward on the roll-out of the project. At the same time, it is also informed that feasibility for 'Consolidated Less Testing Laboratories Option' has been prepared and submitted to IPDF.

# 3. Financial Assessment

## 3.1 General

The impartiality of any project’s financial assessment is an important factor when placing credibility on the feasibility study by potential investors and financiers. The idea usually is to explore the project in enough detail so that potential investors and stakeholders reach a decision with respect to committing resources towards commencement of the project. However, the first step in the process is the development of a financial forecast or financial model as commonly known, of the prospective investment opportunity.

## 3.2 Base Case Financial Model

To access the financial viability of the project, base case financial model has been developed incorporating all the capital and operating cost with specified output with public sector as a supplier. This financial model is capable of reporting on overall project’s financial viability, stability and profitability under predefined set of assumptions. These assumptions (provided in annexure 4) are based on judgments reached by technical experts on each area of the project where as prevailing market rates have also been used - where applicable.

Keeping in view the project, the architecture of the financial model comprises of 3 components of CCS i.e. Cold Stores, Pack Houses and Refer Yards. Each component has its own individual project cost, revenue, financing plan and cost assumptions along with the financial statements - which are consolidated to derive the full project cash flows and statements. Along with consolidated results of each component, the data can also be sorted through their individual account heads such as project costs, investment plan, financing, and revenue & operating expenditure etc.

Project evaluation process is performed automatically by the financial model through key financial indicators such as Net Present Values (both FCFF and FCFE), Payback Period, Concession Period and Internal Rate of Return (IRR). Discounted Cash Flow (DCF) methodology has been used to arrive at these benchmark parameters and for the debt providers, Waterfall Cash Flow model has been used (refer to section 5.4 : CCS From Lender’s Perspective). All the results discussed in this section are compared against the base case financial model scenario (table 9) and later on risk adjustments in lieu of parties and later on where risk adjustments are made, the comparison is made with reference to the following base case financial results.

**Table 9: Base Case Financial Model Results**

	Punjab – Khyber Pakhtunkhwa		Baluchistan - Sindh	
	FCFF	FCFE	FCFF	FCFE
NPV (million)				
IRR (% age)				
Payback( years)				
DSCR (times)				
LLCR (times)				
PLCR (times)				
Benefit to Cost Ratio				

### BOX 4: FCFF and FCFE

In the analysis conducted in this chapter the terms Free Cash Flows to Firm (FCFF) and Free Cash Flows to Equity (FCFE) are frequently used. It is important to understand the differentiating factors within these terms. FCFF represents the analysis from Project’s perspective as it represents the amount of cash flow available for the project as a whole. On the contrary, FCFE represents the analysis from the perspective of equity holders / project sponsors. It represents the cash flow available to the equity holders /

project sponsors after meeting all project related expenditure.

### 3.3 Total Project Cost

These costs are one off costs that have to be incurred to make the project operational. It is estimated from the base case financial results that proposed CCS Project will cost PKR 12,506,611,242 (result without risk incorporation). This project cost consists of PKR 7,513 million and 4,993 million for Punjab-Khyber Pakhtunkhwa and Baluchistan-Sindh cluster respectively. These costs include the cost of acquiring Land, Plant and Machinery, Building & Civil Works and Project Management and Other Miscellaneous heads.

Land Cost has been estimated on the basis of land area required for setting up facilities in their respective locations. This consists of land price and land development charges (7% of the land price) used for cleaning, scalping, construction of boundary wall and pavement. However, as the exact location of facilities is not identified in the pre-feasibility studies; therefore after consultation with the local real estate agents at each location average market price of land per acre has been used to compute the total cost of land.

The second head - Plant & machinery, comprises of machinery to be used in the cold stores, pack houses and Refer yards. This specifically includes components such as compressors, washing and waxing machines and cranes respectively. Diesel generators are also included in this head which will ensure uninterrupted power supply to facilities.

The third head - Building & Civil Works, comprises of cost to be incurred for developing the main infrastructure of each facility. For the purpose of cost calculation, we have assumed that Refer Yards and Pack Houses will be built with conventional RCC structure; however pre-fabricated material will be used to build Cold Storage facilities. Cost estimates of Plant & Machinery and Civil Works has been provided by the technical consultants and details are attached in Annexure 4: Assumption on the Financial Model.

Lastly, Project Management and Other Miscellaneous Heads consist of security systems and other office items such as furniture and fixtures, office equipment etc. These costs also include Project management expenditure covering Legal & Professional Charges, Main Electricity Connection including Electrification within the

facility and expenditure incurred in obtaining No-Objection-Certificated (NOC) from the concerned authorities.

The following table provides an outlook on the total project cost (for each cluster) broken down into heads explained above.

**Table 10: Total Project Cost**

All Amounts in PKR		
Description	Punjab - Khyber Pakhtunkhwa	Sindh-Baluchistan
<b>Land Cost</b>		
<b>Plant, Machinery &amp; Equipment</b>		
<b>Building &amp; Civil Works</b>		
<b>Other Ancillary Equipments</b>		
<b>Others</b>		
<b>Total</b>		

### 3.4 Operating Costs

Operating costs are the chronic routine costs required to keep the facilities at their defined standards. These costs can be divided into direct operational costs and indirect operational costs or overheads.

#### 3.4.1 Direct Cost

Direct Costs are those costs which are directly attributable to operations of the business. For the CCS Project such costs are assumed to include Salaries & Wages, Chemicals for Pack Houses, Electricity for Plant, Diesel and Insurance Costs etc.

Salaries & Wages cover the salaries of staff such as plant technician, plant and fork lifters operators directly engaged in the Cold Stores, Pack House and Refer Yards. Wages is assumed to be paid out to those personnel who will be hired to perform part time duties – specifically for Pack Houses.

Chemicals will be consumed only in the Pack House during washing and waxing of fruits and vegetables. For cost computation of this head, the prevailing market prices of chemicals have been taken as the starting point.

Electricity charges under direct costs will cover expenses for electricity consumption in each component of the CCS. Electricity requirement of each component vary depending upon the load and machinery requirement which has adequately been reflected in the financial model.

Diesel cost in this head is the operating cost of standby generators that will be used to ensure

uninterrupted power supply in the event of load shedding. It has been assumed that on average 4 hrs of load shedding will occur at each location in the project.

In order to cater for any unforeseen circumstance building, plant and machinery will be insured and this cost is assumed as 1% of the written down value of these equipments. Details of manpower, their salary structure, chemical usage and cost are attached in the Annexure 4: Assumptions on financial model. Following table illustrates the averages per annum cost of above mentioned account heads.

**Table 11: Direct Cost**

PKR million		
Description	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh
Salaries		
Chemical		
Electricity		
Diesel		
Insurance		

**3.4.2 Other Direct Costs**

Other direct cost for the project includes the repair and maintenance costs of plant and equipment in order to maintain operational efficiency. These costs will be low in the initial years as new plant will require less maintenance and will increase in accordance to the useful life. The flowing table depicts the estimated maintenance cost on Building and Plant & machinery for the project over asset’s useful life.

**Table 12: Maintenance Cost**

PKR Million		
Description	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh
Years (1-5)		
Years (6-10)		
Years (11-15)		

**3.5 Indirect Cost**

These costs include all other costs that are not directly attributable to the business operations. Such costs are normally fixed in nature and include Office Staff Salaries, Office Block Electricity and Other Expenses such as utilities and Repair and Maintenance for Other Ancillary Systems.

Office Block Electricity differs from the Direct Electricity mentioned earlier as this expenditure relates to electricity consumption within the

administrative block of each facility. This head also includes expenditure required to meet diesel requirements during period of power failure.

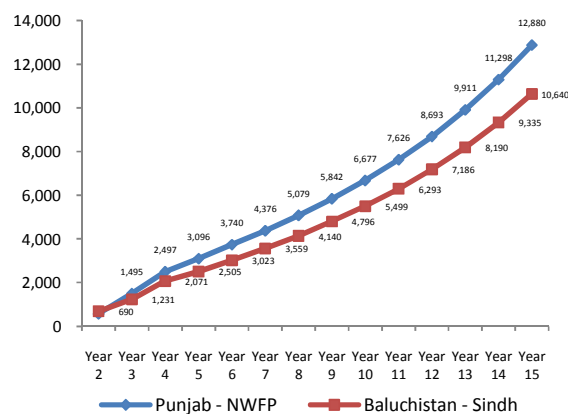
Admin Salary includes the salary of staff other direct staff mentioned above and is provisioned to include manager and clerks etc. on the other hand, other expenses include utility bills, printing & stationary and repair maintenance of office equipment. Table hereunder indicates the average per annum indirect cost for the CCS Project.

**Table 13: Indirect Cost**

PKR Million		
Description	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh
Office Electricity		
Admin Salary		
Other Expenses		

**3.6 Revenue**

Revenue is a major driving force of any business. For the CCS Project it will be earned by rendering services to the consumer in respect of storage, packing, handling and parking facilities. From Cold Stores revenue will be earned in respect of storage facility offered for the fruits and vegetables. In case of Pack House, revenue will be derived from the processing and packing of fruits and vegetables and also from the storage facility offered for the packed product. Whereas in Refer Yard business revenue will be earned from handling and parking facilities offered to the refer containers. Basis of the revenue computation and charge out rate for each of revenue category is attached in the Annexure – 4 Assumption for Financial Model. The following figure provides an outlook on the project revenue (for both clusters with revenue given in PKR million) as determined through the financial model – Base Case Scenario.



**Figure 4: Project Revenue**

### 3.7 Assumptions

#### 3.7.1 Inflation

Core inflation of 11.5% per annum has been assumed for the project based on the average last five years CPI (FY 05 – FY09). This rate is more or less the same as mentioned in the Monetary Policy decision - November 2009 for current fiscal year.

#### 3.7.2 Discount Rate

To incorporate Time Value of Money concept in our financial assessment, we have taken Weighted Average Cost of Capital (WACC) as our discount rate. Formula used to calculate WACC is as follows;

$$\text{WACC} = \text{Cost of Equity} * \text{Equity \%} + \text{Cost of debt (1-tax)} * \text{Debt \%}$$

Cost of equity has been assumed as keeping in view the current return required by the investors. Cost of debt is taken at actual (at the time of preparation of this feasibility) which is 3-months KIBOR plus 3% premium whereas Equity and debt structure for the project is 50:50. The tax rate applicable on the project is taken at actual i.e. Hence, the WACC is computed to be 11.5%.

**Table 14: Discount Rate**

Cost of Debt	Cost of Equity	Discount Rate / WACC

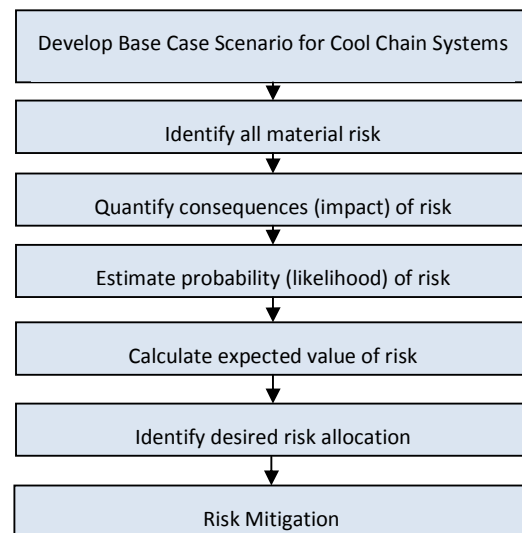
To evaluate the effect of various discount rates on the project, we have carried out sensitivity analysis on head in section 3.13.5 of the report.

### 3.8 Risk Assessment

Risk is the uncertainty of outcomes, either positive or negative. PPP transactions have the advantage in the sense that there can be risk sharing amongst the public and private sector which leads to creation of Value for Money (VFM). This is the reason that assessment is an important milestone for any PPP transaction. Moreover, Infrastructure projects have very high positive externalities and possess many characteristics of Public goods. Hence, large scale infrastructure projects are traditionally financed and carried within the public sector. However, as such projects are implemented over multiple years; they are exposed to risk – external and internal to the business environment. Such risks have the potential to delay projects; influence costs in an adverse fashion; therefore, it becomes important to carry out a comprehensive risk assessment exercise.

In a risk assessment, after development of the base case financial model, the first step in the process is to identify and document all material risks associated with the project. Second, the identified risks are assigned probabilities which show their chance of occurrence. Third, to calculate the impact of the risk by inflating or deflating the relevant head(s) that risk occurrence would affect. Once this is concluded, the impact of risk occurrence is evaluated on the entire project viability. The fourth step is to allocate the risk to the party that is best suited to manage it. Lastly, risk mitigation measures are drawn as a precaution against any colossal loss to business.

Our approach in conducting the risk assessment exercise of CCS Project is based on the above methodology which is graphically presented below.



### 3.9 Risk Adjusted Financial Model

Risk-adjusted financial model is the base case model plus a costing for risks associated with undertaking the project. Government does not usually cost these risks, but it is necessary to do so in order to estimate the risk exposure to the project. Another functionality of risk adjusted model is that it is used to determine the Value for Money (VFM) at the feasibility stage of the project.

The following table provides the results of risk adjusted financial model (based on the discounted cash flow technique) when all risks pertaining to this project materialize simultaneously. The individual impact of each risk identified for the project is covered later in this chapter whereas the

project results without risk are illustrated in "Table 9: Base Case Financial Model Results".

