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Economic analysis of production and marketing of coconut in Kollam district of Kerala

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Abstract

The aims of the study to assess the socio-economic profile of coconut growers, estimate the cost and returns of coconut cultivation across different farm sizes, examine the marketing channels and associated costs, and identify the major production and marketing constraints in Kollam district of Kerala. A multistage sampling method was used to select 110 coconut farmers from seven villages in Kottarakkara block. The farmers were classified into marginal, small, semi-medium, medium, and large categories based on landholding size.

During the pre-bearing stage, per hectare input usage showed that marginal and small farms relied more on family labour, manure, and fertilizers, while hired labour use increased with farm size. The average establishment cost (Cost C₂) was estimated to be ₹5,50,664 per hectare. Marginal farmers incurred the highest cost (₹5,72,269.23), followed by small (₹5,71,148.30), semi-medium (₹5,57,282), medium (₹5,31,639), and large (₹5,20,982.70), indicating a clear declining trend in costs with increasing farm size. In the bearing phase, input use continued to decline with increasing farm size, with the average maintenance cost (Cost C₂) at ₹1,78,913.99 per hectare. Again, marginal farmers had the highest maintenance cost at ₹1,93,282.69, whereas large farmers incurred ₹1,65,485.86. Gross income was highest for marginal farmers (₹3,28,553.10), but due to higher costs, they reported the lowest net income (₹1,16,932.41). In contrast, large farmers, despite lower gross income, achieved the highest net income (₹1,22,491.81) due to cost efficiency. The Benefit-Cost Ratio improved with scale, from 1:1.55 (marginal) to 1:1.66 (large), indicating increasing profitability with larger farm sizes.

Keywords: Kollam District, costs, marketing efficiency, marketed surplus, profit margin, productivity, returns

Introduction

The coconut palm (*Cocos nucifera* L.) is recognized as one of the most important tropical crops, providing crucial economic support to millions of people across the world's tropical regions. Often referred to as the "tree of life," the coconut has been valued for centuries for its wide range of uses, including food, drink, oil, medicine, shelter, and timber. Every part of the palm finds an application, underscoring its importance in traditional and modern livelihoods. In recent years, the demand for coconut products has grown steadily, driven by increasing consumer awareness of the nutritional and health benefits of products such as coconut water and virgin coconut oil. A comprehensive understanding of coconut botany, diversity, ecophysiology, production challenges under changing climatic conditions, pest and disease management, postharvest handling, and breeding efforts is critical for sustaining and expanding the coconut sector. With its expanding global relevance, the coconut continues to be an essential focus of agricultural research and development, particularly in tropical and subtropical economies (Adkins *et al.*, 2024) ^[20].

Coconut (*Cocos nucifera* L.) is a plantation crop primarily grown by small and marginal farmers across the world. In India, it plays a vital role in strengthening the rural economy by supporting the livelihoods of over 10 million people. The

crop significantly contributes to the national agricultural economy, generating approximately ₹9,000 crores annually towards the GDP and earning around ₹1,200 crores in foreign exchange (Chowdappa and Jayasekhar, 2016) ^[21]. Beyond its economic importance, coconut acts as a major source of food and income, offering employment opportunities that help alleviate poverty. It is widely revered as "Kalpavriksha" or the "tree of abundance" for its diverse benefits (Thamban *et al.*, 1981) ^[22].

The current global scenario of the coconut industry reveals both expanding opportunities and emerging challenges. Coconut is cultivated in over 90 countries, primarily across Asia, the Pacific Islands, and South America, covering approximately 12 million hectares with an estimated annual production potential of around 70 billion nuts. India, Indonesia, and the Philippines together account for more than 75% of the global production. The industry has seen substantial growth in recent years, particularly in the development of value-added coconut products, which are increasingly popular in American, European, Middle Eastern, and East Asian markets. Traditional products such as coconut oil, copra meal, desiccated coconut, and coir continue to hold significant economic value, while emerging products like coconut water, virgin coconut oil, coconut milk, and coconut cream are experiencing rapid market expansion. Despite these positive trends, the industry faces

critical challenges, including the spread of invasive pests like *Brontispa longissima*, *Rhynchophorus ferrugineus*, *Aceria guerreronis*, and *Aspidiotus rigidus*, as well as lethal yellowing diseases in the Caribbean, Americas, and parts of Africa. The discovery of Boga coconut syndrome in Papua New Guinea, the first such report in Oceania, has further heightened concerns regarding crop health and sustainability. To ensure the long-term viability of the sector, it is necessary to focus on the development of high-yielding, pest- and disease-resistant varieties, alongside the adoption of integrated pest management practices. Diversification through coconut cultivation also presents a strategic pathway for countries to strengthen agricultural resilience and reduce dependency on single industrial crops (Hoe, 2018) ^[22].

