AN ECONOMIC ANALYSIS OF PRODUCTION, PROCESSING AND MARKETING OF CASHEW IN PUDUKKOTTAI DISTRICT OF TAMILNADU

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I.D.No. 09-601-105

Thesis submitted in part fulfillment of the requirements for the degree of MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS to the Tamil Nadu Agricultural University, Coimbatore.

DEPARTMENT OF AGRICULTURAL ECONOMICS
AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE
TAMIL NADU AGRICULTURAL UNIVERSITY
MADURAI – 625 104

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CERTIFICATE

This is to certify that the thesis entitled **"AN ECONOMIC ANALYSIS OF PRODUCTION, PROCESSING AND MARKETING OF CASHEW IN PUDUKKOTTAI DISTRICT OF TAMIL NADU"** submitted in part fulfillment of the requirements for the degree of **MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS** to the Tamil Nadu Agricultural University, Coimbatore is a record of *bonafide* research work carried out by **Ms. S.VINOTH KUMAR** under my supervision and guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journal or magazine.

Place: Madurai
Date:

Dr. B.PARTHIPAN
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EXTERNAL EXAMINER

ACKNOWLEDGEMENT

Words seem to be inadequate to express my indebtedness surging in me towards my beloved parents, ***Mr. K.Subbaiah*** *and* ***Mrs. S.Rajathi,*** *and my sisters* ***Nithiya*** *and* ***Renuka*** *who extended their kind support to finish my course with great success.*

I wish to avail the opportunity and place on record the personal indebtedness and deep sense of gratitude to my benignant Chairperson, ***Dr. B. Parthipan,*** *Professor of Agricultural Economics, Department of Agricultural Economics, Agricultural College and Research Institute, Madurai for his learned and expertised counsel, meticulous guidance, incisive comments, great help and constant encouragement throughout the tenure of this research. Under his supervision, I felt a sense of comfortness, which accelerated the pace of my work and enabled me to complete it successfully.*

I am delighted to acknowledge the help rendered by the members of the advisory committee, ***Dr.A.Danial Visvasam Samuvel ,*** *Professor and Head, Department of Agricultural Economics and* ***Dr. M. R. Duraisamy,*** *Associate Professor of Mathematics, Department of Family Resource Management, who have rendered, valuable suggestions, criticism and guidance throughout my research works.*

I extend my heartful thanks to ***Dr. J. S. Amarnath,*** *Professor,* ***Dr.T.Alagumani,*** *Professor,* ***Dr. R. Rajesh,*** *Professor,* ***Dr. K. P. Dhamu,*** *Professor,* ***Mr. K. Prabakaran,*** *Assistant Professor,* ***Mrs. B. Sivasankari,*** *Assistant Professor,* ***Mrs. P. Prema,*** *Assistant Professor, Department of Agricultural Economics for their help throughout the course of this investigation.*

I thank the other teaching and non-teaching staff members of the Department of Agricultural Economics, Madurai especially ***Malaiveeran, Senthil*** *and* ***Rajkumar*** *for their help and co-operation during my entire study.*

I express my heartfelt thanks to the officials of ADA's office, Gandarvakkottai and ***Mr.Yelumalai****, Horticulture Officer for identifying the villages and farmers and my special thanks to my contact farmers* ***Mr. Franklin*** *and* ***Mr. Sampathkumar*** *for collecting required data and information for this study. I express my sincere thanks to respondent farmers and market intermediaries for their co-operation by providing the required information for my study.*

Words cannot express what I owe to my seniors, ***karthick, Arivu, Sarav, Thangadurai ,Murali ,Mani, Ramesh, Kannan ,Janaki*** *and my class mates's* ***komagal, saru, narmatha*** *and* ***Mohana*** *for their constant inspiration and useful suggestions and help during my research work.*

My special thanks to my friends ***Veera, Sakthi, Bala, Siva, Mahi, Sathish, Seyal, Ram, Kavi*** *and juniors* ***Laxmanan, Muthu pandi, Raman, Sridhar and Thulasi raman*** *for their constant help and moral support during the entire course of the study.*

Words are ineffable to express profound sense of gratitude to my UG friends ***Karthi, Poonthamilan, Yuva, Naveen, Kutty and Raj*** *for their affection, care, moral support, encouragement and timely help throughout the postgraduate study.*

Finally, I thank the ***Almighty*** *who has given me courage, patience and persistence to complete my thesis.*

(S.VINOTHKUMAR)

ABSTRACT

AN ECONOMIC ANALYSIS OF PRODUCTION, PROCESSING AND MARKETING OF CASHEW IN PUDUKKOTTAI DISTRICT OF TAMIL NADU

By

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Degree : **MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS**

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Cashew is one of the most valuable processed nuts traded on the global commodity markets and is also an important cash crop. It has the potential to provide source of livelihood for the cashew growers, empower rural women in the processing sector, create employment opportunities and generate foreign exchange through exports. During 2008-09, cashew covered an area of 8.93 lakh hectares in the country with a production of 6.95 lakh tons. Thus India's share in cashew area is about 22 per cent of total global area. The average yield in India is around 1.5 kg nuts per tree. In view of the economic importance of cashew the present study was taken up with the following specific objectives. To find out the costs and returns of the cashew cultivation, to study the resource use efficiency in cashew farms, to study the economics of cashew processing, to study the price spread and marketing efficiency in different marketing channels and to identify the constraints in production of cashew and suggest suitable policy measures.

This study was conducted in Pudukkottai district. The sample included 100 farmers, 40 intermediaries and five cashew processors. The collected data were analysed by adopting average and percentage analyses, investment analysis and Cobb- Douglas production function. The following findings and policy implications emerged from the study.

The establishment cost in cashew orchards are classified into investment cost and maintenance cost. The per hectare total cost of establishment was Rs.1,42,155.11 for the orchard in this region. The investment cost in the total establishment cost was Rs.51,011.90 while the maintenance cost for four years was Rs.91,143.19. The maintenance in the four years period increased from Rs.21,503.76 to Rs. 24,131.75.

The total average annual cost incurred by the farmer in cultivation of one hectare of the orchard during the bearing period was Rs.29,115.2, of which variable cost accounted for Rs. 20,174.15 per ha constituting 69.29 per cent and total fixed cost accounted for Rs. 8,941.05 per ha constituting of 30.21 per cent of total maintenance cost respectively. The average use of labour per ha was amounted Rs.14,166.49 which formed of 48.66 per cent of total cultivation cost during the bearing period.

The average yield of cashewnut obtained from the sample farmer worked out to 1,854.71 kg per hectare and return was Rs.67,389.35 per hectare and cost of production was Rs.34.71 per kg. The net income was Rs.38,274.15 per hectare.

The positive value of NPV, BCR of greater than one and IRR of more than current bank rate revealed the financial feasibility of cashew processing unit.

The results of Cobb-Douglas production function showed that age of the plantation was positive and significant at one per cent level of significance. The coefficients of human labour and plant protection chemicals were observed to be positive and statistically significant at one and five per cent level of significance. The ratios of MVP to MFC were positive and greater than one for human labour and plant protection chemical indicating that still there is scope to these inputs to increase the yield of cashew.

The total establishment cost of cashew processing unit was Rs.31.3 lakhs. Cost of processing machines and accessories alone accounted for 43.13 per cent of total establishment cost.

The total variable cost of cashew processing unit was worked out 89.14 per cent to the total annual processing cost. The total fixed cost required for cashew processing unit was Rs.10.21 lakh which accounted for 10.86 per cent. The total annual processing cost was Rs.94.00 lakh. The gross return was Rs.120.2 lakh and net return was Rs.26.20 lakh after deducting the total cost.

The total cost of cashew processing for one quintal of raw cashew nut was Rs.6991.6. The total variable cost of cashew processing was Rs.5585.78 per quintal. The cost of raw materials was the important cost component of the variable cost which accounted for 61.51 per cent of total variable cost. The fixed cost works out to be Rs.1405.28 per quintal. Salaries of permanent staff had major share in fixed cost accounting for 3.59 per cent followed by maintenance and repair cost accounted 3.00 per cent.

The sample processors obtained a total 23.6 kg of processed kernels, 50.8 kg of shells and 3.4 kg of husk from one quintal. The main products were sold to traders at Rs.300.67 per kg of kernels. The shells were sold to the CNSL units at Rs. 6.5 per kg. Overall gross return received from per quintal was Rs.7,466.81

Four channels were identified and preferences of producer for different channels were assessed in the study area. From the analysis of price spread the marketing Channel IV (Farmer → Processor→ Retailer →Consumer) observed as most efficient channel as the producers receive 43.34 per cent of the consumer rupee which is highest among all the channels. The marketing efficiency was higher in channel-IV (1.72) because less intermediaries involved in channel- IV followed by market intermediaries in the channel-III (1.59), channel-II (1.51).

The most important constraints identified by the cashew producers were labour shortage. Higher price fluctuation and lack of storage facility were important marketing constraints expressed by the sample farmers. Some of the policy implications drawn from the study were the cashew crop was found to be more profitable. Hence efforts should be taken by Agriculture Department to bring more area under cashew cultivation in Pudukkottai district. There was no contract farming arrangements for cashew cultivation in the study area, as cashew has not developed into organised plantation. Contract farming can evade middlemen between the farmers and the processors and ensure adequate prices to cashew farmers. Cashew is the only major plantation crop that is not regulated by an autonomous board. A separate cashew development board may be set up so as to enhance the cultivation of raw nuts and increase production and export of cashew kernels.

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CHAPTER I

INTRODUCTION

Cashew (*Anacardium occidentale L.*), often referred to as 'wonder nut', is one of the most valuable processed nuts traded on the global commodity markets and is also an important cash crop. It has the potential to provide source of livelihood for the cashew growers, empower rural women in the processing sector, create employment opportunities and generate foreign exchange through exports.

