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ECONOMIC FEASIBILITY OF THE INVESTMENT ON MANGO ORCHARDS – A STUDY IN CHITTOOR DISTRICT

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ABSTRACT

India is the leading producer of more than one thousand varieties Mangoes that are unique in taste and aroma, accounting for more than 50 per cent of Mango production worldwide, but only 2 per cent of its production is exported. Other major Mango producing countries, like Mexico, Brazil, and Pakistan, export much higher quantity of their production contributing to their international trade. The reason may be that small farmers own the majority of India's Mango gardens, and some 72 per cent of the farms are less than three hectares. The other reason may also be that nearly 15 per cent of India's Mango production is wasted due to lack of adequate infrastructure facilities. In addition, India's Mangoes exportation also suffer from other factors such as heterogeneous quality and phytosanitary issues due to lack of adequate post-harvest operations. Indian farmers are not properly informed about internationally practiced post-harvest operations for Mangoes, which result in not only heavy post-harvest wastage but also low level of price realization in international markets. Besides being a rich source of nutrients, cultivation of mangoes brings higher income to the farmers. It is possible to have value addition through processing, which in turn, offers vast opportunities for employment and income generation. The processing of mango fresh fruits into pulp is an important agribusiness in Chittoor district and hence the Agri-export zone is located in this district for exporting mango pulp and fresh vegetables. Five major markets in the district Viz. Puthur, Tirupati, Damalcheruvu, Chittoor and Bangarupalyam, more than 60 mango pulp processing units established in the district.

Key Words: ***Mango – Production - Economic - Feasibility - Investment - Mango - Orchards- Profit- Net Present Value- IRR***

INTRODUCTION

India ranks first among world's mango producing countries accounting for about 50 per cent of the world's mango production. Other major mango producing countries include China, Thailand, Mexico, Pakistan,

Philippines, Indonesia, Brazil, Nigeria and Egypt. In 2008-2009, Asia, specifically India, was the largest producer of mangoes, accounting for 74 per cent of world's production by volume, with Latin America and the Caribbean at 16 per cent and Africa producing 10 per cent. The United States and European Union together accounted for 75 per cent of world mango imports. In 2009, based on growing demand, the United States Department of Agriculture predicted that US mango imports would grow nearly by 7 per cent touching 450,000 tons by 2010, a figure that will likely not be attained due to a combination of factors in producing countries, including weather. Worldwide production is mostly concentrated in Asia, accounting for 75 per cent followed by South and Northern America with about 10 per cent share. In India the major producing States are Andhra Pradesh, Bihar, Gujarat, Karnataka, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal. Important commercial varieties of mango grown in Andhra Pradesh are Banganapalli, Suvarnarekha, Neelum and Totapuri. Andhra Pradesh continued to be the leading mango producing state by accounting for 21.6 per cent of the area and 24.4 per cent of the production of mango (2009-10) in the country. It was followed by Uttar Pradesh. Other States where mangoes are grown include Madhya Pradesh, Kerala, Haryana, Punjab.

NEED FOR THE STUDY

Besides being a rich source of nutrients, cultivation of mangoes brings higher income to the farmers. It is possible to have value addition through processing, which in turn, offers vast opportunities for employment and income generation. The processing of mango fresh fruits into pulp is an important agribusiness in Chittoor district and hence the Agri-export zone is located in this district for exporting mango pulp and fresh vegetables. So far very few research studies have been attempted to study the economic aspects of mango production and processing in Andhra Pradesh in general and Chittoor district in particular. Hence, the present study was undertaken.

OBJECTIVES

1. to work out costs and returns of the mango orchards.
2. to examine the economic feasibility of the investment on mango orchards.

COLLECTION OF DATA

Primary data were collected from the selected mango growers and processors through survey method with the aid of pre-tested schedule designed for the purpose. Secondary data pertaining to the description and agro-economic aspects of the study area were collected from District Planning office, Chittoor.

