Financial profitability of vermicompost in Fulbaria Upazila of Mymensingh district

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Abstract: *The present study was carried out during 2016 in Fulbaria Upazila, Mymensingh District to assess the financial viability of vermicompost farms. Data were during the period of mid-March to mid-April, 2016. The findings suggested that majority of vermicompost producers were illiterate and had nuclear families and frequency sale of vermicompost was monthly (62%). The total cost of production of vermicompost was found Tk. 4174.3 per kg. The net returns of vermicompost was Tk.5196.1 per kg. Undiscounted BCR for vermicompost considering total variable cost and gross cost were 2.24 and 2.89 respectively. Financial viability of average size of vermicomposting farm for the economic life of five years was found feasible with respect to net present value (NPV) Tk. 75089.98, discounted benefit cost ratio (BCR) 1.48, internal rate of return (IRR) was 33 per cent and payback period (PBP) was 1.71 years. Sensitivity analysis also suggest viability of vermicompost production. The study revealed that vermicompost production is a highly feasible enterprise from which the producer can enjoy economic benefits.*
Keywords: Profitability, Benefit cost ratio, Net present value; Internal rate of return[1]

I.   Introduction

Bangladesh is a traditional agricultural based country. Bangladesh needs 3375.52 thousand metric tons of fertilizer for every year to run the production process of agriculture and keep up the backbone of the economy. Only 87% of total fertilizer demand of the country is fulfilled. Out of this, local manufactures provide 77% and the rest 23% imported from abroad (http://vermicompostbd.com/). Vermicompost is the next best alternatives to capture the gap. Vermicompost are nothing but excreta of earthworms, which is rich in humus and nutrients. There are no adequate policy guidelines regarding vermicompost production, processing and marketing from the perspective of commercialization. It is worth to mention that the study on vermicompost which mainly based on financial profitability, it is important to know the production and to identify the different cost items. Overall objective of the present study was to investigate the financial profitability of vermicompost in Fulbaria Upazila of Mymensingh district. The specific objectives of this study are:

  i. To examine the economics of production of vermicompost;
 ii. To assess financial viability of average size of vermicomposting farm;

II.   Materials and Methods

Mymensingh district is one of the major production areas of vermicompost in Bangladesh. In the recent year, Mymensingh district occupies top position in vermicompost production. Based on concentration of vermicompost production, Koiyarchola and Bakta villages under Bakta union of Fulbaria Upazila, Mymensingh district were selected for the present study. Forty five (45) producers were selected randomly for interview. An interview schedule was prepared for collecting primary information from vermicompost producers. Census survey was done that included all the vermicompost producers within the district.

The total cost of production was calculated by adding total variable cost and total fixed cost. Total variable cost included cost of organic wastes, cost of water, labor cost, transportation cost and

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maintenance cost. Likewise, total fixed cost included interest on operating capital and machinery and equipment. Tax payment was not observed among the producers in the study area.

According to (Dillon and Hardaker, 1993) gross margin is the difference between gross return and variable cost incurred. Gross margin was calculated as:

Gross margin (tk.) = Gross return (tk.) – Total variable cost (tk.)

Where, Gross return = Price (tk.) × Total quantity produced (kg.)

Total variable cost = Summation of cost incurred in all the variable items.

Similarly, net profit was calculated as:

Net profit (tk.) = Gross return (tk.) – Gross cost (tk.)

Where, Gross cost (tk.) = Total fixed cost (tk.) + Total variable cost (tk.)

The benefit cost analysis was carried out by using following formulas:

Benefit cost ratio (B: C_1) = Gross return (tk.) / Total variable cost (tk.)

Benefit cost ratio (B: C_2) = Gross return (tk.) / Gross cost (tk.)

To determine the financial viability net present value, discounted benefit cost ratio, internal rate of return and payback period were calculated for the economic life of five years. In general, any firm is considered viable if net present value is positive, benefit cost ratio is greater than one and internal rate of return is greater than required rate of return or opportunity cost of capital. For calculating present value of benefit and cost the discount rate of 12 % was considered as it is the interest rate for agricultural loan by Bangladesh government.