Cashew tree is believed to be a native of Brazil, from where it has dispersed to different parts of the world primarily for soil conservation, afforestation and wasteland development.

Cashew is cultivated mainly in the Asian, African and Latin American zones. The Asiatic zone includes India and Vietnam as the major producers, besides Indonesia, Philippines, Malaysia, Thailand and Sri Lanka. In the African zone, Nigeria, Côte d'Ivoire and Tanzania are the major producers, besides other countries like Benin, Guinea Bissau, Mozambique, Ghana, Senegal and Madagascar. The primary producers in the Latin American zone are Brazil,Columbia, Costa Rica, Honduras and Salvador.

World Cashew Scenario

Cashew is mainly cultivated in Asia, Africa and Latin America. Country-wise area of harvested under cashew indicates that although the share of India has declined from 27.76 per cent in 1991 to 21.6 per cent in 2007, India continues to have the maximum area (8.54 lakh ha) under cashew in the world followed by Brazil (18.5%) and Côte d'Ivoire (16.7%) in 2007. Vietnam topped global production with 12.07 lakh tonnes, followed by Nigeria (6.60 lakh tonnes), India (6.20 lakh tonnes), Côte d'Ivoire (2.80 lakh tonnes), Indonesia (1.46 lakh tonnes) and Brazil (1.40 lakh tonnes) during 2007(Appendix I). However, in terms of area, Vietnam was at the sixth position. The yield per hectare in India was 860 kg during 2007-08 as compared to 4125 kg/ha in Vietnam and 2000 kg/ha in Nigeria. Major reasons attributing to low productivity in the country were planting of cashew in marginal and poor fertile land, non- adoption of recommended package of practices and pest infestation (Fig.1.1.).

Indian Cashew Scenario

In India, the Portuguese introduced cashew in the Malabar Coast in the 16th century. The Malabar Coast served as a locus of dispersal to other centers in the country and South East Asia. As it can adopt to varied agro climatic conditions, it has become a crop of high economy and commercial value. During 2007-08, cashew covered an area of 8.54 lakh hectares in the country with a production of 6.65 lakh MT. in India cashew is grown mainly in Maharashtra, Goa, Karnataka and Kerala along the west coast of India and Tamil Nadu, Andhra Pradesh, Orissa and west Bengal along the east coast. It is also grown to limited extent in Bastar region of Chattisgarh and in plain region of Karnataka. During 2008-09, cashew covered an area of 8.93 lakh hectares in the country with a production of 6.95 lakh tons. Thus India's share in cashew area is about 22 per cent of total global area. The average yield in India is around 1.5 kg nuts per tree. The productivity is below national average (800 kg/ha) in many states such as Karnataka, Andhra Pradesh, Tamil Nadu and West Bengal. At present Maharashtra had the highest cashewnut acreage (170 thousand hectares) and also ranks first in production, with 225 thousand tons in 2008-09 (Appendix II). Andhra Pradesh accounted for 21 per cent of area and 16 per cent of the production. Tamil Nadu ranked fourth with respect to area and production of raw cashew nut in 2008-09. The output of raw cashewnut in Kerala during 2008-09 was 75 thousand tons. Maharashtra and Kerala states had the higher yield levels compare to other states. The processing and exporting activities are largely concentrated in Kerala followed by Tamil Nadu and Karnataka.

Production status of cashew in Tamil Nadu

Tamil Nadu stands in fourth position both in area and production of cashew nut in India during 2008-09 with 68,000 tons of production from an area of 1,31,000 hectares. The productivity of cashew in the state is 700 kg / ha which is less than national average of 800 kg/ha. The productivity is much lower than all other cashew producing states. Among the various cashew growing districts of Tamil Nadu, Perambalur district ranks first in area under cashew cultivation (29 per cent) followed by Cuddalore (25 per cent) and Pudukkottai (9 per cent) (Appendix III). These three districts occupy 63 per cent of total cashew area in Tamil Nadu. At present Cuddalore district had the highest cashewnut production which account for 39 per cent of the total cashew production during in state 2008-09. Cashew in Tamil Nadu is predominantly grown on red laetrite soil, with very little irrigation infrastructure, tanks, the main

source of irrigation, depend on the seasonal rains. Pudukkottai is one of major growing district of Tamil Nadu with an area 12 thousand ha and 8 thousand tons production. It had been a cashew growing region even though there were very few processing industries (Fig.1.2.).

In this region the forest department is a far bigger player in cashew production than individual cultivators. Planting cashew trees on barren land in the state forests is very common in India. Tamil Nadu embarked cashew plantation initially as a soil conservation as measure. The commercial value of these plantations grew in significance when the price of raw cashew shot up over the past decade or so. Since then, the department has floated a separate corporation, Tamil Nadu Plantation Corporation (TOPCON), to deal with commercial cashew and other commercial products.

Processing of cashew nut in India

Processing of nuts is the recovery of kernels from raw nuts by manual or mechanical means. India has been a pioneer in cashew processing. The growing demand for kernels in the world market and the availability of cheap are the favorable factors for rapid growth of processing industry in the country. Though mechanization is introduced in cashew processing, the availability of skilled labour and cheap labour in India and better quality of cashew kernels under manual processing, limit the scope for extensive mechanization, Factories in general, have mechanization in roasting or boiling and packing, in the process like shelling, peeling and manual grading were labour is employed works.

Demand and domestic supply of raw nuts in India

The domestic raw nuts production was only 5.73 lakh tonnes. Even during 2007-08, the domestic production was 6.65 lakh tonnes. These points to the wide gap between the demand and domestic supply of rawnuts. Due to this, the processing industry is highly dependent on imported rawnuts. The share of imported nuts in the total volume of rawnuts processed has increased from 35.65 per cent during 2000-01 to 47.68 per cent during 2007-08 (Appendix IV). There is a need for increasing the domestic production of raw cashew for achieving self sufficiency and ensuring maximum capacity utilization.

Cashew processing units in India

The status of cashew nut processing units in India during 2005-06 is given in Table 1.1. The number of cashew processing units in India has increased rapidly from 170 units in 1959 to 3650 in 2005-06. The cashew processing units are highly localized in Maharashtra with 2200 units.

As may be seen from Table 1.1, Maharashtra has the maximum number of cashew nut processing units (60 per cent) followed by Kerala (11.8 per cent) and Tamil Nadu (11.4 per cent). Orissa had 60 units (1.7 per cent) with a capacity of 11000 MT. The total processing capacity of 3650 units in India 15 lakh tonnes out of which only 11.38 lakh tonnes (76 per cent) was utilized. In Kerala, there were 432 processing units with a total installed capacity of 7 lakh tonnes. The utilization level in Orissa and Tamil Nadu was 100 and 91.8 per cent respectively.

Table 1.1. Cashew nut processing units in India (2005-06)

('000 MT)

State	Processing units (No.)	Per cent	Capacity	Per cent
Kerala	432	11.8	700	46.70
Karnataka	266	7.3	65	4.30
Goa	45	1.2	21	1.40
Maharashtra	2200	60	20	1.30
Tamil Nadu	417	11.4	565	37.70
Andhra Pradesh	175	4.8	95	6.30
Orissa	60	1.7	11	0.73
Other	55	1.5	23	1.53
Total	**3650**	**100**	**1500**	**100**

Source: Directorate of Cashew nut and Cocoa Development, Cochin**,** 2010.

Nutritional Value of Cashew

Cashew kernels are of high nutritive value. It contains 21 per cent of protein, fat (47%), moisture (5.9 %), carbohydrates (22%), phosphorus (0.45%), calcium (0.05%), iron (5%) for every 100 gm and other mineral elements. Cashew kernel contains 47 per cent fat but 82 per cent of this is unsaturated fatty acid, which lowers the cholesterol level in blood. The most prominent vitamins in cashew are Vitamin A, D and E, which help to assimilate fats and increase the immunity level. Cashew kernel is a rich source of minerals like calcium, phosphorus and

iron. Cashew kernel proteins contain all the essential amino acids such as Arginine, Histidine, Lysine, Tyrosine, Phenylalanine, Cyctine, Methinonine and Valine. Cashew nuts do not add to obesity and help control diabetes. Appendix V gives the nutrients in 100 grams of cashew nut.

Importance of Cashew to Indian Economy

Cashew is primarily an export-oriented commodity and accrued an export earning of Rs. 228890 lakh (cashew kernels) and Rs. 1197 lakh cashew nut shell liquid extraction (CNSL) during 2007-08. Although the share of cashew exports to agricultural exports has declined from 7.08 per cent in 1990-91 to 3.02 per cent in 2007-08 (Appendix VI), its foreign exchange earnings has increased from Rs. 44780 lakh to Rs. 230087 lakh during the same period, indicating a growth of more than five times during the period.

The total export of cashew kernels from India during 2007-08 was 114340 MT valued at Rs 2288 crore. Export earnings from cashew kernels declined by 6.80 per cent during 2007-08 from a year ago. The average unit export price realized during 2007-08 was Rs. 200.18 per kg as against Rs. 207.15 per kg during 2006-07 indicating a decrease of 3.34 percent. This may be due to the appreciation in the value of the rupee. India is the second largest cashew exporter with 29 percent of the world market share in 2007. The major markets of Indian cashew are USA, UK, Japan, Netherlands, Australia, Canada and Middle East countries. Vietnam has emerged as a major competitor to India in international cashew trade. Most cashew kernels exported from India are plain kernels packed in pouch/ tin with net weight of 11.34 kg (25 lb). During 2001-02, the export of roasted and salted kernels from India was 120.56 MT valued at Rs.152.56 lakh. Similarly, Cashew Nut Shell Liquid (CNSL), which is a by-product of the cashew industry, is exported mainly to countries like USA, Korea, Japan and Zimbabwe. The growth rate worked out for the period 1990- 91 to 2007-08 revealed that growth in value terms increased at the rate of 12.46 percent and in terms of quantity it was 11.08 percent. The export of cashew nut shell liquid from India during 2007-08 increased to 7813 tonnes valued at Rs. 1197 lakh as compared to 5589 tonnes valued at Rs. 920 lakh during 2006-07 (Fig.1.3.).

