

**Detailed Project Report on
Cold-Chain Development for Kiwi**

SAMPLE

CONTENTS

Sl. No.	Chapter	Page
1.	Abbreviations	
2.	Executive Summary	
3.	Introduction	
4.	The Project and the Proposal	
5.	Implementing Cooperative and Financing Institution	
6.	Vision/Mission/Goals/Objectives	
7.	Business Model/Revenue Model	
8.	Products and Markets	
9.	India's Cold-Chain Scenario	
10.	Feasibility Assessment	
11.	Risk Analysis and Risk Management	
12.	Project Implementation, Monitoring and Evaluation	
13.	SWOT Analysis	
	Annexures	

ABBREVIATIONS

BIS	Bureau of Indian Standards
DSCR	Debt Service Coverage Ratio
CIPHET	Central Institute of Post-Harvest Engineering and Technology
GOI	Government of India
IRR	Internal Rate of Return
MoA& FW	Ministry of Agriculture & Farmers Welfare
MIDH	Mission on Integrated Development of Horticulture
MoFPI	Ministry of Food Processing Industries
MT	Metric Tonnes (one tonne = 1000 kg.)
NCCD	National Centre for Cold-Chain Development
NCDC	National Cooperative Development Corporation
NHB	National Horticulture Board
RH	Relative Humidity

Executive Summary

Cold-Chain is an important agri-logistics which helps in bringing about greater value to the farmers/the producers in terms of what they earn on their products and simultaneously help the consumers to get better thing in a proper shape and time and form in which they would like to have the same. Looking at the importance of the cold-chain for the country, the project proposal envisages development of a cold-chain in the State of Arunachal Pradesh for marketing of Kiwi of farmer members of cooperatives at higher prices in Delhi than those available to them locally. It also proposes to reduce loss of kiwi fruit and thus benefit producer members of the cooperatives on the one hand and to benefit distant consumers of Delhi by making available organic kiwi to them at reasonable price. Arunachal Pradesh is the highest producer of Kiwi in India with a production of 6,050 MT Kiwi during 2015-16 out of a total production of 10,650 MT in the country. To meet its requirement, India is importing 4,000 MT of Kiwi every year mainly from New Zealand, which however is very costly. Thus, development of a cold-chain is the need of the hour for Arunachal Pradesh as the State is sparsely populated and cannot consume the whole production.

2. Cold-chain is an environmentally controlled logistics chain, ensuring uninterrupted market link from farm to fork. To ensure the supply of fresh and organic kiwi to Azadpur Mandi, Delhi, the project proposes establishment of one Integrated Pack-House (with a 30 KVA DG Set) of 16 MT/day capacity, four cold stores of 250 MT capacity each and purchase of 3 reefer vehicles of 15 MT capacity each. Integrated Pack-House and two cold stores will be established in West Kameng district, Headquarters Bomdila which is the major Kiwi growing

area and remaining two cold stores will be located in Itanagar which will be the central point for dispatch of Kiwi to Delhi. The project will be able to handle 1850 MT kiwi per year at 100% capacity utilization. The season for kiwi is 3 months only i.e. September to November. The project will be implemented by the Arunachal Pradesh State Marketing and Processing Federation Ltd., Itanagar. The Federation is having substantial experience of procurement and marketing of fruits and vegetables on behalf of its member cooperatives. As per cooperative structure of Arunachal Pradesh, the members of state level federation consist of primary marketing and processing cooperatives whose area of operation is confined to the whole district. The membership of primary cooperatives mostly consists of growers of Kiwi and other fruits and vegetable. The Federation has sound financials with elected board, earning net profits for the last 3 years, having Audit classification of "B". The total capital cost of the project is Rs.245 lakh. Besides, the project will need the Working Capital of Rs.203 lakh. The Arunachal Pradesh being a North-East State, the pattern of assistance for capital cost pertaining to cold-chain components will be on 50:50 basis, i.e., 50% as NCDC Loan and 50% as subsidy available from the GOI i.e. MIDH (NHB). The society proposes to finance the project through NCDC on the State Government guarantee. The NCDC with its more than 56 year experience and vast reach in the rural areas, can be a nodal agency in boosting the high value and value added agricultural exports, perishable commodities, and other agricultural and allied sector items through the cooperative.

Project Benefits and its Financials

3. The project envisages capturing 25% of the Kiwi market in Arunachal Pradesh i.e. 15 MT per day of Kiwi within 3 years. The project is found to be technically feasible, socially desirable and financially viable. The detailed assumptions and calculations of the project are given in the chapter titled "Feasibility Assessment". The economics shows that the project will have IRR of 81% and DSCR of 6.82. Sensitivity analysis shows that the project is most sensitive when Selling Price of Kiwi decreases by 10% and least sensitive when Cost Price of Kiwi increases by 10%. In fact, feasibility study shows that the cold-chain development project will be highly beneficial for the producer members and will fetch them about 72% additional rates for their produce.