Net present value was calculated as:

$$NPV = \sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t}$$

Where,
B_t = Incremental benefit in the tth year
C_t = Incremental cost in the tth year
n = Economic life of the project
i = discount rate

Discounted benefit cost ratio is the ratio of present value of incremental benefit to present value of incremental cost. It was calculated using following formula:

$$BCR = \frac{\sum_{t=1}^{n} \frac{B_t}{(1+i)^t}}{\sum_{t=1}^{n} \frac{C_t}{(1+i)^t}}$$

Where,
B_t = Incremental benefit in the tth year
C_t = Incremental cost in the tth year
n = Economic life of the project
i = discount rate

IRR may be defined as that which equates initial investment with the future value of resulting cash flows (Torries, 1998). It was calculated using following formula:

$$IRR = LDR + DTDR \left[\frac{NPV \text{ at } LDR}{\text{Sum of NPV at Two discounted rates}} \right]$$

Where,
IRR = Internal rate of return
LDR = Lower discount rate
DTDR = Difference between two discount rates
NPV = Net present value

Payback period (PBP) refers to the number of years It would take for an investment to return its original cost of investment through the annual net cash revenues it generates (Groppell and Nikbakht, 2006). Calculated this by adding up the cash flow expected in successive years until the total cost is equal to the original outlay. If the net cash flow revenues are constant each year, the PBP can be calculated as:

$$PBP = \frac{TI}{NR}$$

Where, TI = Amount of total investment
NR = Annual net revenue (profit) which is annual gross income less annual operation cost.

III.   Result and Discussion

Profile of the selected producers

An examination of socio-economic characteristics of the vermicompost producers revealed that 53.33 per cent of vermicompost producers were illiterate and nearly 46.67 per cent producers were literates in the study area. With regard to family type of vermicompost producers, it can be seen that as many as 70 per cent of them had nuclear family, while 30 percent had joint families. A majority of them (80 per cent) had annual income in the range of Tk. 12, 000 to Tk.50, 000, followed by around 13 per cent of them having income of more than Tk. 50, 000 per annum and the rest having annual income of less than Tk.12, 000. Vermicompost sale was monthly in 60 per cent of the cases and quarterly in around 28.88 per cent of the cases and half yearly in the remaining cases. Vermicomposting activity affords part time employment to the family members of all the sample vermicompost producers. The production of vermicompost provided part time employment for the family members and hence it generated additional revenue for the family (Table 1).

Table 1 Socio-economic characteristics of vermicompost producers

Sl. No		Particulars	No. of Respondent's	Percentage
1.		Educational qualification		
	a.	Literate	21	46.67
	b.	Illiterate	24	53.33
2.		Family type		
	a.	Small (3-4persons)	24	53.33
	b.	Medium(5-6persons)	15	33.33
	c.	Large (7 & above)	06	13.33
3.		Annual income		
	a.	low (<Tk.12,000)	03	07
	b.	middle (Tk. 12,000 - 50,000)	36	80
	c.	high (>Tk.50,000)	03	13
4.		Frequency of sales		
	a.	Monthly	27	60
	b.	Quarterly	13	28.88
	c.	Half yearly	05	11.12
5.		Employment for family member		
	a.	Part time	45	100
	b.	Full time	-	-

Economics of vermicompost production
Cost of vermicompost production

The total cost of vermicompost production was derived by adding variable cost and fixed cost. Most of the vermicompost producers used the variable inputs available at home for vermicompost production. Producers used agricultural wastes 3kg and cow dung 50kg to produced vermicompost for every manger (chari). The producers purchased agricultural wastes Tk. 1 per kg and cow dung Tk. 1.5 per kg for every manger (chari). Table 1.2 shows that the average cost of agricultural wastes and cow dung was Tk. 665.96 per kg. The variable cost and fixed cost comprised about 78.80 % and 21.20 % of the total cost of production respectively(Table 2).

Gross margin and Net profit

The average gross margin of vermicompost was around Tk. 6081.11 and the net profit was around Tk. 5196.1. The undiscounted benefit cost ratio for vermicompost was calculated by two ways: one by considering total variable cost (BCR_1) and another by considering gross cost (BCR_2). The study revealed that BCR_1 was 2.24 and BCR_2 was 2.89 (Table 3). This indicates that vermicompost production is feasible enterprise. The undiscounted benefit cost ratio considering total variable cost appeared higher as compared to the benefit cost ratio obtained by Reddy et al., (2009) in a study carried out on economics of vermicompost production in Coorg district of Southern Karnataka, India.