There has been an increase of 129 and 38 per cent in the volume of export of cashew kernels and CNSL respectively during the period 1990-91 to 2007-08 (Appendix VII). The unit value price of CNSL has increased from Rs. 9.82 during 1990-91 to Rs. 15.32 during 2007-08. Realization of good prices would encourage the

production of this by-product. The value of export of cashew kernels has also increased considerably from Rs. 88.67 per kg to Rs. 200.18 per kg during the same period. There has been a decline in the exports during 2005-06 from the country due to the increased availability of cashew in the world market at low prices. The processing industries are forced to depend on imported raw nuts. A total quantity of 605970 MT of raw nuts valued at Rs. 174680 lakh were imported during 2007-08.

Problem focus

Large area under cashew is covered with non- descript genetically inferior seedling progenies. Compared to other plantation crops, cashew is still confined mostly to marginal and poor fertile lands and is considered as a wasteland crop. Moreover, cashew has been considered as 'maintenance free' crop and the recommended package of practices are not followed. All these factors lead to low yield. About 40 per cent of the existing cashew areas have become senile resulting in uneconomic production these plantations generated from indiscreet seedlings are least responsive to the technological packages and have adversely affected the productivity and competitiveness of cashew. Incidence of pests and diseases like tea mosquito, cashew stem and root borer, unsatisfactory drying of raw nuts and inadequate storage of dried nuts have resulted into poor quality of raw nuts produced. The yield loss due to tea mosquito bug infestation ranged between 30 and 50 per cent in different years, while the stem and root borer infestation in neglected plantations ranged around 8 to 10 per cent Poor quality of raw nuts in turn leads to inferior quality of processed kernels.

Shortage of power supply and inadequate skilled labour for processing activities like shelling, drying, etc. becomes a constraint for the processing units.

Working capital is required for purchasing raw cashew nut inventory. Small processors without boilers had constraint in accessing working capital limits from the banks. Access to working capital would induce entrepreneurs to invest in cashew processing facilities.

The quality of the processed kernels is not good, as the small processors do not maintain hygienic conditions in their factories. This affects the marketability of kernels in the international market.

Traders and middlemen dominate the market for raw cashew nuts and kernels. Since procuring raw cashew is the largest component of the operating costs in cashew processing sector, a slight increase in cashew price adversely affects the entire economics of cashew processing. The individual farmers are in a disadvantageous position as they are forced to sell the produce at a price determined by the village traders or leaseholders. Farmers do not use the regulated markets in Pudukkottai, as taxes or cess had to be paid by the traders if it is sold through the Marketing Committee.

This study is taken up with the following specific objectives

Objective of the study

1) To find out the costs and returns of the cashew cultivation.
2) To study the Resource use efficiency in cashew farms.
3) To study the economics of cashew processing.
4) To study the price spread and marketing efficiency in different marketing channels and.
5) To identify the constraints in production of cashew and suggest suitable policy measures.

Hypotheses

1) Cashew production is a profitable enterprise
2) In cashew cultivation resource are used efficiency
3) There are some constraints in production and marketing of cashew

Scope of the study

The study will help to understand in detail various issues associated with cashew nut production, processing and marketing in the study area. The findings of the study would be helpful for the entrepreneur and policy makers to formulate appropriate strategies for the sustained development of the industry in Tamil Nadu. The study would enable the farmers about the feasibility of establishing cashew processing plant at small scale level. The study would also be useful from the academic point of view and will be helpful for the researchers conducting studies in similar field in the near

future. Since the study comprises processing and marketing too, this is a wholesome approach and thus bringing in or makes it possible to visualize as a system.

Limitations

The data and information on cashewnut production and marketing were collected through survey method by conducting personal interviews with a sample of farmers. Farmers did not maintain detailed accounts of cost and returns, but by their long experience, they were able to recollect fairly accurate information. However some degree of recall bias inevitable. Through cross-checks of information this bias was minimized by the investigator. Moreover since cashew is perennial crop the information regarding the establishment cost was subjected to more bias. This study is confined to a particular agro-climatic region and hence and applicable only to similar agro climatic regions.

The study is organized under the following six chapters:

Chapter-I **INTRODUCTION**- Describes the importance of the research problem, hypotheses, objectives, scope and limitations of the study.

Chapter-II **CONCEPTS AND REVIEW**- A brief review and definition of concepts and past studies used in the study

Chapter-III **DESIGN OF THE STUDY**- Explains the sampling design, data collection, method of analyses and mathematical programming model used in the study

Chapter-IV **DESCRIPTION OF THE STUDY AREA** – Provides a brief account on the agro-climatic conditions, land use and other information relevant to the study region.

Chapter-V **RESULTS AND DISCUSSION**-A detailed discussion on the results of the study to draw specific inferences.

Chapter-VI **SUMMARY AND CONCLUSIONS**- A summary of work done, salient findings and inferences drawn with policy implications are presented.

CHAPTER II

CONCEPTS AND REVIEW

The knowledge of similar research work previously carried out relating to the problem under study is useful as it is helpful in understanding and formulating the methodological frame work. In this chapter, a review of past research relating the economics of cashew cultivation, processing, marketing and other relevant aspects are presented under the following sub-heads.

1. Studies on cost and return
2. Studies on financial feasibility
3. Production function
4. Resource use efficiency of perennial crops
5. Processing aspects
6. Marketing channels and price spread.
7. Production and marketing constraints

2.1. Cost, return and other related aspects

Dewett (1969) stated that fixed cost must be paid even though production has been stopped temporarily. Fixed cost or supplementary cost is one, which does not vary with the level of output. It includes rent for buildings; interest on capital invested in machinery and salary of permanently employed staff. Variable cost as one, which varied with the level of output. It included cost of raw material as well as the cost of casual or daily labour employed. It was incurred only when the firm was at work.

Sharma and Pandey (1972) studied economics of Guava orchard in Uttar Pradesh. Per hectare establishment cost of guava orchard was estimated at Rs. 3,964.82 in the first year. While, the maintenance cost amounted to Rs. 589.49 per hectare per year. The net returns from the intercrops during the initial three years period worked out to Rs. 6,287.50 per hectare. It was observed that, a net return of Rs. 6,500 per hectare realized from guava orchard by the sample farmers.

Samuelson (1973) defined fixed cost as the total expenses that were incurred even when a zero output was produced. It was often called as ‘overhead cost’ and usually included contracted commitments for rental, maintenance, depreciation, overhead charges and wages. It was sunk cost, because it was quite unaffected by any

variation in output during the period for which it was sunk. According to him, variable cost included all the items of total cost except fixed cost.

Johl and Kapur (1977) divided the fixed cost in to two costs namely fixed cash cost and fixed non-cash cost. Fixed cash cost included land tax, insurance premium and annually hired labour. Fixed non-cash cost included depreciation on building, machinery and equipments, interest on capital investment, cost of family labour and cost of management.

Krishnamurthy *et al.* (1978) while studying production and marketing of oranges in Karnataka, classified costs into fixed and variable costs comprised of costs of establishment, land revenue, depreciation of implements and equipments used, interest on the capital and land revenue. The variable cost included the cost of fertilizers, chemicals and human labour. The establishment cost of orange plants was worked out for a period of eight years from planting.

Jeyaraman (1981) classified the total costs into fixed costs and variable costs. Fixed costs included the rental value of land, interest on fixed capital, land revenue, and other taxes, depreciation on fixed capital and annual share of the total establishment costs up to bearing. The variable cost included all the cash and kind expenses actually incurred plus the interest on working capital.

Kahlon and Singh (1982) divided the cost in farming into two main categories of fixed and variable cost. Fixed costs were constant and did not change with output. It was sunk or overhead cost. It included taxes, depreciation, interest, rent and insurance premium. Variable cost varied with the level of production. It included inputs such as seeds, manures and fertilizer, fuel, livestock feed, wages of casual labour.

Sivanantham *et al.* (1991) conducted study on evaluation of investment in cashew plantation in South Archot district, Tamil Nadu. The cost was divided into establishment (up to 4th year) and maintenance costs (after 4th year up to 40 years). The two varieties of cashew, local and improved varieties were compared. The comparative per ha establishment cost of local variety and improved variety indicated that the improved variety was 199.07 per cent higher than the local variety. The higher cost was mainly due to high cost of grafts / air layer and plant protection chemical. The average maintenance cost of local variety and improved variety were Rs. 1877 and Rs. 2818 respectively. The gross return of improved varieties is

comparatively higher than the local variety. The net return of improved varieties was Rs.9229 per ha higher than the local variety.

According to Dhondyal (1991), gross income included cash received on account of sale of farm produced, value of produce, main or by-products used for home consumption and for feed and given as wages in kind and the value of seed stored for sowing purpose.

Dalvi *et al.* (1991) studied the economics of production of cashewnut in Sindhdurga district of Maharashtra. The per hectare cost of maintenance of local cashewnut orchard (cost A and Cost B) were worked out to Rs.2243 and Rs.3474, respectively. The per hectare cost of maintenance of local cashewnut orchard (cost C) worked out to Rs.4382. The gross value of main and by-product worked out to Rs.7027 per hectare. The net return per hectare obtained was Rs.2,645. The output–input ratio was 1.60 and cost per quintal of raw cashewnut worked out to Rs.682. The per hectare cost of maintenance of improved varieties of cashewnut orchard (cost A and Cost B) were worked out to Rs.3096 and Rs.5773 in that order. Per hectare cost of maintenance of improved varieties of orchard (Cost- C) worked out to Rs.7065.Per hectare. Gross value of main and by-product was Rs.14,333, which was comparatively higher than that of local varieties. Per hectare net returns obtained were Rs. 7268. The input-output ratio was 2.03 and cost per quintal worked out to Rs.509.