**Table 15: Risk Adjusted Financial Model Results**

	Punjab – Khyber Pakhtunkhwa		Baluchistan - Sindh	
	FCFF	FCFE	FCFF	FCFE
NPV (million)				
IRR (% age)				
Payback( years)				
DSCR (times)				
LLCR (times)				
Benefit to Cost Ratio				

In light of project preparation guideline the impact of each risk is incorporated in the relevant cost heads of the project rather than adjusting the discount rate to accommodate risk factors. Following paragraphs discusses our risk quantification methodology used to calculate the impact of respective risks.

### 3.10 Risk Quantification Methodology

Broadly, risk can be incorporated in the base case scenario through one of the following methods:

- Including the costs of project specific risk in the cash flow numerator- Cash Flow at Risk Methodology using Expected Value; or
- Adjusting the discount rate (cost of capital) to reflect the specific level of risk for each project

For the purpose of quantifying risks, we have proceeded with the Cash Flow at Risk Methodology using Expected Value. In this, the first step was to identify and document all material risks associated with the project. Once all material risks were identified, the project team assessed and quantified the possible consequences of each risk materializing, along with an estimate of time at which a certain proportion or whole of an identified risk would affect the business model. Thereafter, using statistical techniques we estimated the probability of risk occurrence by constructing probability distributions and interpreting the resulting outputs. These distributions were based on professional experience and knowledge of the project team, supported (where available) by historical information and reliable assumptions for similar projects. Following these distributions, reliable estimates of cash flow impact were ascertained using the expected value approach - which is the probability-weighted average value of all possible risk occurrences.

For purpose of illustrating the above methodology, a sample of what was actually done to quantify risk is provided below:

**Table 16: Risk Quantification Sample**

Events	Probability (a)	% (b)	Impact (a*b)
Machine will be available/ purchased at the base price stated in the Base Case Model			
Machine will be available/ purchased at a 10% higher price than the base case model			
Machine will be available/ purchased at a 20% higher price than the base case model			
Machine will be available/ purchased at a 10% lower price than the base case model			
<b>Total</b>			

Table above shows 4 heads namely events, probability, variation in that particular risk or change (%) and impact. In the event column, we first assumed that the machine price will remain the same as assumed in the base case financial model. This event is assumed to have an occurrence probability of with a (zero percent) change in base case prices and overall impact on project of 0% (as depicted in the impact column). In the second event, we assumed that there is a probability that prices of machine will rise by in comparison to the base case figures. The impact of this event happening is computed by multiplying probability which come out to be. Similarly for increase base case prices, the corresponding probability was evaluated to be giving an overall impact of. Lastly, for event with change in prices being less than base case figures at there is a probability with overall impact .

Now applying the expected value phenomenon on the risk quantification, the overall impact of a change in machine price is computed by taking the weighted average values of all risk occurrences i.e. as shown in the row labeled 'Total'. Hence the exposure of machine price risk to the CCS Project is that the machine prices will increase by This is more likely to be the case as inflation and exchange rates are highly unlikely to remain the same and machine price is more likely to change from the base case scenario.

Moreover, an increase in machine prices by % would also affect the total project cost (which would increase by the corresponding change in

machine price); decreased cash flows (as more cash would be required to purchase the machines); increased debt servicing costs (as a consequence of increased project cost) etc.

### 3.11 Project Risk

#### 3.11.1 Construction Risk

The project involves making estimating of the cost of construction, however these estimates may turn out to be less than expected because of an increase in the material or supply cost. In an economic sense, failure to complete the project on time reduces the present value of the services provided by the project which in-turn increases the capital cost required for construction. On the contrary, things may turn out to be better than expected with completion of project before the assumed deadline - chances of which are very rare especially in infrastructure projects. In case of the Cool Chain Project risk that falls in the category of construction are:

- a) Machinery Price risk
- b) Technology availability risk
- c) Site/Land price risk
- d) Risk of price change of other assets
- e) Design Risk

#### a) Machine Price Risk

The risk that the price of machinery required in the project may increase due to one or all of the following reasons. a) Technical input for the project may fail to deliver the required outputs; b) technology improvement may render the technology input as outdated, c) increased lead time between project planning and shipment of order. All these factors contribute to the change in machine price form the one that is anticipated at the planning phase. As a consequence of this risk cost of the project will rise and investor has to put in extra money and will have to face the delayed payback and low returns than projected in the base case. Following table indicates the quantification of this risk and its impact on the project viability and returns.

Event	Probability (a)	Change (b)	Impact (a*b)
Base case price			
10% above base case			
20% above base case			
10% below base case			
Total			
<b>Base Case Financial Results</b>			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	
	FCFF	FCFE	FCFF FCFE
NPV (million)			

IRR (% age)		
Payback ( years)		
DSCR (times)		
LLCR (times)		
<b>Risk Adjusted Impact on Project Results</b>		
NPV (million)		
IRR (% age)		
Payback ( years)		
DSCR (times)		
LLCR (times)		

If this risk materialize from the table above it is evident that this will lead to increase in the price of machinery by. Consequently project NPV (FCFF) will move down by and project equity (FCFE) by for Punjab – Khyber Pakhtunkhwa whereas for Baluchistan – Sindh project (FCFF) and equity (FCFE) NPV will reduce by respectively. The IRR for both clusters shows negligible impact whereas the payback period will delay investment payback by only 1 (one) month for both clusters.

The risk materialization impacts the debt ratios however the impact is negligible as can be seen in the table above. By and large, this risk although deteriorates the NPV, the impact on overall viability of the project remains intact.

#### b) Technology Availability Risk

This risk pertains to the availability of proposed technology solution in the market and also includes the risk of inability to import the required technology from a different country, thus requiring adaptation of alternate technology to deliver the required output specifications. There exists a likelihood that this alternate technology turns out to be more expensive than the one assumed for base case calculations. If this does happen, then project cost and debt servicing requirement would escalate and have a negative impact on project cash flows, specifically the NPV – which as provided below reduces (from equity perspective) from PKR to PKR in case of Punjab-Khyber Pakhtunkhwa and from PKR to PKR for Baluchistan-Sindh cluster.

The table below shows occurrence of this risk will increase the price of plant and machinery by only and this has a minimal impact on the project viability and bankability.

Event	Probability (a)	Change (b)	Impact (a*b)
Base case price			
10% above base case			
25% above base case			
50% above base case			
Total			
<b>Base Case Financial Results</b>			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	
	FCFF	FCFE	FCFF FCFE

NPV (PKR million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			
Risk Adjusted Impact on Project Results			
NPV (PKR million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

### c) Site/Land Price Risk

Is the probability that the price of land at the time of project execution may vary from the projected figures. If an adverse situation arises (with land prices rising above the estimated figures) then the investor would be required to pay more than expected and thus increasing initial setup and capital expenditure costs. There is another possibility that the land may not be available in the proposed locality which would require relocation of the facility to some less commercially viable location which would not only affect the project cost but also would impact the projected revenues. Following table shows that if this risk occurs then it will increase the capital cost in respect of land by, this increase has the impact of on the project NPV and on equity NPV of Punjab – Khyber Pakhtunkhwa cluster, in case of Baluchistan – Sindh cluster, project NPV reduces by and equity NPV by from the NPV of base case. Similarly IRR, pay back, DSCR and LLCR of both cluster remains negligibly affected as a consequence of this risk.

Event	Probability (a)	Change (b)	Impact (a*b)
Base case price			
10% above base case			
20% above base case			
10% lower base case			
Total			
Base Case Financial Results			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	-
	FCFF	FCFE	FCFF
	FCFE	FCFF	FCFE
NPV (PKR million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			
Risk Adjusted Impact on Project Results			
NPV (PKR million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

### d) Risk of Price Change of Other Assets

Risk arises from the probability of price change in other assets and ancillary equipment required for the project. Such changes in price may arise due to lead time between shipment and order on account of project planning, erection, site readiness, exchange rate fluctuation and change in duty or tariff structure. Table hereunder indicates that if such risks materialize then it will increase the capital cost with respect to other assets by, project NPV of Punjab – Khyber Pakhtunkhwa as a result of increase in price falls by and PKR whereas equity NPV by. Similarly for the Baluchistan – Sindh cluster, project NPV shrinks only by and equity by. In case of other viability factors such as IRR and payback period and bankability factor this risk has minimal impact as evident from the table below.

Event	Probability (a)	Change (b)	Impact (a*b)
Base case price			
10% above base case			
20% above base case			
10% lower base case			
Total			
Base Case Financial Results			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	-
	FCFF	FCFE	FCFF
	FCFE	FCFF	FCFE
NPV (PKR million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			
Risk Adjusted Impact on Project Results			
NPV (PKR million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

### e) Design Risk

The design risk pertains to the possibility of not delivering the adequate design that lead to non-achievement of output specifications (given in Chapter 6: Project Management). In a nut shell, if this risk occurs then the facilities would be required to fix the design and translate the same into the physical structure. This would require additional capital expenditure apart from having a negative impact on cash flows and project implementation timeframe. Statistically, this risk would have an incremental affect of 0.75% on Building and Civil Works cost of the project; however this percentage impact would have only negligible impact on the overall project viability as can be seen from the following table.

Event	Probability (a)	Change (b)	Impact (a*b)
Base case price			
5% above base case price			
10% above base case price			
20% above base case price			
Total			

Base Case Financial Results				
	Punjab Pakhtunkhwa	– Khyber FCFE	Baluchistan - Sindh FCFF	FCFE
NPV (PKR million)				
IRR (% age)				
Payback (years)				
DSCR (times)				
LLCR (times)				
Risk Adjusted Impact on Project Results				
NPV (PKR million)				
IRR (% age)				
Payback (years)				
DSCR (times)				
LLCR (times)				

### 3.11.2 Operating Risks

Upon completion of construction, the operation phase commences. In this phase the risk faced by the operators' deals with the operating activities of the business which include the following

- HR salary and Training Risk
- Crop Availability Risk
- Electricity Shortage Risk
- Credit (Receivable Risks)
- Technology Support Risk
- Technology Obsolete Risk
- Management Risk
- Demand Risk

#### a) HR Salary and Training Risk

As HR is a major component for the operation of the project, it is necessary to have a right man at the right place or else it may have an adverse impact on operational costs and ultimately on the profitability of the project as a whole. HR Salary and Training Risk would occur if there is a shortfall of skilled human resource or in extreme cases where there is no resource available in the area where the facility is to be set up. In the latter case, the facility owners / operators would require to being in resource from other areas of the country – an exercise that will cause an increase in operational expenditure. On the contrary, if there is shortage of skilled labor, then the un-skilled labor would require training before being assigned their respective operational tasks.

The results obtained from this risk materializing reflect that increase in salary expense would be witnessed. This would reduce the project NPV by and equity by 2. For the said cluster Equity IRR reduces will reduce by whereas its impact on DSCR and LLCR would remain negligible.

For the Baluchistan – Sindh cluster project and equity would come down by and. In terms of Equity IRR, a decrease would be witnessed however the

pay back would increase by a month further from base case scenario.

The DSCR and LLCR from equity and project perspective show minimal change as shown in the following table

Event	Probability (a)	Change (b)	Impact (a*b)
Base case Salary			
15% above base case salary			
25% above base case salary			
50% below base case salary			
15% lower than base case			
Total			
Base Case Financial Results			
	Punjab Pakhtunkhwa	– Khyber FCFE	Baluchistan - Sindh FCFF
	FCFF	FCFE	FCFE
NPV (PKR million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			
Risk Adjusted Impact on Project Results			
NPV (PKR million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

#### b) Crop Availability Risk

Risk that the production of the relevant produce in a particular facility area would not be sufficient or there might be no produce at all due to unsuitable climate, growing conditions for horticulture crops as well as change in production plan, based on market demand, by the growers of the area. This risk is of great importance in the CCS Project as it revolves around the availability of fruits and vegetables for processing, transportation and storage. Hence, non-availability of crop or lesser production than anticipated, in any of the facility will jeopardize the ability of earning financial returns. This would have a direct impact on project revenue and in actuality; the project revenue would be directly proportionate to production / availability of horticulture crops. Therefore, working out the impact of this risk materializing, we assess that crop availability would cause the annual base case occupancies (as contained in base case financial model) to decrease by 0.5%. This decrease in occupancy will reduce the project revenue.

Table below shows that if this risk occurs, it reduces the Project NPV by and Equity NPV by for Punjab – Khyber Pakhtunkhwa, where as in case of Baluchistan – Sindh cluster Project NPV declines by and Equity NPV by. This risk reduces the equity IRR of both clusters by 1% whereas project IRR remains unchanged. Moreover, it has a little impact on the bankability ratios of project (see table below).

Event	Probability (a)	Occupancy (b)	Impact (a*b)
<b>Average Production</b>			
5% decrease in production			
5% increase in production			
<b>Total</b>			
<b>Base Case Financial Results</b>			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	
	FCFF	FCFE	FCFF FCFE
NPV (PKR million)			
IRR (% age)			
Payback ( years)			
DSCR (times)			
LLCR (times)			
<b>Risk Adjusted Impact on Project Results</b>			
NPV (PKR million)			
IRR (% age)			
Payback( years)			
DSCR (times)			
LLCR (times)			

### c) Demand/Competition Risk

Demand risk refers to the possibility of unforeseen variation in the demand for the services offered by a project. Where there are many consumers, such risk is borne by the service provider. On the contrary, consumer bears the risk associated with changes in their demand. For a Cool Chain project there is a possibility that Introduction of the project will create awareness in the market for creating a lucrative commercial value by the investors. On account of market created by the project, there will be a natural trend of more investors that will not be a part of this project to enter into the same market and tap into the unique pool of resource that will be available to the Cool Chain System. Hence, competition will impair the occupancy by 1.85% and this has the major impact on the NPV of Punjab – Khyber Pakhtunkhwa cluster whereas it has a minimal impact on all other results and ratios of both clusters. Project NPV shrinks and equity NPV by from the base case results. In case of Baluchistan – Sindh cluster project NPV moves down by and equity by from the base case.

