ISO 9001:2008

Profitability Analysis No. 14/2014

Profitability Analysis:

Commercial Production of Organic Fertilizer

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Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
Department of Science and Technology

Providing science solutions for the agriculture, aquatic and natural resources sectors

About PCAARRD

The Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) is one of the sectoral councils under the Department of Science and Technology (DOST). PCAARRD was established on June 22, 2011 through the consolidation of the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) and the Philippine Council for Aquatic and Marine Research and Development (PCAMRD).

The Council formulates policies, plans, and programs for science and technology (S&T)-based research and development (R&D) in the different sectors under its concern. It coordinates, evaluates, and monitors the national R&D efforts in the agriculture, aquatic, and natural resources (AANR) sectors. It also allocates government and external funds for R&D and generates resources to support its program.

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Foreword

The Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) offers a new technology publication that promises to be fully utilizable and handy.

The Profitability Analysis (PA) arose from our yearning to address the needs of small and micro entrepreneurs, farmers, and growers. More than just a handout, this innovative package of information provides tools to help readers gain and secure a niche in their business enterprise.

This PA is based on our study of selected commodities. Here you will find the technical and financial data that you will need to put up an agricultural enterprise. It presents analytical tools that you can use in project planning and in predicting how the business would operate under a set of assumptions. Thus, it ensures that your projects are technically and economically feasible for implementation. Through the profitability analysis and other information, we at PCAARRD, hope to contribute substantially in providing livelihood options for Filipinos, especially those in rural communities.

This publication is an output of the project "Investment Package for the Commercial Production of Organic Fertilizer (Private Entrepreneur Model)" coordinated by the then Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) and was funded through the Presidential Social Fund-Office of the Special Projects/Presidential Management Staff (PSF-OSP/PMS) in 2007–2009.

Moreover, this publication contains the projected income statement and cash flow for commercial production of organic fertilizer. It also includes package of technology (POT) other useful data adopted from the project. As well, feasibility analysis of its production, list of some experts, and profile of the industry are also presented in this publication.

Feel free to make use of the information in these pages. Contact us for any further information you may need or better yet, for any suggestions on how we can make this publication better. Together, we can improve the production system for organic fertilizer and seal its importance in our national economy.

PATRICIO S. FAYLON
Executive Director
PCAARRD

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Introduction

The Philippine National Standard for Organic Fertilizer describes organic fertilizer as any product in solid or liquid form, of plant and/or animal origin that has undergone substantial decomposition that can supply available nutrients to plants with a total nitrogen (N), phosphorus (P), and potassium (K) of 5–7%. This may be enriched by microbial inoculant and naturally-occurring minerals but no chemical or inorganic fertilizer material has been added to the finished product to affect the nutrient content.

Table 1. Financial analysis (before financing).

Investment Requirement	₱2.17 million
Net Present Value (NPV)	₱966,302.34
Internal Rate of Return (IRR)	31.64%
Payback Period	2.7 years

Organic fertilizer conserves the soil, maintains and sustains crop quality and productivity, and protects the environment. It likewise improves the biological activities of the soil as it enhances rapid multiplication of fungi, bacteria, actinomycetes, and other soil microorganisms.

A global survey carried out by the Foundation Ecology and Agriculture (SÖL) and the Research Institute of Organic Agriculture (FiBL) revealed that organic agriculture is developing rapidly around the world. In the Philippines, surveys conducted by the International Foundation for Organic Agriculture (IFOAM) in 2004 and 2006 revealed a significant increase in hectarage under organic management, from 3,500 hectares (ha) and 500 farms in 2002–2003 to 14,140 ha and 35,000 farms in 2004.

In addition, the growing demand for organic fresh food crops such as vegetables, fruits, and rice as well as herbal products increases the need for organic inputs like organic fertilizers. An opportunity, therefore, exists for the local producers of organic fertilizers to supply these organic farms with inputs required in organic crop production.

Moreover, the country has abundant supply of compost materials, ranging from animal manures to plant and domestic wastes. Agricultural production generates crop biomass such as rice hull; sugarcane bagasse; coconut shell, husks, and coir; and animal manure. The country annually generates around 54 million tons (t) of biomass that are readily convertible to fertilizers and fuel (PCARRD, 2000). Moreover, the producers/manufacturers are advised to establish their production plants within a 20-km radius from the source of raw materials to lessen the production cost.

