Business Model for Bio-PROM

Case Example from Suvarnakranthi FPCL, Sindhudurg, Maharashtra

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Contents

List of Abbreviations

BAIF	Bharatiya Agro Industries Foundation
BMZ	German Federal Ministry for Economic Cooperation and Development (Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung)
DAP	Diammonium Phosphate
DFI	Doubling Farmers' Income
FPCL	Farmer Producer Company Limited
FPO	Farmer Producer Organisation
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
IRESA	Integrated Sustainable Energy and Sustainable Agriculture
MAP	Monoammonium Phosphate
NABARD	National Bank for Agriculture and Rural Development
PROM	Phosphate-Rich Organic Manure
ProSoil	Soil Protection and Rehabilitation of Degraded Soil for Food Security in India
SSP	Single Super Phosphate

A study by the Fertiliser Association of India shows that the production and consumption of chemical fertilisers in India has grown from 201.6 tonnes and 65.6 tonnes respectively in 1951-52 to 41,427 tonnes and 25,950 tonnes in 2016-17

Image: Adrian Infernus /unsplash

Introduction

Agriculture and its allied sectors contribute heavily to employment, income, and food security in India.[1] The growth and stability of these sectors were important to meet the needs of the country's growing population. The Green Revolution of the late 1960s helped address this need. This involved an increased use of chemical fertilisers in Indian agriculture. A study by the Fertiliser Association of India shows that the production and consumption of chemical fertilisers in India has grown from 201.6 tonnes and 65.6 tonnes respectively in 1951-52 to 41,427 tonnes and 25,950 tonnes in 2016-17.2

However, prolonged overuse of chemical fertilisers has led to decline in soil health, particularly with soil compaction, soil acidification, and loss of humus. Apart from a decline in agricultural yields, this has negative implications for the environment and human health.

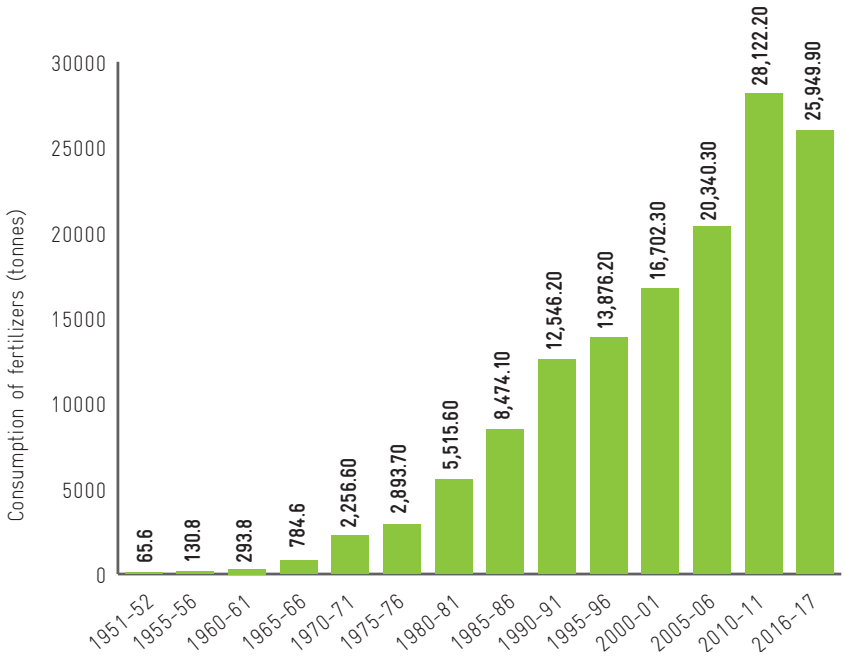


Figure 1: Snapshots of chemical fertiliser consumption in India from the 1950s to 2017.

1 Economic Survey 2019-20 Vol. 2. (2020). Government of India Ministry of Finance Department of Economic Affairs.
2 Fertiliser Association of India: https://www.faidelhi.org/general/con-npk.pdf.

