



Resource Recovery, Reuse and Business Models through Co- composting – Case Studies from Different States

18th July 2025

FINISH Mondial

FSMC





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Organisation - Overview

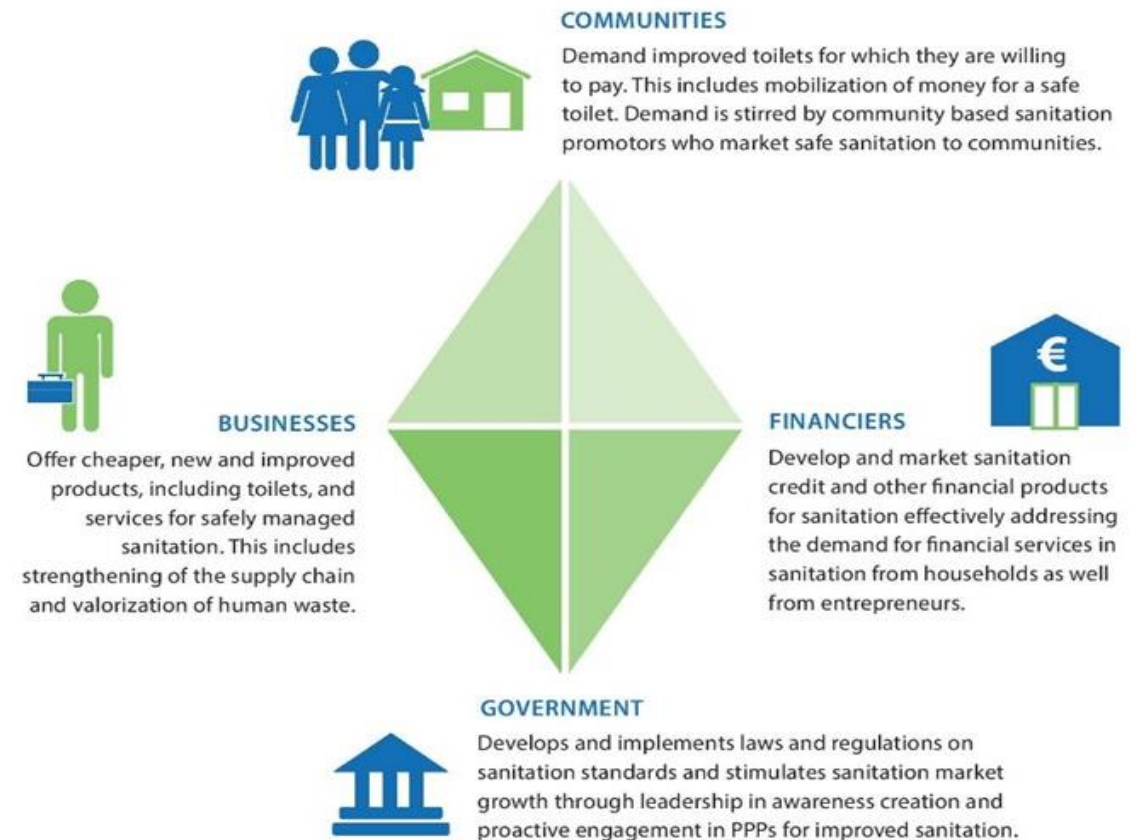
- **Finish Services Management Company (FSMC) Pvt Ltd** is a social enterprise registered as a Private Limited Company in 2014
- **Offshoot of the FINISH project**
- **One of the Implementing Partners of FINISH Mondial in India**
- **Started with projects like:**
 - ❖ **Construction of Toilet linked biogas units in Gujarat**
 - ❖ **Construction of toilets, bathrooms and water supply in 8 villages of Jharsuguda, Odisha**
 - ❖ **Private FSTP (constructed wetland) in Talcher, Odisha**
 - ❖ **Many precast units for SBM toilets in Odisha & Maharashtra**
- **Current Activities - FSM and Swachh Sarvekshan support to ULBs in Odisha & Bihar**
- **Supporting 12 ULBs in Odisha and 2 in Bihar for better Faecal Sludge/Bio-Solids Management**



FINISH Mondial



- A partnership between WASTE and Amref Flying Doctors (AFD)
- Is a global 6 country program funded by DGIS, Netherlands
- Coverage: India, Bangladesh, Kenya, Tanzania, Uganda & Ethiopia
- Ambition: 2 Million Households
- Period: 2021- 2025
- Focus Area: *Safe Sanitation, FSM, WASH Market Creation, Climate Change, GESI, Menstrual Health & Hygiene, Solid & Liquid Waste Management through Financial Inclusion & Leverage of existing infrastructure and facilities.*