TOOLS OF ANALYSIS

The data collected were subjected to conventional analysis and discounted cash flow techniques.

NET PRESENT VALUE

The most important and prominent discounted cash flow measure of project value is net present value. This criterion assesses the present worth of accrued benefits over costs, and ranks the investment for selection among the alternatives as well as to indicate the order of preference to be given. The net present value should be positive to indicate whether the investment is economically feasible and financially viable. It is calculated as:

$$\text{Net present value} = \sum_{t=1}^{n} B^t - C^t / (1+i)^t$$

Where,

B_t= Benefits in the t^{th} year.

C_t=Costs in the t^{th} year.

i= Discount rate

n= Life of the project

Profitability index (PI)

The NPV of the cash flows of the mango orchard was related to the total capital required for a mango orchard through profitability index. It is defined as the ratio of net present values of the cash flows to the initial capital expenditure. Assuming all the capital expenditure is incurred in year zero.

$$PI = NPV/C^0 = 1/C^0 \sum_{t=0}^{n} C^r/(1+i)^t$$

where,

C_r = Cash flows of mango orchard in t^{th} year.

PI= Profitability index

NPV= Net present value of cash flows.

C_0= Initial amount invested in mango orchard.

t= Number of years.

INTERNAL RATE OF RETURN

It represents the average earning capacity of an investment over the economic life period of the mango orchard. It is that discounted rate which just makes the net present value of cash flow equal to zero. In other words, the benefit cost ratio calculated at IRR is unity. Mathematically it can be represented as:

$$IRR = \sum_{t=0}^{n} B^t - C^t / (1+i)^t = 0 \quad t \square 1$$

where,

n= Life of the project

I=Discounted rate

B_t= Benefits in rupees in t^{th} year

C_t=Costs in rupees for t^{th} year

The IRR is arrived at through interpolation techniques by using different discount rates so as to see that the net present value is equated to zero. Therefore, the production costs and benefits are discounted at certain rate to find out the present value of the mango orchard. Again by selecting a higher discount rate, the costs and returns are discounted throughout the economic life period of mango orchard to get a negative net present value. The higher value of IRR indicates the first, while lowest value being the last choice of preference. However, the IRR should be more than the discount rate being considered for economic feasibility and financial viability.

IRR=lowest discount rate + difference between two discount rates (Present worth at lowest discount rate / absolute difference between discount rate)

If the calculated IRR is greater than the market rate of interest, then the investment is considered to be economically viable and financially feasible.

COST STRUCTURE ON MANGO ORCHARD

The profitability of an enterprise mostly depends on the relation between the costs incurred in running the enterprise and the returns obtained from it. The study of costs and returns on mango cultivation helps the farmers to plan future mango production programmes with a view to maximise net profits by adopting efficient resource management practices. Therefore, an attempt is made to analyse the economics of mango farming by estimating the costs and returns on the selected mango farms.

The costs involved in mango cultivation are classified into establishment costs and maintenance costs. Since mango is a perennial crop and it comes to bearing only after 5 years, all the expenses incurred in establishing the orchard right from raising the orchard as well as costs incurred to maintain the same till it came to bearing were considered as establishment costs (pre-bearing costs). Maintenance costs included the costs incurred to maintain the orchard from 6th year up to the life of the orchard (40 years).

Cost of cultivation of mango during first year of pre-bearing period

The details of establishment costs in the first year of mango orchard per hectare are presented in Table 1

The total costs incurred during first year of mango cultivation amounted to Rs. 60,059.52 out of which operational costs and fixed costs worked to Rs. 45,341.52(75.49 per cent) and Rs.14,718.00 (24.50 per cent) respectively.

It can be seen that among operational costs the labour charges formed the major item with Rs. 23,257.5 (38.72 per cent). The operations such as land preparation, digging of pits, planting and watering required more human labour, hence the higher expenditure.