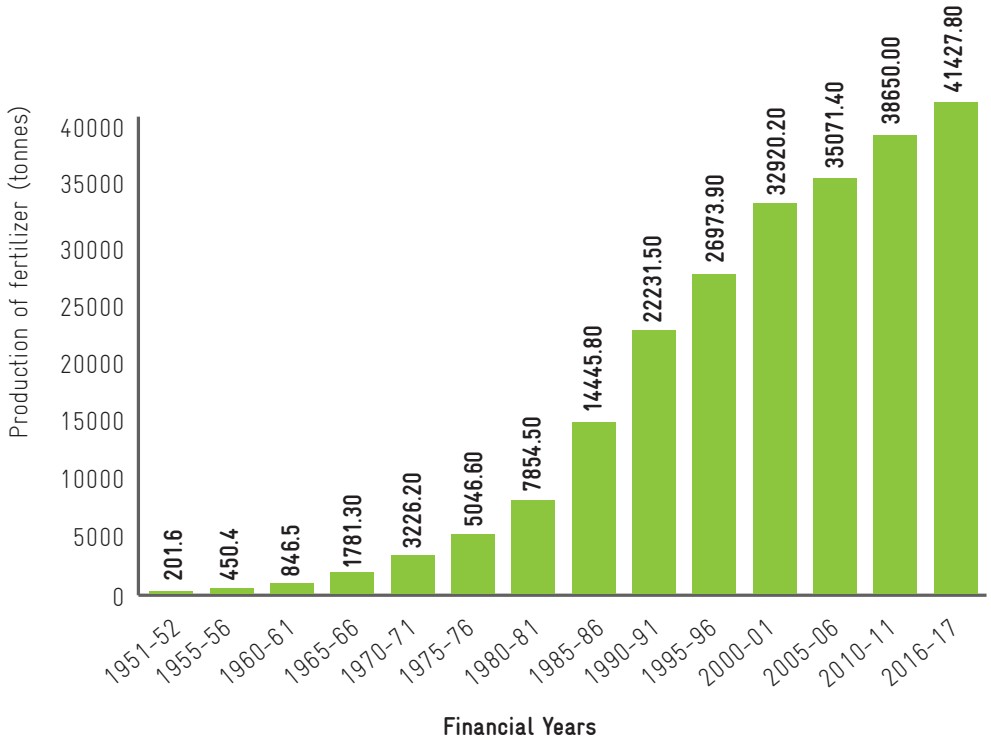


Figure 2: Snapshots of chemical fertiliser production in India from the 1950s to 2017

To ensure better agricultural yields and mitigate environmental damage, the world is now looking towards bio-substitutes for chemical fertilisers. The Government of India has turned its focus on organic farming, with a focus on farmers' livelihoods.

The Ministry of Agriculture and Farmers Welfare's initiative on Doubling Farmers' Income (DFI) has recommended strategies for the same.[3] It is based upon the following primary principles:

- Increasing total output through higher productivity.
- Rationalising/reducing the cost of production.
- Ensuring remunerative prices in the agricultural produce.

Use of biofertilisers like Bio-PROM fits in with the government's strategy as it not only contributes to increasing yields, especially for small and marginal farmers, but it also reduces the cost of production for farmers by limiting the use of expensive chemical fertilisers.

There is an increased awareness among the farming community about biofertilisers. Phosphate fertilisers like Diammonium Phosphate (DAP) and Single Super Phosphate (SSP) are now being substituted by their organic or "bio" versions.

In the last decade, India has reported a decline of about in phosphate fertiliser consumption, indicating a slow shift towards biofertilisers. One such bio-fertiliser that has gained significant prominence during recent times is Bio-PROM (Phosphate Rich Organic Manure), a sustainable substitute for SSP and a close substitute for DAP.

Bio-PROM is a value-added product produced from biogas slurry enriched with Rock Phosphate (P_2O_5), microorganisms' culture, and sufficient moisture content which leads to better productivity at a much cheaper price, as compared to other chemical phosphate fertilisers like DAP and SSP.

Further sections of the report would be confined to phosphorous-based bio fertilisers.

In the last decade, India has reported a decline of about in phosphate fertiliser consumption, indicating a slow shift towards bio fertilisers.

3 Doubling of Farmers Income. Ministry of Agriculture and Farmers Welfare. Press Information Bureau (PIB) 13 Dec 2022.

Project Idea

Indo-German development cooperation project 'Soil Protection and Rehabilitation of Degraded Soil for Food Security in India (ProSoil) is implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) in partnership with the National Bank for Agriculture and Rural Development (NABARD). The project is part of a larger global programme under BMZ's Special Initiative "Transformation of Agricultural and Food Systems". Under this project, GIZ India in collaboration with BAIF Development Research Foundation, is supporting an initiative in the Sindhudurg district of Maharashtra to prepare an organic manure called Bio-PROM using residue from biogas plants.

Bio-PROM can generally be produced using different sources like organic manure, plant-based biomass, de-oiled cakes, potassium hummate, to name a few.

However, under the proposed intervention, the core idea is to use organic manure from existing biogas plants to manufacture Bio-PROM on a commercial scale and supply it to the farmers at a reasonable price. This would address the issues of soil fertility and improving crop yields. This approach seeks to integrate livestock systems with crop systems. In the process, it also generates employment for the local population. Once the local demand for Bio-PROM is met, the surplus can be marketed outside the project area.

A cluster-based approach is proposed under this business model, where an FPO at the cluster level will engage with farmers using biogas units. The FPO will support the biogas users among its members in preparation of dry cakes from biogas plant residue. and the farmers will be provided with relevant equipments for the same.

The FPO will purchase dry cakes from the farmers for making Bio-PROM and in return sell it to the farmers at reasonable prices. Overall, this business model is expected to generate cash revenues for the farmers while also providing them organic manure.

NGOs can play a critical role in community organisation, and in capacity building of these community-based institutions. Under this broad framework, specific interventions are proposed for farmers using biogas and for FPOs.

For biogas user farmers:

- Mobilisation and sensitisation to set up biogas units and to prepare dry cakes through trainings and extension services.
- Assistance in establishment of biogas plants in convergence with government schemes.
- Provide equipment (for e.g., filters) to farmers for preparing dry cakes.
- Sale of Bio-PROM at reasonable prices to the farmers for use as manure.

For FPOs:

- Farmer mobilisation and sensitisation for adoption of biogas and preparation of dry cakes.
- Facilitating credit and subsidies for farmers for installation of biogas plants.
- Training and extension services for the farmers on Package of Practices (PoPs) for preparation of dry cakes.
- Buy back dry cakes from farmers.
- Development of systems for collection and transportation of dry cake.
- Creation of infrastructure for Bio-PROM unit.
- Convergence with various enabling schemes.
- Manufacture of Bio-PROM and its marketing to FPO members and other farmers.