An initial investment of ₱2.17 million can yield an average annual net profit amounting to ₱619,000.00. Based on the projected 10-year income statement and cash flow, before financing, income is realized on the first year of operation. The initial investment can be fully recovered in 2.7 years. Also, the estimated internal rate of return (IRR) is 31.64% while the net present value (NPV) is at ₱966,302.34 at a discount rate of 20% (Table 1, see page 1).

Profitability Analysis

Investment requirement is around ₱2.17 million (Table 2). This amount includes pre-operating expenses, fixed assets, and working capital.

Table 2. Total investment cost.

Item	Total Cost (₱)
Pre-operating Expenses	
Business permit and related expenses	10,000
FPA product registration process*	60,000
Sub-total	**70,000**
Fixed Assets	
Land	1,000,000
Building	400,000
Machineries and equipment	555,550
Payloader	250,000
Forklift	180,000
Shredder	83,000
Weighing scale (1,000-kg capacity)	15,000
Bag sealer	12,000
Plastic sheets for pile covering	12,000
Fork/rake and shovel (2 pcs)	1,400
Water hose (50 m)	1,500
Thermometer (alcohol-based)	150

Table 2. Continued.

Item	Total Cost (₱)
Sieving tool	500
Sub-total	**1,955,550**
Working Capital	
Direct materials	74,266
Direct labor	38,085
Indirect costs	30,396
Sub-total	142,747
Total Investment Cost	**2,168,297**

*FPA registration cost is used in lieu of the fees that certifying agencies may impose.

1. **Pre-operating Expenses -** Aside from costs related to business permit application, one major pre-operating expense unique to manufacturers of fertilizers (including organic fertilizer producers) is the cost of obtaining product certification and registration license.
2. **Fixed Assets -** Fixed assets include land and building facilities such as processing plant, storage room, and administration office. Land (2,000 m^2) may cost ₱1 million. There are also machineries and equipment to be procured (Table 3).

Table 3. List of required machineries and equipment.

Machineries/Equipment	Estimated Acquisition Cost*	Useful Life (Years)
Payloader	250,000	20
Forklift	180,000	20
Shredder	83,000	20
Weighing scale (1,000-kg capacity)	15,000	15
Bag sealer	12,000	8
Plastic sheets for pile covering	12,000	2
Fork/rake and shovel (2 pcs)	1,400	8
Water hose (50 m)	1,500	5
Thermometer (alcohol-based)	150	3
Sieve	500	3
Total	**555,550**	

* July 2009 estimates.

3. **Working Capital -** A two-month working capital is necessary to finance the initial operations of the processing plant (Table 4). Costs of raw materials and labor consist of the bulk of production expenses. Manual labor is paid on contractual basis and computed per unit output. Other production expenses include indirect cost such us utilities and sundries, promotional and marketing cost, and management cost.

Table 4. Working capital requirements.

Item	Monthly Estimate (₱)	Two-month Requirement (₱)
Direct materials	37,133	74,266
Direct labor	19,043	38,085
Indirect costs	15,198	30,396
Total	**71,374**	**142,747**

Pricing

Prevailing market price for a 50-kg sack of organic fertilizer ranges from ₱150 to as high as ₱300 depending on the brand, perceived quality, and marketing strategies. For this investment package, the selling price of a 50-kg processed organic fertilizer is initially pegged at ₱250/bag.

Financial Assumptions

The financial analysis is based on the following assumptions:

A. Production output and selling price

- Fertilizer recovery rate is 80%. Hence, production output is projected at 560 bags/month or about 6,720 bags/year.
- Selling price is ₱250/bag.
- Sale returns and other losses = 1% of gross sales.

B. Tax and discount rates

For purposes of computing the financial viability indicators and projecting the financial statements, income tax rate and the discount rate for the discounted cash flow is assumed at 20%.

C. Other assumptions

- Selling price per bag ₱250
- Annual production, bag (50 kg/bag) 6,720 bags
- Loss allowance 1%
- Income tax/discounting rates 20%

Income Statement

After tax payment, a year-end net income of ₱620,000 can be expected during the first year of operations. On the average, annual production of 6,720 bags of organic fertilizer could generate an average net income of ₱619,000/year.