Recent developments in the coconut sector highlight the increasing use of modern breeding technologies to address long-standing challenges such as low productivity, vulnerability to pests, and the impacts of climate change. Techniques like marker-assisted selection, genomic selection, and genetic engineering are now being employed to create high-yielding, disease-resistant, and climate-resilient coconut varieties. These advancements aim to broaden the genetic base of coconut cultivars, enhance adaptability across diverse environments, and support the growing international demand for coconut products. Despite these promising innovations, the widespread adoption of modern breeding approaches is hindered by factors such as limited research infrastructure, insufficient funding, and a shortage of skilled technical personnel. Strengthening research capabilities, promoting capacity building, and fostering greater international collaboration are essential steps to ensure the sustainable growth and modernization of the global coconut industry (Arumugam *et al.*, 2022) ^[24].

In Kerala, coconut palm is the most extensively cultivated crop (7,56,890 ha in 2018-19). It grows virtually everywhere in the state. Kerala has a diverse range of landforms that includes mountains, riverine deltas, wetlands, and ecoclimatic conditions that range from high rainfall zones to rain- shadow regions. The soil, climate, flora and fauna of these ecoregions are also correspondingly diverse. The principal crops of the state, including coconut, are cultivated in most of these ecoregions since time immemorial. Coconut is a major crop in the lowlands of Kerala, but the midlands and the slopes of the highlands are also suited for its cultivation (Agricultural Statistics 2018-19) ^[25].

2. Material and Methods

The concepts used in the estimation of fixed costs, variable costs, total costs, gross returns, net returns, producer's share in consumer price, price spread, marketing margins and marketing efficiency are discussed below:

2.1 Fixed costs

These included (i) Depreciation on value of fixed assets: Depreciation is a charge on the amount of loss in the value of capital asset due to age and wear and tear resulting for their use. Depreciation in an accounting year, therefore, becomes a cost and is included in the fixed costs. It was calculated by straight line method by deducting junk value from original value and then dividing by number of useful

years of assets under study. (ii) Land rent: It was taken as Rs. 30,000 per acre being the modal rate in sample villages during the study period (2024-25). (iii) Interest on capital investment: It was taken as 10% per annum on the investment incurred on machinery, equipment, etc.

2.2 Variable costs

The sum total of costs incurred on seeds, fertilizers, plant protection chemicals, human labour, machinery/ tractor hours and interest on working capital for half of the period covered under rapeseed and mustard constitute total variable costs.

2.3 Interest on working capital

Interest on working capital was computed at the rate of 7 per cent per annum for half of the period covered under rapeseed and mustard.

- **2.4 Total costs:** It is the sum of variable and fixed costs.
- **2.2.1 Gross returns:** Gross returns were worked out by multiplying the total output and the average price received by the farmers.
- **2.2.2 Net returns:** Net returns were calculated by deducting the total costs from gross returns.
- **2.3 Marketed surplus:** It is the quantity which the producer actually sells is respective of his needs for home consumption and other requirements.

2.4 Marketing concepts

2.4.1 Marketing channels

These refer to the chains of intermediaries through which mustard pass on from the producer to ultimate consumers.

- **2.5 Analysis of data:** Consistent with the objectives of the study, different techniques were used for the analysis of data.
- **2.5.1 Tabular analysis:** For the interpretation and comparison of costs and returns from rapeseed and mustard, marketed surplus on different sizes of farmers and to generate information on other parameters, tabular analysis was carried out.
- **2.5.2 Garrett's Ranking Technique:** Garrett's Ranking Technique was used to rank the problems perceived by the sampled respondents. The degree of response with regard to problems faced by sampled respondents was ranked. The most prevalent problem was given 1st rank and accordingly the next important problem was ranked on the basis of the severity of the problem.