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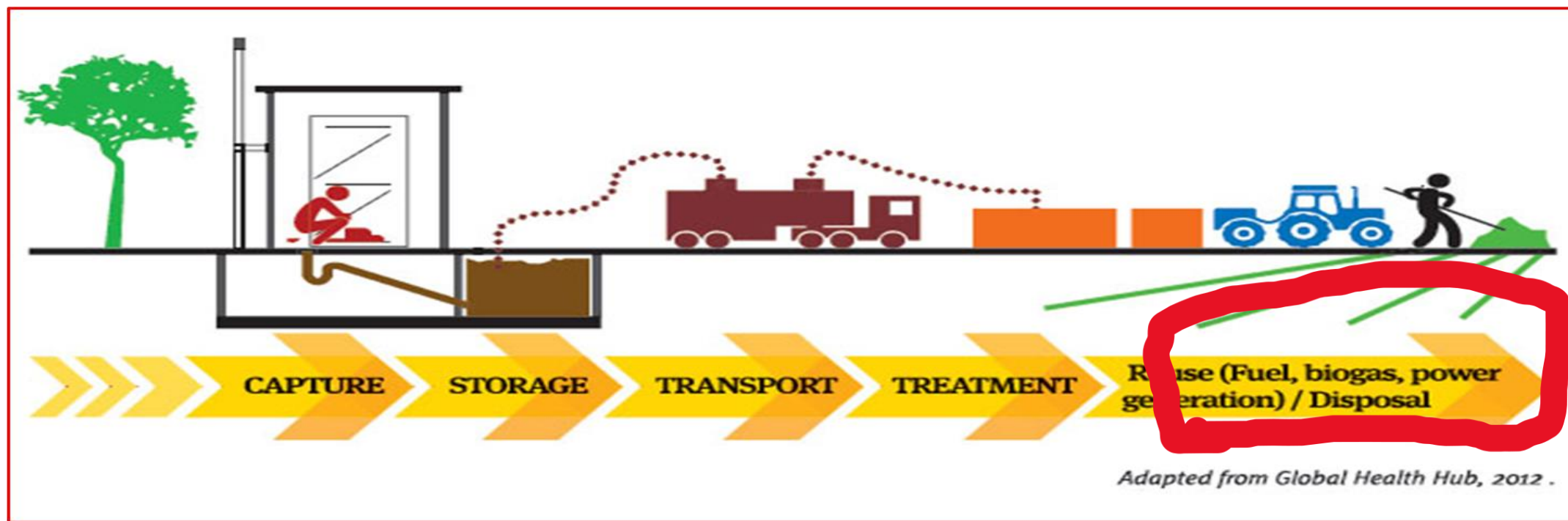


Present Situation



Need of Intervention

- Indiscriminate disposal of FS in the open – soil & water contamination
- Need for a low-cost decentralized model for better FSM which helps in closing the loop of Circular Economy
- Need for a technology that is simple and easily adopted – replicable
- More of nature based solutions – energy efficient
- Need of more private sector participation – financial models





Odisha Model

- MoU with ULB regarding co-composting of the bio-solids and organic waste
- 12 ULBs - Dhenkanal, Cuttack, Jharsuguda, Belpahar, Nayagarh, Aska, Hinjilicut, Soroda, Kamakhyanagar, Bargarh, Buguda and Ranpur
- ULB provides –
 - ❖ Space for co-composting
 - ❖ Raw materials – bio solids and organic waste
 - ❖ Labour & Lab Testing Cost
- FSMC provides –
 - ❖ Technical & Handholding support
 - ❖ Product Development support
 - ❖ Marketing support
- Formation of District Level Advisory Committee for Co-composting
- Revenue Sharing – 60:40 from sale of co-compost
- OUAT Study – quality of co-compost, soil & crop (2nd phase to start shortly)



Odisha Model





Bihar Model

- MoU with ULB regarding construction of FSTP (constructed wetland) co-composting of the bio-solids and organic waste
- Gaya and Purnia
- ULB provides –
 - ❖ Land & Funds for construction of FSTP
 - ❖ Space for co-composting
 - ❖ Raw materials – bio solids and organic waste
 - ❖ Labour
 - ❖ Lab Test Cost
- FSMC provides –
 - ❖ Construction of FSTP
 - ❖ Technical & Handholding support
 - ❖ Product Development support
 - ❖ Marketing support
- Revenue Sharing – 60:40 from sale of co-compost
- ICAR to take up a study very soon – quality of co-compost, soil & crop