Event	Probability (a)	Decrease in Occupancy (b)	Impact (a*b)
<b>Base case price</b>			
Low competition			
Moderate Competition			
High Competition			
<b>Total</b>			
<b>Base Case Financial Results</b>			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	
	FCFF	FCFE	FCFF FCFE
NPV ( million)			
IRR (% age)			
Payback( years)			
DSCR (times)			
LLCR (times)			
<b>Risk Adjusted Impact on Project Results</b>			
NPV (million)			
IRR (% age)			
Payback ( years)			

DSCR (times)
LLCR (times)

### d) Electricity Shortage Risk

The CCS Project requires providing appropriate temperature for storage, processing and packing services of fruits and vegetables. Moreover, the parking facility to the refrigerated containers makes uninterrupted supply of electricity a very important element for project operations. However, considering the prevailing electricity generation in the country where electricity is not regularly supplied to industrial units make this project highly prone to the electricity shortage risk. If such risk materialized it hampers the project profitability because provision of uninterrupted supply of electricity requires backup power supply systems which are costly not only in acquisition also their operating cost are much higher than the conventional electricity supply.

In the base case scenario, we have assumed that during each operational day, 4 hours of electricity would need to be provided by back up electricity generators due to absence of conventional electricity supply. In this risk assessment exercise, we evaluated the impact of this risk materializing with the result that a maximum of 7.3 hours per operational day would require supply of electricity through back-up generators. This impacts Project NPV which reduces by and Equity NPV by) for the Punjab – Khyber Pakhtunkhwa cluster. Similarly, Project and Equity NPV of Baluchistan – Sindh cluster moves down by and respectively from the base case. The table below provides more details.

Event	Probability (a)	Hours (b)	Impact (a*b)
<b>Base case - Load Shedding</b>			
Low			
Medium			
High			
<b>Total</b>			
<b>Base Case Financial Results</b>			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	
	FCFF	FCFE	FCFF FCFE
NPV (PKR million)			
IRR (% age)			
Payback( years)			
DSCR (times)			
LLCR (times)			
<b>Risk Adjusted Impact on Project Results</b>			
NPV (PKR million)			
IRR (% age)			
Payback( years)			
DSCR (times)			
LLCR (times)			

### e) Technology Support Risk

As the CCS Project would require continuous use of plant and machinery, there is a high possibility that a break down would occur. If and when this occurs, the facility would become unavailable for service. Hence, the supplier of machinery would need to provide technological support – which is the normal industry practise. If, for any reason this technological support to make the equipment workable again is not provided – either due to non-availability of parts or due to closure of business, the facility operators would need to make alternate arrangements. This would normally require procuring services from an alternate source which will more-likely-than-not prove to be more expensive.

This risk if crystallizes would increase the maintenance cost by from the first year of operations. As a consequence, Punjab – Khyber Pakhtunkhwa cluster's Project and Equity NPV would slash down by and respectively. Similarly, Project and Equity NPV of Baluchistan – Sindh cluster would move down by and respectively. The complete impact of this risk impact on the project can be seen from the table below:

Event	Probability (a)	Percentage (b)	Impact (a*b)
Base case – repair & maintenance			
Double than base case			
Total			
<b>Base Case Financial Results</b>			
	Punjab – Pakhtunkhwa	Khyber Baluchistan - Sindh	
	FCFF	FCFE	FCFF FCFE
NPV (PKR million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			
<b>Risk Adjusted Impact on Project Results</b>			
NPV (PKR million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

#### f) Technology Obsolescence Risk

Any technology based system is prone to obsolescence due to new market research and dynamically changing customer awareness and demand. On account of this, there is a possibility that a particular technology used in CCS Project may also subject to redundancy or obsolescence. Our risk assessment on this matter evaluates the impact on project as a 6% fall in revenues. This will be due to a shift of customers towards new facilities using latest technology and probably demanding lower tariff against better services.

Low occupancy would result in low revenues and hence reduced project returns which would directly impact bankability of project. If we see the impact from the NPV point of view only, then occurrence of this risk will reduce the Project and Equity NPV of Punjab – Khyber Pakhtunkhwa cluster by and whereas for Baluchistan - Sindh cluster this NPV fall out percentage would be and from the base case results. The table below presents the complete picture of this risk.

Event	Probability (a)	Occupancy (b)	Impact (a*b)
No obsolesce			
Low impact			
Medium impact			
High impact			
Total			
<b>Base Case Financial Results</b>			
	Punjab – Pakhtunkhwa	Khyber Baluchistan - Sindh	
	FCFF	FCFE	FCFF FCFE
NPV (million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			
<b>Risk Adjusted Impact on Project Results</b>			
NPV (million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

#### g) Management Risk

The facilities are required to be operated using international best practices which may require adopting the six sigma approach (see box 10) for operational excellence. However, if following such a practice does not hold true then the risks associated with ineffective and underperforming management, which puts a negative impact on project operations, would arise. This negative impact would impact the project performance and in all likelihoods the occupancy levels would fall.

Project occupancy in the first year of operation, as a consequence of this risk, will fall down by 1.80% where as project returns and bankability ratios would also decline. In case of Punjab – Khyber Pakhtunkhwa cluster Project NPV would go down by and equity NPV would fall by, whereas Project and Equity NPV of Baluchistan – Sindh cluster would shrink by and respectively in comparison to the base case results – see table below

Event	Probability (a)	Decrease in Occupancy (b)	Impact (a*b)
No Management Risk			
Incapable management - Low			
Incapable management - Medium			

Incapable management - High				
Total				
Base Case Financial Results				
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh		
	FCFF	FCFE	FCFF	FCFE
NPV (million)				
IRR (% age)				
Payback (years)				
DSCR (times)				
LLCR (times)				
Risk Adjusted Impact on Project Results				
NPV (million)				
IRR (% age)				
Payback (years)				
DSCR (times)				
LLCR (times)				

### 3.1.1.3 Financing Risk

Financial risks facing the CCS project deals with the fluctuations in debt and equity availability changes in interest rates.

#### a) Interest Rate Risk

Probability that the interest rate projected in the base case financial results may vary either upward or downward depending on the situation in the country. If interest rate increases as a consequence project will have to incur additional cost and cash outflows in term of debt servicing charges which ultimately reduce the valuation of project – in NPV terms. The opposite would also hold true.

From the probability functions we see that the average interest rate over the life of the project would be which is less than the interest rate used to compute base case financial results. Consequently, this would improve the viability of the project (in NPV terms) by and in Project and Equity terms respectively for Punjab-Khyber Pakhtunkhwa cluster. For Baluchistan-Sindh cluster the viability in Project terms increases by and in Equity terms it increases by.

Event	Probability (a)	KIBOR (b)	Impact (a*b)
Base case KIBOR	10%	15.50%	1.55%
1% above KIBOR	5%	16.5%	0.83%
2% above KIBOR	5%	17.5%	0.88%
1% below KIBOR	25%	14.50%	3.63%
2% below KIBOR	25%	13.50%	3.38%
3% below KIBOR	20%	12.50%	2.50%
4% below KIBOR	10%	11.50%	1.15%
Total	100%		13.90%
Base Case Financial Results			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	
	FCFF	FCFE	FCFF
NPV (million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			
Risk Adjusted Impact on Project Results			
NPV (PKR million)			

IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

### 3.1.1.4 Other Risks

There are various other risks that have major impact on the project's cost, operations and viability. Under this heads we have considered the following risks.

- Political Risk
- Foreign Exchange Risk
- Inflation Risk
- Fuel Price Risk and;
- Force Majeure

#### a) Political Risk

The possibility of any unforeseeable conduct by the Institution or any other government authority that materially and adversely affects the expected return on equity, debt service or otherwise results in increased cost to private party. There is an inherent political risk in this kind of long term infra structure projects. Political instability will increase the cost of equity to from the base case cost of. Increase in the cost of equity to increase the discount rate to because cost of equity factor mentioned in "3.7.2 discount rate" increase, as a result of discount rate increase project viability and return affect enormously. As a consequence of this risk, Project and Equity NPV of Punjab – Khyber Pakhtunkhwa cluster shrinks by and respectively from the base case scenario whereas in case of Baluchistan – Sindh cluster Project NPV falls by and Equity by. Impact of this risk on other viability and bankability factors are illustrated in the table below:

Event	Probability (a)	Cost of Equity (b)	Impact (a*b)
Base case – cost of equity			
Low			
Medium			
High			
Total			
Base Case			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	
	FCFF	FCFE	FCFF
NPV (million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			
Risk Adjusted Impact on Project Results			
NPV (million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

#### b) Foreign Exchange Risk

Risk that 'rupee against dollar' (the exchange rate) would fluctuate during the project implementation period - in which specifically Plant and Machinery is to be procured internationally. This will impact on the envisaged cost of imported items required in the project during construction and operational phase. If such risk materializes then it will inflate the price of Plant and Machinery by 2.5% from the base year. Following table shows the impact on project results and bankability as result of this risk.

Event	Probability (a)	Percentage (b)	Impact (a*b)
<b>Base case</b>			
10 % appreciation			
10% depreciation			
15% depreciation			
<b>Total</b>			
<b>Base Case</b>			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	
	FCFF	FCFE	FCFF
NPV (million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			
<b>Risk Adjusted Impact on Project Results</b>			
NPV (million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

### c) Fuel Price Risk

Risk that project will be affected by any increase or decrease in the prices of fuel. Like electricity fuel is a major component of operating cost as it is used to operate the backup power supply in case of electricity load shedding. If this risk occurs then project operating cost will increase and the returns and viability of the project affects accordingly. Table shows that as a consequence of this risk fuel prices will inflate at 7.8% per annum rather than base case of 7.5% per annum, this hits the project returns and impact on it bankability which is shown in the following table.

Event	Probability (a)	Inflation (b)	Impact (a*b)
<b>Base case</b>			
Low			
Medium			
High			
Very High			
<b>Total</b>			
<b>Base Case</b>			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	
	FCFF	FCFE	FCFF
NPV (million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

<b>Risk Adjusted Impact on Project Results</b>			
NPV (million)			
IRR (% age)			
Payback (years)			
DSCR (times)			
LLCR (times)			

### d) Inflation Risk

Inflation is the increase in general prices of commodities in the economy. In the present uncertain economic environment the inflation rate is expected to fluctuate over time. Such fluctuations may lower the interest rate (in case corrective actions are taken by the Government through monetary policy) or increase (for various factors including substantial increase in world oil prices – as witnessed in 2008). Thus, in the risk assessment exercise we have evaluated the interest rate to be at over the life of the project. This increase in interest rate from the base case scenario impacts all capital and operational expenditure for the CCS Project. If our assessment holds true and average rate of inflation (over project life) remains then Project NPV would fall from to for Punjab-Khyber Pakhtunkhwa cluster and for Baluchistan-Sindh it would decrease from to . The comprehensive impact of this risk materializing is tabulated below.

Event	Probability (a)	Inflation (b)	Impact (a*b)
<b>Base case</b>			
Low			
Medium			
High			
Very High			
<b>Total</b>			
<b>Base Case</b>			
	Punjab – Khyber Pakhtunkhwa	Baluchistan - Sindh	
	FCFF	FCFE	FCFF
NPV ( million)			
IRR (% age)			
Payback ( years)			
DSCR (times)			
LLCR (times)			
<b>Risk Adjusted Impact on Project Results</b>			
NPV (million)			
IRR (% age)			
Payback ( years)			
DSCR (times)			
LLCR (times)			

### e) Force Majeure Risk

An act occasioned by an unanticipated, unnatural (change in legislation, war etc) or natural disaster such as earthquake or flood of such magnitude that delays or adjourns the project implementation or operations. Such risk cannot be mitigated as these are beyond the control of any party, however allocation of such risks will need to be negotiated with the successful bidder for this project and allocated thereafter.

### 3.12 Risk Matrix

A comprehensive risk matrix has been developed for the CCS Project which outlines the consequence of risk arising, mitigation measures to be put in place to minimize the adverse affect on the project and lastly its allocation. This is attached to the report as Annexure 8.

### 3.13 Sensitivity Testing

It helps to build confidence in the model by studying the uncertainties associated with parameters (such as investment cost, operating cost and revenues) in the model. It determines whether the project will be worthwhile even if some of the underlying variables turn out to be different from that projected. Therefore to achieve this, sensitivity testing has been carried out on Project Cost, Operating Cost, Revenues and Discount Factor. Following section illustrates the effect of these sensitivities on Project and Equity Net Present Value (NPV), Internal Rate of Return (IRR), Payback, Benefit to Cost Ratios (BCR), Debt Servicing Coverage (DSCR) and Loan Life Coverage (LLCR) ratio.

#### 3.13.1 Project Cost

This head covers the cost that will be incurred in development of all project facilities i.e. Total Project Cost. A increase in investment cost reduces project NPV by and equity NPV by for Punjab – Khyber Pakhtunkhwa whereas for Baluchistan-Sindh Cluster a increase in project cost reduces Project NPV by and equity NPV by .Similarly, for the same percentage change in project cost, the impact on project IRR of both clusters is a fall by whereas the Equity IRR shrinks by and of the clusters respectively. Furthermore, as a result of increase in investment cost the Payback Period is prolonged by 3 months from project’s perspective under each cluster.