Image: Jan Kopriva /unsplash

At the enterprise level, the Farmer Producer Company (FPC) would procure dry cakes from the farmers at INR 7 per kg.

Business Model

At the enterprise level, the Farmer Producer Company (FPC) would procure dry cakes from the farmers at INR 7 per kg. These would then put through the Bio-PROM manufacturing unit where it will be processed with liquid organic fertiliser and rock phosphate to make a value-added phosphate fertiliser called Bio-PROM. The Bio-PROM produced under this model shall be sold to the member farmers of the FPC. Surplus, if any, would be sold in the open market.

The Integrated Sustainable Energy and Sustainable Agriculture (IRESA) model by BAIF Development Research Foundation is the base for the proposed scalable business idea. Intellect Consortium supported the financial analysis and projections for the same. The ProSoil project will bring in an additional dimension of sustainable agriculture to the exercise.

As a part of IRESA, BAIF has supported several farmers in this region in setting up biogas plants to produce cleaner and cheaper cooking gas. Having a pre-installed biogas plant is an important condition for a farmer/farmer household to be a dry cake supplier in this model.

Slurry, which is the residue from biogas plants, will be converted into dry cakes which will form the key input for Bio-PROM production.

FPOs will equip farmers with two-layered slurry filters. The solid filtrate from these would then be sun-dried for 48 hours to make the "dry cake." These would move to the production unit, to be blended with 22% rock phosphate and liquid organic fertiliser to produce powdered Bio-PROM, which can be further converted into pallets, if required.

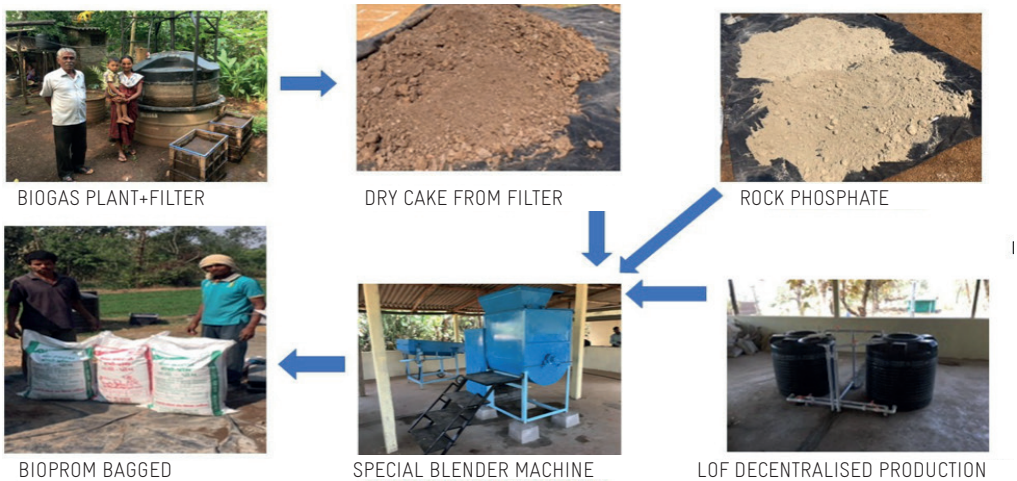


Figure 3: Bio-PROM production process flow

Image: Lukasz Szmigiel /unsplash

While the dry cakes go into Bio-PROM production, the liquid leftover from the filtration can be used as fertiliser in the field, which is an additional and unique benefit of this model.

In the first year, the activity is proposed to start with 100 farmers who already have biogas units in their households. This is expected to increase to 200 farmers in the second year, and 300 farmers in the third year.

Suvarnakranthi FPCL in the Sindhudurg district of Maharashtra will be the private sector partner to support implementation of activities including sourcing of raw material, commercial production, packaging, and marketing of Bio-PROM.

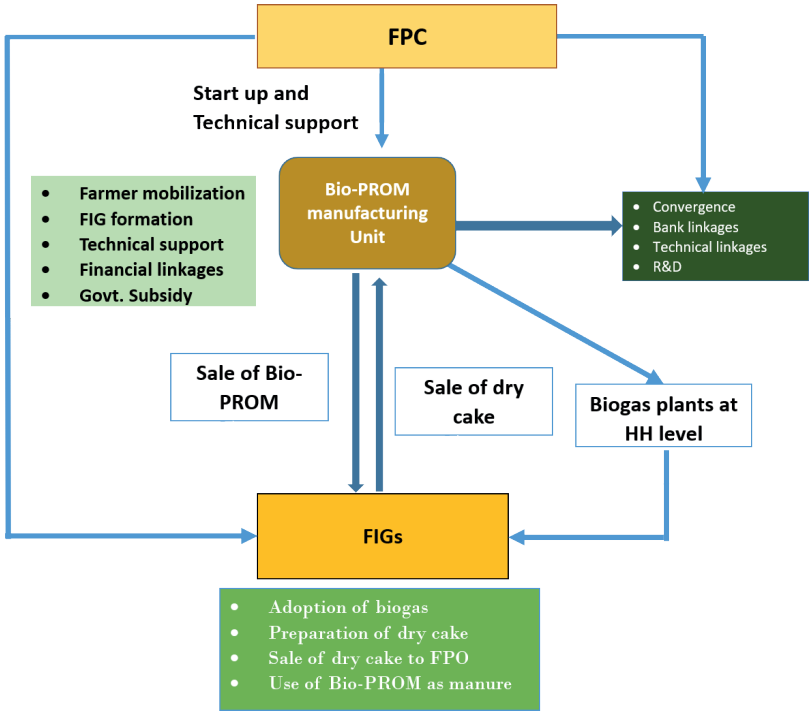


Figure 4: Proposed model for Bio-PROM production and marketing

Market Scenario

The following are some of the favourable market conditions that can drive demand for Bio-PROM:

- Increased emphasis on organic farming by the Government of India has created significant awareness among farmers regarding sustainable agriculture.
- Though there are several organic fertilisers available in the market, few are as efficient as Bio-PROM.
- Bio-PROM can be used as a perfect substitute for prevalent chemical-based phosphate fertilisers and is cheaper than chemical fertilisers. This is a major pull factor for PROM in the fertiliser market.
- Bio-PROM has various market segments based on the base material used in its production viz., organic manure, plant-based biomass, de-oiled cake, potassium hummate, These segments provide an immense opportunity to customise Bio-PROM based on the availability of raw materials and requirements of farmers.

Besides application to agricultural crops, Bio-PROM can also be widely used in the nursery and horticulture sectors.

In the Sindhudurg region of Maharashtra, there is an immense potential for the marketing of Bio-PROM. The area is known for the cultivation of Alphonso mangoes and a variety of cashews. These horticulture crops require phosphate fertilisers, which is a major opportunity for an FPC to sell its PROM.

Local farmers are inclined towards organic fertilisers. They purchase bio-fertilisers of less-established brands at INR 750 per bag. Farmers have reported that the quality of these bio-fertilisers is questionable at times. A better-quality, locally made, and reasonably priced product is likely to fill the market gap felt by the farmers.

Suvarnakranthi FPCL has more than 350 shareholders. The local Primary Agriculture Credit Societies (PACS) have a cumulative membership close to 7,000 members. Based on these numbers, the FPC can cater to more than 10,000 acres with Bio-PROM in the region on a seasonal basis.

7 villages
360 members

The Problem
Excessive use of chemical fertilisers and underutilisation of biogas residue as an alternative.

Current Scenario
Residue from biogas units often goes unused. Few use it as manure currently.

Proposed Solution
- Manufacture 462 MT of Bio-PROM annually with 277 MT of dry cakes prepared with residue from biogas units.
- Bio-PROM to be used as a substitute for phosphate fertilisers.

Value Proposition
- Organic substance.
- Improves productivity and soil health.
- Cheap alternative to phosphate.

Target Customer
- FPO members
- PACS members
- Other farmers

Figure 5: Overview of proposed Bio-PROM solution with Suvarnakranthi FPCL

Upscaling and Replication Potential

Several studies have reported that the yields in crops like paddy spiked up by **15-26%** upon substituting DAP and SSP with PROM

The Indian PROM market was valued at $203.2 million in 2020. It is projected to reach $419.6 million by 2030, growing at a CAGR of 6.8% from 2021 to 2030.[4] The reasons for its projected growth are that PROM is cheaper as compared to other phosphate products such as DAP, while it also shows improved crop yields.[5] Several studies have reported that the yields in crops like paddy spiked up by 15-26% upon substituting DAP and SSP with PROM. Studies also indicate that PROM is suitable for Indian soil conditions and can be used effectively with neutral to high pH content soil.

Moreover, there is a growing emphasis in India as well as worldwide about the need to shift towards organic farming.

Several private players are already engaged in the PROM business, such as Jaipur Bio Fertilisers, Biogen Fertilisers India Private Ltd., Gujarat Pavan Fertiliser Company and Bhoomi Phosphate Pvt. Ltd.

Biogas production at household level is being promoted by the Ministry of New and Renewable Energy (MNRE), Government of India through its National Biogas and Manure Management Programme (NBMMP). Under NBMMP, nearly 50 lakh household size biogas plants were installed by 2017-18. According to MNRE, there is great potential for biogas in India, considering the country's large livestock population of 535.78 million, which includes about 302 million bovines.[6]

With these factors, it seems that there would be no shortage of inputs for Bio-PROM production. Meanwhile the growing demand in the country would ensure ready markets for Bio-PROM units.

Another advantage of the proposed model is that farmers are already familiar with the product on offer. It is only being presented to them in a new way with better efficiencies. The model can easily be scaled up to cover the entire farmer base at the block level to begin with, and later up to the district level, provided sufficient dry cakes are available.

Usage of phosphate based fertilisers like DAP, MAP or SSP is an indicator for scope of replicability of the proposed PROM model. Since most states in India (barring a few north-eastern states, and the Jammu, Kashmir and Ladakh territories) report significant consumption of such fertilisers, this model is replicable across most parts of India.