FSTP – Constructed Wetland

Vertical Constructed Wetland

Horizontal Constructed Wetland

Aerial View





Co-composting



Raw Faecal Sludge



Dried Faecal Sludge



Segregated organic waste



Co-composting in Windrow method



Final Product



CO-COMPOSTING CYCLE



- ▷ **COLLECTION PHASE**
- ▷ **10 DAYS**



- ▷ **STABILISATION PHASE**
- ▷ **10 DAYS**



- ▷ **DRYING PHASE**
- ▷ **3 – 4 DAYS**



CO-COMPOSTING CYCLE



- ▷ **PILE FORMATION PHASE (4:1)**
- ▷ **3 - 5 DAYS (SANDWICH METHOD)**
- ▷ **LENGTH = 6 FT, HEIGHT & WIDTH = 3-4 FT**



- ▷ **DECOMPOSITION PHASE**
- ▷ **21 DAYS (CHURNING - EVERY 7 DAYS)**
- ▷ **TEMP = 40-60, MOISTURE = 20-60%**



- ▷ **MATURATION PHASE**
- ▷ **14 DAYS**
- ▷ **TEMP = 60-65, MOISTURE = 15-20%**



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CO-COMPOSTING CYCLE



- ▷ FINAL PRODUCT – SIEVED, PACKED & STORED
(SAMPLE SENT FOR LAB TEST)



Quality Parameters

No.	Characteristic	Requirement	Unit	Standard
1	Bulk density	1.00	g/cm ³ , Max	Bureau Indian Standard, 2013
2	Moisture	25	percent by mass, Max	Bureau Indian Standard, 2013
3	pH	6.5-7.5	#	Bureau Indian Standard, 2013
4	Conductivity	4.0	dsm-1, Max	Bureau Indian Standard, 2013
5	Total organic carbon	14	percent by mass of total dry mass, Min	Bureau Indian Standard, 2013
6	Total nitrogen (N)	0.8	percent by mass of total dry mass, Min	Bureau Indian Standard, 2013
7	Total phosphorus (P ₂ O ₅)	0.4	percent by mass of total dry mass, Min	Bureau Indian Standard, 2013
8	Total potassium (K ₂ O)	0.4	percent by mass of total dry mass, Min	Bureau Indian Standard, 2013
9	Sum total of total nitrogen (N), total phosphorus (P ₂ O ₅) and total potassium (K ₂ O)	1.5	percent by mass of total dry mass, Min	Bureau Indian Standard, 2013
10	C:N ratio	20:1	Max	Bureau Indian Standard, 2013
11	Faecal coliform	<1,000	MPN/g of dry solids	US Environmental Protection Agency 503, 2010
12	E. Coli	100	MPN/g of dry solids	European Union, 2002
13	Salmonella	0	number of salmonella cells/25 g	European Union, 2002
14	Helminth egg	<1	egg/g TS	World Health Organisation, 2006
15	Arsenic (As ₂ O ₃)	10.00	mg/kg on dry mass basis, Max	Bureau Indian Standard, 2013
16	Cadmium (Cd)	5.00	mg/kg on dry mass basis, Max	Bureau Indian Standard, 2013
17	Chromium (Cr)	50.00	mg/kg on dry mass basis, Max	Bureau Indian Standard, 2013
18	Copper (Cu)	300.00	mg/kg on dry mass basis, Max	Bureau Indian Standard, 2013
19	Lead (Pb)	100.00	mg/kg on dry mass basis, Max	Bureau Indian Standard, 2013
20	Nickel (Ni)	50.00	mg/kg on dry mass basis, Max	Bureau Indian Standard, 2013
21	Zinc (Zn)	1000	mg/kg on dry mass basis, Max	Bureau Indian Standard, 2013
22	Mercury (Hg)	0.15	mg/kg on dry mass basis, Max	Bureau Indian Standard, 2013