Bankability ratios such as debt service coverage (DSCR) and Loan life coverage (LLCR) ratios are the most important ratio for lending institutions when making commercial loans. It measures the ability of a business to meet its regular debt obligations. The ideal DSCR ratio ranges from with any movement upwards from being more favorable whereas LLCR ranges from in a highly geared infrastructure project to or higher in other projects such as oil and gas transactions. The impact of this sensitivity on bankability ratios reflect that as a consequence of 10% increase in investment cost DSCR of both clusters decline a little from range of to for Punjab–

Khyber Pakhtunkhwa cluster and from to for Baluchistan – Sindh cluster. As mentioned earlier that a ratio of over 1 attracts the lender, DSCR under both option still remains high enough to attract the lenders despite increase in investment cost by. Inflating the investment cost by makes the LLCR of both clusters to decline from base case LLCR of and to and for Punjab – Khyber Pakhtunkhwa and Baluchistan – Sindh cluster respectively. In a nutshell, increase in the investment cost although affects the project result of both clusters from the base case, the project maintains its highly lucrative and bankable appeal.

The following table provides a range of possible results with respect to increase in Project Cost at

Description	Punjab – Khyber Pakhtunkhwa		Baluchistan – Sindh	
	FCFF	FCFE	FCFF	FCFE
<b>Net Present Value (PKR Million)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Internal Rate of Return (% age)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Payback Period (years)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Debt Service Coverage Ratio (times)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Loan Life Coverage Ratio (times)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				

#### 3.13.2 Operating Cost

To evaluate the impact of increase in the operating cost on the NPV and returns sensitivity has been executed with various percentages depicted in the table below. Results indicate that increase in the Operating cost declines the base case project NPV by and equity by for the Punjab – Khyber Pakhtunkhwa cluster, whereas in case of Baluchistan – Sindh Project NPV shrinks by and equity NPV by . With respect to IRR, an increase in operating cost by decreases the project IRR of both clusters by from the IRR of base case whereas the decrease in equity terms is and for Punjab – Khyber Pakhtunkhwa and Sindh-Baluchistan clusters respectively. In terms of payback period, the impact is a delay of 0.1 years for both clusters.

Increase in the operating cost also impacts the project's bankability ratios as the tariff charge (rate at which revenue is generated) remains the same, operating expenses increase which makes less cash available to service the debt. Therefore, as a result DSCR falls slightly from for Punjab – Khyber Pakhtunkhwa cluster whereas for Baluchistan - Sindh its range declines from base case to. A similar trend is also noted with respect to LLCR which for the project declines from for Punjab – Khyber Pakhtunkhwa and for Baluchistan – Sindh cluster.

From the results of this sensitivity it is evident that although it impacts the viability and bankability of the project, it does not have the kick that makes the project unattractive either to private party or lender - for issuing finance. Similar is the scenario for worst case assessment with 50% increase in operating expenditure (see table below for details)

Description	Punjab – Khyber Pakhtunkhwa		Baluchistan – Sindh	
	FCFF	FCFE	FCFF	FCFE
<b>Net Present Value (PKR Million)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Internal Rate of Return (% age)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Payback Period (years)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Debt Service Coverage Ratio (times)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Loan Life Coverage Ratio (times)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				

### 3.13.3 Project & Operating Costs Clubbed

Thus far two sensitivities (on Project and Operating Costs) have been carried out. In this section we explore the deviations from the base case scenario by clubbing the impact of Project and Operating Costs. The results of such test depicts that for a increase in the Project and Operating Cost, Project NPV of Punjab – Khyber Pakhtunkhwa cluster declines by and equity NPV by and for Baluchistan – Sindh, Project NPV falls by and Equity NPV by from the base case figures. Similarly Project IRR of both clusters shrink by whereas equity IRR by. In terms of project and equity payback period, this

period gets delayed by 4 months from the base case payback period for both clusters.

DSCR range falls significantly in the initial years but once all facilities become operation, project starts generating sufficient cash flows to repay its debt obligations. Hence, as a result of increase in Project and Operating costs, DSCR is very low in the initial year i.e. in the first year, however it gradually increases and by the time of debt maturity this ratio stands out at . Similarly, LLCR declines by from base case scenario for Punjab – Khyber Pakhtunkhwa cluster but is high enough to attract the lenders. For Baluchistan – Sindh cluster DSCR declines by times from base case in the initial year whereas at the end of debt tenure it decrease by times. Similarly, LLCR falls to times from the base case LLCR of . Sensitivity on the Project and Equity valuation with range of percentages is depicted as under

Description	Punjab – Khyber Pakhtunkhwa		Baluchistan – Sindh	
	FCFF	FCFE	FCFF	FCFE
<b>Net Present Value (PKR Million)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Internal Rate of Return (% age)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Payback Period (years)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Debt Service Coverage Ratio (times)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				
<b>Loan Life Coverage Ratio (times)</b>				
Base Case				
10% Increase				
25% Increase				
50 %Increase				

### 3.13.4 Revenue

Revenue is a major building block of this project and in a Project Finance transaction lender before offering finance looks at the revenue of the project to determine the project's ability to repay its debt obligation. Therefore in order to gauge the viability of the project and enhancing the confidence of the lender institutions, revenue sensitivity has been carried out to check as to how the project behaves in the worst case scenarios.

Decline in the projected revenue by shows a significant fall in the NPV with results indicating that Project NPV would fall by almost whereas Equity NPV would fall by for Punjab – Khyber Pakhtunkhwa cluster. From the perspective of Baluchistan – Sindh cluster Project NPV would decline by and Equity NPV by from the base case scenario.

The IRR also shows a declining trend due to decrease in revenue by . It shrinks by more than (from projects perspective) and approximately by (from equity providers perspective) for both clusters.

The impact on Pay Back Period would naturally be negative as less revenue would be generated where as the expenses would remain unchanged. The delay in investment payback for Punjab – Khyber Pakhtunkhwa is witnessed to be 5 months (projects perspective) and 7 months (equity perspective). Likewise, Baluchistan – Sindh cluster shows similar trend and payback extends by almost half a year from projects and equity's perspective.

As mentioned earlier that lenders are highly interested in the project's ability to earn revenue before offering finances, decline in the projected revenue by results in a fall of DSCR to from base case of over the debt tenure for Punjab – Khyber Pakhtunkhwa clusters. For Baluchistan – Sindh DSCR moves to from (base case results). Similarly, LLCR of both clusters shrinks to reach and for Punjab – Khyber Pakhtunkhwa and Baluchistan – Sindh clusters respectively.

The sensitivity for a fall in revenue by and can be seen in the following table however even in the worst case scenario (revenue fall ) the project returns and bankability not only offer good return over and above the required return to investors but also has the potential to attract finance as indicated by its DSCR and LLCR ratios. This is irrespective of the fact that DSCR range is negative in initial years ( fall in revenue) as with the passage of time when all facilities commence operations this ratio will flourish giving a comfort to the lending institution while assessing the project.

Description	Punjab – Khyber Pakhtunkhwa		Baluchistan – Sindh	
	FCFF	FCFE	FCFF	FCFE
<b>Net Present Value (PKR Million)</b>				
Base Case				
10% decrease				
20% decrease				
25 % decrease				
<b>Internal Rate of Return (% age)</b>				

<b>Base Case</b>				
10% decrease				
20% decrease				
25 % decrease				
<b>Payback Period (years)</b>				
<b>Base Case</b>				
10% decrease				
20% decrease				
25 % decrease				
<b>Debt Service Coverage Ratio (times)</b>				
<b>Base Case</b>				
10% decrease				
20% decrease				
25 % decrease				
<b>Loan Life Coverage Ratio (times)</b>				
<b>Base Case</b>				
10% decrease				
20% decrease				
25 % decrease				

### 3.13.5 Discount Rate

To evaluate the effect of changing circumstance on the project execution which has direct impact on the cost of equity and debt, sensitivity on discount rate has been carried out. Results indicate that if discount rate increases by from the base case scenario of project still depicts the high Net Present Value to attract the investors. Table under listed out the result of change in discount rate by and.

Description	Punjab – Khyber Pakhtunkhwa		Baluchistan – Sindh	
	FCFF	FCFE	FCFF	FCFE
<b>Net Present Value (PKR Million)</b>				
Base Case				
3% decrease				
3% Increase				
5 % Increase				

# 4. Economic Assessment

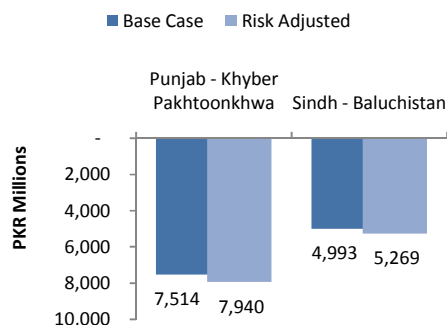
## 4.1 Value for Money

Value for Money (VFM) is used to assess whether or not an organization has obtained the maximum benefit from the goods and services it acquires and/ or provides, within the resources available to it. The significant factors in creating this value for money include efficiencies from competitive construction pricing, integrating the design, build and finance terms and efficient transfer of risk. It looks at a broad range of factors in determining whether a project offers value for money to Institution, the expected results of a hypothetical traditional delivery model, and the expected results of the actual benefit derived from the Public Private Partnership.

Financial value for money analysis is normally conducted at the procurement stage of any PPP transaction when private party bids are received and government institution is required to assess the VFM that the specific bidder is likely to provide to the institution. In this evaluation process both public sector and bidder's risk adjusted financial models are compared to identify the bidder with highest VFM parameters. In these cases VFM is measured as the difference between Net Present Value of the project as computed from project risk adjusted financial model and the Private Sector bid – received at the procurement stage of the project.

However at the feasibility stage VFM can be assumed to be equivalent to the difference between project costs when implemented by the public sector with adjustments made to risk factors – which are transferred to the private bidder. At this stage of the transaction where we are not certain of the factors involved in the full

calculation of VFM such as funding options, contribution by the public sector and other socio economic factors. Therefore based on the method discussed above, Value for Money of the project for the Government is estimated at PKR in aggregate whereas cluster wise the value generated is PKR for Punjab – Khyber Pakhtunkhwa and PKR for Sindh-Baluchistan. Following graph depicts the value added to the project in accordance to the risk allocation matrix (see annexure 8 for details).



The above calculated VFM is based on the assumption that risk allocation will be in accordance to the recommendation made in this report (see annexure 8 for detailed assessment of project risks). However, if at the stage of procurement, risks which have been allocated to the private party are taken up by the government then the VFM will change accordingly.

In addition to the financial value for money which will be gained through private sector participation, the government will also receive many economic and monetary benefits. Following paragraphs discuss some of the benefits that can be gained through this project.

#### 4.2 Benefits to be derived from the establishment of a CCS

- **Sector Development and Future Potential Investment:** The post-harvest improvements will have a direct repercussion on the pre-harvest activities. The growers would become more aware of the benefits provided by value addition and will focus to improve the pre-harvest activities including adopting of better farm management techniques. This way, the focus may be shifted to demand oriented market structure rather than existing supply oriented structure. This shift may create business opportunities in seed management leading to the establishment of seed enterprises which provide a range of skills such as plant breeding, seed production and marketing. Moreover, agriculture research institutions would be presented with an opportunity to enhance its role to a wider and more aware audience.

In addition, the existing infrastructure proposed to service the horticulture sector would be insufficient to cater to the entire market demand. Hence, it is argued that with the establishment of the CCS the profitability of the horticulture sector would be brought to the forefront and entrepreneurs would be tempted to invest in this sector – with vast gap in demand and supply. In the cold storage business, the existing and proposed facilities were sufficient to cater to only 7.9% of the crops produced in 2007-08. This leaves a market gap of 92.1%.

- **Technology Replication:** Most of the existing facilities are based on old and obsolete technology. They are energy inefficient and thus involve high maintenance costs. Use of modern and efficient machinery allows the owners to meet output specifications. The proposed cool chain, because of its high-tech operating efficiency, will attract the domestic food preservation sector to invest in similar technology. This will encourage local vendors and suppliers to set-up manufacturing plants to cater for potential future demand for plant and machinery. This will not only reduce the cost for setting up such facilities but would also reduce US Dollar import bill.
- **Prevent Export Dumping:** Fruits and vegetables exporters in Pakistan procure their product from wholesales markets. They

prefer that period for purchase when there is a glut in markets and prices are low. After procurement, they have no place to store their perishable commodity. Since the shelf life is limited, all exporters try to export it immediately. As a result, some of the traditional foreign markets are dumped with Pakistan's fruits and vegetables. Market of Dubai can be quoted as an example. Because of these practices, we fetch very low price for our valuable crop.

The proposed facilities will smoothen out to some extent, the supply of fruits and vegetables to the wholesales markets. Market glut and urgency for the export of crop will be reduced. As a result, exporter will have an opportunity to enter the higher value segments in the existing markets in order to maximize unit value realization. Longer shelf lives and improved quality of packaging and processing would provide an opportunity to enter new markets. These markets have not been explored so far because of longer geographic distances or stringent quality standards.

- **Fair Rewards to Farmers:** One of the constraints faced by the farmers is the shortage of storage facility near the farm area, therefore most of the products are sold to contractors through auctions prior to fruit maturity reducing the bargaining power of the producers. The price at which these products are sold are much less than the price at which the middle man/ Arthi takes the products to the market, thereby the disposable income in the hands of the growers is low.