Break-even Analysis

Break-even point, the volume level where operations neither incur a loss nor produce profit, is computed to be at approximately 18,375.40-bag level. This can be reached after 2.37 years of full capacity operations of the processing plant.

Payback Period

The payback period or the number of years the initial investment will be recovered out of the net cash flow generated, is 2.7 years.

Net Present Value (NPV) and Internal Rate of Return (IRR)

NPV is the present value of a stream of future discounted net cash flows minus the initial investment. For this project, NPV will be the value of all the cash to be received in a 10-year project life net of expenses, minus the initial investment to establish the production plant. If NPV is positive, the investment project is acceptable. IRR, on the other hand, takes into account the time value of money by considering the cash flows over the lifetime of the project. The IRR of the organic fertilizer production project should be higher than the current cost of money in the bank. For organic fertilizer production, a positive net cash flow can be generated, giving an NPV of ₱966,302.34. It is also expected to generate an IRR of 31.64%, which is more than the 20% discounting rate used for the cash flow. Financial indicators derived from a projected 10-year cash flow statement shows a financially viable business operation.

Sensitivity Analysis

Several scenarios have been tested to determine how certain conditions might affect the financial viability of the project, namely:

- Decrease in selling price per bag from ₱250 to ₱200;
- Selling price per bag at ₱225;
- Reduce production by 20%;
- 10% decrease in production and selling price per bag at ₱225;
- 30% increase in operating cost; and
- 25% increase in operating cost.

The project is highly sensitive to changes in the price and output level. At ₱225/bag or if production decreased by 10%, the project is acceptable with a positive NPV but with lower IRR. Selling at ₱200/bag is unacceptable due to negative NPV and IRR below the discount rate. A decrease in production by 20% also adversely impacts on the financial viability of the project. On the other hand, production will be unprofitable only at 30% change in operating cost. The results are summarized in Table 5.

Table 5. Sensitivity analysis.

Scenario	Conditions	NPV	IRR (%)	Payback Period (Years)
Base Case	Selling price ₱250/bag; production of 560 bags/month	₱966,302.34	31.64	2.7
1	Selling price ₱200/bag	Negative	14.65	4.5
2	Selling price ₱225/bag	₱268,467.73	23.28	3.3
3	Yield decreased by 20%	Negative	14.65	4.5
4	Yield decreased by 10%	₱243,866.64	23.00	3.4
5	Selling price ₱225/ bag; yield decreased by 10%	Negative	15.53	4.3
6	Operating cost increased by 30%	Negative	18.91	3.9
7	Operating cost increased by 25%	₱86,902.89	21.06	3.6

Criteria for project acceptability:
1. NPV should have a positive value or at least equal to zero to be acceptable.
2. IRR should be more than the discounting rate used to calculate the discounted cash flow.

Plant Capacity

The processing plant has an annual production capacity of 420 t organic fertilizer or 6,720 bags at 50 kg/bag. The plant will operate at single eight-hour shift capacity, 300 days a year. It is estimated that for every ton of raw materials to be processed at 80% recovery, 16 bags of organic fertilizer will be produced.

Required Raw Materials and Other Inputs

The main raw materials for organic fertilizer production are chicken manure, carbonized rice hull (CRH), and Bio Quick, a microbial activator. The recommended proportion of raw materials to be used is 90% chicken manure to 10% CRH. For every ton of raw materials to be processed into organic fertilizer, 400 g of microbial activator will be added. Finished products are packed in sacks with inner plastic lining. Table 6 shows the material requirements when producing 6,720 bags of organic fertilizer (50 kg/bag).

Table 6. Monthly material requirement.

Material	Monthly Requirement	Unit Cost (P)*	Monthly Total Cost (P)
Chicken manure	900 bags @ 35kg/bag	30/bag	27,000
Carbonized rice hull	117 bags @ 30kg/bag	5/bag	585
Microbial activator (Bio Quick)	70 packs @ 200 g/pack	20/pack	1,400
Sack with plastic liner	560 pcs	14/pc	7,840
Thread	560 pcs	0.55/pc	308

*July 2009 prices.

Manpower Requirement

Manpower required for the operations of an organic fertilizer processing plant includes a plant manager and contractual laborers. Details of manpower requirements are shown in Table 7.

Table 7. Manpower requirement.

