Indian J. Applied & Pure Bio. Vol. 40(1), 408-414 (2025). **ISSN: 0970-2091**
A Web of Science Journal

Economic analysis of profitability and productivity of banana production

***P. Aravind Perumal**

*Department of Economics, S.T.Hindu College, Nagercoil
Affiliated to Manonmaniam Sundaranar University, Abishekapatti,
Tirunelveli – 627012 (India)

Abstract

Increasing agricultural productivity and yield is no longer the only factor driving agriculture's growth nowadays; improved and well-managed marketing is also essential to getting agricultural products from the farmer's field to the final consumer's location. One of the most well-known and ancient fruits is the banana. Tamil Nadu, Karnataka, and Maharashtra are renowned for producing a significant amount of shares among all the states in India. In practically every district of Tamil Nadu, bananas are farmed. Districts like Trichy, Tuticorin, Coimbatore, and Kanyakumari are where it is primarily grown. While demand is inelastic, banana production is seasonal. This has an impact on price fixing.

Because bananas vary widely in quality, it can be challenging to grade and standardise them. Examining the structural differences in banana output between the blocks of Kalakadu and Cheranmahadevi in the Tirunelveli district was the aim of the study. The results show that the marginal value of all factor product input was positive in the Kalakadu and Cheranmahadevi blocks. It implies that income might rise by utilising an additional unit in these variables. The analysis of the marginal productivities of inputs in orchards in Kalakadu and Cheranmahadevi reveals that the orchards in Kalakadu have higher marginal value productivities for the two variables—the cost of tillage practices and plant protection—while the orchards in Cheranmahadevi have higher marginal value productivities for the variables of human labour, age of the orchard, and number of bearing trees. There is a structural difference in the production relationship between the two taluks, as evidenced by Chow's test, and the examination of marginal value productivity generally indicates the possibility of further boosting inputs while retaining profitability. On both taluks, it was discovered that the marginal value productivities of all factor inputs were positive. According to this, there might be an opportunity to raise input levels while still turning a profit.

Key words : Banana cultivation, value-addition, commercial products, nutritional value, structural difference.

*Assistant Professor

The majority of the bananas farmed in India, the world's leading grower, are consumed locally. While Cavendish cultivars account for more than half of India's banana production, the country's main growing states are in the northeast and south. In terms of area and production, India is in the top place, growing on over 4,90,700 hectares and producing 168,13,500 mt annually, or almost 17% of global production. Maharashtra is the state that produces the most bananas, with Tamil Nadu having the most area under cultivation. But Maharashtra is the most productive state, followed by Madhya Pradesh and Tamil Nadu. The principal banana-growing districts in Tamil Nadu are Kanyakumari, Erode, Coimbatore, Trichy, Tirunelveli, and Tuticorin[6].

Prior to separation, the Tirunelveli district cultivates bananas on 5728 hectares of land; the planting season runs primarily from April to May. Bananas are low in iron and vitamin A but high in potassium, magnesium, copper, manganese, and vitamin C. Wall, M.M. (2006)[16]. A third of the three fruits, bananas, are cultivated throughout the state. The most popular food in the state, bananas, are enjoyed year-round and come in a variety of forms[2]. In 2005–06, the districts of Thoothukudi, Tiruchirapalli, Coimbatore, Erode, Tirunelveli, Kanyakumari, Vellore, and Thanjavur collectively accounted for 60.2% of the total area planted to this crop[14].

Adding value and processing are essential to raising farmers' incomes. Regrettably, a dearth of information regarding the advantages of banana processing results from the underreporting of relevant research. Bananas, in their dried form, are utilised as a raw material for many commercial products, such as functional meals and as a softening and binding agent. Also, they are directly consumed everywhere in the world[4]. In Tami Nadu, a wide variety of bananas are grown in various locations. Robusta, Red Banana, Poovan, Rasthali, Nendran, Monthan, Karpuravalli, Sakkai, Peyan, and Matti are a few of them.