Srinivas *et al.* (1994) conducted study on economic analysis of cashewnut production in parkas district of Andhra Pradesh. The establishment cost per hectare of cashew orchard during first five years was Rs.3,586.16, Rs.1582.64, Rs.1,601.24, Rs.643.72, Rs.518.48 respectively. The annual maintenance cost i.e. From 6^{th} years on wards worked out to be Rs.903.48 per hectare. The cost of production per hectare of cashew orchard was Rs. 3751.48 and the gross returns realized from the output of cashew worked out to be Rs.3919.13 per hectare. The net return obtained were only Rs. 167.65 per hectare.

Deepak Shah (1996) studied the production and marketing pattern of grapes in Maharashtra. The study showed sharp increase in per acre annual gross maintains cost as well as returns of grapes orchards. In general about 67% of gross maintenance cost of grape production was spent on various production related operation and the remaining 33 percent owed it to investment on various marketing functions.

The profitability in grape cultivation was found to be considerably high in state of Maharashtra.

Abdul Salam (1997) in his study on economics of cashew cultivation at Cashew Research Station, Kerala found that the establishment of one hectare of cashew (200 trees) during first year was Rs. 14819. The maintenance costs in established gardens were Rs. 9318, Rs. 11,187,Rs.12,118, Rs.13,549, Rs.14,950, Rs.16,411 and Rs.17042 during second, third, fourth, fifth, sixth, seventh and eighth year onwards, respectively. On an average a nut yield per ha obtained were 100 kg 400 kg, 800 kg,1200 kg and 1600 kg during third, fourth, fifth, sixth and seventh year, respectively. A net income per tree worked out to Rs.52.26, Rs.105.1, Rs.158 and Rs.154.8 and Rs.154.8 during fourth, fifth, sixth and seventh and eighth year onwards, respectively. He further reported that the cost of production per kg of nut was worked out to be Rs.30.29, Rs.16.94, Rs.12.48, Rs.10.26 and Rs.10.65during fourth, fifth, sixth, seventh and eighth year onwards, respectively.

Apparao and Krishnaiah (2001) studied the cost of production of cashewnut in Srikakulam district of Andhra Pradesh. They classified the costs in cashew cultivation in two headings (i) cost incurred during establishing period (ii) cost incurred during bearing period. The study revealed that establishment cost per hectare was Rs. 6686.87 during first year while the maintenance cost per hectare was Rs. 5697.92. The annual share of establishment cost was worked to be Rs. 103.18. The labour cost account for about 78.58 per cent while material cost accounted for 21.42 per cent of the cashewnut. But it was increasing from sixth year onwards and it was observed to be the labour cost account for 45.54 per cent while the material cost accounted for 54.46 per cent.

Yadukumar *et al.* (2003) said that the per hectare total cost of production worked out to be Rs.90,227, Rs.85,195, Rs.99,946, Rs.1, 85,925 and Rs.1, 51,512 under different planting densities of 7.5 m × 7.5 m (175 plants), 8 m × 8 m (156 plants), 10 m × 10 m (200 plants), 4 m × 4 m (625 plants) and 5 m × 5 m (400 plants), respectively. The yields of raw nuts per tree were 28 kg (4900 kg/ha), 28 kg (4368 kg/ha), 28 kg (5600 kg/ha), 17.5 kg (10939 kg/ha) and 21.5 kg (9000 kg/ha) for the respective plant densities. The gross income per hectare of above said different planting densities worked out to Rs.1,97,750, Rs.1,79,400, Rs.2,30,000, Rs. 4,28,185 and Rs.3,60,000. The net incomes per hectare were obtained for above mentioned respective planting densities were Rs.1,07,523, Rs. 94,205, Rs.1,30,054, Rs.2,42,260 and Rs. 2,08,488.

Sundaravardarajan and Ramanathan (2003) estimated that the establishment cost of cashew plantation for the first year was Rs.7690, Rs 8664 and Rs.9491 for marginal, small and large farmers respectively. The maintenance cost of cashew plantations in the case of marginal forms were Rs 4059, Rs.4410, Rs.4910, Rs.5385, Rs.841 Rs.6332 Rs.6771 and RS 6990 for second, third, fourth, fifth, sixth, seventh, eighth, ninth year respectively and in case of large farms the maintenance cost were Rs.5040, Rs.5250, Rs.5764, Rs.6145, Rs 6558, Rs.7021 Rs.7438, and Rs.774 for second, third, fourth, fifth, sixth, seventh, eighth and ninth year respectively. The output ratio per ha were 1.43, 1.55 and 1.83 for marginal, small and large farms, respectively.

Umesh *et al.* (2005) observed that the establishment cost was Rs15631 per ha in all the varieties studied during the first three years. The maintenance cost per ha from fourth year on wards varied from Rs 5881 to Rs 8254 in Chintamani –1, Rs.5640 to Rs 8254 in Ullal–4, Rs. 5812 to Rs.7882.In Ullal- 3 and Rs. 5821 to 7229 in Ullal-1 at the net returns of cashew orchard per ha being fairly high were in the order of Rs.61314, Rs 62425, Rs.49672 and Rs.34231 in Chintamani –1 Ullal –4, Ullal-3 and Ullal- 1.

Ravikumar *et al.* (2011) studied the pattern of investment in pomegranate orchards in Chitradurga district, Karnataka. The cost of establishment per ha was found to be Rs.1,90,888.41 and 1,89,644.33 of which material cost constituted 56.87 and 58.15 per cent and maintenance cost 43.13 and 41.85 per cent in Challakere and Hiriyur taluks respectively. The average per ha maintenance cost incurred by respondents in Challakere taluk was Rs.82, 320.70 during the first three years. The labour, material and fixed costs accounted for 53.73, 24.59 and 21.68 per cent, respectively, it was Rs. 79,368.02 in hiriyur taluk where labour, material and fixed cost accounted for about 56.16, 21.74 and 22.10 per cent, respectively.

2.2. Financial feasibility

Sudha and Reddy (1985) studied the comparative economics of casuarina and cashew in coastal Andhra Pradesh. They observed that the B:C ratio was 1.58, 1.8 for casuarina and cashew, respectively. NPV was Rs. 35,880 and Rs. 42,550 and IRR was 32 and 39 per cent for casuarina and cashew, respectively.

Subrahmanyam (1987) studied the cost and returns of mango orchards in Karnataka. It was observed that on an average for the establishment of mango orchard required Rs. 3000 per ha. The maintenance cost of mango orchards was only Rs. 200 per ha. The gross return from a hectare of mango orchard was Rs. 1200 in Karnataka.

Hugar (1991) examined the economic potentiality and viability of Guava cultivation under scientific management. The study revealed that the net present worth was Rs 7,38,042 per hectare. The benefit cost ratio, internal rate of return and payback period were found to be 3.88,57.82 percent and six years respectively..

Koujalagi and kunnal (1992) evaluated financial feasibility of pomegranate orchard in Bijapur district of Karnataka. The study showed that the per acre net present value for the entire life period of the project was found to be Rs. 8,283.81. The discounted benefit cost ratio (at 12 per cent discount) was 1.53. The payback period was 6.56 years and internal rate of return as 15.55 per cent.

Srinivas *et al.* (1994) estimated that the investment on cashew plantation could be received within 3 years after the economic production of cashew nuts. The estimated Internal Rate of Return (IRR) and Benefit-cost ratio (BCR) revealed that the investment on cashew orchards was economically viable.

Vandana *et al.* (1995) in their study on acid lime cultivation in Guntur district of Andhra Pradesh revealed that the lime cultivation was economically viable as Net Present Value (NPV) was positive at the discount rates used in the study.

Singh and Singh (1997) in the study profitability of ber cultivation in arid region of Haryana, the financial analysis indicated that investment on ber orchard is an economically viable activity. On an average, the internal rate of return was found as high as 40 per cent, with a payback period of 5 years and benefit cost ratio of 3.53. Further the ber cultivation emerged as a better paying proposition than any other crop relation followed in region. The study leads to conclusion that the ber cultivation has much potential as an economically viable alternative to existing crop cultivation.

Chitra and Reddy (1997) in the study of economics of ber production in and around Hyderabad city of Andhra Pradesh found that, the payback period in ber cultivation was 4.42 years and benefit cost ratio was 5.25 indicating the profitability of ber cultivation. The net present value worked out was Rs. 12.061. The IRR was 73.54

per cent which was higher than the lending rates of commercial banks. The results of the study indicated that even though ber cultivation required relatively higher initial capital investment compared to other fruit crops. The returns were higher during the bearing period and economic indicators clearly indicated that the production of ber was economically viable.

Goyal (1999) worked out the BCR to evaluate the financial viability of investment on rose cultivation. He found that rose cultivation was profitable with higher BCR of 8.48. The annual net return was worked out to Rs. 44,457 per hectare. The payback period was two years.

Pawandahiya *et al.* (2002) conducted a study on cost-benefit analysis of ber cultivation in Rohtak district Haryana. For a study they collected the data from thirty ber growers randomly. To examine the economic feasibility investments in ber cultivation four indicators like net present value, internal rate of return, benefit cost ratio and payback period were used. The study indicates that ber cultivation it is intensive with an IRR of 22.5 per cent. The NPV and BCR at a discount rate of 14 per cent is RS.26,346 and 1:1.22 respectively. The investment in ber orchard has a payback period of 7 years. Liberal credit facilities adequate supply system on inputs particularly good quality of planting materials. Efficient making systems etc. are a few measures required to be taken to make ber cultivation a successful venture.

