Project Design Document: Greening of Rural value chains for turmeric

Project Background

Son Mahila Kisan Utpadak Company is a Farmers' Producers organisation in Pondi Kala, Jaisinghnagar of Shahdol, which was formed in 2021. The FPO has 227 shareholders from 80 villages. It has currently been engaged in activities like procuring seeds and delivering them to farmers, mobilising the farmers to sell their produce collectively. Given their know-how in the cultivation of turmeric, the FPO has been planning to set up an integrated plant for processing turmeric as well as packaging, as they have not been able to sell raw turmeric at remunerative prices to existing processing units. Every year, a huge quantity of powdered haldi is left over as there are very weak linkages to the market. Often they have to invest in processing the raw haldi as it is easier to store, but cannot sell their produce due to lack of market linkages. They intend to procure haldi from farmers locally and conclude further processing. The FPC is currently looking for financing options to set up the plant.

Turmeric has been announced as the product under the ODOP scheme for Shahdol. In comparison to other districts, Shahdol has favourable soil conditions – light and sandy- for turmeric farming, and has been traditionally grown by local farmers. Turmeric has several medicinal properties and hence is highly recommended for daily use. Also, a ready market in terms of medicine manufacturing companies is available in Indore, wherein Pithampur SEZ hosts several pharmaceutical companies. The types of turmeric used for sowing in this region are Basith haldi and Jawli haldi (desi variety) and Sonia haldi and Sukhana haldi (improved variety). The uses of these varieties range from cooking to medicinal usage, especially black haldi is of great value for medicinal use.

Turmeric cultivation is practiced in many districts of Madhya Pradesh, and its traditional processing is a labour-intensive process. The price of raw turmeric that farmers get in the market ranges between INR 20-25/kg, which often equates to the total input cost of its cultivation. After processing, turmeric powder can be sold at around INR 100-120/kg.

Project Description

This project aims at increasing the scale of operations of the processing unit, diversification of its products, decarbonisation of the energy vector with renewable energy assets and the electric vehicles included in the logistical requirements and support for market linkages by enabling the branding of the manufactured products. The project envisages the accomplishment of these objectives through following equipment:

1. **Solar photovoltaic panels systems and battery storage equipment** - Cumulative total savings on energy consumption amount to 30250 units annually, which equals to 22 tonnes of CO_2 emissions mitigated annually, assuming 6 hours of daily generation for 250 days in a year. The initial investment is compensated for by savings in electricity bills to be incurred regularly for the operation of the plant at an average variable electricity cost of INR 11/kWh, while also accommodating the operation of expanded activities like bakery, packaging and branding.

2. **Electric hauler for micro-logistical services** with a payload capacity of 500kg – cumulative total savings on using electric vehicle as compared to diesel-powered vehicle is INR 1,13,735 annually, along with 1 tonnes of CO_2 emissions mitigated.
3. **Extension of scope of operations with additional equipment** for further value addition to fetch better prices, including equipment for packaging unit for packaging and branding.
4. **Supporting the FPO in certification of their products** which would further improve the marketability of the product.
5. **Overall annual savings/benefits from the investments include:** INR 166375 from energy vector, INR 14,00,000 from sale of processed products in first year itself, with increasing sales revenue in upcoming years and INR 125000 from fuel switch in good carriage.

Summary of Investments

Total project cost is expected to be close to INR 30 lakhs that includes design, engineering, procurement, installation, first year operations and support in packaging and branding. Table below summarizes the project components and the investment requirements.

Table 1: Capital Costs for the project

S. No	Technology	Unit	Capacity	Qty (Nos.)	Cost (Rs/unit)	Value (Rs.)	Cost sharing			Sharing (%)	Relevant schemes
							FPO equity	Govt subsidy	Loan		
1	**Electric Hauler (Mahindra Treo Zor)**	kg	500		400000	400000	40,000	74,000	286,000	10:18.5:71.5	FAME II
2	**Project Cost**				4,335,000	4,335,000					
	Weighing scale			1	100000						
	Washer	kg/hr	100	1	250000						
	Curing boiler with furnace	kg/hr	100	1	150000						
	Polisher	kg/hr	100	1	100000						
	Grinder	kg/hr	100	1	400000						
	Siever	kg/hr	100	1	150000						
	Solar dryers	kg	80	4	70000						
	Packaging machine			1	200000			1,000,000	2,901,500		PMFME, point iii and iv
	Bar Coding Machine			1	25000		433,500			10::23::67	

	Solar photovoltaic panel system with battery	kW	22		1080000						
3	Land cost				250,000				250,000	0::0::100	
	Total					4,985,000	473,500	1,074,000	3,187,500	9::22::64	

Source: MP Ensystems Research

Barriers addressed in the project implementation:

The FPO has been aspiring to work for improving the income levels of farmers in the region through procurement of their produce locally at remunerative prices and distribute the profits generated through the operations of the plant as dividend at a later stage. It aims to achieve these targets through a low carbon pathway, which would further improve its sustainability in the long run and doesn't add to the widespread land and air pollution in Singrauli through its operations. The key barriers addressed through the proposed project implementation are listed below.