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Test Reports



CIN : U93000TN2000PTC043869

TEST REPORT

Test Report No & Date	CTL/CH/N-37760/2024-25 & 25.01.2025
Sample Number	N-37760/24-25
Name of the Customer	M/s. Finish Services Management Company Private Limited,
Address	Bharati Nivas, Plot No-1150, D1- Sector 9, Cuttack, Odisha.
Sample Drawn by	Customer
Sample Name	Co Compost
Sample Quantity	1 kg
Sample Condition	Good & Received in Packed Condition
Sample Received on	18.01.2025
Analysis Started on	18.01.2025
Analysis Completed on	23.01.2025

Test Results:

The above sample tested as received, and results are as follows:

S. NO	PARAMETERS	METHOD	UNITS	RESULTS
1	Bulk Density	Schedule -IV-Part D (3) of FCO 1985	g/cm ³	0.69
2	Moisture	Schedule -IV-Part D (2) of FCO 1985	%	9.76
3	pH	Schedule -IV, Part D(1) of FCO, 1985	-	6.0
4	Conductivity	Schedule -IV, Part D(4) of FCO, 1985	dsm ⁻¹	5.920
5	Total Organic Carbon	Schedule -IV-Part D (5(ii)) of FCO 1985	%	24.6
6	Total Nitrogen as N	Schedule -IV, Part D(6) of FCO, 1985	%	1.74
7	Total Phosphorus as P ₂ O ₅	Schedule -IV, Part D(8) of FCO, 1985	%	0.83
8	Total Potassium as K ₂ O	Schedule -IV, Part D(9) of FCO, 1985	%	0.57
9	C : N Ratio	Schedule -IV, Part D(7) of FCO, 1985	-	14.14
10	Sum of Total Nitrogen, Total P ₂ O ₅ & Total K ₂ O	By Calculation	%	3.14
11	Arsenic as As ₂ O ₃	Schedule -IV-Part D (12) of FCO 1985	mg/kg	BLQ(DL:0.1)
12	Cadmium as Cd	Schedule -IV-Part D (10) of FCO 1985	mg/kg	BLQ(DL:2.0)
13	Chromium as Cr	Schedule -IV-Part D (10) of FCO 1985	mg/kg	13.72
14	Copper as Cu	Schedule -IV-Part D (10) of FCO 1985	mg/kg	143.3
15	Lead as Pb	Schedule -IV-Part D (10) of FCO 1985	mg/kg	22.61
16	Nickel as Ni	Schedule -IV-Part D (10) of FCO 1985	mg/kg	13.30
17	Zinc as Zn	Schedule -IV-Part D (10) of FCO 1985	mg/kg	570.7
18	Mercury as Hg	Schedule -IV-Part D (11) of FCO 1985	mg/kg	BLQ(DL:0.2)
19	Total Bacteria	CTL/SOP/MB-SL/010	CFU/g	85,00,000
20	Total Fungi	CTL/SOP/MB-SL/013	CFU/g	68,000
21	E.coli	CTL/SOP/MB-SL/005	CFU/g	< 10
22	Helminth Eggs	CTL/SOP/MB-SL/014	eggs/g	270
23	Clostridium Perfringens	CTL/SOP/MB-SL/018	Per 25g	Absent

END OF REPORT

T. N. N. N.

Verified by

For Chennai Testing Laboratory Pvt Ltd

R. Jayarathnan

Authorised Signatory

R. JAYARATHNAN
Manager
(MICROBIOLOGY)

The Report shall not be used to malign, defame and for any malicious purpose.
The Report is meant only for sole use of the addressee

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भारत सरकार/ Government of India
कृषि एवं किसान कल्याण मंत्रालय/Ministry of Agriculture and Farmers Welfare
कृषि एवं किसान कल्याण विभाग
Department of Agriculture and Farmers Welfare

क्षेत्रीय जैविक एवं प्राकृतिक खेती केंद्र

Regional Centre of Organic & Natural Farming
अमरावती रोड, नेशनल हाईवे नं.6, गोंडखैरी, पोस्ट-वाडी, तालुकामेश्वर, नागपुर-440023
Amravati Road (N.H- 6), Village-Gondkhairy, Post-Wadi, Tal-Kalmeshwer, Nagpur-440023