4. The project will ensure better price to the Kiwi producer members for their produce, will ensure availability of organic Kiwi to consumers at reasonable price at far of places, help in increasing the share of farmer producers and the implementing cooperatives in Kiwi markets and the project will also help in making available the Kiwi to consumers during the off-season. Besides, there are a number of other benefits of Kiwi as it is having medicinal value and recommended for dengue and diabetic patients, etc.

Project Details

Cold-Chain Infrastructure : Rs.220 lakh

(Rs.110 lakh as NCDC loan and Rs.110 lakh as subsidy as per GOI scheme)

- i) Cost of Land levelling and development, and renovation cost of existing building to make it fit to be used for Integrated Pack-House purposes : Rs.25 lakh
- ii) Margin Money (25% of Working Capital) : Rs.50 lakh

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Introduction

India is the 2nd largest producer of Fruits & Vegetables globally after China. It produced 299.85 million tons of Horticulture produce in 2016-17 contributing 30% to Gross Net Value of Agriculture. India's exports of horticulture products increased by more than 3 times in the last 10 years. However, post-harvest losses in the horticulture sector are also high. As per recent study by Central Institute of Post-Harvest Engineering and Technology (CIPHET), harvest & post-harvest losses including losses during storage for fruits and vegetables were in the range of 5% to 16%. Major reasons for losses specific to perishables, as identified by CIPHET are inadequate cold-chain capacity for perishables other than milk, meat, and pharmaceuticals, non-availability of refrigerated transport from point of harvest to point of sale, and the gap is large in case of pre-cooling, Integrated pack-houses, transport connectivity and ripening chambers.

2. Another study done by National Centre for Cold-Chain Development (NCCD) has estimated that there is a big gap of 99.6% and 85% respectively in the availability of Integrated Pack-Houses and Refrigerated Vehicles in the country. Same study found out that the Arunachal Pradesh requires about 60 Integrated Pack-Houses as against almost none available so far. The estimated requirement of funds during the next five years for Cold-Chain Development in the country is Rs.6100 crores comprising of, among others, 249 Integrated Pack Houses (Rs.2450 crore) and 20,000 reefer vehicles (Rs.1850 crore). A table showing State-wise requirement of pack-houses in the country, as assessed by the NCCD, may be seen at [Annexure-I](#). The

Government of India is committed towards doubling of farmers income and helping the farmer members in reducing post-harvest losses and to this end has declared logistics as an infrastructure sector and allocated huge funds for establishment of Cold-Chains in the country, including subsidy of 35% for various components of Cold-Chain in the general States and 50% for the States located in North-East/Hilly/Scheduled Areas.

3. Looking at the above scenario, Kiwi crop and its production in the country was examined wherein it was observed that Arunachal Pradesh is the largest producer of Kiwi in the country. Further, there is large scope for reaching this crop to Delhi and other distant markets where lucrative prices for Kiwi are available. This, however, requires cold-chain development from the farm to fork i.e. Arunachal Pradesh to the Azadpur Mandi, Delhi, as chosen for the present project.

The Project and the Proposal

Cold-Chain is an important agri-logistics which helps in bringing about greater value to the farmers, the producers in terms of what they earn on their products and simultaneously help the consumers to get better thing in a proper shape and time and form in which they would like to have the same.

Cold-chain in Horticulture

- Cold-chain is an environmentally controlled logistics chain, ensuring uninterrupted market link from farm to fork.
- Cold-chain includes near farm pack-houses for pre-conditioning (sorting, grading, packing, pre-cooling), reefer vehicles, cold storages, ripening chamber, etc.
- In Horticulture, cold-chain strengthens the value chain system by enhancing marketability of the perishable produce & reducing food loss in the supply chain.
- Cold-chain can play an important role in doubling farmer's income by improving saleability of the produce and bringing more production to markets.

Details of the Proposed Project

2. The project proposal envisages development of a cold-chain in the State of Arunachal Pradesh to reduce loss of kiwi crop and thus benefit producer members on the one hand and on the other to benefit distant consumers of Delhi by making available organic kiwi to them at reasonable price.

3. Thus, the project proposes establishment of one 16 MT/day capacity Integrated Pack-House with a 30 KVA DG Set, provision of three refrigerated vehicles (15 MT each) and four cold stores (250 MT each). The total project cost is Rs.295 lakh. The Arunachal Pradesh being a North-East State, the pattern of assistance will be on 50:50 basis, i.e., 50% as NCDC Loan and 50% as subsidy available from the GOI i.e. MIDH (NHB).