Table 2: Barriers addressed through the project

Barriers	**How the proposed project will address barriers through net-zero carbon solutions**
Frequent power outages, reliance on diesel generator sets as backup, high operation expenses	Installation of a rooftop solar panels which eliminates carbon emissions while ensuring continued power availability at minimal costs
High cost of fuel for transport and logistics	Use of electric hauler for local transportation to bring-in produce from the individual farms to the central processing facility
Limited scope of operations	Addition of bakery unit and further processing to produce more value-added products, which have greater visibility and fetch better prices
Market Access	The packaging machine helps shape the brand identity of the products which improves market access.

Source: MP Ensystems Research

Financial Analysis

We developed a simple cash-flow analysis, where although the equipment proposed would have a lifespan of at least 15 years, our effort was to demonstrate feasibility with a conservative lifespan of 10 years.

Project Cost

The major component of a small-scale fruit processing unit are land, building and civil works. A project cost of **INR 49.85 Lakhs** has been estimated. The details of project cost are given in **Table 3**

Table 3: *Total Project Cost*

Project Cost					
S. No.	**Particulars**	**Unit**	**Qty.**	**Rate (Rs.)**	**Amount (Rs. Lakh)**
1	Land	acre	0.5	500000	2.5
2	Land Development				5
3	Civil Work				5
4	Storage Area	Sq ft	1000	200	2
5	Plant and Machinery				31.35
6	Miscellaneous fixed assets				2
7	Preliminary and Preoperative expenses				2
	Total				49.85

Source: MP Ensystems Research

Operational Expenses

The operational expenditure incurred under different heads is as specified in Table 4. The operational expenditure is expected to grow at an annual rate of 5%.

Table 4: Operational expenditure

Manpower Requirement				
S. no.	**Personnel**	**Number**	**Salary (Per Month)**	**Total (Rs. Lakh/year)**
1	Plant manager	1	20000	2.4
2	Workers	2	12000	2.88
3	Accountant	1	15000	1.8
	Total			7.08
Other Costs				
S. No.	**Cost Head**	**Annual Cost(INR)**		
1	Administrative Costs	50000		
2	Utility Costs	50000		
3	Marketing and advertising	50000		
	Annual Increase in wages, administrative and utility costs	5%	(Assumed)	

Source: MP Ensystems Research

Means of Finance

Financing to food processing falls under priority sector lending. The loans to units meeting the criteria of MSME are classified under MSME sector. Such units can be financed by any scheduled commercial banks, Regional Rural Banks and Cooperative Banks. Important terms and conditions of financing such units are discussed in this section.

Table 5: Means of Financing

Means of Finance		
Total Financing required	INR lakhs	49.85
Equity	%	10%
Grant	%	22%
Debt	%	64%
Interest Rate (Per Annum)	%	12.00%
Moratorium	Years	1
Annual Installment	Years	9
Equity Component	INR lakhs	4.7
Grant Component	INR lakhs	10.74
Debt Component	INR lakhs	47.35

Source: MP Ensystems Research

Based on the assumptions on input and output parameters, an Income Expenditure statement (Cash Flow Statement) prepared. The financial indicators like Net Present Worth (NPW), Benefit Cost Ratio (BCR), Internal Rate of Return (IRR) etc. analysed by discounting cash flow @10% discounting rate are given in **Annexure II** and summary is presented in **Table 6**.

Table: 6 Estimated Financial Indicators

Financial Indicators	**Estimated**	**Requirement**
Net Present Worth	94.92	Should be +ve
IRR	61%	> 10%
BCR	1.210534	Should be >1.0
DSCR	4.09	Should be >1.5

Source: MP Ensystems Research

The repayment period has been drawn by considering net surplus available for repayment. The bank loan with interest is repayable within 9 years with a moratorium of one year. The debt service coverage ratio based on assumed techno economic parameters is found satisfactory.

The following specific attributes of ESG can further be achieved through the implementation of this project:

- There are a number of environmental opportunities including mitigation of carbon emissions, reduction of resource depletion. There are direct climate benefits to the project. The installation of roof-top solar results into the mitigation of 24 tonnes of

CO_2 emissions every year, while the usage of EVs leads to the prevention of 1.2 tonne of CO_2 annually.

- There is a strong integration of gender-diverse leadership as most of the members of the FPO, including in decision-making positions, are women. The project will increase social opportunities and strengthen existing community relations by generating local employment and increasing income opportunities.

Annexure I: Catalogue of processed products

Types of processed Products	Selling Price (Rs/kg)	Packaging Cost (INR/kg)
Turmeric Powder	100	2
Wastage of turmeric during preparing ketchup	%	10%
Rate of turmeric	INR/kg	50
Rate of other raw materials	INR/kg	10

Annexure II: Calculation of financial indicators

Particulars	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	
Capital Cost	49.85	0	0	0	0	0	0	0	0	0	
Recurring Cost	58	66	75	83	92	93	93	94	94	95	
Total Cost	107	66	75	83	92	93	93	94	94	95	892
Benefits	72	84	96	108	120	120	120	120	120	120	1,080
Net Benefits	-35	18	21	25	28	27	27	26	26	25	
Discounting Factor	10%										
Net Present Worth	94.92										
IRR	61%										
BCR	1.21										