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CoP

REPORT

Organic Cost of Production under Research Field

National Centre for Organic Agriculture

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INTRODUCTION

1 An overview of Cost of Production

An entity incurs manufacturing expenses, sometimes referred to as costs associated with the product, whenever it produces a good or renders a service to another party. Numerous charges are included in these fees. Companies must pay labor expenses as well as raw material costs to create a good or service, for instance. The labor needed to carry out the service's operations and any materials needed to provide it are the sources of production costs for the service industry.

Production-related costs also include government taxes and royalties paid by businesses that harvest natural assets. When an item is completed, the business keeps track of its worth in its financial accounts as a stock until it's delivered. A completed product is recorded as an asset to satisfy reporting obligations and notify investors (Hayes, 2022). Any item that has a direct impact on the company's ability to make money needs to be considered a production cost.

2 Importance of cost of production

A firm's overall accomplishment is greatly impacted by effective cost management, which has an impact on many different areas of its day-to-day operations. Productivity is mostly correlated with production costs, and businesses can increase the percentage of their profits by applying precise pricing techniques that are grounded in a careful examination and management of production expenses. Proper control of costs also makes it possible for businesses to maintain a competitive advantage by enabling them to charge lower prices for goods and services than their rivals, which increases their market share. Cost accounting optimizes resource allocation by helping organizations find areas for cost cutting or optimization, clearing up resources that may be allocated to more lucrative industries. Proper cost control also helps businesses speculate and combat possible risks brought on by changes in manufacturing costs, like spikes in labor or prices for raw materials, which in turn protects the making methods' general affordability.

The influence of production costs on earnings, competitiveness, distribution of resources, choice-making, and the long-term viability of a business makes them significant. Companies with efficient cost management and control systems have a stronger chance of succeeding in the long run.

3 Organic cost of production

The costs associated with growing and producing organically agricultural goods are referred to as the organic cost of production. Using natural ways instead of chemical-based insecticides, or manipulated organisms is the focus of organic farming operations. Because of this, the cost framework for organic farming may be different from that of conventional farming for reasons such labor-intensive procedures, soil maintenance, organic certification, and insect control.

Several costs are associated with organic agriculture, all of which support the upholding of environmentally friendly practices and natural criteria. The fees of certifying require payment to guarantee adherence to organic standards. The cost of using organic inputs, such fertilizers and pesticides, could vary from using traditional chemical alternatives. Rotating plants, mulching, and particular soil management are some of the procedures that organic farming frequently entails, which come with significant costs. Because there is less dependence on artificial pesticides, labor-intensive techniques like hand weeding are frequently used. Costs are also impacted by the selection of non-GMO or organic seeds. Special facilities and protocols are needed for handling after harvest to preserve the natural quality of crops throughout manufacturing and shipping. It is crucial to understand that the costs related to growing organic food differ depending on the type of plant, the region, and the farming methods used. Organic producers weigh these expenses against the potential increase in price they may be able to fetch for their production.

4 Difference between organic farming and conventional farming cost of production

The main source of the discrepancy among the cost of production for organic and conventional farming methods is the different inputs and procedures employed in each. Here are some salient features that set the two apart:

Organic farming avoids synthetic chemicals and genetically modified organisms in favor of natural inputs, healthy soil, and environmentally friendly methods. Contrarily, conventional farming frequently uses pesticides, herbicides, and genetically modified organisms; it also depends more on artificial nutrients and may place a higher priority on immediate results than over time maintenance of the soil (FAO, 2024). When comparing organic and conventional farming, the modern method uses synthetic substances while the first relies on natural means to control pests and diseases. While traditional agricultural practices may include genetically engineered seeds for increased yields, organic farming places a higher priority on variety and

non-GMO seeds. Conventional farming typically has fewer certification necessities but could face costs associated with regulatory compliance. In contrast, organic farming requires strict conformity to costly organic criteria, which results in higher recognition costs. Organic farming prioritizes soil health and long-term viability, which may have lasting advantages despite ultimately producing less. Conversely, organic products typically command greater costs due to customer demand for environmentally friendly and organic things. Commercial farming, on the other hand, may raise questions about longevity as it relies on artificial nutrients for larger initial harvests.

Very crucial to remember that a variety of variables, like location, the size of agricultural operations, and the methods used by agriculturalists, may influence the expenses of output. The economic feasibility of both conventional and organic farming is also influenced by customer choices and market dynamics.

5 Objectives

1. *Identify Cost Drivers:* Identify the key factors and inputs that contribute significantly to the overall cost of production in organic farming systems, such as labor, organic fertilizers, pest management strategies, and certification expenses.
2. *Compare with Conventional Methods*: Conduct comparative analysis between organic and conventional farming systems to understand the cost differentials, advantages, and challenges associated with organic production methods.
3. *Optimize Input Usage:* Determine optimal input levels and resource allocation strategies to minimize costs while maintaining organic integrity and meeting production targets.
4. *Support Certification Processes*: Assist organic certification bodies and organizations in setting realistic certification standards and requirements by providing accurate cost estimates for organic production.