Benefits and Justification for the Project

4. Feasibility study shows that the cold-chain development project will be highly beneficial for the producer members and will fetch them about 72% additional rates for their produce. The project will ensure better price to the Kiwi producer members for their produce, will insure availability of organic Kiwi to consumers at reasonable price at far of places, help in increasing the share of farmer producers and the implementing cooperatives in Kiwi markets and the project will also help in making available the Kiwi to consumers during the off-season. Besides, there are a number of other benefits of Kiwi as it is having medicinal value and recommended for dengue and diabetic patients, etc.

Availability of Required Project Facilities

5. The Federation has a building of its own in Bomdila headquarters of West Kameng district which after renovation will be used as an Integrated Pack-House. In addition, the federation has 20000 sq.feet of land in West Kameng district and 18000 sq.feet in Itanagar which will be used for establishment of four cold stores of 250 MT capacity each. If more land is required for the project, the local authorities are willing to provide the same on long term lease basis. Arunachal Pradesh is the largest producer of Kiwi in India. During 2015-16, the State's production

of Kiwi was 6050 MT which was about 57% of the total production of 10650 MT of Kiwi in India. In comparison to this, total demand of Kiwi in India is approximately 15000 MT per annum leaving a gap of more than 4000 MT which is imported mainly from New Zealand. The State of Arunachal Pradesh is sparsely populated and cannot consume the whole production of Kiwi of the State. Thus, the raw material for the project is abundantly available in the project area. Since the Federation is dealing in handling of Kiwi and other fruits and vegetables for the last more than 18 years, it has enough technical know-how of implementing the proposed project. The society is already located in the project area i.e. Bomdila and Itanagar and undertaking marketing activities for many years, it already has tie-up with the utility providers for supply of water, electricity, etc. The Society has 14 employees who are skilled in their profession. However, the project proposes employing 73 fresh manpower for undertaking the newly proposed project activities. Out of this manpower, 23 will be skilled having expertise in their area of functioning, 5 will be semi skilled and rest 45 will be unskilled.

Item-wise Project Cost Estimates

6. The project proposal will need many Cold-Chain facilities for its success, the item-wise cost estimates of which are as under:

- | | |
|---|--------------------|
| (i) Land levelling and development: | Rs.10 lakhs |
| (ii) Renovation cost of existing building to make it fit to be used as Integrated Pack-House purposes | Rs.15 lakhs |

(iii) **Cold-Chain Components:**

- ❖ Integrated Pack house
 - ✓ Components included: Conveyor belt, sorting, Grading, Washing, drying and weighing facilities including Diesel Generator:
 - ✓ Requirement: One Pack-House of 16 MT/day capacity
 - ✓ **Cost: Rs.50.00 lakhs for 16 MT.**

- ❖ Cold-Storage (0° C with 90% RH)
 - ✓ Requirement: 4 units of 250 MT capacity each
 - ✓ Cost: Rs.8000/MT
 - ✓ **Total: Rs.80.00 lakhs.**

- ❖ Reefer Vehicle:
 - ✓ Requirement: 3 no's of 15 MT capacity (one round trip to Delhi will take : 9 days)
 - ✓ Cost: Rs.30 lakhs per 15 MT
 - ✓ **Total: Rs.90 lakhs.**

- ❖ Total cost of the Cold-Chain components: **Rs.220.00 lakhs.**

- ❖ Back-ended subsidy available from Govt. Of India: 50% for cold-chain components mentioned above = **Rs.110 lakhs.**

- ❖ **Capital expenditure to be met from NCDC:Rs.135 lakhs (Rs.10 lakhs + Rs.15 lakhs + Rs.110 lakhs)**

Margin Money for Working Capital

7. The implementing Society will need working capital for 15 days in respect of Kiwi purchase as the cycle for procurement of Kiwi from the members, its selling and payment for the same is expected to be received during 15 days period. The society may also need to keep in its reserves, fuel expenses for 10 days for every reefer vehicle and one month wages for labour and miscellaneous expenses to meet its requirements. For the purpose, the society will have to raise working

capital for operating its activities, the requirements of which have been worked out as under:

- i) Working capital for purchasing Kiwi for 15 days
@ Rs.80/- per kg. ($Rs.80 \times 1000 \times 15 \times 15$) : Rs.180 lakh
 - ii) Working capital for fuel charges for 10 days for
3 vehicles ($Rs.22750 \times 10$) : Rs.2.27 lakh
 - iii) Working capital for one month labour wages
($Rs.67600 \times 30$) : Rs.20.28 lakh
- Total Working capital required : Rs.203 lakh
- Margin Money @ 25% of Working Capital : Rs.50 lakh

Total Loan/Funds Required from NCDC

- A) Capital Cost (Cold-Chain Infrastructure at 50% of cost i.e.
Rs.110 lakhs and Rs.25 lakhs for Land Levelling, renovation of
building, etc.) : Rs.135 lakhs
- B) Margin Money : Rs.50 lakh
- Total : Rs.185 lakh**

Implementing Cooperative and Financing Institution

Particulars of the Implementing Cooperative

3. The project will be implemented by a cooperative society in Arunachal Pradesh State. The society is having substantial experience of procurement and marketing of fruits and vegetables on behalf of its member cooperatives whose membership mostly consists of Kiwi growers. The society has the whole state of Arunachal Pradesh as its area of operation. In addition, the society has 20000 sq.feet of land in West Kameng District and 18000 sq.feet in Itanagar which will be used for establishment of 4 cold stores of 250 MT capacity each.