With the establishment of the CCS the disposable income in the hands of the growers will increase due to the fact that during the season they can store their produce and keep on taking their produce to the market at regular intervals without the fear of the produce being damaged due to its perishable nature. Thus, they can sell at times when the prices are high and keep the crop stored, in temperature controlled environment, at times when the prices are low.

- **Improved Quality of Fruits and Vegetables:** Field heat removal & timely placement of products inside cold storage will help preserve

their quality and improve shelf-life. It will also avoid food contamination caused by microbial activity thus assuring improvement of food quality and hygiene. Furthermore, with improved access to testing laboratories and pack houses for processing it will be possible for the Government of Pakistan to regulate and ensure that the horticulture crops are maintained at minimum quality standards requirement for sale even in the domestic markets.

- **Improvement of Hygienic Conditions in the Whole Sale Markets:** At present in Pakistan, there are four main categories of wholesale markets; primary wholesale (terminal), secondary wholesale, district wholesale and rural assembly markets. These markets are difficult to quantify as this sector is unregulated, however, 203 such markets are established under statutory acts<sup>8</sup> which comprise of 132 in Punjab, 68 in Sindh, 2 in Baluchistan and 1 in Khyber Pakhtunkhwa. These wholesale markets are witnessed to have poor hygienic conditions resulting from dumping of decaying fruits and vegetables.

In order to improve the current situation the supply of fruits and vegetables needs to be controlled. The establishment of cold stores at such locations will help restrict supply and ultimately reduce formation of decaying dumps and will be helpful in improving hygienic conditions in markets.

- **Poverty Alleviation through Job Creation:** Pakistan being an underdeveloped country with a significant number of its population living below the poverty level is in dire need of projects that create source of employment for the unemployed. Hence, the establishment of the cool chain system, at least two to three thousand permanent job opportunities will be created followed by temporary job opportunities like in case of manual packing in the pack houses etc. As assumed in the base case financial model for the CCS project the number of direct employment will be approximately 4,000 which includes skilled, semi-skilled and unskilled workforce.

The development and operation of the proposed national pool of reefer containers, and improved marketing techniques would

need skilled labor hereby creating further employment opportunities. Similarly, technical expertise will be developed through new technology to be adopted in Cold Storages and Pack Houses. All these projects would also result in indirect jobs in the form of development of processing industry, opportunities in construction industry, small workshops, roadside restaurants, and supplies of various items needed.

### 4-3 Economic Appraisal

The economic appraisal of the CCS was undertaken by considering the costs and benefits over the life of project. Such costs and benefits are based on those obtained from the forecasting model which assumes that all facilities in the project would become operational immediately after three years - following the start of construction phase in 2011. Therefore, costs and benefits over the life of appraisal period were discounted back to a common year of 2009 in accordance with standard economic practices using a discount rate of 12.5%<sup>9</sup> to discount the costs and benefits; this rate is currently recommended by Central bank. Based on this, Baluchistan – Sindh cluster has a benefit to cost ratio of where as in case of Punjab – Khyber Pakhtunkhwa cluster this ratio comes out to be. Benefit to cost ratio of 1 indicates that project benefits and cost are equal where as a ratio of above 1 show that benefits out weight the cost.

Other important factors that public sector weigh upon before embarking on the project is the Economic Net Present Value (ENPV) and Economic Internal Rate of Return. ENPV calculated from the base case financial model turns out to be PKR for Baluchistan – Sindh cluster and PKR for Punjab – Khyber Pakhtunkhwa cluster. In terms of EIRR, Baluchistan – Sindh cluster has an EIRR of where as Punjab – Khyber Pakhtunkhwa cluster has an EIRR of .

The economic appraisal factors reflect that the project is a viable opportunity as it has a benefit to cost ratio of both cluster more than 2 times the cost, has a positive ENPV and lucrative EIRR. Such results indicate generation of VFM.

<sup>8</sup> Agriculture Produce (grading and Marketing) Act 1937 and the Agriculture Produce Markets Act. Work. UNIDO SPS Report

<sup>9</sup> Khaleej Times

# 5. Building a Bankable Structure

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## 5.1 General

Traditionally, an infrastructure PPP method of procuring projects is done where the project is proved to be economically viable but the scarcity of financial, technical and / or human resources with the public sector hinders its implementation. Hence, the public sector seeks private sector's participation for effective and efficient implementation of the project whereas the public sector's role is restricted primarily to monitoring while the private sector is kept responsible for management and operations.

Such projects are mostly capital intensive and do not easily attract interest by the private sector. Thus the public sector offers various incentives so as to make it attractable to the private investors. These incentives may include a capital subsidy in the form of a one-time grant or alternatively, it may support the project by providing fiscal subsidies or support, including tax holidays, guaranteed annual revenues for a fixed period etc. By and large, the motive is to create a bankable structure – which means that the transaction is structured in a manner that each stakeholder benefits from its creation i.e. entrepreneurs / sponsors are keen to inject equity; the implementing institution is facilitated in carrying out the monitoring function; and above all, the lenders are facilitated and secured in providing finance and subsequently the debt servicing is securitized.

In this chapter we draw attention to factors that will make the CCS Project most bankable through identification and assessment of various facilitating factors that the GOP can offer to the project. However, before embarking upon the crux of this chapter is it important to start off by determining the mode of finance under which the CCS project will be implemented.

## 5.2 Mode of Finance - Corporate or Project Based?

In order to determine the exact nature of financing requirements for the CCS project it is important to first understand the distinguishing features contained within the terms - Corporate and Project Finance.

Project finance is the non re-course financing for long term infrastructure, industrial projects and public services projects where project debt & equity used to finance the project are paid back from the cash flow generated by projects rather than general assets or credit worthiness of the sponsor. Project lenders are given a lien on all of these assets, and are able to assume control of a project if the project company has difficulties complying with the loan terms.

On the contrary, in corporate finance debt is raised on the creditworthiness of the sponsors who, apart from facing normal risk arising from principal business activities, are also exposed to the project risk. In case of default on debt servicing, the lenders have a right to claim against assets of the sponsors - apart from the project assets.

From the financial perspective, corporate finance requires consolidation of Project Company's financial performance under annual financial reporting; however such consolidation is not permissible under project finance mode.

Keeping in mind the complex nature of the CCS Project, creation of a legally independent Special Purpose Vehicle (SPV) under Project Finance mode is recommended to be adopted primarily for three reasons as follows:

- i. It requires establishment of a legally independent company – a Special Purpose Company as commonly known. This SPV provides the sponsors relief while evaluating project performance. If for instance the project under evaluation is exposed to risk then such risk would be contained within the SPV and not transferred to the sponsors' primary business.
- ii. Second, the level of gearing for the project would not affect the gearing levels of primary business of sponsors. This is supported by the fact that many infrastructure projects have a high debt to equity ratio (gearing) where as this ratio for CCS Project is assumed and recommended to be 50:50. If viewed independently – through creation of an SPV, this ratio would be acceptable to sponsors.
- iii. Lastly, the SPV would remove ownership from control – the case is not true for corporate finance. Certain assets, namely large, tangible assets with high free cash flows, are susceptible to costly agency conflicts. The creation of a project company (SPV) provides an opportunity to create a new, asset-specific governance system to address the conflicts between ownership and control – as project sponsors and SPV itself are legally independent.

### 5.3 Formation of a legally independent company is Inevitable!

With the application of project finance the formation of an independent company for project's execution becomes inevitable. Such company commonly referred to as a Special Purpose Vehicle (SPV), ring fences its liabilities to the extent of its own assets and cash flows which secures the sponsors and lenders alike. The SPV to be created for this project will ensure against any non-business risk carried out by the sponsors and will simplify monitoring of performance by the stakeholders. The SPV structure for the CCS Project is provided below however its relevant functions, as labeled, are explained comprehensively in Chapter 6: Project Management.

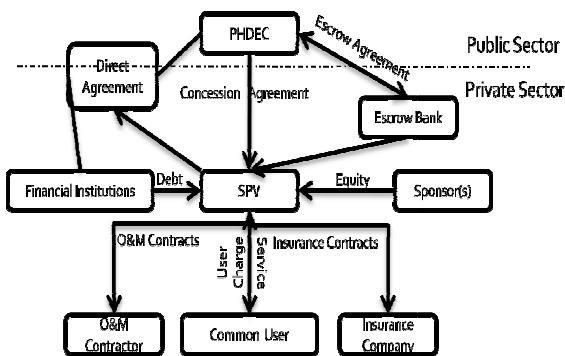


Figure 5: CCS's SPV Structure

**BOX 5: Conditions for Registration of an SPV**

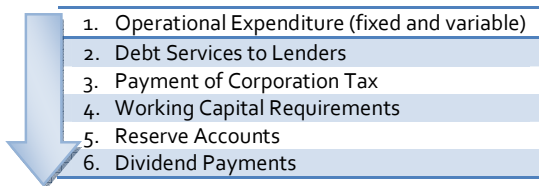
Under the Companies Ordinance 1984, an SPV is eligible for registration as a public limited company or body corporate formed under any law for the time being in force. However it has to be owned or controlled, whether directly or through a company or corporation, by the Federal Government or a Provincial Government; No director, officer or employee of such person has been adjudged as insolvent or has suspended payment or has compounded with his creditors or has been convicted of fraud or breach of trust or of an offence involving moral turpitude; and The promoters, directors and trustees of such person are, in the opinion of the SECP, persons of means and integrity and have special knowledge and experience of matters to be dealt with by a Special Purpose Vehicle.

The structure, as pictorially depicted, would ensure that SPV’s cash flows and assets are kept independent from its sponsor thus allowing it to enter into detailed contract with debt providers. Such contract includes complex debt structuring though cash flow projecting however its creditworthiness will be established through ‘Cash Flow Waterfall Model’.

**5.4 CCS Project from Lender’s Perspective**

Providing security against debt raised, for any infrastructure project under project finance, may be done under three modes. First, it can securitize its cash flows; second, it can securitize its assets and third, it can securitize its cash flows and assets both at the same time. The exact nature of security to be provided shall be at the discretion of the Private Party and the debt provider at the time of final negotiations to the contract however our recommendation – based on the financial strength of Cash Flows (determined through the Water Fall Model) is to only securitize the cash flows of the project. Under the Water Fall Cash Flow Model the debt providers are endowed with the discretion to decide how the project cash flows will be utilized and consumed for project’s functionality. This is normally done to secure the debt servicing requirements by giving a priority to each cash inflow and outflow item. Such priority can be negotiated with the debt provider, however for the purpose of this project we assume and recommend that priority for cash flow items to be as follows:

All cash flow (revenue) generated will first be utilized to meet

- 
1. Operational Expenditure (fixed and variable)
  2. Debt Services to Lenders
  3. Payment of Corporation Tax
  4. Working Capital Requirements
  5. Reserve Accounts
  6. Dividend Payments

After meeting the operating expenditure requirements whatever cash that will be left available, will be utilized to service SPV’s debt including both principal and interest components. Thereafter, if there remains any cash surplus, it is to be utilized as per the desire of the debt provider. Usually it establishes a mechanism through which it can exercise control over this surplus cash by requiring the SPV to create special reserve account (Escrow Account as commonly know).

**BOX 5: Escrow Account**

In ‘Limited Recourse Financing’ (Project Finance), the importance of Escrow Account increases due

to the fact that the primary security is the project receivables/cash-flows. A project may generate sufficient cash flows to repay its debt; however, the sponsors could divert such funds to some other area, which puts the lenders interest at a disadvantage. An Escrow Account not only ensures that contract obligations are met, but also helps control project expenditures. Therefore, banks/DFIs shall institute a mechanism for repayment of project debts through an Escrow Account, which shall be pledged in favor of the lenders.

**Source: State Bank of Pakistan**

By setting up an Escrow Account, control would be achieved by the debt provider by monitoring the balance of these reserves and taking corrective actions as and when necessary. Moreover, these reserves provide verifiability of SPV's performance; and future capacity of interest and debt repayment is assured.

Sometimes the creation of special reserves (Escrow Account) is not solely justification enough for the Debt Provider to finance the project. It calculates the bankability ratios – including debt service coverage ratio (DSCR), loan life coverage ratio (LLCR) and Project Life Cover Ratio (PLCR) to evaluate the ability of the project to service debt requirements. These ratios are computed from the waterfall cash flow model and for the Provincial Mix less Testing Laboratories, the results are as tabulated below.

**Table 17: Projects Bankability Ratios under Project Finance**

Year	DSCR	LLCR	PLCR
Year 1			
Year 2			
Year 3			
Year 4			
Year 5			
Year 6			
Year 7			
Year 8			
Year 9			
Year 10			
Year 11			
Year 12			

The above table reflects the fact that project's ability to service its debt obligations on a year-on-year basis, computed through Debt Service Coverage Ratio (DSCR) is lowest at in year 2 and thereafter it shows improving signs and reaches in year 12 where the debt is settled.

Likewise, for Loan Life Coverage Ratio (LLCR) and Project Life Coverage Ratio (PLCR) the lowest benchmark is attained in year 3 when LLCR reaches and PLCR reduces to. By and large, the bankability ratios - as witnessed from the table above has all the ingredients to attract Debt Providers.

# 6. Project Management

## 6.1 General

Structuring an arrangement for the public and private parties where they can co-exist and benefit from the legal relationship in essence leads to many possibilities. However, as we have already established the need for creation of a SPV, in this chapter we establish the mechanism, performance reporting and rights & obligations facing the SPV. To understand the functionality of the SPV, diagrammatic structure of Project Company is re-presented below.