Position	Nos.	Monthly Salary (P)
Plant Manager	1	8,000
Laborers	4–12	280–339/day

Manual labor is usually contracted out to workers and paid based on per bag output. Rates vary depending on the tasks to be performed. Table 8 shows the rates for the required labor. Meanwhile, the projected cash flow and income statements are shown in Tables 9 and 10, respectively.

Table 8. Number and rate of required labor.

Tasks	No. of Labor (Man-day)	Rate/ Bag (P)	No. of Bags	No. of Bags/ Man-day	Rate/ Man-day (P)
1. Gathering and hauling of waste	12	4	1,017	84.75	339.00
2. Mixing, piling, and covering of wastes	6	2	1,017	169.50	339.00
3. Turning of compost	6	2	1,017	169.50	339.00
4. Harvesting and sifting	4	2	560	140.00	280.00
5. Weighing, packing, and storing in warehouse	4	2	560	140.00	280.00

Table 9. Projected cash flow statement for commercial production of organic fertilizer.

Cash Inflows	Year 0	Year 1	Year 2	Year 3	Year 4
Gross Cash Inflows		1,680,000.00	1,680,000.00	1,680,000.00	1,680,000.00
Less: Sales Returns & All (Losses) (1%)		16,800.00	16,800.00	16,800.00	16,800.00
Residual Value of Sssets					
Residual Value of Land					
NET CASH INFLOWS		**1,663,200.00**	**1,663,200.00**	**1,663,200.00**	**1,663,200.00**
Less: Cash Outflows					
Investment	2,168,297.07				
Land	1,000,000.00				
Building	400,000.00				
Machineries and equipment					
Payloader	250,000.00				
Forklift	180,000.00				
Shredder	83,000.00				
Weighing scale – 1000 kg	15,000.00				
Bag Sealer	12,000.00				
Plastics for pile covering	12,000.00			12,000.00	
Other tools and implements	3,550.00			3,550.00	
Working Capital	142,747.00				
Pre-operating expenses	70,000.00				
Operating cost					
Chicken manure		270,000.00	324,000.00	324,000.00	324,000.00
Carbonized rice hull		5,850.00	7,020.00	7,020.00	7,020.00
Microbial activator		14,000.00	16,800.00	16,800.00	16,800.00
Sacks with plastic liner		78,400.00	94,080.00	94,080.00	94,080.00
Salaries and wages		190,426.67	228,512.00	228,512.00	228,512.00

Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1,680,000.00	1,680,000.00	1,680,000.00	1,680,000.00	1,680,000.00	1,680,000.00
16,800.00	16,800.00	16,800.00	16,800.00	16,800.00	16,800.00
					271,983.33
					1,000,000.00
1,663,200.00	**1,663,200.00**	**1,663,200.00**	**1,663,200.00**	**1,663,200.00**	**2,968,783.33**
				12,000.00	
	12,000.00			12,000.00	
	3,550.00			3,550.00	
324,000.00	324,000.00	324,000.00	324,000.00	324,000.00	324,000.00
7,020.00	7,020.00	7,020.00	7,020.00	7,020.00	7,020.00
16,800.00	16,800.00	16,800.00	16,800.00	16,800.00	16,800.00
94,080.00	94,080.00	94,080.00	94,080.00	94,080.00	94,080.00
228,512.00	228,512.00	228,512.00	228,512.00	228,512.00	228,512.00

Cash Inflows	Year 0	Year 1	Year 2	Year 3	Year 4
Utilities expense		13,272.00	15,926.40	15,926.40	15,926.40
Transportation expense		101,700.00	101,700.00	101,700.00	101,700.00
Repairs and maintenance		20,340.00	20,340.00	20,340.00	20,340.00
Promotional/marketing expenses		16,666.67	20,000.00	20,000.00	20,000.00
Product registration and license		-	-	6,129.00	-
Income Taxes		156,176.05	156,176.05	154,102.05	152,756.25
NET CASH OUTFLOWS	**2,168,297.07**	**866,831.39**	**984,554.45**	**1,004,159.45**	**981,134.65**
NET CASH FLOW	**(2,168,297.07)**	**796,368.61**	**678,645.55**	**659,040.55**	**682,065.35**

NPV = 966,302.34

IRR = 31.638%

Payback = 2.7 years

Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
15,926.40	15,926.40	15,926.40	15,926.40	15,926.40	15,926.40
101,700.00	101,700.00	101,700.00	101,700.00	101,700.00	101,700.00
20,340.00	20,340.00	20,340.00	20,340.00	20,340.00	20,340.00
20,000.00	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00
-	6,129.00	-	-	6,129.00	-
154,102.05	154,102.05	152,756.25	154,102.05	154,102.05	152,756.25
982,480.45	**1,004,159.45**	**981,134.65**	**982,480.45**	**1,016,159.45**	**981,134.65**
680,719.55	**659,040.55**	**682,065.35**	**680,719.55**	**647,040.55**	**1,987,648.68**

Table 10. Projected income statement for commercial production of organic fertilizer.