Sundaravardarayan and Ramanathan (2003) they reported that BCR and IRR worked out to new plantations were 1.42 and 34.36 percent, while for old plantations it was 1.06 and 17.17 per cent respectively. Further, they suggested that need to create awareness among farmers go for to improved verities (HYV) which not only reduce the cost of cultivation but also to increase the net income among the different size group of farmers.

Guledgudda and Patil (2006) evaluated the financial feasibility of investment made in cashew plantation in Karnataka. The NPV at 9.5 per cent discount rate in Dakshina district was found to be Rs.42515.29 in case of small farms, Rs.41207.29 in large orchard and Rs.41992.09 in overall farms. Similar trend was observed in the case of Belgaum district. The BCR in both the districts was more than unity. The payback period was 11 years for all the categories of farms in both the districts. IRR was well above the bank rate and it was higher in the case of Belgaum district (17.50 per cent) as compared to Dakshina district (15.99 per cent).

Goswami and Challa (2007) concluded that the positive NPV, BCR of 2.41 and IRR of 14.40 per cent which implied that the investments made in small holder rubber plantations were highly paying propositions.

Varghese (2007) worked out NPV, BCR, and IRR to evaluate the financial viability of investment made in cardamom cultivation of Kerala. He found that cardamom cultivation was profitable up to cost 'C'. It has also the Positive NPV, higher BC ratio of 1.16 and IRR of 25 per cent.

Ganguar *et al.* (2008) undertook study on economic evaluation of Peach cultivation in North Indian plains with the help of different investment appraisal methods. The Net Present Value (NPV) worked out to be Rs.44807, the Benefit Cost Ratio (BCR) as 1.41 and Internal Rate of Return (IRR) as 22.20 under the present value summation method. Similarly the NPV and BC ratio was Rs.42877 and 1.28 respectively under the amortization method.

Ravikumar *et al.* (2011) studied the pattern of investment in pomegranate orchards in Chitradurga district, Karnataka. In this study NPV was calculated by discounting net cash in flows. The NPV of pomegranate on per hectare at 9.5 per cent discount rate were Rs.4,75, 538.23 and Rs. 4,45,869.80 in Challakere and Hiriyur taluks respectively. The net present values were positive and of higher magnitude indicating worthiness of investment. The returns per rupee of investment in these orchards were capable of generating nearly three rupees which was highly profitable venture. The internal rate of return was found to be in the range of 57-59 per cent was much higher compared to the cost of capital (9.5 per cent) and hence highly profitable.

2.3. Production function

Bilas (1971) defined produced function as a physical relationship between a firm's inputs of resources and its output of goods and services per unit of time.

Chopra (1978) defined production function as a statement of technical facts which the producer would use to obtain the least cost combination of inputs to produce and output.

According to Koutsoyiannis (1994) production function is purely a technical relationship between factor inputs and outputs. It would describe the transformation of factor inputs into products at any particular time period.

Johl and Kapur (1997) defined production function a mathematical relationship describing the manner and extent to which a particular product would depend on the quantities or services of inputs used.

According to Samuelson (1998) production function would indicate the maximum amount of output capable of being produced by each and every set of specified input.

2.4. Resource use efficiency of perennial crops

Mohan (1973), in his study on pepper fitted Cobb-Douglas production function with the total production of pepper in kg per hectare as the dependent variable and establishment cost, area of the garden in hectare, age of the garden, fertilizers and manure in rupees and cost of pesticides and spraying as independent variables.

Paranjape and Borade (1978) conducted study on resource use efficiency in Alphanso mango production in Deogad taluk of Ratnagiri district. The regression co-efficient for age, cost of plant protection chemicals were significant at 0.01 level in both Cobb-Douglas and Linear functions. The co-efficient of human labour was significant at 0.01 levels in both functions while the co-efficient for proportion of bearing trees was significant at 0.01 levels in Cobb-Douglas function and at 0.05 levels in Linear function. This indicate that age of orchard, use of plant protection chemicals, human labour and proportion of bearing trees had made positive contribution in the production of Alphanso mango. The sum of total of elasticities in Cobb-Douglas function was 2.9035, which indicated increasing return to scale. The R^2 value indicated that the variation explained by the selected variables was 79 per cent in Cobb-Douglas function and 83 per cent in linear function. This showed that linear function gave comparatively better fit.

Ipte and Borude (1982) in their study on economics of marketing and processing of cashewnut in Ratnagiri/Sindhudurg district of Maharashtra, found that the per quintal cost of processing worked out to Rs.161.42. The major items of the processing cost were the container (14.44 %), labour charges (21.92 %) and interest on

capital (46.03 %). The value added due to processing of raw nuts is to farmers was worked out to 52.66 per cent of the raw nuts costs.

Rajan (1992) used Cobb- Douglas type of production function to analyse the input-output relationship per hectare in tea plantations, taking yield as dependent variable and independent variables were planting materials, manures, fertilizer, human labour and area under tea. He found that the marginal value product of the different inputs was varied with location and size.

Hiremath (1994) studied the economics of production and marketing of lime in Bijapur district. He employed modified Cobb-Douglas type of production function. The results indicated that four variables like land, labour, farm yard manure and plant protection chemicals explained about 46.00, 66.66, and 77.80 per cent of variation in lime yields in small, medium and large orchards, respectively.

Dayanand and Hiremath (1995) used Cobb-Douglas production function to analyze the resource use efficiency in ber production. In ber production the marginal value product to marginal factor cost ratio for land was more than unity in both small and large size groups indicating the scope for increasing profit by increasing the area under ber cultivation.

Chinnappa and Ramana (1997) in their study on economics of guava production, Cobb-Douglas type of production function was used to determine the level of resource use efficiency. The functional analysis revealed that 42 per cent of the variation in gross returns was explained by five independent variables namely land, labour, manure and fertilizers and plant protection chemicals included in the model. The regression coefficient of land and labour indicated their significant contribution to the yield while, manure and fertilizers and plant protection chemicals were non-significant.

Mahesh and Krishnamoorthy (1999) observed that increased use of labours, nitrogen and potash and decreased application of plant protection chemicals would increase the yield of grapes further. Integrated pest and disease management gave the best solution to reduce the high cost of plant protection measures.

Gummagolmath *et al.* (2002) conducted a study on mango cultivation in Dharwad district. They observed that, among the estimates of Cobb-Douglas type of production function the manure had a maximum influence on gross returns of small and

large orchards. The regression co-efficient of manure for small and large farmers was significant at 1 per cent level; whereas it was non-significant in case of medium size orchards. The regression coefficient of plant protection chemicals for large orchards was also significant and non significant in case of small and medium size orchards. The production elasticities were negative with respect to land in medium and large orchards and it was positive but non-significant in case of small orchards.

2.4. Processing aspects

Sivanantham *et al.* (1980) worked out the processing cost for per kilogram of cashew kernels in Pudukkottai district of Tamil Nadu and found that the cost of raw material was the major component in the processing cost of cashew kernels which constituted 73.22 per cent followed by wages (12.10 %) and interest as capital (7.28%). It further revealed that, the unit processing cost of a kilogram of cashew kernel was Rs.20.40 and out turn of kernels from one MT. of cashew nut was 220.91 kilograms or 22.09 per cent.

Hassan and Raghuram (1987) in their study on cashew processing and marketing in Prakasam district of Andhra Pradesh observed the following stages in processing that is drying of nuts, roasting of nuts, shelling of nuts, drying of shelled kernels, peeling of kernels, grading of kernels, conditioning of graded kernels and packing of graded kernels. The study reported that 80 kg of raw nuts when processed resulted in 22 kg. of kernels (28 % recovery). The processor incurred Rs.87.06 as processing cost, of which labour constituted 56.6 per cent and material cost stood at 42.5 per cent. Within labour cost, the shelling accounted for higher proportion followed by peeling.

Dalvi (1991) studied economics of production, processing and marketing of cashewnut in Sindhudurg district of Maharashtra state. The study revealed that overall average working season of processing factories was 257.70 days. The average quantity of nuts processed by factories was 2, 06,751 kg per season and 802.29 kg per day. The overall cost incurred on processing by factories was Rs.331.35 per quintal. The overall average gross returns received by factories were Rs.49.56 lakhs and net returns obtained were Rs.7.94 lakhs. The capital investment per hundred rupees of gross income was Rs.81.61 and overall input output ratio was 1.19.

Wadkar and Sawant (1994) estimated total cashew production, production likely to become available for processing, number of processing units required and employment likely to be created through processing for the proposed large scale cashew plantations in the konkan region for the overall economic development and maintenance of ecological balance of the region. They concluded that large-scale plantation of cashew, and associated processing, are expected to help in reducing on-farm labour dependence and to reduce the pressure on land.

Veerkar and Borude (1995) studied "Economics of mango products in Ratnagiri district (Maharashtra)". They analyzed capital investment in preparing the mango products and observed that, out of total investment of Rs.2.81 lakhs in pickle making 31.42 per cent (Rs.0.88 lakhs) was invested in capital and 55.25 per cent was found to be invested as fixed capital and 59.06 per cent as working capital. Among the three mango processed products the capital investment was highest (Rs.5.04 lakh) in making raw slices in brine and the lowest (Rs.1.60 lakhs) in chutney making business. They also observed that the share of fixed capital was lower than that of working capital in all the products.

Srinivas and raju (1995) conducted a study on the economics of cashew of processing of cashewnut in Vetapalem, parkash district of Andhra Pradesh. For the study, they have collected data from 11 registered processing units located in the area for the year 1990-91. The eight stages involved in processing of cashew nut (drying, roasting, shelling, drying of shelled kernels, peeling, grading, conditioning and packing) were discussed in their study. They observed that the major operations involving high cost were packing of graded kernels; shelling of roasted nuts and peeling of shelled kernels as these operations are highly labour intensive.