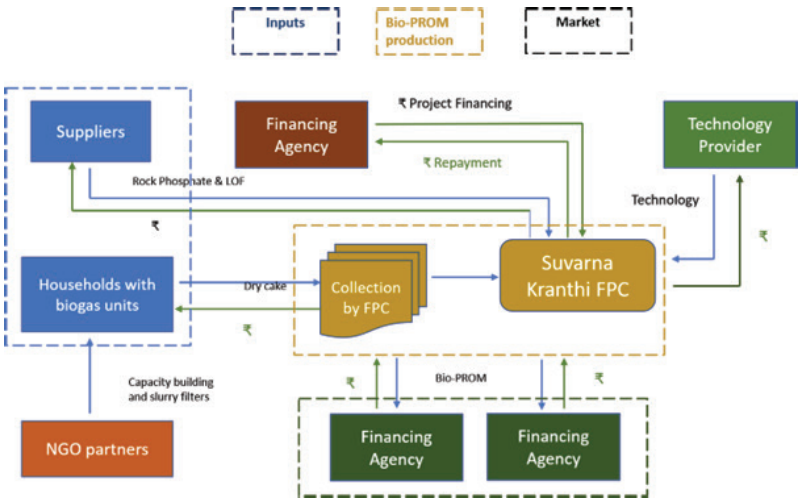
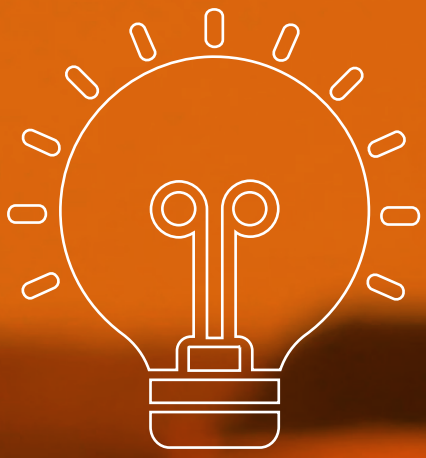


Figure 6: Bio-PROM value chain

4 Chidanand B., Amit N., Eswara P. (2022). **India Phosphate Rich Organic Manure (PROM) Market Statistics – 2030.** https://www.alliedmarketresearch.com/india-phosphate-rich-organic-manure-prom-market-A16015.
5 Ibid.
6 https://biogas.mnre.gov.in/about-the-programmes.



Key Challenges

Bio-PROM is proven to be a great alternative to chemical fertilisers and is made of locally available materials. It also has significant potential to be converted into a sustainable model. However, one must overcome the following challenges to build a sustainable business around Bio-PROM:

Availability of Raw Materials: The current model of Bio-PROM manufacturing is planned in such a way that along with rock phosphate and liquid organic fertiliser, dry cakes made from biogas slurry are used as raw material. Consistent availability of dry cakes is important for the continuous production of Bio-PROM. For scaling up Bio-PROM production the adoption of biogas at the household level must be scaled up. This requires both investment and willingness among farmers to adopt biogas. However, the fact that PROM can be manufactured out of different materials besides dry cake inspires hope that the model can be taken forward even if dry cakes are short in supply.

Human Drudgery: The process of collecting slurry, depositing it into filters, collecting sediments and drying them to get the dry cake requires manual labour. Field interactions reveal that most of this work is being done by women members of the household. To increase the willingness of farmers to engage in dry cake production, technologies that can reduce the drudgery of manual labour must be explored.

Competition and consumer awareness: Several brands in the market claim to market organic fertilisers. Farmers in the region have reported dissatisfaction with the quality of several such products. This has made them a bit wary. There is a need to rebuild their trust in organic/ bio-fertilisers and also to convince them that Bio-PROM is the perfect substitute for chemical phosphate fertilisers. Another challenge is to explain to the farmers why Bio-PROM is a significantly better product than the slurry itself. One possible method could be to set up demonstration plots to showcase its effectiveness.

Operational Utility: It is important to ensure that the unit operates at a reasonable utility percentage for two reasons: a) to ensure better utilisation of plant and machinery; b) to ensure continuous procurement of dry cake from farmers. The latter is more crucial since consistent purchase is the only way to keep farmers interested in this activity. Any discontinuity in purchase might discourage farmers from production, thereby jeopardising the business model. Hence, it is important that the FPC look beyond the local market and generate sufficient demand to make the Bio-PROM production a year-round activity.

Image: Meric Tuna/unsplash

Impact and Sustainability

The Bio-PROM project has impacts of multiple magnitudes over multiple players in the value chain. While some of the key impacts are yet to be measured, with the available information, the following are expected to be key impacts of the projects:

Social impact

- Promoting the use of organic fertilisers and preventing harmful chemical residues from entering the human food chain.
- Building social capital and cohesion through organisation of farmers.
- Generating additional employment through the FPO and other business activities.
- Ensuring the development of sustainable community-based organisations at the village level and cluster level (FPO).
- Encouraging the use of biogas and thereby reducing community dependence on biomass-based fuels which has major health implications for women and children.

Economic impact

a. Use of Bio-PROM can reduce the use of chemical fertilisers. Furthermore, it is provided to farmers at reasonable prices. This reduces input costs.

b. Smallholder farmers can enhance their incomes through the sale of bio cakes.

c. Residue after making dry cakes from slurry can be used as a manure which results in additional cost savings for farmers.

d. Secondary sediments left after the extraction of dry cake can also be used for making incense sticks.

Environmental impact

a. Use of Bio-PROM can reduce soil, water and air pollution caused due to the excessive use of chemical fertilisers.

b. Promotion of biogas units – as part of the Bio-PROM manufacturing process – can help reduce dependence on forest biomass-based fuels and ensure forest conservation.

c. Organic cultivation can be promoted through use of Bio-PROM as bio-fertiliser.