Vision/Mission/Objectives

Vision

To penetrate export markets 10 years from now

Mission

To capture entire North-East produce through cooperatives 8 years from now

Objectives

- To reduce loss of kiwi crop thus benefiting producer members
- To benefit existing members through timely payments, increased price for their produce and by providing other services so that other farmers are encouraged to become members of the cooperative thus increasing quantity of produce available for marketing
- To benefit distant consumers by making available kiwi at reasonable price to them
- To arrange education and training for members, technical staff and employees of the society for their capacity building so that they are able to contribute optimally for the efficient functioning of their cold-chain, very crucial for the success of this highly technology driven sector

Products and Markets

The produce chosen for the project proposal, i.e., Kiwi, has high medicinal values. More than 96% of Kiwi is grown in four North-Eastern

States, i.e., Arunachal Pradesh, Nagaland, Mizoram and Sikkim with about 56% of the produce coming from Arunachal Pradesh itself which has been chosen for the present project proposal. Demand for Kiwi is all over India as well as in other countries. In fact, India is importing about 27% of its demand annually from other countries, mainly New Zealand.

India's Horticulture Scenario

- Produced 299.85 million tons of horticulture produce in 2016-17
- Contributes 30% to Gross Net Value of Agriculture
- Availability of per capita fruit & vegetable increased from 397 gm/day in 2004-05 to 540 gm/day in 2015-16
- 2nd largest Producer of Fruits & Vegetables globally
- Exports increased by more than 3 times in 10 years

Growth in Exports of Horticulture

S.No.	Commodity	Value (Rs. In crore)		% increase
		2004-05	2015-16	
1	Fruits & Vegetables	1363.71	8391.41	515.34
2	Floriculture	221.11	972.96	340.03
3	Spices	2627.62	14842.36	464.86
4	Cashew	2709.24	5432.85	100.53

Post Harvest Losses

As per recent study by CIPHET, Harvest & Post Harvest losses including losses during storage for fruits and vegetables were in the range of 5% to 16% as under :-

S. No.	Stages	Range of losses (%)	
		Fruits	Vegetables
	Operations (A)		
1.	Harvesting	1.68 – 5.33	0.99 – 3.16
2.	Collection	0.26 - 0.42	0.04 – 0.52
3.	Sorting/Grading	1.46 – 3.94	0.99 – 5.34
4.	Packaging	0.09 – 0.34	0.06 – 0.38
5.	Transport	0.42 – 1.91	0.51 – 1.75
	Total (A)	4.12 – 11.90	3.22 – 9.41
	Storage Channels		
6.	Farm Storage	0.01 – 0.23	0.05 - 0.66
7.	Cold Storage	0.01 – 0.13	0.00 – 0.30
8.	Wholesale	0.57 – 1.62	0.31 – 1.26
9.	Retail	0.34 – 2.08	0.11 – 1.63
10.	Processing	0.03 – 0.25	0.00 – 0.17
	Total (B)	1.31 – 3.98	0.78 – 0.03
	Grand Total (A+B)	6.70 – 15.88	4.58 – 12.44

Reasons for Losses specific to Perishables

- Inadequate cold-chain capacity for perishables other than milk, meat, and pharmaceuticals.
- Existing surface cold storage capacity is inadequate (only 11% of production).

- ❑ Surface cold storage is largely dedicated to potato (75.4% of available cold stores).
- ❑ Low availability of multi-commodity cold stores (23.1% of cold stores).
- ❑ Non-availability of refrigerated transport from point of harvest to point of sale.
- ❑ The gap is large in case of pre-cooling, Integrated pack-houses, transport connectivity and ripening chambers.

About Kiwi

Kiwi fruit may be eaten raw, made into juices, used in baked goods, prepared with meat or used as a garnish. The whole fruit, including the skin, is suitable for human consumption; however, the skin is often discarded due to its texture. Raw kiwi fruit contains actinidain (also spelled *actinidin*) which is commercially useful as a digestive aid. In a 100-gram amount, green kiwifruit provides 61 calories, 83% water and 15% carbohydrates negligible protein fat. It is particularly rich in vitamin C and vitamin K, has a moderate content of vitamin E, with no other micronutrients in significant content. Kiwi seems to have natural insulin and a good antidote for diabetics.