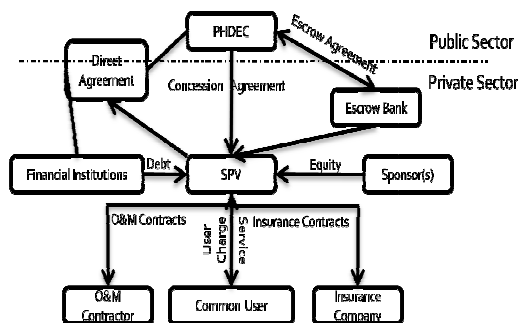


Figure 7: CCS Project SPV Structure

## 6.2 Payment Mechanism

The objective of payment mechanism is to give incentive to the private party to provide service of required standard. This involves the Institution to pay contractor a sum of money for required level of service, which if not met leads to imposition of fines and penalties or deduction of payments by the institution. This payment to the private party varies with the amount of performance, availability and other risks borne by it and leads to two possibilities. Firstly, it depends on the user for which the service is provisioned and secondly, its affordability / profitability of the project without the support of the institution.

The recommended structure of the CCS Project - SPV transfers the maximum number of risks to the private party including those related to construction, operations, maintenance, financing etc. Moreover, the SPV will be providing a service and collecting revenue directly from the users whereas the financial assessment of the project indicates it to be financially worthwhile making it inappropriate for the institution to provide any direct payment over performance or availability of service. Hence, the only payment mechanism applicable for this transaction is '**User Charge**' which is by definition a fee charged by the SPV from the service users.

The User Charge shall be collected and retained by the private party however the charge itself must be kept under check by the institution so that the Private Party does not increase the charge to take the service to unaffordable levels at any time in the future. Thus, the institution shall test for its affordability after appropriate intervals of time and it shall have no claim over the user charge.

### BOX 7: Eliminating other Payment Mechanisms

There are various payment mechanism options available in a PPP transaction like user charge, usage payment, availability based payment and performance payment. A PPP transaction can take any single or a combination of these payment mechanisms depending on the scope of service (i.e. whether the service is intended to be provided to general public or to public sector only). If service is provided to public directly then user charge, availability of payment, performance payment and ancillary revenue may be used whereas, service provided to the public sector leads to one possibility i.e.

usage payment.

Cool Chain System involves provision of service to the general public in which user is expected to pay for the service. The tariff structure forecasted (see chapter on financial assessment) is sufficient in health to draw the project into profitable levels hence, the institution is not constrained over any financial payments for making the project profitable and attractable for the private bidders. Thus, availability and performance based payments becomes an invalid choice for payment mechanism and leave behind only User Charge as the applicable mechanism to operate the CCS. However, performance and availability are important characteristics and have been catered for under 'Fines and Penalties' Mechanism.

### 6.3 Right of the Institution

#### 6.3.1 Right to Monitor the Project

The institution, which will represent the Public Sector in this project, will have the right to monitor performance of the facilities. This right to the institution will mean that the private party is bound to provide all required documents and performance monitoring data to enable the institution to carry out its duties effectively. Moreover, the Institution shall also reserve the right to provide oversight to project management and demand any information from the private party as necessary.

#### 6.3.2 Right to Inspection

The institution shall reserve the right to inspect (technically and/or financially) any facility at any time. This implies that the Institution can conduct technical and /or financial audits of the facilities to ensure compliance with the technical and financial reporting requirements. Such audits may be conducted annually or under special circumstances (when a complaint is received against any facility) or may be conducted on as and when required basis.

#### 6.3.3 Right to Fix User Charge

The Institution shall have the right to fix the user charge to keep the service affordable for the common users. This shall not only mean that the user charge is kept in check but also that the private party is allowed to charge a premium to keep the service at profitable levels. The

recommendation is to provide a list of charges for each component of the cool chain on a bi-annual basis however in extreme conditions (such as in periods of hyper-inflation) the Institution may issue the same on quarterly basis.

#### BOX 8: Increase in Tariff

Tariff for the project is assumed to increase with the rate of inflation each year whereas the base rate is taken to be that prevailing in the market. The uncertainty in the economic conditions shall allow the SPV to follow similar pattern and adjust the tariff according to the inflationary trend. Henceforth, the following formula shall be used to compute tariff each year.

$$\text{Tariff Charge} = \text{Base Tariff} \times (1+A)$$

The 'A' in the above formula represents the rate of inflation which shall be taken from the State Bank of Pakistan (SBP) notifications. The Base Tariff, on the other hand, shall be the prevailing market charge out rate. This rate shall be revised each year and communicated to PHDEC when changed.

#### 6.3.4 Right to Impose Fines and Penalties

As the payment mechanism for the project is based on the User Charge methodology, the revenue from operations will be received directly by the Private Party. Thus, the Institution will not be in a position to deduct payments instead it will impose fines and penalties in case of non-adherence to output specifications. Such fines and penalties will be finalized at the procurement stage; however, the nature of these will depend directly on the severity of non-compliance to the output specifications.

The SPV will need to maintain a special reserve account specifically to make prompt payments with respect to fines and penalties. This reserve, which may be termed as Fines and Penalties Reserve Account, will need to be maintained at PKR 3,000,000 at all times in the implementing stage of the project. In the operations phase the same would be required to be maintained at PKR 5,000,000.

#### BOX 9: Fines & Penalties and Right of the Private Party to Administrative Review

In situations where the Institution imposes a fine or penalty over the service level being unsatisfactory, the private party should be entitled to administrative review where it may present its case to the contrary. In the event of

the private party proving true to its claim then such fines and penalties shall be withdrawn or adjusted subsequently. If the claim is proved to be wrong then the original fine or penalty shall stand.

### 6.3.5 Right to Suspend and Terminate Services

As a third remedy apart from fines and penalties, the institution shall reserve the right to suspend service of facilities in suspicious conditions or terminate the contract in extreme violation of the output specifications. The term suspicious here shall be taken to mean time when complaint has been received by the common user over failing of the facility to provide adequate service levels that cause his consignment to be rejected in the international market. Instead of allowing the facility to continue operations, it is considered to be in the best interest of the project to halt service of the facility so that technical due diligence may be carried out. This due diligence will try to establish the reasons as to why there was a defect in service that caused the consignment to be rejected. If this process reveals technical maltreatment of the consignment then the institution shall impose fines as per the norms and standards set forth and demand the facility management to rectify the technical fault. However, if the due diligence process reveals the defect to be caused due to negligence of management then heavy penalties shall be imposed.

### 6.3.6 Right to Publish Management and Technical Processes

As the entire project is to be rolled out into two clusters with each cluster having no geographical and business competition between them, any innovative managerial or technical process enhancing the effectiveness of the facilities shall be shared with the Institution. The institution shall reserve the right to publish or share such information with the other cluster operator to achieve country-wide success with the establishment of such a project. The information may be published in a newsletter or through direct communication.

#### **BOX 10: Introducing Industry Best Practices**

In absence of Industry Best Practices it is recommended that the institution educates the facility operators to adopt Six Sigma approach in achieving operational excellence. This

approach, which will be based on the performance monitoring mechanism, will act as a method of continuous improvement and will provide a rational approach for evaluating performance, recognize problem areas, determining the cause of those problems and mobilizing resources towards the best solutions. Henceforth, it is recommended that the institution, through the CCC, shall adopt the DMAIC model (a six sigma tool) to assess and improve performance of the entire cool chain. DMAIC, a mnemonic, stands for Define, Measure, Analyze, Improve and Control.

The next question shall be that how will DMAIC, a six sigma approach, contribute to operational excellence for the entire cool chain? The answer is simple; the institution shall monitor the results as and when submitted by the facilities. It should identify deviations from the benchmark practices and visit the facilities where the deviations have occurred. It should diagnose and investigate the reasons contributing to the deviations. Once these have been identified, a plan, in agreement with the stake holders, should be made to apply appropriate changes to the process. Once the process is changed, the subsequent results submitted by the facilities shall be monitored to assess the impact of process change. If the impact is positive and as expected then the process change shall be retained and if not then the DMAIC process shall be initiated again.

Once the process is successful in eliminating the inefficiencies (deviations) then the institution shall inform each of the other facility operators/owners about the process change and shall monitor the transition in process when adopted by rest of the cool chain.

## 6.4 Role of the Private Party

### 6.4.1 Construction, Operation and Maintenance

The private party shall be solely responsible for the construction, operations and maintenance of all project facilities. This implies that the private party shall, at its own cost, provide for the required level of service through adequate designs and mechanical inputs. Failure to comply with the requirements and in event of falling short of the desired output, the private party shall be subject to fines and penalties.

## 6.4.2 Sub – Contracting

Considering the number of facilities that exist, the private party shall be allowed to consider the option of sub-contracting operations. If the operations are sub-contracted then the Private Party should bear the risk of poor performance of its Sub-Contractors. It is recognized that sub-contractors may be replaced in case of poor performance therefore the right to replace the subcontractor is granted with provision for uninterrupted availability and functionality of the facilities. If the private party opts for sub-contracting operations, then it is recommended that it sets a stricter performance threshold than contained in the original contract with the institution to avoid fines, penalties and in extreme circumstances termination of the contract.

In case of poor performance by the sub-contractor the private party shall have the right to replace such sub-contractor(s). However, in such cases there may be limitations in finding a suitable sub-contractor therefore the private party shall engage its own staff to operate the facility till the time a suitable candidate is found.

## 6.4.3 Insurance

### **BOX 11: Insurance**

In traditional “input”-based procurement, government self-insures against those risks retained by it, which are not passed on to the private sector. Since, in PPPs, there is substantial risk transfer to the private sector; self-insurance by government is not practical or appropriate. Instead, the insurances required in a PPP will be maintained by the Private Party in order to mitigate the risks transferred to it. Since the Institution’s primary concern in a PPP is that the Services remain available, it will need to be satisfied that the insurances maintained by the Private Party provide sufficient cover to enable the Private Party to meet its availability obligations.

As the project is mega-scaled and complex in nature, it shall be made compulsory for the private party shall to transfer the risks face by it to a third party through entering into insurance agreements. This way the private party can limit its financial loss arising from damage, destruction, business interruption, loss of profit including insurance against all force majeure events that are insurable.

Moreover, the private party through the SPV shall be required to submit an attested copy of the insurance certificate as proof of insurance. The institution shall also reserve the right to enquire directly from the insurance company about the status of insurance contract. In an event of contact expiring the institution shall send reminders to the private party over renewal of such contracts, failure to do so may incite the institution to keep in-force all insurance contracts and pay premiums and at the same time recover such costs from the private party (on written demand) along with fines and penalties.

## 6.4.4 Raising Finance

The private party at its own risk and cost shall arrange for the requisite financing of the project. At this stage, the debt to equity ratio is assumed to be 50:50 which implies that half of the project cost will be in the form of debt. Hence, the private party shall make necessary arrangements for timely attainment (at financial closure) of debt from the financial institution(s) in order to avoid possible penalties associated with untimely completion and interrupted operations of the project.

### **BOX 12: Penalties on Untimely Completion and Interrupted Operations**

Upon delay in project completion the SPV will be liable to pay penalties to the institution to the tune of PKR 1,000,000 per month of delay.

## 6.4.5 Reporting to the institution

The private party shall report its performance to the institution. This reporting requirement shall be set and finalized at the procurement stage however at this point in time the reporting requirement as summarized by the consultant consists of Initial Contract, Annual Performance and Financial Reporting.

### **BOX 13: Delay in Reporting or Misreporting**

The SPV would be expected to adhere to the reporting deadlines and ensure providing authentic information. Any non-compliance i.e. missing the reporting deadlines or passing on falsified information shall lead to imposition of penalties. For missing the reporting deadlines a penalty of PKR. 100,000 per month delayed shall be imposed (which may be time apportioned if the delay (in months) is not in a whole number. For supply of falsified information the penalty to be

imposed shall be PKR 500,000 per identified falsified information.

Before imposition on penalties on supply of falsified information the institution shall request a clarification from the SPV. A satisfactory response shall result in a warning to be issued and penalty to be waived. However in case of an unsatisfactory response, a warning along with penalty shall be imposed immediately.

#### 6.4.6 Making Service Available

It shall be the responsibility of the private party to make the facilities available for service to common user at all times during the period of product harvest. Availability shall be taken to mean being mechanically and operationally fit for service. If there is non-availability of service then a penalty is to be imposed for non compliance (this is given in 6.6 Output Specification 1).

#### 6.4.7 Operating at agreed performance levels

As part of the output specifications, the private party will be provided with the service level requirements for each facility (i.e. for cold storages, pack houses and refrigerated container yards). It is expected of the private party to operate the facilities in line with the output specifications (see 6.6 below) failure to do so shall lead to imposition of fines and penalties and in extreme conditions suspension of service or termination of the public private relationship.

### 6.5 Monitoring Framework

The role of PHDEC in post implementation phase of the CCS will be restricted to monitor the PPP structure including the terms agreed between the parties. As with majority of the PPP agreements implemented internationally, this will be established through a monitoring and management framework at three distinct levels as follows

#### i. Systematic Monitoring by the Institution through a Dedicated Facility

It is felt that systematic monitoring will be best achieved with the establishment of a dedicated facility such as the Cool Chain Cell (CCC). Such a facility will create a 'culture change' in the institution and will enable a positive monitoring mechanism.