This fruit receives significant profits for the growers during festival seasons[3]. Since the Nendren cultivar is used to make both chips and banana powder, it is often preferred by consumers. Over time, the country had received a slightly rising signal from the area and output of bananas[1]. Among fruit crops, bananas are the most produced and occupy the third most area in India. It makes up 33% of the overall fruit production and 13% of the entire area. Maharashtra has the most production, followed by Tamil Nadu[13].

Bananas are the fourth most significant crop in the world, after main cereals, according to the United Nations Food and Agriculture Organisation[5]. Worldwide, Indian banana varieties are favoured for their potent fragrance, deeper peel colour, mouthwatering flavour, and abundant nutritional value[8]. Bananas are climacteric fruits, meaning they ripen gradually and slowly even after harvest. The dealers frequently utilise smoking treatments to accelerate and stimulate the ripening process. The ethylene gas that causes ripening is released when the temperature within the smoking chamber rises[12]. The ripening phase 10 primarily impacted the plantain chips' quality. Thus, the study's goal was to examine the structural variations in banana output in the Tirunelveli district's Kalakadu and

Cheranmahadevi blocks.

Objectives of the study :

1. To research the structural distinctions between banana farmers in Kalakadu and Cheranmahadevi.

2. To determine the factor inputs' marginal value productivities for banana orchardists.

In the Tirunelveli district's Kalakadu and Cheranmahadevi blocks—which have red sand, red loam, and river alluvium soil types, respectively—a survey was carried out. The study was conducted in Kalakadu, which has 2120 hectares, and Cheranmahadevi, which has 3020 ha. Of the 86 banana producers, 54 use groundwater irrigation. For the survey, seventy farmers were chosen at random from each block and contacted. Out of the 140 banana cultivators, 100 farmers were contacted, comprising 50 small cultivators and 90 large cultivators. A well-structured questionnaire was used to gather data. Data were tabulated and consolidated. The following statistical tools were used to analyse the data: Mean, Percentage Geometric Mean. The research was carried out from April 2023 to March 2024.

Review of literature :

According to Walke *et al*.,[15] 15, 47.33 percent of banana farmers knew a medium amount about growing bananas. According to Marimuthu[9], a significant proportion of the participants possessed advanced expertise in the growing of bananas. Joechin[7] investigated and discovered that 27% of non-adopters indicated input restrictions, 8% reported supply constraints, and 20% reported information constraints.

According to research by Raman, and Umanath,[11], banana farming in Tamil Nadu is a lucrative business since the net returns for Karpooravalli and Poovan bananas are, respectively, Rs. 32793.96 and Rs. 37339.70. For Karpooravalli banana farms, the total cultivation cost was Rs. 140691.04. In contrast, for Poovan banana farms, it was Rs. 123220.30.

The Chow test is used to evaluate the structural differences between banana producers in Cheranmahadevi and Kalakadu, with the results displayed in Table-1.

Table-1. Chow's test for structural difference between Cheranmahadevi and Kalakadu farmers

Σe^2	Σe_1^2	Σe_2^2	$n_1 + n_2 - 2K$	F	F(6,203) at 1 percent level	Inference
0.2741	0.1814	0.0311	203	5.81	1.76	A structural difference exists between Cheran-mahadevi and Kalakadu farmers.

Source: Computed from Survey Data.

The computed values of F in Table-1 are 5.81, and the table value of F at the one percent significance level is 1.76. The computed number, which is less than the table value at the 1% level, suggests that the farmers in Kalakadu and Cheranmahadevi have different farming practices when it comes to banana growing.

Test of stability :

Dummy variables were added at the slope and intercept levels to determine whether structural differences between the farmers of Cheranmahadevi and Kalakadu existed at these levels. The results of the analysis are shown in Table-2.