Indian Production of KIWI
Production(000 Tonnes)

		2015-16	
Sr No.	State	Production	Share(%)
1	Arunachal Pradesh	6.05	56.83
2	Nagaland	2.44	22.92
3	Mizoram	1.02	9.58
4	Sikkim	0.79	7.42
5	Himachal Pradesh	0.34	3.19
6	Jammu & Kashmir	0.01	0.09
Total		10.65	

The kiwi fruit is native to China. Previously called Chinese gooseberry, it is now more commonly known by its marketing name of kiwi fruit. Kiwi fruits grow on large vines that are similar to grapevines in their general growth and fruiting habits. The fruit normally ripens within 25 weeks after the flowers first appear. The fruits range in weight from 40 to 90 g and can be picked shortly after the first frost in autumn; after that, they can be kept in cold storage for 4–6 months at 0 degree C. Kiwi vines can be grown on a wide range of soil types at elevations ranging from 1000 m to 2500 m

Post Harvest

To ensure that fruits are of high quality, it is important to discard any damaged or diseased fruits prior to transport or storage so as to prevent them from having a negative effect on the healthy fruits. Kiwi fruit must be firm and their skin and pulp must not be damaged either

mechanically or by rot pathogens. To prevent injury to adjoining fruits, the stem-ends must be removed completely.

Basic market promotional steps such as collection centres, packing houses are non-existent. Growers have no post-harvest facilities today. Many kiwi growers keep their harvest in their homes spread on floor. No collection centres. Nor are any packing houses which possibly can help value addition and sell it at a better price than what they get now. Arunachal Kiwi is the most organic variety in the world.

Demand

Study suggests that the Arunachal Government should go for a nationwide brand promotion of its organic fruit and vegetables, especially kiwi. Metros like Mumbai, Delhi, Bangalore, import New Zealand kiwi and consume in large quantities.

Import

India imports 4,000 tonnes of kiwis from New Zealand, Italy and Chile - the most favoured brand name being Zespri - but those grown in Arunachal Pradesh sell for 30 per cent lower than the price commanded by the multinational.

Production

Arunachal, which enjoys the distinction of being the largest kiwi producing state in the country, annually produces an average of 30,945.2 MT of apples, 6,000 MT of kiwi, 1,76,707 MT citrus and 67,580 MT of pineapples.

According to official data, the state has 18 lakh hectares of land available for horticulture of which only 1.13 lakh hectares have till date been brought under cultivation.

Grading and Packing

There is no standard for grading and packing of Kiwi in India. However, under 'A' grade Kiwi having weight >70g is categorized, 'B' grade (50-70g), 'C' grade <50g but international standard of grading is 'A' grade is above 100g, B 70-100g. <70g is C grade. In India kiwifruit is packed in 3-5 Kg boxes of cardboard. However, kiwifruit are packed in tray packs. Standard tray consists of an outer case of cardboard or plastic, a perforated plastic packet tray-packs, a polyliners corrugated strawboard and a cardboard lid. In a tray, 33 fruits of 100 g/fruit weight are accommodated. Polymer reduces moisture loss during transpiration. Fruits are eaten fresh or combined with other fruits in salad. A large number of processed products such as jam, jelly, candy, squash and wine are prepared from kiwifruit.

Export

Kiwi fruit can be exported by India to the Middle East, Southeast Asia and European countries. Because of its high keeping quality, fruits can be transported by sea. Since market has already been developed by New Zealand and the varieties grown in India and New Zealand are the same, market promotion is not required. There is no clash in the harvest season also. Hence, tremendous potential exists for export of kiwi fruits in the national and international market provided we should produce good quality fruit comparable to international grade.

India's Cold-Chain Scenario

This chapter dwells upon the India's Cold-Chain scenario bringing about the importance of the sector for protection of green products of the farmers, adding value to their produce and capturing full value of their produce. It also finds out that there is a big gap between availability and requirement of Cold-Chain infrastructure in the country, Government's thrust for the rapid growth of the sector and incentives being given for establishing Cold-Chain infrastructure. The findings of studies show that the present project proposal is the need of the hour.