Income	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Gross Sales	1,680,000.00	1,680,000.00	1,680,000.00	1,680,000.00
Less: Sales Returns & Losses (1%)	16,800.00	16,800.00	16,800.00	16,800.00
Gross Income	1,663,200.00	1,663,200.00	1,663,200.00	1,663,200.00
Less: Expenses				
Chicken manure	324,000.00	324,000.00	324,000.00	324,000.00
Carbonized rice hull	7,020.00	7,020.00	7,020.00	7,020.00
Microbial activator	16,800.00	16,800.00	16,800.00	16,800.00
Sacks with plastic liner	94,080.00	94,080.00	94,080.00	94,080.00
Salaries and wages	228,512.00	228,512.00	228,512.00	228,512.00
Utilities expense	15,926.40	15,926.40	15,926.40	15,926.40
Transportation expense	122,040.00	122,040.00	122,040.00	122,040.00
Repairs and maintenance	24,408.00	24,408.00	24,408.00	24,408.00
Promotional/marketing expenses	20,000.00	20,000.00	20,000.00	20,000.00
Product registration and license	-	-	6,129.00	-
Depreciation	34,841.67	34,841.67	34,841.67	34,841.67
NET INCOME BEFORE TAXES	**775,571.93**	**775,571.93**	**769,442.93**	**775,571.93**
Less: Income Taxes (20%)	155,114.39	155,114.39	153,888.59	155,114.39
NET INCOME	**620,457.54**	**620,457.54**	**615,554.34**	**620,457.54**

Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1,680,000.00	1,680,000.00	1,680,000.00	1,680,000.00	1,680,000.00	1,680,000.00
16,800.00	16,800.00	16,800.00	16,800.00	16,800.00	16,800.00
1,663,200.00	1,663,200.00	1,663,200.00	1,663,200.00	1,663,200.00	1,663,200.00
324,000.00	324,000.00	324,000.00	324,000.00	324,000.00	324,000.00
7,020.00	7,020.00	7,020.00	7,020.00	7,020.00	7,020.00
16,800.00	16,800.00	16,800.00	16,800.00	16,800.00	16,800.00
94,080.00	94,080.00	94,080.00	94,080.00	94,080.00	94,080.00
228,512.00	228,512.00	228,512.00	228,512.00	228,512.00	228,512.00
15,926.40	15,926.40	15,926.40	15,926.40	15,926.40	15,926.40
122,040.00	122,040.00	122,040.00	122,040.00	122,040.00	122,040.00
24,408.00	24,408.00	24,408.00	24,408.00	24,408.00	24,408.00
20,000.00	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00
-	6,129.00	-	-	6,129.00	-
34,841.67	34,841.67	34,841.67	34,841.67	34,841.67	34,841.67
775,571.93	**769,442.93**	**775,571.93**	**775,571.93**	**769,442.93**	**775,571.93**
155,114.39	153,888.59	155,114.39	155,114.39	153,888.59	155,114.39
620,457.54	**615,554.34**	**620,457.54**	**620,457.54**	**615,554.34**	**620,457.54**

Package of Technology

Facility Requirements

The necessary facilities will depend on (1) level of operation or the capacity of plant and (2) supply of raw materials. It is necessary to characterize and determine the availability of the supply of organic wastes to project the level of operation and the size of material production/recovery plant.

Production Plant

The production plant is a place where wastes are stored and sorted. It is where the materials for composting are piled and processed. Raw materials used include chicken manure and CRH.