Cost Economics

The proposed business model provides estimates of cost-benefits at two levels – at the level of FPO and at the level of individual farmers who manufacture dry cakes.

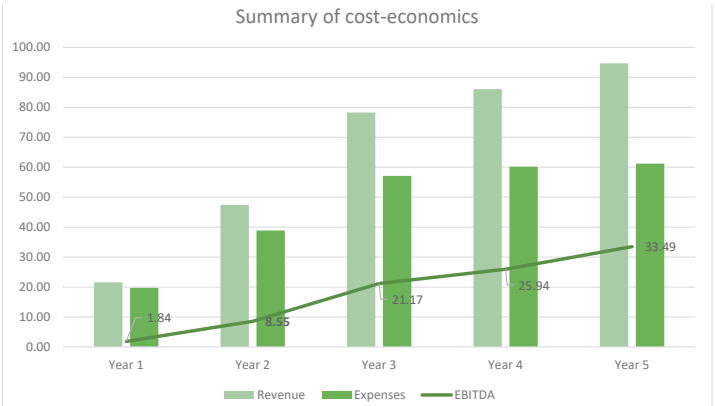


Figure 7: Summary of cost economics for the Bio-PROM business model (all figures in INR lakh)

The FPO would incur capital expenditure of INR 16.84 lakh for the construction of a shed and for purchasing plant and machinery for setting up the Bio-PROM manufacturing unit. It would incur operating expenses of INR 19.72 lakh in the first year. This would gradually increase to INR 61.21 lakh.

A detailed of cost-benefit analysis of an FPO engaged in manufacture and marketing of Bio-PROM is below:

Table 1: Cost-benefit analysis of an FPO running a Bio-PROM business

S.No	Particulars	Unit	(Figures in INR lakh)						
			Quantity	Cost (Rs.)	Year 1	Year 2	Year 3	Year 4	Year 5
A.1	Capital Cost								
1.1	Mixture Blender	Nos	1	2.56	2.56				
1.2	Chipper Shredder/ Pulveriser	Nos	1	0.80	0.80				
1.3	Water Filter	Nos	1	0.12	0.12				
1.4	Heavy Duty Weighing Machine	Nos	1	0.20	0.20				
1.5	Moisture Meter	Nos	2	0.16	0.32				
1.6	Bag Stitching Machine	Nos	1	0.23	0.23				
1.7	Barcode Printer	Nos	1	0	0.31				
1.8	PLOF Multiplication & Pumping System	Nos	1	2	1.72				
1.9	Rotary Screening Machine	Nos	1	1.65	1.65				
1.10	Installation Charges (including transportation)	Lumpsum		0.93	0.93				
1.11	Shed	Sq. ft.		8.00	8.00				
	Total capital cost				16.84	0.00	0.00	0.00	0.00
A.2	Operational expenses								
2.1	Raw material								
2.1.1	Procurement of dry cake from farmers at 924 per farmer per year	Kg	924	7	6.47	13.58	21.39	22.46	21.39
2.1.2	Procurement of rock phosphate at 600 kg batch	Kg	600	12	7.42	15.50	24.45	25.67	26.96
2.1.3	Procurement of LOF at 1 litres per batch	Lts	1	250	1.29	2.69	0.85	0.89	0.94
2.2	Recurring cost								
2.2.1	Packing Material Cost (for bag of 40 kg volume)	No. of bags		10	0.39	0.85	1.40	1.54	1.69
2.2.2	Power consumption @ 3 units per batch	No of units		10	0.15	0.34	0.56	0.61	0.68
2.2.3	Transportation at Rs 15 per km	No of trips		90	0.06	0.14	0.28	0.37	0.48
2.2.4	Sample Testing Cost at 3,000 samples per year	No of samples	3,000	20	0.60	0.63	0.66	0.69	0.73
2.2.5	Repair & Maintenance	Lumpsum	10,000		0.10	0.11	0.11	0.12	0.12
2.2.6	Marketing expenses at 1% of sales	% of sales		1%	0.22	0.47	0.78	0.86	0.95
2.2.7	Miscellaneous expenses	Lumpsum	25,000		0.25	0.26	0.28	0.29	0.30
2.2.8	Labour for production unit at 2 labourers per day	Person days		400	0.82	1.72	2.72	2.85	3.00

2.2.9	Labour for dry cake collection	Person days		400	0.16	0.69	1.63	1.71	1.80
2.2.10	Salary for Unit Supervisor	Per month	15000	12	1.80	1.89	1.98	2.08	2.19
	Total recurring cost				19.72	38.88	57.09	60.15	61.21
A.3	Income/ Benefits								
3.1	Sale of Bio-PROM	kg		14	21.56	47.43	78.26	86.09	94.70
	Total Revenue				21.56	47.43	78.26	86.09	94.70

The above analysis is based on the following assumptions:

- The FPO engages with 100 famers during the first year, 200 during the second year, and with 300 farmers from the third year onwards.
- The cost of setting up a biogas plant has not been factored in during the economic analysis, as nearly 700 farmers in the region already have biogas plants.
- Working capital loan of INR 5 lakh to 18 lakh per annum will be obtained for meeting operational costs.
- A loan of INR 16.84 lakh would be obtained for meeting the capital costs.
- There will be five batches of production of Bio-PROM per day, with 300 kg of Bio-PROM produced in each batch.
- An increment of 5% each year for price escalation in costs of dry cake, rock phosphate, LOF and labour has been factored into the cost sheet.
- An increment of 10% each year for price escalation in costs of packing materials and power has been factored into the cost sheet.
- Transportation cost is to increase at the rate of 30% each year.
- Marketing cost has been taken to be 1% of the total sales.
- The sale price of Bio-PROM is expected to increase at the rate of 10% each year.
- Total stock produced is sold off without any carry forward.