Cold-chain Infrastructure Gap – NCCD study 2015

Type of Infrastructure	Infrastructure Requirement (A)	Infrastructure Created (B)	All India Gap (A-B)	% share of Gap to Required
Pack-house	70,080 nos.	249 nos.	69,831 nos.	99.6%
Reefer Vehicles	61,826 nos.	9,000 nos.	52,826 nos.	85%
Cold Storage (Bulk)	341,64,411 MT	318,23,700 MT	32,76,962 MT	10%
Cold Storage (Hub)	9,36,251 MT			
Ripening Chamber	9,131 nos.	812 nos.	8,319 nos.	91%

Five Year Plan for Cold-chain development

(Rs. In crore)

S. N.	Component	Existing Capacity (2015)	Approximate Requirement in next 5 years	Funds required for five years as Government support
1.	Integrated Pack Houses	249 numbers	14,000 numbers	2450.00
2.	Cold Room	--	20000	1050.00
3.	Cold stores (Bulk & distribution hubs)	32.5 million tonnes	2.5 million tonnes	700.00
4.	Reefer Trucks	<10,000 numbers	20,000 numbers	1850.00
5.	Ripening Chambers	800 numbers	4000 numbers	56.00
	Total			6106.00

Challenges and Opportunities

- Cold-chain support is designed as a demand driven activity.
- Huge funding gaps: Rs. 6100 crores required in next five years.
- Disproportionate focus on cold storage capacity limited to long term storage crops only.

- Strengthening of integrated cold-chain will reduce post harvest losses, add to farmer's income, stabilise prices, create near-farm jobs and will make available quality produce to consumers.

Financial assistance for cold-chain under MIDH (NHB, NHM)

Credit linked back ended subsidy @ 35% of the project cost in general areas and 50% in case of NE, hilly and scheduled areas is available. Norms for various components are as under :

S. No.	Components	Maximum Admissible Cost/Unit (Rs. in Lakh)
1	Pack House	4.00
2	Integrated Pack House	50.00 for 16 MT/day
3	Pre – Cooling Unit	25.00 for 6 MT/batch
4	Mobile pre-cooling unit	25.00 capacity
5	Reefer vehicle	30.00 for 15MT
6	Reefer Container (multi-modal)	6.00 for 9 MT
7	Primary processing units	25.00
8	Ripening chamber	1.00/MT for maximum 300 MT
9	Cold Storage Type – I @ Rs.8000.00/MT	Rs.680.00 lakh for maximum 10000 MT
10	Cold Storage Type – II @ Rs.10000/MT	Rs.850.00 lakh for maximum 10000 MT

11	Low energy cool chamber (100 kg)	0.04 per unit
12	Temperature controlled retail units	10.00 per establishment

Support for modernization of existing infrastructure, add-on component for CA storage, alternate energy and energy saving systems are also provided.

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Feasibility Assessment

Economics and feasibility of the project proposal have been worked out in the following paragraphs:

- Area in which Integrated Pack-house to be established: Bomdila and Itanagar, Arunachal Pradesh.
- Distance between Bomdila to Itanagar to New Delhi- 2,100 kms

Production Data:

- ✓ Production in Arunachal: 6000 MT (Months: Sep, Oct, Nov)
- ✓ Per Month Production: 2000 MT
- ✓ Per day production: 60 MT (approx.)
- ✓ 25% of the above per day production may be initially tapped in the cooperative sector means: **15 MT per day or 1850 MT annually** as the season is for 90 days and total cold store capacity available with the Federation after implementation of the project will be 1000 MT

For implementation of the project, following facilities are needed:

- ❖ Land levelling, development and renovation cost of the existing building to make it usable as Integrated Pack House : **Rs.25 lakhs**

Cold-Chain Components:

- ❖ **Integrated Pack house**
 - ✓ Components included: Conveyor belt, sorting, Grading, Washing, drying and weighing facilities including Diesel Generator:
 - ✓ Requirement: 16 MT/day
 - ✓ Cost: **Rs.50.00 lakhs** for 16 MT.

- ❖ **Cold-Storage** (0° C with 90% RH)
 - ✓ Requirement: 4 units of capacity 250 MT each
 - ✓ Cost: 8000/MT
 - ✓ **Total: 80.00 lakhs.**

- ❖ **Reefer Vehicle:**
 - ✓ Requirement: 3 no's of 15 MT capacity (one round trip to Delhi will take : 9 days)
 - ✓ Cost: Rs.30 lakhs per vehicle
 - ✓ **Total: Rs.90 lakhs.**

- ❖ Margin Money @ 25% of Working Capital of Rs.203 lakh (to be arranged by the society) : Rs.50 lakh

- ❖ **Total project Cost:Rs.295.00 lakhs.**

- ❖ Back- ended subsidy available from Govt. Of India: 50% = Rs.110 lakhs on infrastructure/Cold-Chain components costing total of Rs.220 lakhs

- ❖ Capital expenditure :Rs.245 lakhs.