Major Machineries/Equipment for Organic Fertilizer Production

1. Tractor for hauling collected raw materials.

2. Shredder for cutting raw materials into small pieces to hasten the decomposition process.

3. Fork/rake and shovel for mixing and piling of raw material or finished product.

4. Wire mesh to sift the composted materials prior to bagging.

5. Weighing scale to weigh the finished product.

Recommended Substrates (Raw Materials) and Activator

1. **Chicken Manure -** The manure should be free from foreign materials such as rice hull and sand. It is a good source of nitrogen and protein, which provide energy for the activity of the microorganisms during the decomposition. It also adds organic matter and increases the water holding capacity and beneficial biota in soil.
2. **Carbonized Rice Hull (CRH) -** CRH is added to provide good structure to the compost pile as it prevents compactness. A compacted pile will result in the anaerobic process of decomposition due to lack of oxygen. CRH also helps reduce bad odor of the final compost product. It is prepared by burning the rice husk using a carbonizer. From burning to cooling, it will take a week before it can be used. It is advisable to prepare CRH prior to piling of raw materials.

3. **Activator/Inoculant -** Bio Quick is an activator that helps shorten the composting time from 4-6 months (traditional composting) to 3–4 weeks. It is the brand name of the composting inocula, which contains the fungus *Trichoderma* sp. Bio Quick is available at National Institute of Molecular Biology and Biotechnology-University of the Philippines Los Baños (BIOTECH-UPLB).

Steps in Composting

1. Mix the raw materials at the ratio of 9 parts chicken manure: 1 part CRH.
2. Add Bio Quick (20 packs or 400 g/t of substrate) to the mixed raw materials. If Bio Quick is not available, a compost fungus activator (CFA) that is also a Trichoderma-based inoculant may be used (1,000 g/t of substrate). CFA can be purchased at the Bureau of Soils and Water Management (BSWM) and its selected Regional Soils Laboratories.
3. Moisten materials with clean water while mixing. Water (400 L/t raw materials) is necessary to ensure enough moisture for effective decomposition. Water is needed specially when the chicken manure is dry or has been stored for a long time. Manure from chicken layers contains lower moisture than those from broiler.

4. Pile the mixed materials up to 1.5 m high, 1 m wide, and 5 m long. Cover the compost pile with plastic to reduce water evaporation and to build up heat. The use of colored plastic covering materials is advisable. Increase in temperature from 60 °C to 65 °C indicates increase in microbial activity. Such increase in temperature also helps kill weed seeds and major disease-causing organisms as well as fly larvae.

5. Monitor the temperature (use alcohol-based thermometer) every three days. Monitoring is done by inserting the thermometer at three sampling points: on the two sides of the pile and on the top. See to it that the thermometer reaches the center of the pile.

6. Turn the pile when the temperature reaches 55–60^{0}C, which usually happens two weeks after piling. Moisten the pile while turning to ensure enough moisture. To check whether the moisture is sufficient, get a handful of the decomposing materials and apply slight pressure. Add water If the material breaks upon opening of hand. Cover the pile again and allow decomposition for another two weeks.

7. The pile is ready for harvesting when it is 90–95% decomposed. Cool and dry the product by spreading it in a 1-ft high layer for one week. Maturity period ranges from 21 days to 30 days. Sift the composted materials through a 2-mm sieve to eliminate hard, solid, and unwanted particles. A shredding machine may be necessary to produce a much finer material. The finished product is dark brown to black, porous, with 35% moisture content or less, and without foul odor.

8. Pack the finished product in 50-kg sack with plastic liner. A ton of raw materials at 80–83% recovery rate will give about 16 bags of organic fertilizer (50 kg per bag). The N (2.43%), P (1.41%), K (1.67%), and organic matter (20.04%) contents of the produced compost pass the FPA requirements. The C/N ratio (11:1), which is significantly lower, is an indication of the relatively high nutrients present in the product.

9. Seal the sacks using a bag sealer.

Product Registration

As stipulated in Administrative Order No. 14, Series of 2011 dated 08 April 2011, organic fertilizer products sold commercially should be registered at the Bureau of Agriculture and Fisheries Product Standards (BAFPS). A registration fee of ₱3,000.00 is required. The following are the new requirements in registering the new organic fertilizer.

A. Administrative requirements

- Duly accomplished and notarized application form with documentary stamps. Original copy must be submitted together with the duplicate copy.
- Organic certification for a DA-accredited certifying body.