Where,

- R_{ij} = Rank given for i th items/problems by the J th respondent
- N_j = Number of items/problems ranked by the J th respondent

The relative position of each rank is converted into scores by referring the table given by Garrett and Woodworth (1969). Then for each factor problem, the scores of individual respondents were added together and mean score was calculated. The factor with highest mean score was considered to be the most important problem. The prime

advantage of this technique over simple frequency distribution is that the problems are arranged based on their severity from the point of view of respondents.

3 Results and Discussion

3.1 Input utilization

The data in Table 1 shows the per hectare input utilization by coconut farms at the pre-bearing stage, by farm size. Use of hired labour was seen to rise with farm size, with marginal farms needing 30.19 man days, small farms 32.87, semi-medium farms 36.31, medium farms 58.33, and large farms the most at 71.27 man days, resulting in an overall average of 45.79 man days. In contrast, family labor was utilized most by marginal farmers at 70.87 man days, followed by small (62.21), semi-medium (54.52), and went down further for medium (28.67) and large farms (16.22), with an average of 46.49 man days by all farm sizes. Machine labor input in hours was most for marginal farms (103.81 hours), then small (98.42), semi-medium (96.71),

medium (94.28), and large farms (91.82), averaging a total of 97 hours per hectare. For seedlings, the need was relatively, uniform but highest on marginal farms (139.3 seedlings), followed by small (137.28), semi- medium (133.34), medium (130.12), and the least on large farms (127.2), averaging 133.44 seedlings per hectare. Manure application followed the same pattern, with marginal farms using the maximum (420.81 quintals), followed by small (409.65), semi-medium (401.25), medium (392.33), and large (389.45), averaging 402.69 quintals. Finally, fertilizer use per hectare was once more highest on marginal farms (715.16 kg), followed by small (702.58), semi-medium (698.1), medium (695.4), and lowest on large farms (690.4), averaging 700.33 kilograms. It can be observed that there is a decreasing trend in use of inputs from marginal to large large farmers. These trends indicate that smaller farms make greater use of family labour and greater physical inputs per hectare, while larger farms use more hired labour and cut back on their input intensity elsewhere.

Table 1: Input utilization during pre - bearing period (per hectare)

S. n o	Particulars	Unit	Margin al	Small	Semi medium	Medium	Large	Total
1	Hired labour	Man days	30.19	32.87	36.31	58.33	71.27	45.794
2	Family labour	Man days	70.87	62.21	54.52	28.67	16.22	46.498
3	Machine labour	Hours	103.81	98.42	96.71	94.28	91.82	97.008
4	Seedlings	No.	139.3	137.28	133.34	130.12	127.2	133.44
5	Manure	Quintal s	420.81	409.65	401.25	392.33	389.45	402.69
6	Fertilizer	Kgs.	715.16	702.58	698.1	695.4	690.4	700.32

3.2 Establishment cost during pre - bearing period

The data in Table 2 illustrates the establishment cost of coconut production during the five-year pre-bearing phase. It was seen that the total establishment cost (Cost C2) per hectare was ₹5,50,664. In this, machine labour was ₹67,897.1 (12.63%), then manure at ₹32,141.7(5.97%), family labour ₹15,987.7 (2.97%), hired labour ₹16,027.9 (2.98%), fertilizer ₹12,941.7 (2.14%), seedlings ₹10,676 (1.98%), irrigation ₹11,256.5 (2.09%), and PPC ₹7,231.35 (1.34%). The total working capital was ₹1,74,160 (32.40%), with interest on this capital at ₹12,151.2 (2.26%). Fixed costs comprised depreciation ₹33,499.8 (6.23%), land revenue ₹612.88 (0.11%), rental value of owned land ₹2,85,245 (53.06%), and interest on fixed capital ₹31,886.9 (5.93%). The amortized cost over the economic life of the orchard was ₹28,886.9. Farm wise analysis showed that the marginal farmers had the highest Cost C2 of ₹5,72,269.23 per hectare, followed by small ₹5,71,148.3, semi-medium ₹5,57,282, medium ₹5,31,639, and large farmers ₹5,20,982.7, which shows quite a clear declining trend in costs with growing farm size. The same trend is found in amortized costs, which decreased from ₹30,338.14 for marginal farmers, ₹29550.5 for small farmers, ₹28520.5 for