METHODOLOGY

6 Data collection and Analysis

The organic cost of Production for major agricultural commodities was published based on the data collected in the Research Centre by the Researchers of National Centre for Organic Agriculture. The researchers from Horticulture Programme, Fields Crop Programme and National Potato Programme collected the data through the research trials.

Variable cost data were collected through the records of cost of materials and inputs administered in the trials. The latest cost of data was calculated through the daily labor wage data available in the Technology Adoption Study conducted in the west Central Region in the year 2023. To ensure the quality of the publication, expert opinions and views from national commodity coordinators and specialists were sought on the analyzed data. This is mainly to remove outliers and validate price variables.

The data triangulation was also carried out using the inflation rate published by the National Statistical Bureau to test the consistency and other threats that influence the results. Further, the report also presents the Organic Cost of Production in comparison with the Conventional Cost of Production. The conventional cost of production is being published by the Department of Agriculture.

6.1 Cost Calculations

1. *Depreciation Method:* Fixed capital is depreciated using the straight-line depreciation method. This means that the value of capital assets is evenly spread out over their useful life.
2. *Unit Cost Calculation:* Unit costs are determined by dividing total costs by productivity, measured in kilograms per acre, for each type of input every year. This allows for a standardized measure of cost efficiency and productivity across different inputs and crops.
3. *Cost Calculation for Annual Crops:* For annual crops like cereals and vegetables, costs are calculated based on annual expenditure divided by total yield. This provides insights into the cost-effectiveness of production for these crops on a yearly basis.
4. *Cost calculation of Perennial Crop:* It is calculated by the total average cost incurred over the entire year period divided by the total expected average production. This is mainly as perennial crops has the high initial establishment cost and then decreases over

time which is also commonly referred to as plateau years. Fruit trees usually yield from third year and continue up to 10-15 years.Net Present Value (NPV) and Benefit Cost Ration (BCR) for the fruit were also calculated for the interested individuals in enterprising it.

$$NPV = NBO + \sum_{t=1}^{n} (NBt) * (1 + R) -^{t}$$

5. *Cost for fence:* To address the challenge of human-wildlife conflict in agricultural communities, implementing fencing around agriculture fields is a primary strategy. To standardize cost estimation this study also included a comprehensive list of modern fencing technologies and their corresponding cost. This information enables interested farmers and entrepreneurs to adjust their Cost of Production (CoP) based on their investment preferences, offering flexibility and options for effectively managing human-wildlife conflicts while optimizing agricultural operations (DoA, 2023).

6.2 Cost Dynamics calculations

1. *Variable costs:* Variable costs in agricultural production refer to the expenses associated with different inputs required for producing a specific commodity, valued at market prices at the time of production. These inputs may encompass seeds, fertilizers, irrigation, plant protection inputs, labor, machinery hire charges, and other consumables. The variable cost fluctuates based on the volume of inputs needed to yield a certain quantity of produce, providing flexibility for adjusting costs through input usage.
2. *Fixed costs:* fixed costs remain constant regardless of the enterprise's size or production levels and do not influence decisions to increase or decrease production. Examples of fixed costs include building expenses, machinery costs, irrigation equipment, fencing, and tools.
3. *Total cost:* Is the sum of total variable cost and Fixed Cost.
4. *Cost of Production:* Is the total sum of money needed to produce one unit of a particular commodity.

$$Cost\ of\ production\ \left(\frac{Nu}{KG}\right) = \frac{Total\ Cost}{Total\ Quantity\ Produced}$$

5. *Average cost:* The cost of production for the perennial crops is calculated by using the average cost method. It gives the average cost per year.

$$Average\ Cost = \frac{Average\ Total\ Cost}{Averaage\ Quantity\ Produced}$$

6. *Revenue cost*: The unit cost for the produce was established based on the base farm gate price, determined through consultations with experts and researchers. Due to the absence of data on organic farm gate prices for the commodities, their input was crucial in arriving at a reasonable estimate.