E-Mail: biofmg10@nic.in, rcnfngp@gmail.com

Tel. No. 07118-297054

No. : 4-1/2022-23/OF/RCONFNGP/47

Date : 30.06.2022

सेवा में/To

Asst. Agril. Officer,
Asst. Agril. Office
Sadar Block,
Dhenkanal, Odisha 759001

Sub: Analysis of the sample code no. AAO.Sadar.59

Ref: 1. Your letter no. 109 dated 09.05.2022

2. NCOF letter no. L. No.90 dated 24.05.2022 & NCOF A.O. email dt. 29.06.2022

Sir,

With reference to above, the NCOF recoded sample bearing code no. SCC240502 received in this laboratory from NCOF on 31.05.2022 for analysis as per FCO 1985. After the compliance of the due procedure of NCOF coding and decoding SOP, the details of the sample and Form 'P' were received in this laboratory in connection to your letter under reference. The analysis report of city compost sample sent by you, bearing your code no. AAO.Sadar.59 is as follows:

FORM L-1

[See clause 30]

- Name of organic fertilizer : City Compost
- Date of sampling : 09.05.2022
- Code no. of sample as indicated by the inspector : AAO.Sadar.59
- Date of receipt of the sample in laboratory : 31.05.2022
- Laboratory sample no. : RCONFNGP/2022-2023/OF/CC-14
- Date of analysis of sample : May & June 2022
- Analysis of Organic Fertilizer:

S. No	Specification as per FCO	Composition as per analysis	Variation	Permissible tolerance limit
1	2	3	4	5
A. Physical Characteristics				
i. Moisture content per cent by weight	25 (maximum)	23.8	-	
ii. Bulk Density (g/cm ³)	<1.20	0.48	-	
iii. Particle size	Min. 90% material passed through 4.0 mm IS sieve	99%	-	
B. Chemical Characteristics				
i. Total Organic Carbon per cent by weight	12.0 (minimum)	32.63	-	
ii. Total Nitrogen as N, Phosphates as P ₂ O ₅ , Potash as K ₂ O per cent by weight	1.2 (minimum)	8.3	-	A sum total of N, P and K nutrients shall not be less than 1.0%.
iii. C:N ratio	<20	8.77	-	
iv. pH	6.0-8.0	7.23	-	
v. Conductivity as dsm ⁻¹	≤6.0	2.25	-	
vi. Heavy metal content (as mg/kg) maximum				
Arsenic (As ₂ O ₃)	10.0	-	-	
Cadmium (Cd)	5.0	-	-	
Chromium (Cr)	50.0	-	-	
Copper (Cu)	300.0	-	-	
Mercury (Hg)	0.15	-	-	
Nickel (Ni)	50.0	-	-	
Lead (Pb)	100.0	-	-	
Zinc (Zn)	1000.0	-	-	

*N- 3.72 %, P- 1.68 % and K- 2.90 %

Remarks: The Sample is in accordance with the specification of FCO (1985).

Signature of the Analyst

Signature of In-charge
(Testing Laboratory)

Copy to :-

- Directorate of Agriculture and food production, 7RCH+89H, Keshari Nagar, Bhubaneswar, Odisha 751001 agofcc.org@nic.in
- Director/SCC, NCOF, Ghaziabad





Calculations

- A windrow should contain min. of the inputs = Organic Waste (1200 kgs) + Biosolids (300 kgs) = 1500 kgs
- Ratio = 4:1
- Final Product – Biosolids will remain the same, but the Organic waste will decompose & will reduce to 10% of 1200 kgs
- Therefore, 1500kgs will decompose to = Biosolids (300 kgs) + Organic Waste (120 kgs) = 420 kgs of co-compost.





Calculations

- Raw Materials + Labour + Space = Free
- Cost of Supervisor = ₹ 20,000 per month
- Annual Cost of Supervisor = ₹ 2,40,000
- Price of 1 kg of Co-compost = ₹ 20
- Revenue from Sale = 40% of ₹ 20 = ₹ 8
- Sale To Break Even = $2,40,000 / 8 = 30,000 = 30 \text{ MT}$
- Min. 30 MT is to be sold in 1 year to Break Even





Safety & Risk Mechanism



Rameshtah





Impacts

- Simple Solution for Reuse of bio-solids
- Additional Revenue Source for ULBs
- Climate & Health – reduces soil & water contamination, reduction in CO2 emissions
- Agriculture – substitute for chemical fertilisers, soil conditioner & enhances water holding capacity of soil – impacts yield
- Livelihood Creation – production & marketing done by local people
- GESI





Challenges

- Establishment of the product – No specific quality standards
- Need of Related Infrastructure – Pathological labs, institutions for monitoring, regulating and supporting, etc.
- Awareness & Knowledge at various levels – Attitude





Thank you !

Abhishek Chaudhuri

Managing Director

Finish Services Management Company (FSMC) Pvt Ltd

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