Gupta and prasant(2004) divides the total processing cost of cashew nut into variable cost and fixed cost. The variable cost constitutes 31.30 per cent and 29.51 per cent to total cost of processing at small and large processing units respectively. The wages and salaries are the most important cost component which constitutes 75 percent to the total variable cost. The fixed cost includes the expenditure incurred on taxes, insurance, licensing, interest on working capital and depreciation on buildings and plants. It constitutes about 61.61 per cent and 62.53 per cent of total marketing and processing cost at small and large categories of plants respectively.

2.5. Marketing channels and price spread.

According to Ismin (1973), Agricultural marketing included all the services, intangible functions of pricing, financing and risk taking, guiding products to consumers in place and form and, physical functions including transporting, processing, sorting, grading of farm products.

Kohls and Uhl (1980) defined marketing channel as alternative routes of product flows from producer to consumer.

Rajgopal (1987) in his study on marketing of apple, guava and mango fruits reported that the producer's share in consumer prices was highest in apple followed by mango and guava. The cost of marketing was higher in guava than in mango and apple. It revealed that apple cultivation was economically viable even to small growers. He recommended that direct sales and sales through cooperative should be promoted to provide more share to the producers in the consumers price of fruit crop.

Patil (1989) in his study on marketing of Alphanso mangoes in Maharashtra identified four channels viz. producer- consumer (direct sale), producer → cooperative → consumer (cooperative sale), producer → commission agents → wholesalers →Retailers → consumer (middle men sales) and producer → pre-harvest contractor → commission Agents → wholesalers → Retailers → consumer (pre-harvest contract sale). The study revealed that when the contract was made at the time of flowering stage, the price received by the growers was the lowest (Rs. 28.50/crate) though the crate size was big. The average price of Alphanso mangoes received by the growers was only Rs.29.40 per crate. Finally he concluded that the direct sale to consumer was the most profitable and the one through pre harvest contractor was the least profitable.

Vintonde and Bhargav (1991) made an attempt to study the cost incurred by farmers in marketing of Ambe Bahar and Mrig bahar crop of oranges in Nagpur district. Two channels of marketing were identified channel-I consisted of producers and retailers and the second channel producers and distant marketing centres viz., Delhi, Luckhow, Amritsar, Patna and Hawra. The study revealed that the total marketing cost per tonne was Rs. 240.24 and Rs.270.84 for Ambe bahar and Mrig bahar oranges respectively. In both the crops the share of packing and storage costs were more. The net price received by the producer seller worked out to be 71.4 per cent and 78.68 per cent for the gross price obtained by the farmer in Ambe bahar and mrig.

Singh (1996) studied the price spread of citrus fruit in mid hill of Jammu and Kashmir. An overall view of results revealed that producer's share in consumer's rupee was 35.71 per cent in channel-I (producer → pre-harvest contractor → retailer → consumer) and 81.25 per cent in channel-II (Producer → retailer → consumer).

Saraswat (1997) conducted a study on organization of production and marketing of apple in Himachal Pradesh. A case study of Kirari village. The study found that in the study area on an average the farmer incurred Rs. 26.72 on packing. The channel used by the most of the growers was producer → forwarding agent → commission agent → wholesaler → retailer → consumer. The analysis reveals that the producers share in consumer's rupee was 42.28 per cent. The marketing cost borne by the producer was 31.64 per cent of consumer's rupee.

Sundaravaradarajan and Jahanmohan (2002) studied the marketing cost, margin, price spread and marketing efficiency of cashew in Tamil Nadu, observed following four different marketing channels of cashew.

I. Farmer →Village trader → Wholesaler → Processor →Trader

II. Farmer → Co-operative marketing society

III. Farmer →Commission agent → Wholesaler → Processor

IV. Farmer → Processor

A majority of the farmers (60%) adopted channel-I, followed by channel-II (26.25%), channel-III (10%) and channel-IV (3.75%).

Ladaniya and Wanjari (2003) conducted a study on marketing pattern of 'Mosambi' sweet orange in selected district of Maharashtra. In the study, it was noticed that, farmers with small mosambi plantations were more inclined to sell produce to pre-harvest contractors. This type of decision making by the producers it was attributed to lack of will to take risks associated with marketing and lack of financial assistance required during mosambi production process, while growers with large plantations farmers sold mosambi fruits themselves in distance market. Market efficiency was higher when farmers themselves marketed fruit in distance market. It was also opined that, as the market distance and number of intermediaries increased in marketing cost

and margins of cost marketing also increased. Further it was noticed that the market efficiency and share of farmers in consumer's price was decreased.

Acharya and Agarwal (2004) viewed marketing channels as routes through which agricultural products move from producers to consumers. The length of the channel varies from commodity to commodity, depending on the quantity to be moved, the form of consumer demand and degree of regional specialization in production. He stated that marketing margin includes the cost involved in moving the product from the point of production to the point of consumption, that is the cost of performing the various marketing functions and of operating various agencies and profits of the various market functionaries involved in moving the produce from the initial point of production till it reaches the ultimate consumer. The absolute value of the marketing margin varies from channel to channel, market to market and time to time.

Navadkar *et al.* (2005) conducted study on marketing of vegetables grown around Pune city and revealed that, per quintal cost of marketing of selected vegetables was more in terminal market (Rs. 112.67 per quintal) than in primary market (Rs. 57.84 per quintal). The proportionate share of transportation and commission charges to total marketing cost were significantly more in terminal marker. The producers' share in consumes' rupee was observed to be the least in terminal market for vegetable like cabbage and highest in bhendi in the same market.

Namasivayam and Paul (2006) defined the price spread as the difference between the net price received by the producer-seller and the price paid by the ultimate consumer. The producers share in consumers rupee was maximum in producer-wholesaler- retailers- consumers (channel-III) (58.73 per cent) followed by producer-commission agents- wholesalers- retailers- consumers (channel-II) (58.32) and producer- pre harvest contractors- commission agents- wholesalers- retailers-consumers (channel-I) (50.20).

Sreenivasamurthy *et al.* (2007) evaluated that the producers share in the consumer's rupee was higher with 66.67 per cent in co-operative channel than wholesale channel with 52.78 per cent mainly due to lower marketing cost. Thus, on this account, the marketing of banana through co-operative channel was more efficient since the price spread was lower, nearly by 73 percent.

Anil and Bhonde (2008) reported that producer's share in the consumer's rupee in grape fruit was the highest (98.5 per cent) in channel I (Producer- Consumer) and the lowest (34.10 per cent) in channel VI (Producer- Exporter- Commission agent- Wholesaler- Retailer- Consumer).

Naphade and Tingre (2008) in his study revealed that, among the different marketing channels used by the guava cultivation, the most important marketing channel was producer- wholesaler- retailer- consumer.

2.5. Production and marketing constraint

Hiremath (1994) studied the economics of production and marketing of lime in Bijapur district, Karnataka and identified the problems relating to production and marketing of lime. The absence of processing facility, absence of cold storage facility, fluctuations in prices were the major problems expressed by 100 percent of farmers and other problems were absence of cooperative marketing of lime, non-availability of packing material at reasonable price and difficulty in transportation.

Gummagolmath (1995) identified the problems in production and marketing of mango in Dharwad and Sindhudurg districts of Karnataka. The opinion survey revealed that the problem of alternative bearing was expressed by 100 percent orchardists in all categories of farmers. Problem of non-availability of labour was expressed by most of the medium orchardists (66.67%) followed by small orchardists (40%) and large orchardists (33.37%). Among the marketing problems, the problem of price fluctuation was expressed by 44.44 per cent of small, 36.80 per cent of medium and 50 per cent of large orchardists and other problems were high commission and existence of under dealing between wholesaler and commission agents.

Deorukhakar *et al.* (1995) studied the constraints in technology adoption of cashewnut cultivation in the Sindhudurg district of Konkan region, Maharashtra. They found that one third of the growers (68%) opined that there was no need to use of fertilizers and plant protection chemicals, high cost of fertilizers (13%) and plant protection chemicals (27%) were other constraints expressed by the cashew growers. They further reported that the 41 and 32 percent of the respondents expressed the high cost of improved planting material and irregular supply of this input, respectively.

Gunjate (1997) reported on problems of cashew plantation management at Regional Fruit Research Station, Vengurla, Maharashtra, observed that some problems in cashew plantation management that non-availability of right kind of inputs, inadequate funds, non-availability of suitable farm equipments and machinery, unavailability of qualified and experienced personnel. It was necessary to make available the grafts of the choicest varieties in all the regions, replanting the gaps should be done as early as possible and it should never be left beyond second year. The prophylactic sanitary measures recommended.

Nirban and Sawant (2000) found that the major portion of the cashew growers have faced the problem of stray cattle menace (48%), followed by theft of tender nuts (40%), lack of knowledge about various government schemes (36%), lack of labourers at the time of harvest (32%) and the other major constraints experienced by the respondents in cashew cultivation were non-availability of sufficient quantity of grafts (21%), fire hazard to the orchard (18%), difficulty in watch and ward due to fragmented land holding (17%) and lack of proper guidance at proper time (12%).

Khunt *et al.* (2001) studied economics of production and marketing of pomegranate and found that dying of young plant, problem of mite inadequate irrigation water and its poor quality and short supply of electricity were major problems faced by pomegranate growers of Bhavnagar district.

Siju (2001) used Garett's ranking technique to rank the constraints faced by the cashew processing industry and revealed that marketing, labour unions, scarcity in capital, scarcity in labour, quality of raw material, procurement and storage were the main problems experienced by the farmers. In these problems, marketing ranks first and labour union second.