Next to labour charges, cost of plant material formed the major item of operational expenditure which worked out to Rs.11,480 (19.11 per cent) followed by interest on working capital (8.08 per cent), manures and fertilizers (3.34 per cent) and transportation (2.99 per cent). The farmer

Table -1. Cost structure on mango orchard per hectare (1st year)

Sl. No	Particulars	Costs (in Rs)	Percentage to total
1	Operational costs		
	a) Human labour	23,257.50	38.72
	Owned	27,31.5	4.54
	Hired	20,526.00	34.17
	b) Bullock labour	750	1.24

	Owned	250	0.41
	Hired	500	0.83
	c) Machine labour	800	1.33
	Owned	400	0.66
	Hired	400	0.66
	d) Plant material	11,480	19.11
	e) Manures and fertilizers	2,008	3.34
	f) Plant protection chemicals	208	0.34
	g) Electricity charges	180	0.29
	h) Transportation	1,800	2.99
	i) Interest on working capital	4,858.02	8.08
	Total operational costs	45,341.52	75.49
2	Fixed costs		
	a) Depreciation	750	1.24
	b) Land revenue	180	0.29
	c) Rental value of owned land	12,450	20.72
	d) Interest on fixed capital	1,338	2.22
	Total fixed costs	14,718.00	24.5
	Total costs	60,059.52	100

procured plant material from Tirupati, Puttur and other nearby private agencies. The cost of each plant ranged from Rs.60 to Rs.80 and it depended on variety.

Machine labour was used for land preparation for raising the orchard. No bullock labour was used for land preparation because it was difficult to remove deep rooted weeds from soil with bullock labour. The other reason was most of the mango orchards were extended over a large area. Hence for speedy and efficient operation, machine labour was used.

Among the fixed costs, rental value of owned land formed the major item of total costs amounting to Rs.12, 450 (20.72 per cent) followed by interest on fixed capital (2.22 per cent), depreciation charges (1.24 per cent) and land revenue (0.29 per cent).

Cost of Cultivation of Mango from 2nd to 5th year of pre bearing period

The total costs incurred from 2nd to 5th year were Rs. 10, 7497.43. Costs incurred towards human labour during 2nd, 3rd, 4th and 5th year were Rs.5824.5 (22.75 per cent), Rs.5550.00 (21.87 per cent), Rs.4006.5 (16.64 per cent) and Rs.8748.00 (26.95 per cent) respectively. Costs incurred towards human labour were low in 4th year. More labour was required for watering the plants. As the plants grew up watering the plants gradually decreased. Most of the farmers cut down the application of irrigation from 4th year onwards. In 5th year the expenditure on human labour was again on the increasing side. It was mainly due to commencement of the bearing and consequent labour requirement for harvesting the fruits. Plant protection measures were initiated by the farmers from 5th year as the orchard started bearing. As the age of the orchard increased more labour was needed for weeding. All these led to more human labour requirement in 5th year over 4th year.

Costs incurred towards bullock labour during 2nd to 5th year ranged from Rs 400 to Rs.500. Bullock labour was used for transportation of manures. It is also clear that machine labour was used from 5th year onwards which amounted to Rs.2400 accounting for 2.23 per cent of total costs. Machine labour was used for inter cultivation to keep orchard weed free and to facilitate rain water percolation. Inter cultivation was taken up from 5th year only. Till then the inter crops were grown in the mango orchard. 4.54 per cent of total costs were incurred towards manures and fertilizers. Plant protection chemicals were applied from 2nd year onwards and the expenditure on which came to Rs1593 (1.48 per cent).

As the bearing started with small output from 5th year onwards, transportation costs were incurred which worked out to Rs.3720 (3.46 per cent). About 2.54 per cent of total costs were incurred towards watch and ward

during 5th year. No watch and ward were under practice upto 4th year, while the orchard was in pre bearing period.