semi-medium farmers, ₹28200.9 for medium farmers and ₹27,824.24 for large farmers. Cost A1 and A2 were the ₹2,08,715.38, ₹2,03,171, ₹2,00,666, ₹2,03,958, ₹2,05,643.8 for marginal, small, semi-medium, medium, large farmers respectively whereas Cost B1 and B2 varied from ₹2,43,690.59 and ₹5,37,057.93 (marginal), ₹2,36,190.2 and ₹5,27,601.3 (small), ₹2,33,119 and ₹5,19,117 (semi-medium), ₹2,34,318 and ₹5,14,436 (medium), ₹2,34,298.2 and ₹5,09,628.3 (large). Similarly, Cost C1, C2, and C3 reduced from ₹2,93,299.59, ₹5,72,269.23, and ₹6,29,496.15 for marginal farmers, ₹2,57,963.71, ₹5,71,148.3, ₹6,28,263.2 for small farmers, ₹2,52,201, ₹5,57,282, ₹6,13,010 for semi-medium farmers ₹2,39,975.4, ₹2,42,919, ₹5,31,639, ₹5,84,803 for medium farmers ₹2,39,975.4, ₹5,20,982.7, ₹5,73,080.9 for large farmers. This shows there is consistent decline in establishment costs from marginal to large farm sizes, which reflects the presence of economies of scale. Larger farms tend to use inputs more efficiently, benefit from bulk procurement, and rely more on hired labour and mechanization, which helps reduce overall unit costs. Conversely, smaller farms depend heavily on family labour and may face higher costs due to limited bargaining power and smaller scale operations.

Table 2: Establishment cost during pre - bearing period (in ₹/ha)

S. No	Particulars	Marginal	Small	Semi (medium)	Medium	Large	Overall
VARIABLE COST							
1	Hired labour	10566.5 (1.88)	11504.5 (2.09)	12708.5 (2.36)	20415.5 (3.90)	24944.5 (4.84)	16027.9 (2.98)
2	Family labour	24804.5 (4.41)	21773.5 (3.96)	19082.1 (3.54)	8601.1 (1.64)	5677.2 (1.10)	15987.7 (2.97)
3	Machine labour	72673.5 (12.93)	68844.8 (12.53)	67697.2 (12.57)	65996.1 (12.61)	64274 (12.47)	67897.1 (12.63)
4	Seedlings	11144.8 (1.98)	10982.4 (1.99)	10667.2 (1.98)	10409.6 (1.99)	10176 (1.97)	10676 (1.98)
5	Manure	33589.8 (5.97)	32689.3 (5.95)	32027.8 (5.95)	31315.8 (5.98)	31085.89 (6.03)	32141.7 (5.97)
6	Fertilizer	13216.2 (2.35)	12982.2 (2.36)	12900.8 (2.39)	12850.9 (2.45)	12758.59 (2.47)	12941.7 (2.41)
7	PPC	7708.9 (1.37)	7458.75 (1.35)	7249.35 (1.34)	6953.3 (1.32)	6786.45 (1.31)	7231.35 (1.34)
8	Irrigation charges	11721.6 (2.08)	11421.5 (2.07)	11261.8 (2.09)	11021.2 (2.11)	10856.6 (2.11)	11256.5 (2.09)
9	Total working capital	185425.8 (33.01)	177657 (32.33)	173595 (32.25)	167563 (32.03)	166559.2 (32.32)	174160 (32.40)
10	Interest on working capital @ 7%	12979.8 (2.31)	12288.9 (2.23)	12151.6 (2.25)	11676.4 (2.23)	11659.14 (2.26)	12151.2 (2.26)
FIXED COST							
11	Depreciation	34489.7 (6.14)	34379.3 (6.25)	33391.5 (6.20)	32739.3 (6.25)	32499.3 (6.31)	33499.8 (6.23)
12	Land revenue	624.28 (0.11)	619.3 (0.11)	610.14 (0.11)	607.4 (0.11)	603.3 (0.11)	612.84 (0.11)
13	Rental value of owned land	293367.34 (52.22)	291411.1 (53.04)	285998 (53.13)	280119 (53.55)	275330.1 (53.43)	285245 (53.06)
14	Interest on fixed capital @ 10%	34975.51 (6.22)	33019.28 (6.01)	32453.3 (6.02)	30332.1 (5.79)	28654.41 (5.56)	31886.9 (5.93)
	TOTAL COST	561702.73 (100)	549374.8 (100)	538200 (100)	523038 (100)	515305.5 (100)	537524 (100)
	Amortization cost	30338.14	29550.5	28520.5	28200.9	27824.24	28886.9
15	COST A1	208715.38	203171	200666	203985	205643.8	204436
16	COST A2	208715.38	203171	200666	203958	205643.8	204431
17	COST B1	243690.59	236190.2	233119	234318	234298.2	236323
18	COST B2	537057.93	527601.3	519117	514436	509628.3	521568
19	COST C1	293299.59	257963.7	252201	242919	239975.4	257272
20	COST C2	572269.23	571148.3	557282	531639	520982.7	550664
21	COST C3	629496.15	628263.2	613010	584803	573080.9	605731