Cost Economics for an Individual Farmer

An individual farmer is expected to receive returns of more than INR 3,000 per annum from the first year onwards. These have been calculated after deducting labour cost incurred by the farmer.

Table 2: Cost-economics for individual farmers

S.No	Particulars		Quantity	Cost (Rs.)	(all figures in INR lakh)				
		Unit			Year 1	Year 2	Year 3	Year 4	Year 5
A.1	Operational expenses								
a	Manufacturing of dry cake								
b	Dry cake production per day	kg	2.8						
c	Avg. no. of hrs of work per day in dry cake making	Hours	0.5						
d	No, of production days per year	330							
1.1	Labour cost @ Rs. 20 per hour	Hours	165	20	3300	3465	3638	3820	4011
	Total cost				3300	3465	3638	3820	4011
A.2	Income/ Benefits								
3.1	Sale of dry cake	kg	924	7	6468	6791	7131	7488	7862
	Total Revenue				6468	6791	7131	7488	7862
B	Net returns (A.1-A.2)				3168	3326	3493	3667	3851

The above calculations have been made based on the following assumptions:

- the farmer maintains two milch animals.
- Slurry filter costing Rs. 7,000 would be provided as grant to each household.
- Dry cake production is assumed for eleven months in a year
- Farmers can get additional benefits by using residual slurry as manure. These benefits have not been monetised.
- The secondary residue after removing dry cake can be used for incense stick manufacturing, enhancing farmers' income.
- Farmers already have biogas units installed. However, if this is not the case then they can obtain subsidies ranging from Rs. 4,000 to Rs. 8,000 for its construction.

Profitability Analysis

Since in the first year, the number of farmers is only 100, the Bio-PROM unit would not be able to work at full capacity due to less supply of dry cake. Therefore, in the first year, the FPO is projected to suffer small loss amounting to INR 2,14,000. However, once the number of farmers increases to 200 in the second year, the FPO would make a profit of 9%. From the third year onwards, a profit margin of more than 20% would be achieved.

Table 3: Projected profit and loss statement

S.No	Particulars	(All figures in INR lakh)				
		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
		2023-24	2024-25	2025-26	2026-27	2027-28
1	Sale of Bio-PROM	21.56	47.43	78.26	86.09	94.70
A	Total Revenue	21.56	47.43	78.26	86.09	94.70
7	Total Expenses	19.72	38.88	57.09	60.15	61.21
8	EBITDA	1.84	8.55	21.17	25.94	33.49
9	Depreciation	1.57	1.36	1.18	1.03	0.90
10	EBIT	0.28	7.19	19.99	24.90	32.59
11	WC Loan Interest	0.39	0.78	1.14	1.20	1.22
12	Term Loan Interest	2.02	2.26	1.70	1.13	0.57
13	EBT	(2.14)	4.15	17.15	22.57	30.80
14	TAX	-	-	-	-	-
15	Profit After Tax	(2.14)	4.15	17.15	22.57	30.80
16	Net Profit (in %)	-10%	9%	22%	26%	33%

This amounts to a profit of INR 4.15 lakh from the second year onwards. From the third year the FPO would earn sizeable revenues amounting to INR 21.17 lakh, which is expected to increase to INR 33.49 lakh in the fifth year. The benefit cost ratio is calculated to be 1.24 which indicates high financial viability of this business model.

Table 4: Economic analysis of FPO operations

S.No	Particulars	(all figures in INR lakh)				
		Year 1 2023-24	Year 2 2024-25	Year 3 2025-26	Year 4 2026-27	Year 5 2027-28
1	Capital Cost (in lakh Rs)	16.84	-	-	-	-
2	Recurring Costs	19.72	38.88	57.09	60.15	61.21
3	Total Costs	36.56	38.88	57.09	60.15	61.21
4	Total Benefits	21.56	47.43	78.26	86.09	94.70
5	Net Benefits	(15.00)	8.55	21.17	25.94	33.49
6	Net present worth of cost @15%	164				
7	Net present worth of benefits@15%	202				
8	BCR	1.24				

Projected Cash Flow

After accounting for payment of interest for working capital and term loan, and after the repayment of working capital loan and term loan, the cash flow for the FPO is projected to be favourable in the first year itself (net cashflow of INR 0.43 lakh). This is expected to increase significantly from the second and third year onwards, as the turnover of the FPO increases.