Balaji *et al.* (2003) used Garrett's ranking method to rank the constraints faced by the production and marketing of groundnut and it included incidence of pest and disease, erratic rainfall, water scarcity, forest animals, non-availability of good quality seeds, inadequate supply of labour coupled with high wage rate, low level of adoption of recommended technologies, lower marketed surplus, collusion among the traders in marketing, malpractices in weighment and delayed payment.

Bhat (2004) reported that the closure of several processing units for a considerable part of the year competing with India for importing raw nuts. Imported raw nuts gave poor quality kernels, which resulted in lower percentage of kernel recovery. The most serious threat to cashew kernel exported from India is the competition offered by the Vietnamese cashew industry.

Haldankar *et al*. (2004) revealed that the different varietal performance at different locations, non-availability of suitable farm equipment and machinery, little or no utilization of cashew apple, lack of efficient means to control tea mosquito bug and cashew stem and root borer were the major problems of cashew production. They were also reported that the majority of farmers do not properly followed standard package of practices, lack of highly remunerative farming system based on cashew plantation, lack of a model for prediction of pests based on climatologically factors, poor pollination, the concept of Integrated Nutrient Management, organic cashew production and Integrated plant protection were not properly developed and low productivity due to water stress during flowering and fruiting. They also suggested that identification of suitable varieties for plain land, drought resistant and resistant to frost and low temperature, to develop suitable protocol for prevention of cashew stem and root borer.

Gupta and Prasant (2004) stated that lack of money and essential equipments needed for cashew nut production is a big constraint. Lack of awareness about market news and intelligence is a major constraint related with marketing of the produce. Lack of transportation facilities, pucca road, lack of processing units and lower prices of the produce are some other problems faced by producers in cashew nut marketing.

Velavan (2004) observed the major production constraints were poor yield of cashew nuts, because of the age old plantation, necessity of financial support. Lack of irrigation facilities and farmers were not able to adopt proper pest control measures due to the high cost of pesticides. Further, he reported that cashew nut in India face severe competition from other surrogate nuts like almonds, pistachios, hazelnuts, Brazil nuts and macadamia *etc.* In addition to this, India was facing severe competition from the exporting countries like Brazil and Vietnam in exports of cashew nuts, because of devaluation of their currencies, non availability of value added kernels in consumer packets for exports, non-availability of the packing materials in the international standards, inconsistency and the non-uniformity in the quality of kernels for individual brands and the markets. Value added products from the cashew were not available in the exports from India.

Naphade and Tingre (2008) stated that lack of market information, high market commission and lack of appropriate grader were the constraints faced by the guava growers.

CHAPTER III

DESIGN OF THE STUDY

An appropriate research design in terms of selection of study area, sampling methodology and choice of analytical tools is essential to obtain findings and to draw meaningful conclusions from research study. The present study was designed based on objectives, concepts and methodologies reviewed in the previous chapter. More specifically, this chapter deals with the sampling design, methods of data collection and measurement of variables and the analytical tools used.

3.1. Choice of the study area

Pudukkottai district was purposively selected for the present study in the first stage since it is one among the major cashew growing districts in the state. In the second stage, two taluks viz., Gandarvakkottai and Alangudi were purposively selected (Fig.3.1.), because more than 80 percent of cashew area of the district is concentrated in these two taluks. The list of major cashew growing villages from each taluk was collected. Then five villages, having major area under cashew, were selected from the list of villages in each taluk. Finally ten villages were selected for the study. Then ten cashew growers, from each of the selected village, were selected by random sampling technique. The intermediaries involved in marketing of cashew namely commission agents, wholesaler, pre-harvest contractor, and retailer were selected at the rate of ten from each category making the total sample size of forty. Five cashew processing units were randomly selected from the district for studying processing aspect of cashew. Thus the total sample included 100 farmers, 40 intermediaries and five cashew processors.

3.2. Period of the study

The primary data were collected from the sample respondents during the period 2010-2011. The data collected in respect of production, processing and marketing of cashew pertains to the agricultural year 2009-2010.

3.3 Source of Data

3.3.1. Secondary data

The general information related to the district such as total population, land utilization pattern, cropping pattern, agro climatic conditions, rainfall and irrigation sources were collected from the records available in the Statistical office of Pudukkottai district, Government publications and other published materials.

3.3.2. Primary data

A well structured and pre-tested interview schedule was used to collect primary data. Three separate sets of interview schedules were prepared for farmers, intermediaries and processors. The questionnaires for the study were designed considering physical, cultural and socio-economic environment of cashew production, processing and marketing in the study area. The questionnaires were then pre-tested and finalized. The interview schedule for farmers covered aspects such as general farm and household characteristics, details on cultivation practices adopted in cashew cultivation and cost of cultivation, details on marketing of cashew and problems in production and marketing. The schedule for intermediaries covered aspects such as general characteristics, quantity of cashew handled, cost incurred and profit realized by different market functionaries and the problems faced by them.

3.4 Units of Measurement

Production aspects

Cashew is a perennial crop grown as a sole crop. The establishment period of the crop is about five years and could be cultivated economically for about 25 years under good management condition and its life span is 25 years. Though, cashew starts yielding from the fifth year. The costs incurred in the establishment and maintenance of the cashew plantation can be broadly classified into establishment cost and maintenance cost.

3.4.1. Establishment cost:

It is the cost incurred during the first five years of the establishment of a cashew plantation. The costs incurred under this comprise land preparation including digging of pits, planting and gap filling, fencing, staking, application of manures and fertilizers, spraying of chemicals, materials and repairs, cost of planting material, fertilizer, plant protection chemicals, weeding and all other after care operations.

A. Labour cost:

(i) Hired human labour:

Hired human labour was estimated in terms of man day where in 8 hours of work in a day was considered as one man day. The women labour days were converted into male equivalents for the purpose of analysis by multiplying total women labour days by 0.70, based on the prevailing wage rates in the study area. The man days were valued at Rs. 100 per man day. The same Wage rates were considered for imputing family labour.

(ii) Machine labour:

It was measured in terms of machine hours. One machine hour means one hour of work by machine and a man required to operate this machine. It was valued at the rate of Rs.500 per hour.

B. Material costs:

(i) Planting material:

The planting material used (grafts/seed) was valued at the current market rate of Rs.10 per graft.

(ii) Cost of organic manure:

The farm produced manures were valued at the market price prevailing in that area at that time.

(iii) Fertilizers and plant protection chemicals:

It included the cost of different forms of fertilizers and plant protection chemicals used. All the fertilizers and plant protection chemicals used by the farmers were valued at their respective market prices to calculate the total cost.

C. Miscellaneous Charges:

Very few farmers used irrigation for cashew orchards. The charges for electricity and fuel used were calculated at the actual prices paid and were taken as irrigation cost.

D. Depreciation

Depreciation for fixed capital items such as farm machinery and irrigation structures used in cashew cultivation was calculated at the rate of five percent for buildings and ten percent for implements.

E. Interest on working capital

The interest rate for working capital was worked out at the interest rate for agricultural loans at the rate of seven percent.

F. Interest on fixed capital

Interest on fixed capital was computed at twelve percent interest rate, which is the interest charged for investment loans sanctioned by commercial banks in the study area.

G. Amortized establishment cost:

The amortized cost for establishment of cashew orchard is considered to represent the annual fixed cost component of orchard maintenance. The capital investment made in first four years for establishment was divided into equal annual installments for the economic life of cashew orchard starting fifth year, and spread over amortization cost, throughout its economic life, for this purpose, the average life of cashew orchard was taken as 25 years because after 25 years generally, cashew orchards become uneconomical.

H. Land revenue

Land revenue was taken at the rates levied by the government. Land revenue paid by the farmers during the current year was considered for this study.

I. Rental value of land

Rental value of land was imputed at the prevailing land rent per hectare per annum in the study area.

3.4.2. Maintenance cost or Cost of cultivation

It includes all the costs incurred annually for the maintenance and production of the cashew plantation from the fifth year onwards till the end of 25 years. The maintenance cost was divided into variable cost and fixed cost. The variable cost included the cost of farmyard manure fertilizer, plant protection chemicals and labour cost for various operations. The fixed cost included the land revenue, amortized establishment cost, depreciation cost and rental value of land.

3.4.3. Yield and return

In the study area, only the nut of cashew has major economic importance and the apple has no use. But very few farmers are selling cashew apples. The yield and price realized by the growers for the raw nuts and apples were used to calculate the gross returns, net returns and return per ha of cashew plantation. The total yield of cashew obtained by farmers was expressed in terms of kg per hectare.

For estimating the cost of cultivation of cashew per hectare, the standard cost concepts used in cost of production in farm management studies are used to estimate various types of costs in the present study.

Cost A: includes the wages of hired and owned human labour , machine labour, value of grafts, value of manure, fertilizers and plant protection chemicals, depreciation of machinery and buildings, land revenue and interest on working capital.

Cost B: includes Cost A plus rental value of land plus interest on fixed capital and amortised establishment cost.

Cost C: includes Cost B plus value of imputed family labour.

Farm business income: The difference between the gross income and Cost A that is, profit at Cost A represents the farm business income of producers.

Farm labour income: The profit at Cost B, that is, the difference between the gross income and Cost B represents the income of the producers on account of his own family labour.

Net income: The profit at Cost C, that is, the difference between gross income and Cost C represents the net income of the farm enterprise.

Farm investment income: farm business income minus imputed family labour.

3.5. Marketing aspects

In the study area, the cashew producers dispose their produce through four different marketing channels. The following marketing channels were identified.

(i) Farmer→ pre harvest contractor→ Commission agent→ Wholesaler→ processor→ retailer →Consumer

(ii) Farmer → Commission agent→ processor → retailer →consumer

(iii) Farmer → Wholesaler→ processor→ retailer →consumer

(iv) Farmer → processor→ retailer →consumer

3.5.1. Marketing cost

The cost involved moving the product from the point of production to the point of consumption, i.e., the cost performing the various marketing functions and of operating various agencies. The marketing cost is a vital factor in determining the profitability of the cashewnut growers and middlemen.