As a first step, PHDEC shall enhance human resource in skills, knowledge and number to facilitate establishment of the Cool Chain Cell (CCC). Although, establishment of the CCC is certain there need to be adequate human resource to support the potential workload. In hiring personnel, care must be taken in terms of the following

- **Adequate Qualification:** *the personnel shall hold horticulture and administration related qualification(s) with previous experience reflecting their capabilities of such characteristics. At junior levels fresh university graduates may be engaged. For technical support, the personnel hired should reflect technical knowledge and capabilities to handle large tasks.*
- **Know-How on CCS and/or Related Industries:** *personnel with operating or managing experience in horticulture value addition and preservation sectors shall be given preference to those having little to no experience.*
- **Working in Teams:** *the personnel in the CCC shall be divided between different teams to attend to different facilities. For instance, there can be different teams for pack houses, cold storages and refrigerated container yards or the division may be based on geographical segments with different teams for northern and southern regions.*
- **Competency:** *the personnel shall reflect competency in being flexible, efficient and effective in coping with varying demands.*

The CCC shall be responsible for delivering a timetable containing deadlines for submission of performance and financial reporting by the facilities. These reports shall be examined, as soon as received, to detect any performance deviations and imposition of fines and penalties. Moreover, this Cell shall investigate positive processes (managerial and technical) and share the findings with the CCS operators in order for them to effectively manage and maintain the facilities.

#### ii. A review of the private party's service level by the institution:

PHDEC shall observe strict configuration with respect to reporting deficiencies. Instantaneous actions shall be taken when deficiencies are noted. Such actions may include implementation of fines and penalties for mild deficiencies and termination of the PPP agreement for more vigorous deficiencies.

Whatever the mode of action is, it is important for the implementing institution to not allow any inefficiency go unnoticed. By and large, the reporting requirement for the Private Party will be threefold as follows:

a. **Initial contract Reporting:** The institution when entering in to a service contract with a user shall document the contract in shape of 'Form'. The Form shall contain basic user information and user-desired conditions for product storage or processing. This form shall be produced in triplicate (one original and two copies) with the original copy for the user and one copy each for the private party and PHDEC.

b. **Annual Reporting:** this includes three categories of reporting requirements on part of the private party. Firstly, there is 'Availability Reports' that will determine the availability of service by the facilities, second is 'Usage Reports' that will help determine the quantity of products serviced and lastly, there is 'Rejection of Consignments Reports' which will establish the grounds on which the provision of service is rejected to common user. The exact nature of the reporting requirements will be finalized in the procurement stage however an estimate of these reporting requirements is provided below:

▪ **Availability Reports:** The institution shall make compulsory for all facilities to maintain inventory/consignment records at all time which shall be kept up to date. At the end of each financial year, every facility shall submit the inventory/consignment records to the institution. The institution upon receiving the records shall monitor the occupancy of each facility and shall look into substance where the facility was not full to operational capacity and where consignments were rejected for service.

▪ **Usage Reporting:** each facility shall maintain a record of stock/consignments that it services. This record shall contain information on number of packages, total capacity (may be approximated figures) in tons, name of the user with contact information. Such records upon submission to the institution shall be analyzed to check the fact that in period when the specific horticulture product is available for service no other product consignment is accepted

for storage. It should be binding for the facility to keep idle capacity (if any) available for horticulture products at all times during period of product supply. A penalty shall be imposed if records indicate storage of non-horticulture products at times of harvest.

▪ **Rejection of consignment:** each facility shall maintain records of consignment that are rejected for service. Such a record shall only be applicable for horticulture product consignments that are rejected on any reason other than being unfit (defected) for service and shall specifically include consignments that are rejected on basis of the facility being full to capacity. This record shall also be submitted along with the inventory/consignment records.

▪ **Maintenance Reporting:** The risk of maintenance of the facilities lies with the private party. Hence, it must be ensured by the institution, through an agreement, that appropriate measures are taken by the private party to keep the plant and machinery at bay with the maintenance requirements. Annual technical examination of plant and machinery must be carried out at each facility by an independent technical firm. The technical firm must provide a certificate to the private party upon completion of such examination and make recommendations as to the modifications or upgrade required to maintain operational efficiency. PHDEC via the Cool Chain Cell must provide a time table in which the said certificate and recommendation's Performa / Report are to be submitted to the institution as evidence of appropriate maintenance.

▪ **Internal Environment Reporting:** the facilities would be required to keep track of the environment (with respect to temperature, ethylene content, humidity etc) prevailing within the storage compartments at all times through data loggers. It is preferred that such loggers are capable of recording internal environment at intervals not more than 1 (one) minute.

Such reporting shall be produced on demand by the institution and an annual log (in soft form) should also be produced and submitted to the institution.

c. **Financial Reporting:** the SPV shall be required to produce annual financial statements as per and under the conditions laid out in the Companies Ordinance 1984. These statements shall be submitted to the institution within 2 months from the entity's reporting date. The cost for annual audits and preparation of annual financial statements shall be borne by the private party alone. If at any stage of the financial audit a fraud is suspected by the auditors then in such a case the auditors shall be required to report to the institution immediately. The institution upon attaining such information shall be entitled to institute a forensic audit – which may be conducted by any party as nominated by the institution and the cost of such exercise shall also be borne by the institution.

### iii. End-User feedback on the quality and effectiveness of service delivery

PHDEC needs to establish a 'Cool Chain Help Desk' to facilitate users of the facilities in attaining information on horticulture and Cool Chain System from 'Basic Information' (such as lodging complaints, user rights, form filling etc.) to more 'Concentrated Information' (including information on most optimal storage and processing conditions, laboratory testing requirements, HACCP certification etc.). This help desk will bring awareness to the common man on the project as well as provide a high level of customer care to all helpdesk users. This shall create confidence amongst users that a timely response will be achieved. Furthermore, such practices will create goodwill for PHDEC and the Project as a whole.

Lastly, PHDEC shall conduct annual customer satisfaction surveys to establish linkages between facility operations and user satisfaction. These surveys shall be conducted from a selected sample of users who have availed the facilities. The information on such users will be available to the institution upon submission of 'Initial Contract Reporting', by the private party, through which a database (specifically created for the purpose) of users shall be maintained. This survey will not form part of the payment mechanism and any adverse findings and results from the survey will not trigger any penalties. However, the findings from the survey shall be used to make necessary adjustment to the payment mechanism on 'If-and-When' required basis.

## 6.6 Project Output Specifications, Performance Measurement and Penalty Calculation

Output Specification defines the services that are required by the public sector from the private partner. They ultimately lead to the design of Performance Management System to monitor the level of service. Such specifications for many PPP projects implemented internationally have been criticized to be overly complicated and at times immeasurable. Therefore, it is important to keep these specifications simple to have an effective management process.

For the Cool Chain System the output measures are designed keeping in view the pure service oriented nature of the project i.e. facility owner have no control over the input provided hence it becomes impracticable to ensure quality after service. Thus, it is considered appropriate to ensure that service levels are maintained throughout periods in which service is provided. Henceforth, the following list of output specifications are deemed to be most suited to the project; however if overtime the requirements of the project change, these specifications should also be modified to correspond to the change.

### a) Output Specification 1: Ensure Availability of Service throughout the Natural Harvesting Period of the Product(s)

The meaning of 'Ensuring Availability of Service' is twofold as follows

- First, as the facilities are designed to facilitate horticulture consignments – fruits and vegetables only, the private party should ensure that no non-horticulture product consignment is kept for storage. Such products specifically include medicines, vaccines and other dairy related products such as meat and milk.
- Second, the facilities should be technically fit for service which includes availability of labor for operations.

In an ideal scenario the service will be kept available for use at all times – making 100% service availability practical. Any technical default or breakdown and storage of non-horticulture related consignments will cause the availability to fall below the 100% mark. Hence, such a situation shall be penalized.

**Storage of Non-Horticulture Consignments:** This shall constitute a serious offence and shall be penalized to the extent that the revenue generated from such practice is not only lost but additional costs, in shape of penalties, shall be

incurred by the private party. Hence, the following formula has been derived to establish the exact amount of penalty.

$$PKR 1.1 \times \left( \frac{\text{Size of Non-Horticulture Consignment}}{\text{Size of Store}} \times \text{Days Stored} \times 100 \right)$$

In the above formula the constant factor of PKR 1.1 is reflective of the base line tariff charge of PKR 1 per Kg per Month and PKR 0.1 which is the penalty component. This constant factor will need to be revised in line with revision to tariff structure by the private party on as-and-when changed basis. For example, if the tariff increases from PKR 1 to PKR 1.2 the constant factor shall be increased by 20% representing the percentage change in tariff charge.

**Technical Breakdowns:** the risk of maintenance and keeping the facilities fit for service lies with the private party hence in instances where service is unavailable due to technical breakdowns the institute shall impose fines and penalties under the following penalty brackets

**Table 24: Penalty Implications for Technical Breakdown**

Service Unavailability in Days	Penalty to be Imposed in PKR
1 – 10	100,000 / day
11 – 20	80,000 / day
21 - 35	60,000 / day
36 – 50	50,000 / day
> 50	25,000 / day

**b) Output Specification 2: Ensure Safety of Consignment**

Ensuring safety of consignment has different meaning for Cold Stores and Pack Houses. This specification is however not applicable to Refrigerated Container Yards as it only has to ensure continuous electricity supply.

For Cold Storages, it implies that products that are compatible in nature with respect to storage conditions (in terms of humidity content, temperature, ethylene treatment, odor transfer etc.) may be kept in the same compartment - if required. For consignments that require different set of environment should be kept in different storage rooms. For example, Apples and Bananas cannot be stored together as the latter is sensitive towards ethylene treatment and requires a different humidity level to minimize its respiration - hence extending its shelf life. If stored in the same compartment, there is a risk of odor transfer and deterioration of apples due to ethylene injection to protect bananas. The compatibility

chart is provided as annexure 6 to this report will serve as the reference point in establishing non-compliance.

The facility operators would be required to keep a log of all consignments that are stored in such stores categorized further into compartments. This log, which will be presented to the Institution as part of the annual reporting requirements, will not only be used to determine negligence but also to serve as evidence for any claim against the facility. The log book will also be crossed checked with results presented in the 'Internal Environment Reports' that will stand witness to proper handling of the consignment.

With respect to Pack Houses, safety will be ensured if products are handled adequately throughout the process chain. Although this measure is only qualitative in nature, its application to the success of the project is important. Hence, we propose that the Private Party shall reach operational excellence within 3 years of business commencement and must get its process certified under the Hazard Analysis and Critical Control Points (HACCP). Failure to achieve this benchmark within the stipulated timeframe shall make the Private Party liable to pay annual fines with a multiplying effect, as given in the table below. Such fines shall only be applicable till the 5<sup>th</sup> year after expiry of the initial 3 years, after which the PPP agreement shall be terminated.

**Table 25: Penalty for Non-Compliance**

Years Certification	Without	Fine Amount PKR
1-3		No Fine
4		200,000
5		400,000
6		800,000
7		1,600,000
8		3,200,000
6		Termination of the Agreement

**c) Output Specification 3: Ensure a Constant Throughput**

This specification is the most complicated of all and it is meant to deal with deviations in the optimal storage requirements. Such deviations shall occur if a particular consignment is exposed to conditions that are unfavorable towards its storage. However such deviations shall only be penalized if they account for reducing the shelf life of the product. For example, apples can be stored for a maximum period of 9-12 months and require to be stored around 1°C. If it is exposed to unfavorable conditions for a period of say 1 week,

its natural contents will be compromised and the consignment is likely to develop internal browning, brown core, breakdown and soft scald. These symptoms are product specific and can be generalized for products within the CCS ambit, as follows.

**Table 26: Symptoms of Injury**

Commodity	Symptoms of Injury
Apples	Internal browning, brown core, breakdown, soft scald
Bananas	Dull color when ripened
Guavas	Pulp injury, decay
Grape	Scald, pitting, watery breakdown
Peach	internal breakdown, abnormal ripening, flesh browning or reddening
Mango	Grayish, discoloration of skin, uneven ripening
Oranges	Pitting, brown stain
Potatoes	Mahogany browning, sweetening
Sweet potatoes	Decay, pitting, internal discoloration
Tomatoes	
- Ripe	Water soaking and softening, decay
- Mature Green	Poor color when ripe, alternaria rot
Apricot	Gel breakdown, flesh browning and loss of flavor

The above symptoms are likely to develop if product consignments are exposed to constant unfavorable conditions. However if this exposure happens in intervals then the damage done to the product is minimal. Thus, the facilities shall only be penalized if the exposure to such conditions is constant or if the intervals are for a considerable length in time. The benchmarks against which these can be compared are provided in annexure 7.

The monitoring of the optimal conditions shall be through data loggers that note the conditions within a cold store a set interval of time. Such loggers are readily available in the markets and it is recommended that each cold store is monitored through such devices. Simultaneously, these loggers are capable of communicating the results to a computer machine by connecting through the USB port. They record and transmit the log as required.

In an event of complaint being received from the consignment owner (user of the facility), the institution shall obtain the data logs and inspect for any deviation from the optimal conditions. Unless the records suggest otherwise, fines and penalties shall be levied on the Private Party where as the time in deviation shall be computed by using the following formula with the final answer expressed as a percentage of total storage time.

$$= (X/Y) * 100\%$$

Where  
X = Time in Deviation (in minutes)  
Y = Total Storage Time of Consignments in Cold Storage (in Minutes)

For pack houses, ensuring a constant throughput would mean to process the consignment as per the specifications requested by the user. Such specifications are provided in the following heading.