3.3 Input utilization during bearing period for maintenance (per hectare)

The data in Table 3 presents the per hectare input utilization by coconut farms during the bearing period for maintenance, disaggregated by farm size. Hired labour usage increased progressively with farm size, beginning at 11.73 man days for marginal farms and rising through small (13.73), semi-medium (15.73), and medium (17.33), reaching a peak of 21.2 man days for large farms, with an average of 15.94 man days across all sizes. Conversely, family labour showed a declining trend, with marginal farms utilizing the highest at 20.82 man days, followed by small (17.25), semi-medium (14.13), medium (11.28), and large farms the least at 6.33 man days, averaging 13.96 man days overall. Machine labour input also decreased with farm size, from 17.85 hours in marginal farms to 13.1 hours in large farms, with intermediate values for small (16.85), semi-medium (15.53), and medium farms (14.26), averaging 15.52 hours

per hectare. Soil bedding followed a similar downward trend, with marginal farms using 106.01 loads, and decreasing sequentially through small (102.31), semi-medium (100.11), medium (96.55), to 91.25 loads for large farms, with a mean of 99.25 loads. Likewise, manure application declined from 106.39 quintals in marginal farms to 90.8 quintals in large farms, averaging 98.96 quintals per hectare. Fertilizer application also showed a marginal decrease with farm size: 231.67 kg for marginal farms, 228.53 for small, 226.31 for semi-medium, 224.5 for medium, and 221.9 kg for large farms, averaging 226.58 kg overall. It can be observed that there is a decreasing trend in use of inputs from marginal to large large farmers. These figures suggest that marginal and small farms continue to depend more on family labour and apply higher quantities of physical inputs per hectare, whereas larger farms rely increasingly on hired labour and tend to economize on input intensity.

Table 3: Input utilization during bearing period for maintenance (per hectare)

S.n o	Particulars	Unit	Marginal	Small	Semi-medium	Medium	Large	Total
1	Hired labour	Man days	11.73	13.73	15.73	17.33	21.2	15.944
2	Family labour	Man days	20.82	17.25	14.13	11.28	6.33	13.962
3	Machine labour	Hours	17.85	16.85	15.53	14.26	13.1	15.518
4	Soil bedding	Loads	106.01	102.31	100.11	96.55	91.25	99.246
5	Manure	Quintal s	106.39	102.11	100.11	95.4	90.8	98.962
6	Fertilizer	Kgs.	231.67	228.53	226.31	224.5	221.9	226.582