Table 5: Projected cash flow statement

S.No	Particulars	(All figures in INR lakh)				
		Year 1	Year 2	Year 3	Year 4	Year 5
		2023-24	2024-25	2025-26	2026-27	2027-28
1	Opening Balance	-	0.43	3.28	20.59	44.50
2	Cash Inflows	44.33	60.85	99.46	110.91	120.76
	Equity	1.00	1.00	1.00	-	-
	Grants	-	-	-	-	-
	Term Loan	16.84	-	-	-	-
	Working Capital Loan	4.93	9.72	14.27	15.04	15.30
	Sales	21.56	47.43	78.26	86.09	94.70
	Debtors Balance Received		2.70	5.93	9.78	10.76
3	Cash Outflows	43.90	58.00	82.16	87.00	88.03
	Capital Expenditure	16.84				
	Operational Expenses	19.72	38.88	57.09	60.15	61.21
	Creditors Balance Paid		1.64	3.24	4.76	5.01
	Bank Interest Paid	2.41	3.04	2.84	2.33	1.79
	Term Loan Payment	-	4.71	4.71	4.71	4.71
	Working Capital Loan Paid	4.93	9.72	14.27	15.04	15.30
4	Net Cashflow	0.43	3.28	20.59	44.50	77.23

Loans

The FPO is expected to require capital assistance of INR 16.84 lakh and working capital assistance ranging from INR 5 lakh to 18 lakh, depending on the business turnover each year. The working capital requirement would be primarily met through loans from banking and financial institutions, while capital costs would be met partially through loans and partially through grant assistance from financial institutions such as NABARD.

Table 6: Working capital requirement of the FPO

(All figures in INR lakh)							
S.No	**Particulars**		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
			2023-24	**2024-25**	**2025-26**	**2026-27**	**2027-28**
1	**Working Capital Loan**		**4.93**	**9.72**	**17.00**	**17.90**	**18.31**
2	**Working Capital Loan Principle**		**4.93**	**9.72**	**17.00**	**17.90**	**18.31**
3	Interest Rate	8%	0.39	0.78	1.36	1.43	1.46
4	Working Capital Loan Repaid		4.93	9.72	17.00	17.90	18.31
5	Working Capital Loan Balance		-	-	-	-	-

The above calculations are based on the following assumptions:

- Working capital is requirement calculated at three months of annual operating expenses of the FPO.
- Interest on working capital loan is assumed at 8% per annum.
- It is expected that working capital would be repaid at the end of each year.

Table 7: Term loan requirement of the FPO

(All figures in INR lakh)							
S.No	Particulars		Year 1	Year 2	Year 3	Year 4	Year 5
			2023-24	2024-25	2025-26	2026-27	2027-28
1	Loan Principle	16.84	16.84	18.86	14.14	9.43	4.71
2	Interest	12%	2.02	2.26	1.70	1.13	0.57
3	**Principle Repaid**		**-**	4.71	4.71	4.71	4.71
4	**Loan Balance**		**18.86**	**14.14**	**9.43**	**4.71**	**-**

The above term loan calculations are based on the following assumptions:

- Interest on term loan is assumed at 8% per annum.
- It has been assumed that the repayment of principal would start from the second year onwards.

A certain depreciation on capital goods is also expected. This is calculated based on the following assumptions:

- Cost of installation and transportation of machineries has been capitalised
- The cost of machineries includes GST as applicable.
- Depreciation of 15% per annum has been assumed for machinery.

Table 8: Calculation of depreciation on capital goods

Particulars	Cost (in INR lakh)	Rate of Depreciation	Depreciation Amount (in INR lakh)					Depreciated value at the end of 5th Year
			Year 1	Year 2	Year 3	Year 4	Year 5	
Mixture Blender	2.56	15%	0.38	0.33	0.28	0.24	0.20	1.14
Chipper Shredder/ Pulveriser	0.80	15%	0.12	0.10	0.09	0.07	0.06	0.35
Water Filter	0.12	15%	0.02	0.01	0.01	0.01	0.01	0.05
Heavy Duty Weighing Machine	0.20	15%	0.03	0.02	0.02	0.02	0.02	0.09
Moisture Meter (2 Nos)	0.32	15%	0.05	0.04	0.04	0.03	0.03	0.14
Bag Stitching Machine	0.23	15%	0.03	0.03	0.03	0.02	0.02	0.10
Barcode Printer	0.31	15%	0.05	0.04	0.03	0.03	0.02	0.14
PLOF Multiplication & Pumping System	1.72	15%	0.26	0.22	0.19	0.16	0.13	0.76
Rotary Screening Machine	1.65	15%	0.25	0.21	0.18	0.15	0.13	0.73
Installation and transportation (*)	0.93	15%	0.14	0.12	0.10	0.09	0.07	0.41
Shed	8.00	3%	0.24	0.23	0.23	0.22	0.21	6.87
Grand Total	16.84		1.57	1.36	1.18	1.03	0.90	10.79

Way Forward

The proposed business model is expected to be profitable for the FPO, with the integration of 200 farmers. If the FPO works with less than 200 farmers, the Bio-PROM manufacturing unit would not be able to work at full capacity owing to the shortage of dry cake.

For the farmers, the returns from the sale of dry cake are significant. However, these could increase with a raise in the number of milch animals with the farmers. Dairy farmers with more than two milch animals could benefit more from the sale of dry cake.

The value of financial support (including subsidies) from the Government has not been factored into this model. However, in case a farmer receives subsidies from the government, and if the FPO receives grants for establishing the Bio-PROM enterprise, then they could earn higher revenues.

There is a need to obtain support from NABARD or other financial institutions for the farmers as well as the FPOs engaged in the Bio-PROM business. Moreover, the support of an NGO is also critical as a facilitating organisation for establishing the FPO and for community mobilisation.

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