Table-2. Test of the stability of intercept and slope between Cheranmahadevi and Kalakadu farmers producing Banana cultivation

Variables	Parameter estimates
Intercept (a0)	1.8342
Intercept dummy (a1D)	0.0539 (0.0276)
Log x_1	0.1183 (0.4795)
Log x_2	0.0386 (1.0119)
Log x_3	0.1034* (2.1537)
Log x_4	0.1167* (1.6894)
Log x_5	0.1017 (0.0357)
D log x_1	-0.0116 (-0.0137)
D log x_2	0.0031 (0.0019)
D log x_3	0.1372* (2.3745)
D log x_4	0.1189 (0.1179)
D log x_5	0.1485 (1.0274)
R^2	0.5175
F-value	23.84
Residual sum of squares	0.2107
Number of Observations	140

Note: Figures in parentheses represent t-values. *Suggests that, at the five percentile, the coefficients are statistically significant.

Because of the statistical significance of the intercept dummy variable, there are no structural differences between the farmers of Cheranmahadevi and Kalakadu at the intercept level. On the other hand, when varying inputs were applied, the difference was noted at the slope level. The table shows that every explanatory variable has a favourable effect on yield for farmers in Cheranmahadevi. Manure, mechanical power, and variables were shown to be statistically significant at the 5% level. A one percent increase in the variable inputs will result in a corresponding yield increase of 0539, 0.1183, 0.0386, 0.1034, 0.1167, and 0.1017 percent.

Mechanical power is the structural reason for the disparity between the farmers of Cheranmahadevi and Kalakadu. For Cheranmahadevi farmers, an increase of 1% in mechanical power could increase the yield by approximately 0.0381 percent. For farmers in Kalakadu, a 1% increase in variable input mechanical power results in a 0.1406% yield increase. According to the analysis's findings, mechanical power was used by banana growers in Kalakadu and Cheranmahadevi, resulting in a production differential. The low production of Cheranmahadevi farmers is a result of their constant reliance on human labour.

Marginal value productivities of the factors:

The addition to gross income resulting from an increase of one unit in the input variable in question is indicated by the marginal value productivity of that input. Table-3 presents the marginal value productivities that were calculated using the input variable formula.

Table-3. Marginal value productivities of the factor inputs at the Geometric Mean level

Variables	Cheranmahadevi	Kalakadu
Human labour	8.01	7.33
Cost of tillage practices	4.37	5.54
Plant protection	8.92	10.22
Age of the orchard	831.96	275.18
Number of bearing trees	141.54	101.03

Source: Computed from Survey Data.

According to Table 3 above, in both the Cheranmahadevi and Kalakadu blocks, the marginal value of all factor products input was positive. It suggests that adding another unit to these variables could increase income. When the marginal productivities of inputs are compared between orchards in Cheranmahadevi and Kalakadu, it can be seen that the orchards in Cheranmahadevi have higher marginal value productivities than those in Kalakadu. However, the orchards in Kalakadu have higher marginal value productivities of the two other variables—the cost of tillage practices and plant protection—than those in Cheranmahadevi. The analysis of marginal value productivity generally shows the potential for more profitably increasing inputs.

The marginal value products of the input variables are compared with the corresponding factor costs in order to assess the efficiency of resource usage. The equality of marginal value product to factor cost is the fundamental requirement that must be met in order to achieve efficient resource usage. The calculation of resource usage efficiency has only taken into account variables that can be controlled, like labour force, tillage techniques, and plant protection. The age of the orchard and the quantity of bearing trees provide conceptual issues. Therefore, factor inputs such as labour from humans, tillage techniques, and plant protection alone have been taken into account when analysing resource-use efficiency.

The cost of labour was determined using the man-day rate that prevailed in the Kalakadu and Cheranmahadevi blocks throughout the study period, which was Rs. 185 and Rs. 328, respectively. The cost of bullock labour per pair per day in the Cheranmahadevi and Kalakadu blocks, respectively, has been factored in when calculating the cost of tillage methods. This cost is Rs. 320 per pair per day. The amount that the orchardists actually paid for plant protection was taken into account. The ratios of the factor input costs to the corresponding marginal value products are displayed in Table-4.