4 Maintenance cost during bearing period (in ₹/ha)

The data in Table 4 illustrates the maintenance cost of coconut cultivation during the bearing period. The total maintenance cost (Cost C2) per hectare was ₹1,78,913.99. Among the major components of variable cost, machine labour accounted for ₹13,190.84 (7.63%), followed by manure at ₹14,859.43 (8.60%), family labour ₹6,170.99 (3.57%), hired labour ₹7,175.11 (4.15%), fertilizer ₹6,350.37 (3.67%), soil bedding ₹11,097.18 (6.89%), irrigation ₹2,631.61 (1.52%), and PPC ₹2,773.23 (1.61%). The total working capital was ₹68,791.61 (39.82%), with interest on this capital at ₹4,815.60 (2.78%). Fixed costs comprised depreciation ₹6,699.96 (3.87%), land revenue ₹122.56 (0.07%), rental value of owned land ₹57,049.02 (33.02%), and interest on fixed capital ₹6,377.37 (3.87%). Farm wise analysis showed that the marginal farmers had the highest Cost C2 of ₹1,93,282.69 per hectare, followed by small ₹1,85,770.66, semi-medium ₹1,79,326.29, medium ₹1,70,164.53, and large farmers ₹1,65,485.86, which shows quite a clear declining trend in costs with growing farm size. The same trend is found in amortized costs, which

decreased from ₹30,338.14 for marginal farmers, ₹29,550.5 for small farmers, ₹28,520.5 for semi-medium farmers, ₹28,200.88 for medium farmers and ₹27,824.24 for large farmers. Cost A1 and A2 were ₹77,629.07, ₹75,809.11, ₹69,560.3, ₹72,289.31, and ₹71,167.72 for marginal, small, semi-medium, medium, and large farmers respectively, whereas Cost B1 and B2 varied from ₹84,642.17 and ₹1,43,297.63 (marginal), ₹82,412.96 and ₹1,40,695.16 (small), ₹76,050.9 and ₹1,33,250.5 (semi-medium), ₹78,355.73 and ₹1,34,379.57 (medium), ₹76,898.6 and ₹1,31,964.62 (large). Similarly, Cost C1, C2, and C3 reduced from ₹93,997.63, ₹1,92,382.69, and ₹2,11,620.95 for marginal farmers, ₹90,175.46, ₹1,85,770.66, and ₹2,04,947.72 for small farmers, ₹82,409.4, ₹1,79,326.29, and ₹1,97,258.91 for semi-medium farmers, ₹82,867.73, ₹1,71,604.45, and ₹1,88,764.89 for medium farmers, and ₹79,747.1, ₹1,65,485.86, and ₹1,82,034.44 for large farmers. Overall, a downward trend in costs is evident from marginal to large farms, likely due to reduced input requirements and the benefits of scale efficiency as farm size increases.

Table 4: Maintenance cost during bearing period (in ₹/ha)

S. No	Particulars	Marginal	Small	Semi - medium	Medium	Large	Overall
VARIABLE COST							
1	Hired labour	5282.65 (2.88)	6178.5 (3.47)	7078.5 (4.09)	7798.5 (4.66)	9540.4 (5.86)	7175.71 (4.15)
2	Family labour	9373.46 (5.12)	7762.5 (4.36)	6358.5 (3.67)	4512 (2.70)	2848.5 (1.75)	6170.99 (3.57)
3	Machine labour	15175.21 (8.29)	14322.5 (8.04)	13200.5 (7.63)	12121 (7.25)	11135 (6.84)	13190.84 (7.63)
4	Soil bedding	12721.42 (6.95)	12265.2 (6.89)	12013.2 (6.94)	11586.1 (6.93)	10950 (6.73)	11907.18 (6.89)
5	Manure	15959.18 (8.72)	15316.5 (8.60)	15016.5 (8.68)	14385.1 (8.60)	13619.9 (8.37)	14859.43 (8.60)
6	Fertilizer	6486.85 (3.54)	6398.84 (3.59)	6366.68 (3.68)	6286.3 (3.76)	6213.2 (3.82)	6350.37 (3.67)
7	PPC	2862.94 (1.56)	2784.33 (1.56)	2765.3 (1.59)	2744.1 (1.64)	2709.5 (1.66)	2773.23 (1.61)
8	Miscellaneous	4041.02 (2.21)	3800.63 (2.13)	3669.1 (2.12)	3600.5 (2.15)	3549.9 (2.18)	3732.23 (2.16)
9	Irrigation charges	2844.69 (1.55)	2732.59 (1.53)	2650.2 (1.53)	2510.3 (1.50)	2420.3 (1.48)	2631.61 (1.52)
10	Total working capital	74747.42 (40.84)	71561.59 (40.20)	69118.48 (39.96)	65543.9 (39.22)	62986.7 (38.72)	68791.61 (39.82)
11	Interest on working capital @ 7%	5232.31 (2.85)	5010.3 (2.81)	4838.29 (2.79)	4588.07 (2.74)	4409.06 (2.71)	4815.60 (2.78)
FIXED COST							
12	Depreciation	6897.95 (3.76)	6875.86 (3.86)	6678.3 (3.86)	6547.86 (3.91)	6499.86 (3.99)	6699.96 (3.87)
13	Land revenue	124.85 (0.06)	123.86 (0.06)	122.02 (0.07)	121.48 (0.07)	120.6 (0.07)	122.56 (0.07)
14	Rental value of owned land	58673.46 (32.06)	58282.2 (32.74)	57199.6 (33.06)	56023.84 (33.52)	55066.02 (33.85)	57049.02 (33.02)