Running Costs (Diesel):

- ✓ Diesel cost: Rs.65/- per litre (appx.)
- ✓ Distance between Bomdila to Itanagar to New Delhi: 2,100 kms.
- ✓ Round trip: 4,200 kms.
- ✓ No. of Round Trips per year per truck : 40
- ✓ No. of Round Trips required for handling 1850 MT: 120
- ✓ Km. covered in 120 round trips : 504000
- ✓ Avg Mileage: 4.00 km per litre
- ✓ **Cost of fuel for handling 1850 MT Kiwi: Rs.81,90,000**

Manpower Expenditure:

- ❖ Modern Pack houses:
 - ✓ Estimated Manpower requirement for Pack-house: 40 (30 unskilled, 5 semiskilled, 5 skilled)
 - ✓ Labour Cost: Rs.33,000 per day
 - ✓ **Labour cost for 360days : Rs.118.80 lakh**

- ❖ Cold-Storage of 1000 MT capacity:
- ✓ 6no's per 250 MT unit
- ✓ Total: 24no's (Warehouse Manager-2, Record keeper-4, Technicians-6 and Helpers-12)
- ✓ Cost: Rs.22000/- per day
- ✓ **Cost for 360 days:Rs.79.20 lakh**

- ❖ Reefer Trucks: 3 no's (2 Drivers and 01 Helper) per truck
- ✓ Total Manpower required: 9no's
- ✓ Cost: Rs.12600/- per day
- ✓ **Cost for 360 days : Rs.45.36 lakh**

Total manpower Cost: Rs.243.36 lakh

Electricity cost: (30 KVA DG set required for the project)

- ✓ Units consumed per day : 325
- ✓ Per unit tariff : Rs.4
- ✓ Yearly cost : Rs.474,500/
- ✓ However, if DG is used then per unit cost : Rs.11.48
- ✓ Yearly cost including lubricant
Oil charges and maintenance : Rs.13.62 lakh

So average of both : Rs.9.18 lakh

Water charges : Rs.2.00 lakh

Maintenance Cost @ 5% of total capitalcost : Rs.12.25 lakh

Contingency (3%) :Rs.7.35 lakh

Spoilage during transportation : 3% ofKiwi Purchased

Existing cost of Kiwi per ton during season and its economics:

- ✓ Farm price on an average: Rs.70/kg i.e. Rs.70,000/tonne
- ✓ At Terminal Markets: Rs.120/Kg i.e.: Rs.1,20,000 /tonne

2. The project is technically feasible, socially desirable and financially viable as may be seen from the calculation sheets at [Annexure II](#) wherein IRR and DSCR have been calculated at 81% and 6.82 respectively.

Other advantages of implementing the project:

- Kiwi fruit may be stored in the cold-storage for 4-6 months and sold in the terminal markets in off-season as the shelf life is 4-6 months at 0 deg C and 90% of RH.
- As it has huge medicinal value it may be exported to the neighbouring countries viz. Bangladesh, Bhutan, Nepal & Myanmar.
- It can also be sold in the Metro Cities like Hyderabad, Bengaluru, Chennai and Mumbai.
- Presently 10-20% loss is observed due to lack of post harvest infrastructure and poor handling of commodity.
- Arunachal Kiwi is the best organic kiwi in the World.

Risk Analysis and Risk Management

The technology for integrated pack-house, reefer vehicles, etc. is widely available domestically for the development of Cold-Chain.

2. The produce, i.e., Kiwi has a great demand in the metros and in other countries. India itself is a net importer of Kiwi and hence no problem is envisaged on the demand front. However, the implementing cooperative will have to recruit new manpower at managerial level or train their own existing staff in handling of integrated pack-house, cold storage, etc. and also recruit staff in the field of electricity as the Cold-Chain infrastructure is a technical area. For salary and wages of technical staff, the economic viability of the project has been calculated after making enough provisions/amount required for this purpose in the project and therefore the society undertaking Cold-Chain Development will recruit, if required, all types of technical staff. After taking into consideration the higher salary, the IRR, DSCR and other financial ratios of the project are found to be in line showing the viability of the project.

3. The project is strategically located where the produce (Kiwi) is available in abundance. However, the cooperative will have to maintain a good relationship with their members by making regular and timely payments for their produce so that regular supply of Kiwi is maintained to the implementing cooperative which is the most important factor for the success of the project proposal.

4. The financial viability of the project has been worked out separately which shows that it will be viable and the commitment of the

promoter cooperative is evident from the fact that they are contributing working capital requirement out of their own sources.

5. The project is most sensitive to the selling price of Kiwi. Sensitivity analysis shows that the IRR and DSCR will drop/fall the most if the selling price of Kiwi in the markets drop due to some reason. However, at present the chance of prices dropping substantially are negligible as India is importing Kiwi and the demand for it is growing not only domestically but internationally. Therefore, if the production increases due to which selling price decreases, there is a good possibility with the implementing cooperative to export the commodity to neighbouring countries like Malaysia, Thailand, etc. because the cooperative has Cold-Chain Infrastructure available with it for undertaking exports.

6. The failure of crop is another risk. At that time, the reefer vehicles of the society will be utilized for transport of other fruits and vegetables or they can be rented out for that period as there is demand for such vehicles. Similarly, cold storages can also be rented out during such times.