Table 2 Cost of vermicompost production (Tk.) in the study area

Sl.	Cost of vermicompost production

			Unit's	Physical quantity	Value (tk.)	Per cent of total cost
A.		Variable cost				
	I.	Material costs	Tk.		2939.3	70.14
	1.	Agricultural wastes and cow dung	Kg.	1.5	665.96	15.94
	2.	Earthworms	Kg.	1.5	2273.34	54.45
	II.	Labor costs			250	5.98
	1.	Cost of worm separation	MD	0.5	75.43	1.80
	2.	Cost of watering	MD	0.61	55.56	1.33
	3.	Costs of collection of wastes	MD	0.28	44.01	1.05
	4.	Cost of Sieving	MD	0.82	75	1.79
	III.	Interest on working capital			100	2.39
		Total variable cost			3289.3	78.80
B.		Fixed cost				
	I.	Land rent	Tk.		200	4.79
	II.	Working shed cost	Tk.		310	7.4
	III.	Tool & machinery	Tk.		375.54	8.99
		Total fixed cost			885.54	21.20

Table 3 Gross margin, net profit and undiscounted benefit cost ratio of vermicompost production in the study area

Gross return	9370.4
Gross cost	4174.3
Gross margin	6081.11
Net profit	5196.1
BCR$_1$	2.24
BCR$_2$	2.89

Financial viability of vermicompost producing firm

From the study it was observed that the average number of earthworm reared was about 68 thousand. Thus financial viability for vermicompost production was determined for a firm with average earthworm numbers for economic life of five years. Cash inflow, outflow and incremental net benefit with their present values for the economic life of five years are shown in (Table 4). The variable costs and the benefit were kept constant for each year. The net present value calculated at 12 % discount rate was around Tk. 75089.98 (Table 5). Similarly, discounted benefit cost ratio was 1.48 which means that taka every one of initial investment yields a net benefit of 1.48 from vermicompost producing firm with average number of earthworm. The internal rate of return was 33 % which was very high as compared to required rate of return i.e. 12 %. Higher internal rate of return was due to the use of home available organic wastes and other resources; due to low initial investment. The payback period appeared to be 1.71 years. The values of these all parameters indicated that vermicompost production is financially viable. . Shivakumara (2008) in his study about production and marketing of vermicompost in Karnataka, India have done the financial feasibility analysis for vermicompost production units which revealed that the net present value (NPV) was around IRs. 99800 at 12 % discount rate. The benefit cost ratio was 3.44 and the internal rate of return (IRR) was 38 %. Furthermore, payback period (PBP) for vermicompost production appeared to be 1.71 years. The net present value and benefit cost ratio for this study appeared lower as compared to findings made by Shivakumara (2008) but the internal rate of return appeared much higher for this study. The payback period was nearly equal for both the studies.

Table 4 Cash flows in vermicompost production

Year	0	1	2	3	4	5	Total
Cost (tk.)	52917.08	28054.95	28054.95	28054.95	28054.95	28054.95	-
Benefit (tk.)	0	63513.97	63513.97	63513.97	63513.97	63513.97	-
INB (tk.)	-52917.08	35459.02	35459.02	35459.02	35459.02	35459.02	-
Discount factor	1	0.89	0.8	0.71	0.64	0.57	-
PV of benefit (tk.)	0	56527.43	50811.17	45094.91	40648.94	36202.96	229285.41
PV of cost	52917.08	24968.9	22443.96	19919.01	17955.16	15991.32	154195.43
PV of INB	-52917.08	31558.53	28367.21	25175.9	22693.78	20211.64	75089.98

Table 5 Financial viability of vermicompost production unit with average earthworm number in the study area

S.N	Particulars	Values
1	Net present value (Tk.)	75089.98
2	Benefit cost ratio	1.48
3	Internal rate of return	33
4	Payback period	1.71

Sensitivity Analysis

The (Table 6) showed sensitivity analysis for vermicompost production units. The ratio was more than 1.30 even with 10 per cent increases in the cost of earthworms, agriculture waste and labor. Also, even if the vermicompost price falls by 10 per cent in each year, the Benefit cost ratio would still be around 1.15. The farm would pay for itself in less than 2 years even when 10 per cent unfavorable change is contemplated in input prices. With 10 per cent decrease in vermicompost price, payback period would slightly increase but the farm would pay for itself in just 2.14 years.

Table 6 Sensitivity analysis of vermicompost unit

Sl. No.	Changes in the underlying variable	NPV (Tk.)	B:C Ratio	Internal Rate of Return (%)	Payback Period (years)
1	10 per cent increase in the cost of agricultural waste	72735.15	1.48	33	1.71
2	10 per cent increase in earthworms cost	68604.97	1.42	33	1.77
3	10 per cent increase in labor cost	67217.37	1.40	32	1.79
4	10 per cent decrease in vermicompost price	47222.92	1.16	30	2.14

IV.   Conclusion

The study indicated that vermicompost is a profitable enterprise with better net profits and benefit cost ratio. From the financial viability study we can conclude that vermicompost production is feasible enterprise. Appropriate supply chain of organic waste and cow dung can attract people to produce vermicompost on a large scale. At present context demand for vermicompost in Bangladesh is increasing and government is also giving subsidy which is appreciative.

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