ORGANIC COST OF PRODUCTION

Fruits Category

Table 1: Cost of Production for fruits

#	Name	Expenditure/year (Nu)		Yield/year(kg)		CoP/kg	
		Organic	Conventional	Organic	Conventional	Organic	Conventional
	Apple	90526	79847	1897	2818	48	28
	Persimmon	65173	70931	2538	2962	26	24
	Kiwi	130818	85538	1807	2615	72	33
	Pear	61266	78964	1635	4417	37	18
	Prune	134028	N.A	4250	N.A	32	N.A
	Cherry	143706	N.A	2080	N.A	69	N.A

Table 2:Net Present Value and Benefit-Cost Ratio

#	NAME	PV (cost) (Nu/Acer)	PV (benefits) (Nu/Acer)	NPV (Nu/Acre)	BCR	
					Organic	Conventional
	Apple	1357892	4267200	2909308	3.14	5.66
1	Persimmon	977598	4568400	3590802	4.67	2.00
2	Kiwi	1962270	5782187	3819917	2.95	7.04
3	Pear	918995	3139584	2220589	3.42	3.01
4	Prune	2010422	7650000	5639578	3.81	N.A
5	Cherry	2299298	4992000	2692701.867	2.17	N.A

Vegetable Category

Table 3: Cost of Production for vegetable

#	Name	Expenditure/year (Nu)		Yield/year(kg)		CoP/kg	
		Organic	Conventional	Organic	Conventional	Organic	Conventional
1	Cucumber	112376	NA	3800	NA	30	NA
2	Radish	156712	38850	4000	2416	39	16
3	Carrot	174834	41510	4500	1380	39	30
4	Slippery Gourd	115860	NA	2500	NA	46	NA
5	Brinjal	135586	NA	2700	NA	50	NA
6	Mustard Green	104296	NA	2000	NA	52	NA
7	Pakchoi	141278	NA	5000	NA	28	NA
8	Broccoli	145926	63089	3500	1825	42	35
9	Cauliflower	145926	66104	3500	1850	42	36
10	Cabbage	144774	69859	5000	1825	29	38
11	Tomato	361064	347292	25680	1425	14	244
12	Onion	119080	34489	3500	1041	34	33
13	Small Chilli	117815	81265	1300	1000	91	81
14	Large Chilli	124964	73024	2155	2138	58	34

Table 4: Net Present Value and Benefit-Cost Ratio of vegetables

#	Name	Total cost (Nu/Acre)	Gross Revenue (Nu/Acre)	Net Benefit (Nu/Acre)	BCR	
					Organic	Conventional
1	Cucumber	112376	228000	115625	2.0	NA
2	Radish	156712	160000	3289	1.0	1.55
3	Carrot	174834	202500	27666	1.2	1.83
4	Slippery Gourd	115860	125000	9141	1.1	NA
5	Brinjal	135586	135000	-586	1.0	NA
6	Mustard Green	104296	120000	15705	1.2	1.56
7	Pakchoi	141278	150000	8723	1.1	NA
8	Broccoli	145926	210000	64075	1.4	2.31
9	Cauliflower	145926	280000	134075	1.9	1.82
10	Cabbage	144774	150000	5227	1.0	2.51
11	Tomato	361064	1284000	922936	3.6	0.98
12	Onion	119080	140000	20920	1.2	0.81
13	Small Chilli	117815	130000	12185	1.1	1.48
14	Large Chilli	124964	129300	4336	1.0	1.76

MAP Category

Table 5: Cost of Production for MAPs

#	Name	Expenditure/year (Nu)		Yield/year(kg)		CoP/kg	
		Organic	Conventional	Organic	Conventional	Organic	Conventional
1	Dill	222460		1283		173.35	

Table 6: Net Present Value and Benefit-Cost Ratio of Maps

#	Name	Total cost (Nu/Acre)	Gross Revenue (Nu/Acre)	Net Benefit (Nu/Acre)	BCR	
					Organic	Conventional
1	Dill	222460	384990	162530	1.73	

Organic Technologies

Table 7: Bio inputs cost of production

#	Technologies	Production Capacity	Total Cost	Cost per unit production (CoP)
1	Bokashi	50kg	1978	39.56
2	Vermi compost	300kg	6018	20.06
3	Biochar	30kg	3246	108.2

LIMITATION OF THE STUDY

7 Scope and Generalizability

The study focuses primarily on organic farming practices for selected crops and may not capture the full diversity and complexity of agricultural systems. Additionally, the findings may not be universally applicable to all regions or farming contexts, as factors such as climate, soil conditions, and farming techniques can vary significantly.

8 Assumptions and Methodology

The calculations of net present value, benefit-cost ratio, and cost of production involve various assumptions and methodologies, which may introduce uncertainty and limitations. Sensitivity analyses could help address some of these uncertainties, but it's essential to recognize that the results are subject to change based on different assumptions and scenarios.

9 External Factors

External factors such as market fluctuations, policy changes, climate variability, and technological advancements can significantly impact the economic viability and profitability of organic farming. While the study provides valuable insights, it may not fully account for the dynamic nature of these external factors.

10 Human and Wildlife Interaction

The study briefly mentions the implementation of fencing to address human-wildlife conflict in agricultural communities. However, the effectiveness and cost-effectiveness of such measures may vary depending on the specific context and require further investigation.

11 Long-Term Sustainability

While the study emphasizes the economic feasibility of organic farming, it's essential to consider the long-term sustainability and environmental impacts of agricultural practices. Future research could explore the environmental sustainability of organic farming and its implications for ecosystem health and resilience.

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