The results also revealed that the fixed costs accounted for 56.78 per cent of total costs. Major part of fixed cost was rental value of owned land which worked out to Rs.51, 774 (48.16 per cent) followed by interest on fixed capital 5.16 per cent, depreciation 2.79 per cent and land revenue 0.66 per cent respectively. Among the total costs during four years (2nd costs amounted to Rs.61,043.4 (56.78 per cent) Rs.46,454.03 (43.21 per cent).

COSTS AND RETURN FROM INTERCROPS

During the first year of mango orchard as the plants are small, in order to allow them to establish well no intercrops were taken. From 2nd to 4th year intercrops were taken by farmers. Groundnut, green gram, horse gram and cowpea were grown as intercrops. The per hectare cost of cultivation of intercrops, gross and net income were given in Table -2

Table -2. Costs and returns from intercrops per hectare

(Value in Rs)

Particulars	2nd year (in Rs)	3rd year (in Rs)	4th year (in Rs)
1.Total Costs	25599	25367.24	24074.95
2. Gross income	36400	31200	28600
3. Net income	10801	5832.76	4525.05

Returns on mango orchard from 5th to 10th year

Mango grafts commence bearing from 5th year onwards. Earlier, stray fruits may appear on the tree but it is advisable not to allow them to mature. Good yields are obtained from 7th year onwards. Flower bud initiation take place after cessation of rains in October and November and flowering occurs during dry months (December to February). Yields are obtained on commercial scale from 15th year and may continue till 40th

year.

The per hectare yields on mango orchard from 5th to 10 year are presented in Table -3

During 5th year a hectare of mango orchard yielded 1.82 tonnes. As the age of the orchards increased, the yield also increased to 7.24 tonnes during 10th year.

The gross return from the orchard ranged from Rs 21,840 during 5th year to Rs 86,880 in 10th year. The net return ranged from Rs -10,616.24 to Rs 49,715.91.

Table- 3 Returns on mango orchard per hectare (5th to 10th year)

(Value in Rs)

Particulars	5	6	7	8	9	10
1. Yield (tonnes)	1.82	2.78	3.76	5.72	5.81	7.24
2. Gross returns	21840	33360	45120	68640	69720	86880
3. Total costs	32456.24	34679.6	35089	35459	36441.1	37164.1
4. Net returns	-10616.2	-1319.56	10031	33182	33278.9	49715.9

Table 4 Estimate of economic viability of mango orchard

Sl. No	Particulars	12%	15%	20%
1.	Net present value (Rs)	2,64,105.42	1,31,992.95	33,043.89
2.	Benefit-cost ratio	1.77	1.48	1.15
3.	Profitability index	2.93	1.46	0.3669
4.	IRR (%)	23.17	-	-

Net Present Value

It was observed from the table that the net present value was as high as Rs.2, 64,105.42 at 12 per cent and Rs.33, 043.89 at 20 per cent discount rates. The high positive NPV even at higher discount rates indicated the soundness of the investment in mango cultivation.

Benefit-Cost Ratio

The benefit cost ratios for mango orchard worked out to 1.77 at 12 per cent discount rate and 1.15 at 20 per cent discount rate. These values proved that the investment on mango cultivation was economically feasible.

Profitability index

The estimated profitability index of mango orchard was 2.93 at 12 per cent and 0.3669 at 20 per cent discount rates respectively.

Internal Rate of Return

The IRR in the mango cultivation was found to be 23.17 per cent indicating the favourable nature of returns and was also higher than the borrowed rate of interest i.e., 15 per cent.

CONCLUSIONS

The following conclusions emerged from the present study:

1. Most of the mango growers were large farmers whose involvement in farm operations was less.
2. In human labour utilization major share was taken by harvesting followed by watch and ward.
3. Most of the recommended packages of practices were not adopted by the mango growers in the study area.
4. The discounted techniques used to know the feasibility of the mango project even at a higher discount rate of 20 per cent indicated the feasibility of investment in mango orchard.

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