15	Interest on fixed capital @ 10%	6995.1 (3.82)	6603.85 (3.71)	6490.6 (3.75)	6066.42 (3.63)	5730.88 (3.52)	6377.37 (3.69)
16	Amortization cost	30338.14 (16.57)	29550.5 (16.60)	28520.5 (16.48)	28200.88 (16.87)	27824.24 (17.11)	28886.85 (16.72)
	TOTAL COST	183009.23	178008.16	172967.79	167092.45	162637.36	172742.99
17	COST A1	77629.07	75809.11	69560.3	72289.31	71167.72	73291.10
18	COST A2	77629.07	75809.11	69560.3	72289.31	71167.72	73291.10
19	COST B1	84624.17	82412.96	76050.9	78355.73	76898.6	79668.47
20	COST B2	143297.63	140695.16	133250.5	134379.57	131964.62	136717.49
21	COST C1	93997.63	90175.46	82409.4	82867.73	79747.1	85839.46
22	COST C2	192382.69	185770.66	179326.29	171604.45	165485.86	178913.99
23	COST C3	211620.95	204947.72	197258.91	188764.89	182034.44	196925.38

3.5. Returns and yield from coconut farms

The data given in Table 5 highlights the income pattern from coconut cultivation across different farm sizes. On an aggregate level, the total return per hectare stood at ₹3,15,997.23. Among the various components, the sale of coconuts generated the highest income at ₹2,14,941.9, with additional contributions from husk (₹15,324.56), broom (₹76,545.25), and leaf base (₹9,185.55). When returns are analyzed by farm category, marginal farmers led with the highest earnings of ₹3,28,553.1, followed by small farmers with ₹3,23,135.1, semi-medium farmers with ₹3,15,647.5,

medium farmers with ₹3,09,924.2 and large farmers with ₹3,02,726.25. The number of coconuts harvested per hectare also showed a downward trajectory from marginal to large farmers. Similar trend was seen in the case for other products such as husk, broom and leaf base. This descending pattern in returns from all component, correlates with increasing farm size. The trend likely stems from reduced tree population and limited care and input use, which are common challenges faced by larger farms due to the scattered nature of landholdings and reduced intensity of cultivation.

Table 5: Returns and yield from coconut farms

S. N	Type Of Farme rs	No of trees	Main Product				By Product		Leaf base		Total returns
			Coconut		Husk		Broom				
			Total no of nuts	Value (Rs.)	Qty (kg)	Value (Rs.)	Qty (No.)	Value (Rs.)	Qty (No.)	Value (Rs.)	Rs.
1	Margin al	127.34	8277.1	223481.7	2276.2	159334	3183.5	795875	1910.1	9550.5	3285531
2	Small	125.24	8140.6	219796.2	2238.7	156709	3131	78275	1878.6	9393	3231351
3	Semi -	122.34	7952.1	214706.7	2186.8	153078	3058.5	764575	1835.1	9175.5	3156475
4	Mediu m	120.12	7807.8	210810.6	2147.1	150296	3003	75075	1801.8	9009	3099242
5	Large	117.33	7626.4	205914.2	2097.3	146811	2933.2	7333125	1759.95	8799.75	30272623
	Overall	122.47	7960.8	214941.9	2189.2	1532456	3061.8	7654525	1837.11	9185.55	31599723

The data given in Table 4.12 provides detailed insight into the cost structure and returns from coconut cultivation per hectare across different farm sizes. The data reveals that marginal farmers incurred the highest per hectare cost across almost all cost concepts, with Cost C3 reaching ₹2,11,620.95, followed by small farmers (₹2,04,947.70), semi-medium (₹1,97,258.90), medium (₹1,88,764.90), and large farmers (₹1,82,034.44). This consistent decline in cost with increasing farm size reflects the effect of scale on reducing input costs.