B. Technical requirements

- Proposed packaging materials/label or bag
- Guaranteed analysis of nutrients (macro and micro) including percentage of moisture and C:N ratio, in accordance to the philippine national standards
- Raw materials used
- Brochure/pamphlet describing the product including the rate and direction of application
- General description of production process (confidential business information)
- Test for pathogens
- Bio-efficacy data generated by accredited researchers/institutions for fertilizers
- Any claim on the presence of beneficial microorganisms must be specified
- Other relevant information (i.e., Brochures/pamphlets of exporting/manufacturing firm or company profile)

Renewal of license is done annually. Product registration is done every 3 years with submission of sample product for quality and safety validation.

Provisional registration valid for one year is given if the bioefficacy test has been done for one cropping only. Full registration is given after significant effectiveness of product for second cropping is validated.

The total cost of the requirements for registration (such as organic certification and bioefficacy testing) is not available at the moment. In estimating investment cost, FPA's cost of registration amounting to about ₱60,000.00 is used.

Marketing Strategies

Organic fertilizers are important inputs to the production of organic products that cater to a gradually expanding market.

The following are the suggested marketing strategies for organic fertilizer:

- **The manufacturer as marketer.** The promotion of investment package will help farmers and other clients increase their production and sale of organic fertilizers. Establishment of demonstration farm by the producers close to the organic fertilizer production plant will facilitate the showcasing of package of technology for organic crop production using the product. Conducting training courses will show farmers and other crop enthusiasts the viability of applying organic fertilizers and also convince them to buy and use this product in their farms. In this case, the producer shall also act as marketer.

- **Franchising.** This scheme will create a wider consumer base for organic fertilizer. Also, this will further boost the profit of the franchiser (registered producer) by selling his product at no travel cost. The franchiser has to convince a franchisee in areas where there are large agricultural lands to venture in the business. The major consideration, however, is the availability of raw materials.

Marketing and Distribution

The fertilizer industry in the country operates mainly under a free market system and the private sector is usually involved in the production, importation, and distribution of fertilizers (Aganon et al. 2008). Smaller companies engaged in agricultural trading can now enter into the fertilizer market, previously controlled by only few private and government-assisted firms. This is due to the trade liberalization policy and the removal of levy and other restrictions.

The project *Supply Chain Improvement of Locally-produced Biofertilizer in Selected Areas in the Philippines* identified the handlers of organic fertilizers: the manufacturer/processor; importer/re-packer; and the distributor/ traders (Aganon et al. 2009). This study revealed that the industry is not yet well-developed. So, the producers act as traders to save on operational costs. Most distributors also hold a dealer's license and sell directly in areas where there are no dealers or where local dealers are weak. The dealers constitute the last step of the fertilizer marketing channel. They sell directly to the farmers.

Literature Cited

Administrative Order No. 14, Series of 2011. Guidelines on the registration of organic food and organic input producers. Elliptical Road, Diliman, Quezon City: Department of Agriculture, 2011.

Aganon, C.P.; Galang, L.M.; Gajete. T.P.; Parayno, R.S. Supply chain improvement of locally-produced bio-fertilizer in selected areas of the Philippines. Science City of Muñoz, Nueva Ecija: CLSU, 2009. - (Terminal Report, July 2007–October 2008).

Agricultural Waste Processing and Management Committee, 2003. The Philippines recommends for agricultural waste processing and management. Los Baños, Laguna: PCARRD-DOST, PARRFI, and DA-BAR, 2004. - (Philippines Recommends Series No. 91).

Bureau of Agriculture and Fisheries Product Standards. Organic fertilizer.

Fertilizer and Pesticide Authority. Production and sales of organic fertilizer (2001–2010). Visayas Avenue, Diliman, Quezon City: FPA, n.d.

Lansangan, J. Regulations and standards for organic fertilizer. Paper presented during the Organic Fertilizer Production and Enterprise Development Training. Science City of Muñoz, Nueva Ecija: CLSU, August 21, 2009.

Philippine National Standard for Organic Fertilizer. Organic fertilizer. Diliman, Quezon City: BAFPS, 2013. 3p. - (Unpublished).

The Organic Fertilizer Production and Utilization Committee, 2006. The Philippines recommends for organic fertilizer production and utilization. Los Baños, Laguna: PCARRD-DOST, 2006. pp. 103–104. - (Philippines Recommends Series No. 92).

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