**d) Output Specification 4: Facilitate the common user in determining appropriate standard requirement for export**

It is argued that most farmers would be unaware of the specific processing and storing requirements. Hence, to increase awareness amongst the farmers it is recommended that the Private Party, before accepting the consignment for service and as its ethical duty to do so, must educate the specific servicing requirements.

The measurement of this specification is more qualitative rather than quantitative henceforth it is recommended that 'Initial Contracts' with the users should contain a disclaimer that the user has been educated about the specific processing and storing requirements and the same should be signed by the user.

As part of the annual reporting, copy of these Initial Contracts will be shared with the Institution. After receiving these Contracts the institution shall check for any non-signed form and inquire from the Private Party for reasons thereof. If the inquiry reveals non-performance due to negligence then a fine shall be imposed. However, if the same consignment is rejected (in either international or domestic market) and the user complains to the institution about non-performance of this specification then penalties shall be imposed. The mechanism that follows user complaint is comprehensively covered in the following pages under the heading 'Penalty Mechanism' however the exact scope of penalties to be imposed is proposed as under

**Table 27: Financial penalties for Non-Compliance**

No. of forms that do not comply with specification	Penalty to be Imposed in PKR
1 – 10	30,000 / consignment
11 – 20	25,000 / consignment
21 - 35	20,000 / consignment
36 – 50	15,000 / consignment
> 50	10,000 / consignment

**e) Output Specification 5: Ensure following International Best Practices for processing.**

This specification is specifically developed to cater to the processing requirements for pack houses and is in line with output specification 4. It is known that different countries have different processing criteria with respect to horticulture consignments and once the user is educated about these, it must be ensured that such processing is provided to the user. If, for instance, the processing as promised in the 'Initial Contract Reporting' differs from the specification after service, the user will leave the facility dissatisfied with two possibilities. First, he may demand reprocessing in accordance to the terms agreed. Second, as an alternative he will lodge a complaint against the facility.

In instances where a formal complaint is lodged against the facility, the institution shall immediately look into the matter and check for difference in specification as contained in the Initial Contract Reporting and the final processed consignment. If the claim proves to be true then penalty using the following mode shall be applied

$$= 10,000 \times \left( \frac{\# \text{ Consignments Rejected}}{\# \text{ Consignments Serviced}} \times 100 \right)$$

In the above formula the number of consignments rejected will be established through complaints received by the institution where as the number of consignments serviced will be established through Usage Reporting and 10,000 represents a constant factor. Although complaints will be received throughout the year, the penalty to be imposed will be done on an annual basis.

Although this specification remains specifically for export oriented consignments, it is recommended that its application for domestic market needs to be encouraged but not obligated. This is based on the fact that most producers of horticulture products are less attentive towards quality and hygiene and it will take years before they opt for cost-incurring value enhancements. Thus, the Private Party needs to inquire from the service user, at the time of entering into the contract, about the intended market for sale and associate the relevant processing requirements to the contract.

**f) Output Specification 6: Ensure unbiased availability of service to the common user**

Historically the common grower of the horticulture crop has been at a disadvantage due to its lower bargaining power compared with the middle man – who is the agent and known as 'Arthi' in the local language. These crop growers are generally unaware of the market conditions prevailing and refrain from entering such markets. Thus, during the period of harvest, they enter into a futures-agreement with the middle men who place a substantially low price on the expected yield of consignment. Such practices have made the grower's community to fall below the rest of the communities in terms of social and economic development. However with the establishment of CCS it is presumed that the prospective users of the CCS facilities will have reservations with respect to value addition services. Such users will need to be encouraged to spend more (initially) in order to gain higher financial returns. Therefore, apart from the private party which will make marketing efforts to boost revenue, PHDEC should also market the benefits of the facilities and carry out awareness campaigns at the bottom of the horticulture hierarchy. By making the growers aware of potential benefits of the value addition services, the market dominance can be diverted away from the middle man (Arthi) and be directed more towards the growers. This will enable an environment where the monetary benefits will flow directly to the growers and aid GOP in alleviating poverty, creating environment for social uplift in rural based communities and economic well being of the growers.

In light of the above, it is proposed that the facilities under the CCS treat users without any bias. This specification is more about ethical practices and values however the private party would always have the upper hand in manipulating the results to avoid fines and penalties. Thus, it is argued that a mechanism which puts fear in the private party's mind –of being penalized has to be in place. This mechanism would revolve around three set of reporting criteria. Firstly, the service availability reports would confirm about any scarce capacity at any time. Secondly, rejection of consignment reports would be used to counter check with the availability reports that no consignment was treated with negative intent. Thirdly, the user may complain about being subject to bias. In such situations the institution shall check with the accuracy of the claim – through the mechanism explained above. Subject to the contrary, if the claim holds true then the facility shall be penalized using the following formula

$$= 10,000 \times \left( 100\% - \left[ \frac{\text{Consignment Rejected}}{\text{Scarce Capacity}} \right] \times 100 \right)$$

- Where 10,000 is a constant
- Consignment Rejected represents the size of the consignment that is rejected for service
- Scarce Capacity is the size of the facility in terms of storage capacity or processing capacity that is available for service.

#### BOX 14: Example for Specification 4

If the scarce capacity of a cold storage is 1500 M Tons and a consignment of size 100 M Tons is rejected for service. Then in percentage terms the size of consignment rejected is 6.6% which is 93.4% (100% - 6.6%) or 93.4 times of the available capacity. Thus the penalty to be imposed is as follows:

Multiplier factor = 100% - 6.6% = 93.4% or 93.4 times  
 Total penalty = 10,000 × 93.4  
 = PKR 934,000

Hence, higher the percentage consignment subject to bias, lower the penalty would be and vice versa. That is to assure better and equitable treatment of the small growers. It can be computed on the same basis as calculated above.

This mechanism is based on the argument that the private party is more likely to reject consignments on bias due to its size i.e. the smaller the size of the consignment the less tempted the private party will be to store or process it and vice versa.

### 6.7 Penalty Mechanism

In the above output specifications the exact nature of penalties to be imposed is provided. In this section, we explore the trigger points that would lead to the need of imposition of penalties. For the CCS project, it is felt to have two main driving forces or trigger points under the penalty mechanism. First, on receipt of complaint from the user and second, by the institution upon receiving reports and scrutinize the same to carve out any evidence of non-compliance. Through which ever mode non-compliance is noted, the mechanism to be followed shall fall under three categories as follows

**Category 1: Non-Compliance noted but where no complaint is received for the user:** In such cases, the institution shall be at discretion to decide if to impose fines and penalties upon first

offence or to issue a warning letter cautioning the private party to comply with output specifications. In case a warning is issued it must be communicated on the institution's letter head stating the reasons and supported by evidence. However, if an offence has been committed for a second time then the institution shall not issue any further warning; instead it should penalize the offence.

**Category 2: Complaint is received from the user and Non-Compliance is later noted:** In such instances the institution shall initiate an official inquiry and look for evidence through documents submitted by the private party under the reporting mechanism. If evidence of non-compliance is found then the offence should be penalized in accordance to the mechanism laid out in output specification above.

**Category 3: Complaint is received from the user and evidence shows total compliance to output specifications:** if the investigation by the institution reveals that no non-compliance was committed then the institution shall dismiss the claim as put forward by the user and a written letter on institutions letter head stating the reasons for claim's dismissal shall be provided. Such action shall by default give the user of the facility a right to an 'Administrative Review'.

**Administrative Review:** If the user is not satisfied with the response from the institution then he shall be entitled to an Administrative Review. The user shall clearly state the reasons as to why he believes that the decision is wrongly assessed and submit the complaint to the institution in a timely manner. Upon receiving the request for an Administrative Review, the institution shall appoint a three member 'Administrative Review Team' (consisting of 3 officers including 1 from the 'Cold Store Monitoring Team') to conduct the review. The Administrative Review Team shall revisit the facts and data obtained by the 'Cold Store Monitoring Team'. If the need arises then a member of the administrative review team shall visit the facility and conduct a technical due diligence along with resubmission of the monthly results in which the deviation claim transpires.

If the review findings reveal that the claim is true then the same conditions shall apply as given in 'Deviation noted and a complaint is received from the user'. If review finding reveal no deviation to have occurred then a response, stating the findings of the review team, shall be made to the user on the institution's letter head after which

further right for an Administrative Review shall expire.

### 6.8 Measuring Performance of the CCS Project

The measures for assessing the performance of the private party with respect to compliance to output specification have been provided in 6.7 above however it is also necessary to assess the performance of the project as a whole. For the purpose, key performance indicators (KPIs) have been developed to measure the objectives of setting up the cool chain. These include boosting exports of horticulture products (in general) and to high end consumer markets (in specific), reducing post harvest losses and price stabilization in domestic markets.

These measures will establish the effectiveness of growth and success achieved upon establishing the entire cool chain infrastructure. However, any negative outcome of the following performance measure shall not initiate fines and penalties for the private party.

**Measure 1: Increase in Exports** - This measures the increase in exports of horticulture products on a 'year-on-year' basis using the following formula.

$$= \left( \frac{(D - C)_{yr1} - (D - C)_{yr0}}{(D - C)_{yr0}} \right) - \%average\ growth\ for\ last\ 5\ years$$

Where

D = Exports (in tons)

C = Rejection (in tons)

The answer to the above will be expressed as a percentage increase over the preceding year performance less the average growth of exports (for last 5 years) without CCS Infrastructure. If the answer is a positive percentage that will reflect increasing export trends mainly on account of established CCS infrastructure.

**Measure 2: Export to High-End Consumer Markets** - This performance indicator analyses the export made to high-end consumer markets. It is important to identify these markets beforehand and consistency shall be maintained for year-on-year analysis. In the following formula 'E' which represent Exports to High-End Consumer Markets shall include all consignments that are accepted by the consignment owner and later exported. 'C' representing Rejections shall only include those consignments that are rejected by the international buyer and shall not include the rejections made by the domestic consignment owner.

$$= \left( \frac{(E - C)_{yr1} - (E - C)_{yr0}}{(E - C)_{yr0}} \right) - \%average\ growth\ for\ last\ 5\ years$$

In the above formula it is necessary to establish the average growth of exports to high end consumer markets for previous few years to reflect the true picture the effectiveness of the CCS Project.

#### Measure 3: Reduction in Post Harvest Losses -

This is the most complicated measure as there is no annually-compiled data with respect to post harvest losses. Therefore, the best way to measure performance will be to see the year on year trend for products stored in cold storages.

This will be an annual measure and will be product specific. Increasing trend will mean a reduction in post harvest losses where as a decreasing trend will indicate increase in post harvest losses. As it can be seen from the following formula, the denominator is the production of the specific product; it is to reflect the reduction in post harvest losses as a percentage of production. This percentage presentation will give a more appropriate measure since it will defy annual production fluctuations.

$$= \left( \frac{G}{P} \right) * 100\%$$

Where

G = Products stored in Cold Store (in tons)

P = Total Production of Product

#### Measure 4: Price Stabilization in Domestic Market -

This measure shall be calculated on the basis of price variations experienced per annum. The highest price for the product at times of limited supply and the lowest price in times of peak supply shall be measured and difference calculated. This difference, if over the years, has a shrinking trend then price stabilization is achieved. It is noteworthy that inflation may cause new high and low prices each year therefore only the difference between the two shall be taken account of.

### 6.9 Project Procurement

The submission of this feasibility study report marks the end of the transaction structuring phase and moves the project into Procurement Stage. In this stage the project will be marketed through the floatation of the Expression of Interest that will call for parties interested to undertake the project. A bidder selection criteria

will be formed that will evaluate the bids received and a preferred bidder will be awarded the contract to undertake the project. However, before all this can be done the Institution (PHDEC) will be required to present different options as given in Chapter 5 to the Ministry of Commerce, GoP which will decide its mode of participation into the project. Once this is done IPDF through the TA will conduct the procurement exercise which is to consist of the following steps.

**Step 1: Preparation of the Project Information Memorandum** – this will provide summarized information about the project including information on project itself, project need, project management cycle, terms and conditions under which the project is proposed to be carried out including timeline for execution of the project etc.

**Step 2: Preparing the Draft Concession Agreement** – once the security package is decided and approved by the GOP, the detailed functionality of the PPP Structure will be finalized in form of a Draft Concession Agreement.

**Step 3: Preparing Bids evaluation criteria** – this will be carried out concurrently with Step 2. In this exercise a detailed criteria for evaluating bids by interested bidders will be prepared.

**Step 4: Preparation and Floating of the Request for Proposal** – this will include assembling the work done under step 2 and 3 and in line with IPDF guidelines in order to prepare a comprehensive document that lays out the required information by the interested bidders. Once this document is prepared, it will be floated in to the market for interested parties so that they may submit their bids in line with the project requirements.

**Step 5: Evaluating bids and selecting the preferred bidder** – upon receiving bids from bidders, the evaluation process will initiate. This will include checking the completeness of information provided, scoring the bids in line with criteria prepared under step 3. Once each bid is scored the highest scoring bidder will be called in for contract negotiations.

**Step 6: Contract negotiations with the preferred bidder and making changes as agreed between the parties** – this activity will include negotiating on the structure of the SPV and its monitoring mechanism to be enforced. The changes agreed between the parties will be reflected in the final PP Contract to be signed between PHDEC and the selected bidder.

**Step 7: contract finalization, signing and financial closure** – this activity will mark the end of the project structuring phase and the assignment. The bidder awarded the contract will then commencement with project implementation.