SWOT ANALYSIS

Strength

- Due to its medicinal values, Indian market has huge demand and is a net importer of Kiwi.
- Entire Kiwi production in Arunachal Pradesh is organic and fetches better price.

Weakness

- Natural calamity may prove to be the only weakness as production of more than 57% of kiwi is only from single state i.e. Arunachal Pradesh.

Opportunities

- Out of the total demand of 14650 MT of Kiwi in India, about 4000 MT (means 27%) is imported from New Zealand & Italy. This gap can be bridged by North Eastern States, especially Arunachal Pradesh, if they are connected with consumer markets in India through Cold-Chain infrastructure. This connection will fetch the farmers of North East a better price and encourage more farmers to go for kiwi production, thus, further reducing the demand and supply gap of Kiwi.

Threat

- There are chances of dumping of Kiwi from New Zealand & Italy in case the production in these countries increases. Hence a policy from Govt. of India to be introduced to avoid dumping.

Annexure-I**State-wise requirement of Pack-houses in the country as assessed by NCCD**

Name of the State	Pack-houses required (Nos.)
Andhra Pradesh	3124
Arunachal Pradesh	60
Assam	809
Bihar	2205
Chhattisgarh	1131
Delhi	3003
Goa	170
Gujarat	4835
Haryana	1695
Himachal Pradesh	122
Jammu & Kashmir	645
Jharkhand	1476
Karnataka	4388
Kerala	3361
Madhya Pradesh	3671
Maharashtra	9244
Manipur	160
Meghalaya	110
Mizoram	106
Nagaland	115
Odisha	1285
Punjab	1903
Rajasthan	3146
Sikkim	36
Tamil Nadu	6410
Telengana	2171
Tripura	197
Uttarakhand	578
Uttar Pradesh	8206
West Bengal	5378
UT & Others	340
Total :	70080

**ARUNACHAL PRADESH COLD-CHAIN DEVELOPMENT
PROJECT FOR KIWI IN BOMDILA DISTRICT
CASH FLOW**

Annexure-II

STATEMENT

(Amount in Rs.Lakhs)

S. No.	Items	Year	1	2	3	4	5	6	7	8
A.	INVESTMENT (including Rs.25 lakh site dev charges)		295.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B.	INCOME/CONTRIBUTION	Capacity		70%	80%	90%	100%	100%	100%	100%
	(Selling Price-Marketing Expenses (Commission, Unloading Charges at Mandi)-Purchase Price)	Utilization								
1	Purchase Price (1850 MT * Rs.0.70 lakh per MT)			906.5	1036	1165.5	1295	1295	1295	1295
2	Selling Price (1850 MT * Rs.1.20 lakh per MT)			1554	1776	1998	2220	2220	2220	2220
3	Marketing Expenses (5% of Sales Amount)			77.7	88.8	99.9	111	111	111	111
	Total (B)		0.00	569.80	651.20	732.60	814.00	814.00	814.00	814.00
C.	OPERATIONAL EXPENSES									
4	Maintenance (5%)			12.25	12.25	12.25	12.25	12.25	12.25	12.25

5	Water & Electricity charges			11.18	11.18	11.18	11.18	11.18	11.18	11.18
6	Contingency (3%)			7.35	7.35	7.35	7.35	7.35	7.35	7.35
7	Interest on Working Capital		0.00	30.45	30.45	30.45	30.45	30.45	30.45	30.45
8	Project Management (Op.Exp., Labour and Diesel Cost)		0.00	325.26	325.26	325.26	325.26	325.26	325.26	325.26
9	Spoilage during transportation (2% of Kiwi Purchased)			18.13	20.72	23.31	25.90	25.90	25.90	25.90
10	Interest @ 15%		27.75	27.75	27.75	23.1255	18.501	13.8765	9.252	4.6275
11	Depreciation (20%)		0.00	59.00	59.00	59.00	59.00	59.00	59.00	59.00
12	Total Operational Exp.		27.75	491.37	493.96	491.93	489.89	485.27	480.64	476.02
D.	NET PROFIT (B-C)		-27.75	78.43	157.24	240.67	324.11	328.73	333.36	337.98
E.	Cash Flow for IRR (D27+D23+D24-D6)		-295.00	165.18	243.99	322.80	401.61	401.61	401.61	401.61

IRR =

81%

DSCR

0

5.95

4.17

5.98

8.14

8.98

10.02

11.33

Avg DSCR

6.82

	Loan		185.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Repayment		0.00	0.00	30.83	30.83	30.83	30.83	30.83	30.83
	Loan Balance		185.00	185.00	185.00	154.17	123.34	92.51	61.68	30.85
	Interest		27.75	27.75	27.75	23.1255	18.501	13.8765	9.252	4.6275

SAMPLE