Table-4 above shows that in both blocks, the factor price ratio and marginal value productivity of plant protection are more than unity. It suggests that the plant protection practices used by the banana orchardists in both blocks are reasonable. The ratio of the marginal value productivity of the two variables—human labour and the cost of tillage practices—to their cost is smaller than unity

Table-4. Ratios of marginal value products to factor costs

Blocks	Ratios of marginal value products to factor cost		
	Human labour	Tillage Cost of Practices	Plant Production
Cheranmahadevi	0.31	0.14	8.24
Kalakadu	0.45	0.16	10..76

Source: Computed from Survey Data.

in both blocks when it comes to the other variable inputs. It suggests that the orchardists in these blocks are not making the best use of these variables. When two blocks, Cheranmahadevi and Kalakadu, are compared, it is discovered that Kalakadu orchardists employ all three input elements more rationally than Cheranmahadevi orchardists.

Chow's test findings showed that there are structural differences between the two taluks' production relations. All factor inputs' marginal value productivities were found to be positive on both taluks in terms of marginal value productivity. As a result, it suggested that there was room to increase input more while still making money.

When opposed to selling raw bananas, small-scale banana-based businesses can make more money by implementing value-added farming strategies. This could aid the farmers in the Tirunelveli district's Cheranmahadevi and Kalakadu orchardists' financial circumstances. These training programs provide farmers with the assurance to keep processed bananas for extended periods and offer year-round processed food options to consumers, such as banana fig, powder, squash, Nutri mix, and pickles. Engaging in the food processing industry might help farmers lower their marketing risks when business is slow.

In the realm of banana agribusiness, farmers require information and financial help from the government and other partners. To improve farming, farmers should get training and awareness programs from the agricultural department officials. It is possible to implement new strategies and tactics to enhance banana production. To lower unemployment, educated individuals should focus on the agriculture sector as well. Although commission agents' roles cannot be completely removed, they should be reduced. Thus, it can be said that the development of the rural population has benefited from the production and marketing of bananas.

Conflicts of Interest

The author does not have any conflict of interest.

References :

1. Agarwal, P.K., P. Yadav and S. Mandal (2018). *Comparative International Journal of Agriculture Sciences, 10* (8): 5890-5893.
2. Amutha D. (2015). *Journal of Social Welfare and Management,* p-ISSN 0975-0231e-ISSN 24560871, *7*(2): 67-71.
3. Amutha, D. (2014). *International Journal of Economics and Management Sciences, 3:* 203. https://doi.org/10.4172/2162-6359.1000203.

4. Amutha, D., (2011). *International Journal of Bioresource and Stress Management, 2*(2): 159-162.
5. FAO (Food and Agricultural Organization). (2004). Production Yearbook 2003, Rome, Italy.
6. https://simplicity.in/app/farming-detail.php?id=3218
7. Joechin. Adoption of superior banana varieties in the Kagera region: Accomplishments and constraints. 2003
8. Kudachikar V, S Kulkarni, K Prakash, and M.Vasantha (2007). *Journal of Food Science and Technology (India) 44*(1): 112114.
9. Marimuthu, P. (1998). Marketing Behaviour of Banana Growers. Unpub. M.SC. (Ag.) thesis, AC & Rl, TNAU, Madurai.
10. Onyejegbu CA, and AO. Olorunda (1995). *Journal of the Science of Food and Agriculture 68*(3): 279-283.
11. Raman, M.S. and M. Umanath, (2016). *International Research Journal of Agricultural Economics and Statistics, 7*(1): 67-75.
12. Ranaweera S, A Ampemohotti, and US. Arachchige (2020). *International Journal of Scientific & Technology Research 9*(3): 4395-4401.
13. Sathiya R, M Naveen Kumar, S Senthilnathan, S Grunathan, M Nirmala Devi, and V Banumathy, *et al*. (2022). *Int J Plant Soil Sci. 34*(20): 592-598.
14. Season and Crop Report of Tamil Nadu, 2005-06.
15. Walke P K, S D Wangikar and A C Rout (1995). *Maharashtra Journal of Extension Education 14:* 201-04.
16. Wall, M.M. (2006). *J Food Compos. Anal. 19*(5): 434–445.