Gross income was the highest for marginal farmers at ₹3,28,553.10, followed by small farmers at ₹3,23,135.1, semi-medium farmers at ₹3,15,647.5, medium farmers at ₹3,09,924.2 and large farmers earned the least

gross income of ₹3,02,726.25.

Net income of large farmers was the highest at ₹1,22,491.81, slightly ahead of medium farmers (₹1,21,159.30) and semi-medium farmers (₹1,18,388.60), small farmers (₹1,18,187.40). Marginal farmers had the lowest net income at ₹1,16,932.41.

The farm business income, family labour income and farm invest income followed similar trend with marginal farmers having highest followed by small farmers, semi-medium, medium and large farmers.

The Benefit-Cost Ratio (BCR) for marginal, small, semi-medium, medium, and large farmers were 1:1.55, 1:1.58, 1:1.60, 1:1.64 and 1:1.66 respectively with the average being 1:1.61.

Table 6: Per hectare costs and income from Coconut cultivation under different cost concepts.

S.no	Particulars	Marginal	Small	Semi - Medium	Medium	Large	Overall
1	COST A1	77629.07	75809.11	69560.3	72289.31	71167.72	73291.102
2	COST A2	77629.07	75809.11	69560.3	72289.31	71167.72	73291.102
3	COST B1	84624.17	82412.96	76050.9	78355.73	76898.6	79668.472
4	COST B2	143297.63	140695.2	133250.5	134379.6	131964.62	136717.496
5	COST C1	93997.63	90175.46	82409.4	82867.73	79747.1	85839.464
6	COST C2	192382.69	185770.7	179326.3	171604.5	165485.86	178913.99
7	COST C3	211620.95	204947.7	197258.9	188764.9	182034.44	196925.382
8	Gross Income	328553.1	323135.1	315647.5	309924.2	302726.25	315997.23
9	Net Income	116932.15	118187.40	118388.60	121159.30	122491.81	119072.032

10	Family Labour Income	185255.47	182439.9	182397.3	175544.6	170761.63	179279.794
11	Farm Business Income	250924.03	247326	246087.2	237634.9	284958.53	253386.128
12	Farm Investment Income	241550.57	240563.5	239728.7	233122.9	230274.89	237048.11
13	Benefit Cost Ratio	1:1.55	1:1.58	1:1.60	1:1.64	1:1.66	1:1.61

Conclusion

Coconut is a vital component of Kerala's agrarian economy, providing livelihood, income, and employment to a large rural population. The present study, conducted in Kollam district, highlights key aspects of coconut cultivation, cost structures, marketing channels, and constraints faced by farmers. Coconut continues to be the dominant crop in the district, particularly among marginal farmers who form the majority of cultivators. The study revealed that establishing one hectare of coconut orchard incurred an average cost of ₹229,472.56 during the pre-bearing period (5 years), with the highest expenditure (around 42.68%) occurring in the first year itself. Labor wages accounted for the largest share across all farm sizes, contributing over 50% of the total establishment cost in marginal and small farms. During the bearing stage, the annual maintenance cost per hectare averaged ₹90,753.42 for marginal farmers, decreasing progressively to ₹68,245.13 for large farmers, highlighting economies of scale. The gross income per hectare ranged from ₹150,000 for marginal farmers to ₹280,000 for large farmers, while net income (Cost C3 basis) varied from ₹56,328.15 (marginal) to ₹189,340.22 (large), indicating significantly higher profitability for larger farms. The benefit-cost ratio improved with scale, from 1.55 for marginal to 1.66 for large farms, making coconut cultivation highly profitable at scale.

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