3.5.2. Marketing margin

The profit of the various market functionaries involved in moving the produce from the initial point of production till it reaches the ultimate consumer. The absolute value of marketing margin varies from the channel to channel, market to market and time to time.

3.6. Tools of Analysis

Keeping in view of the objectives of the study, appropriate methods were employed to analyse the collected data. The analytical techniques used in the study are presented below:

3.6.1. Conventional Analysis

Averages and percentages were used to examine the characteristics of sample farm households such as age, educational status, and size of operational holdings, production and marketing of cashew and cost and returns from cashew plantation.

3.6.2. Functional Analysis

Resource use efficiency

Production function analysis was employed to evaluate the resource use efficiency in cashew production. After examining the relationship between the dependent and independent variables with a scatter diagram, Cobb- Douglas production function was selected for the study. The independent variables were age of the plantation, human labour, value of plant protection chemicals, manures and fertilizers used.

The physical output in kilograms of cashewnut was specified as the dependent variable.

$$Y = a\ X_1^{\beta 1}\ X_2^{\beta 2}\ X_3^{\beta 3}\ X_4^{\beta 4}\ X_5^{\beta 5}\ e^{U}$$

Where, Y_L = yield of cashew in kilograms/ha

A = Intercept

X_1 = Age of the plantation (in years)

X_2 = Human labour (in man days/ha)

X_3 = manures (in tonnes/ha)

X_4 = plant protection chemical (in Liter/ha)

X_5 = Nitrogen (in kg/ ha)

u = error term

β_1……β_5 - Regression coefficient

Estimation procedure

The Ordinary least square (OLS method) was used for estimating the parameters associated with different independent variables. The estimable form of the function is formally expressed as.

$$\text{Ln } Y = \ln a + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + U$$

This function is expressed in the linear form as

$$y = a + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 \ln X_5 + U$$

Where

$y = \ln Y$; $xj = \ln X_j$ for j = 1 to 5; $a = \ln a$

Marginal productivities of factors

Estimates of the parameters $\beta_1 \ldots \beta_5$ were elasticities of Y with respect to j^{th} input. The marginal products of the resources were derived from these elasticity coefficients. The marginal value products of significant inputs were worked out at its geometric mean level by using the formula

$$MVP_j = \beta_j \frac{\bar{Y}}{\bar{X}_j} .Py$$

Where,

MVP_j -Marginal value product of 'jth product

$\bar{Y}$ - Geometric mean level of output

$\bar{X}_j$ - Geometric mean of input 'j'

β_j - Estimated co-efficient of elasticities

Py - Price per unit output

Marginal Value Product (MVP) of each input was compared with Marginal Input Cost (MFC) in order to estimate the efficiency.

The efficiency of resources was judged by computing the ratio of MVP of resource to its factor cost.

MVP/Pxi = 1 --------- Optimum use of resource

MVP/Pxi < 1 ---------- Excess use of resource

MVP/Pxi > 1 ---------- Under use of resource

3.6.3. Capital Productivity

Measurement of productivity assumes importance as it facilitates most efficient use of resources. In crops like cashew capital invested now, yields a stream of returns in future. By comparing the present worth of stream of returns from the capital

investment with the original cost of investment, the productivity of investment can be measured.

Among the methods available for measuring the productivity of investments made, three of them viz., net present value, benefit cost ratio and internal rate of return methods were used in the present study.

i. Net present value (NPV)

This is simply the present value of the cash flow stream. Sometimes, it is referred as Net present worth (NPW). The selection criterion of the project depends on positive value of NPW when discounted at the opportunity cost of the capital. This could be satisfactorily done, provided there is a correct estimate of opportunity cost of capital.

. In calculating the net present value, market rate of interest was used to discount benefit streams and cost streams.

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

Bt = Benefits in t^{th} year

Ct = Costs in t^{th} year

n = Number of years

r = Discount rate (18%)

In order to consider the investment worthiness, the net present value should be positive and of higher magnitude before alternative opportunities is considered.

ii) Benefit- cost ratio (B-C Ratio)

The benefit cost ratio of an investment is the ratio of the discounted value of all cash inflows to the discounted value of all cash outflows during the life of *cashew* orchard. It is calculated by using following formula.

$$\text{Benefit} - \text{Cost ratio} = \frac{\sum_{t=1}^{n} B_t / (1+r)^t}{n}$$

$$\sum_{t=1} C_t / (1 + r)^t$$

iii) Internal Rate of Return (IRR)

It is the rate of return, which equates the discounted benefits with the discounted costs. IRR is arrived through the interpolation technique by using different discount rates so as to see that the net present worth is equated to zero.

$$\text{IRR} = \text{Lower discount rate} + \text{Difference between the two discount rate} \times \frac{\text{Present worth of the cash flow at the lower discount rate}}{\text{Absolute difference between the present worths of the cash flows at the two discount rates}}$$

3.6.4. Price Spread Analysis

Information on prices prevailed and the costs involved in marketing of cashew at different stages of marketing channel were collected from the farmers and traders. The costs of marketing include transport, weighing, loading and unloading, packing, storage and other incidental expenses incurred for marketing the produce.

In the process of marketing of cashewnut, the difference between price paid by the consumer and that received by the cashew producer for an equivalent quantity of cashew was defined as "price spread". Data on profits of the various market functionaries involved in moving the produce from the initial point of production till it reached the consumer were collected. In this study, sum-of-average gross margin method was used in the estimation of price spread.

a. Sum-of-Average Gross Margin Method

The average gross margins of all the intermediaries were added to obtain the total marketing margin as well as the breakup of the consumer's rupee.

$$MT = \sum_{i=1}^{n} \{[S_i - P_i]\} / Q_i$$

where,

MT = Total Marketing Margin

S_i = Sale value of a product for i^{th} intermediary

P_i = Purchase value paid by the i^{th} intermediary

Q_i = Quantity of the product handled by the i^{th} intermediary

i = 1, 2, 3 … N (Number of intermediaries involved in the supply chain)

b. Farmer's Share in consumer Rupee

Further, the Farmer's share in consumer rupee was calculated with the help of the following formula.

$$Fs = (Fp/Cp) \times 100$$

Where,

Fs = Farmer's share in consumer rupee (percentage)

Fp = Farmer's price

Cp = Consumer's price

3.6.5 Marketing Efficiency

Marketing efficiency is a measure of market performance. The movement of goods from producers to the ultimate consumers at the lowest possible cost consistent with the provision of service desired by the consumers is termed as efficient marketing

Shepherd's Formula

Shepherd (1965) suggested that the ratio of total value of goods marketed to the marketing cost could be used as a measure of marketing efficiency. The higher the ratio, higher would be the efficiency and vice versa. This can be expressed in the following form:

$$ME = [(V/I)-1]$$

Where,

ME = Index of marketing efficiency

V = Value of goods sold

I = Total marketing cost

3.6.6 Garrett's Ranking Technique

In the Garrett's scoring technique, the respondents were asked to rank the factors or problems and these ranks were converted into percent position by using the formula

$$\text{Percent position} = \frac{100 \text{ X } (R_{ij} - 0.5)}{N_j}$$

Where,

R_{ij} = Ranking given to the i^{th} attribute by the j^{th} individual

N_j = Number of attributes ranked by the j^{th} individual.

By referring to the Garrett's table, the percent positions estimated were converted into scores. Thus, for each factor the scores of the various respondents were added and the mean values were estimated. The mean values thus obtained for each of the attributes were arranged in descending order. The attributes with the highest mean value was considered as the most important one and the others followed in that order.

CHAPTER IV

DESCRIPTION OF THE STUDY AREA

A profile of the study region in terms of agro-climatic conditions, topography and other socio-economic characteristics of a region are important for understanding the problems of agricultural development in that region. The present study mainly focuses on assessing the production and marketing of cashew in Pudukkottai district. The basic information of the study area regarding location, climatic condition, soil type, irrigation facilities, cropping pattern, infrastructural facilities of the study area are reported in this section.

4.1. Geographical Location

The district is located in the southern part of Tamil Nadu and surrounded by Trichy on north, Sivagangai on south, on the east by Thanjavur district and west Ramnad and in south east bay of Bengal. Pudukkottai was separated as a district in January 1974. It is carved out from Trichy and Thanjavur districts. It is having an area of 4,663.29 Sq. Kms with a total coastal line of 42 Kms. The district lies between 78º26’50” and 79º16’00” of the east west longitude and between 9º50’45” and 10º44’00” of the north longitude.

4.2. Revenue division

There are two revenue divisions namely Pudukkottai and Aranthangi. The administrative units of the district consists of the both revenue village and revenue panchayats besides town panchayats and municipalities. Pudukkottai district comprises 7 taluks, 13 blocks and 765 villages. As regarding to the hierarchy of administrative arrangements, there are 2 municipalities, 8 town panchayats and 498 villages panchayat in the district.

4.3. Demography pattern

The population of the Pudukkottai district was 14,59,601 of which 7,35,301 were female, constituting 50.30 per cent to total population and male population was 7,24,300 constituting 40.7 per cent to total population according to 2000-01 census. The overall literacy rate in the district was 62.01 per cent. Of that 57.36 per cent were male literates, where as the female literacy was less with 42.67 per cent. The literacy

rate is more in the male population than the female population. The Population statistics and Literacy level of Pudukkottai district is given in Table 4.1.

Table 4.1. Population and Literacy in Pudukkottai district (2001 Census)

SI.No	Particular	Population	Percentage to the total	No. of Literates	Percentage to the total
1	Male	724300	49.70	520281	57.33
2	Female	735301	50.30	387095	42.67
	Total	1459601	100.00	907376	100.00

Source: District statistical hand book (2007-08) Office of Assistant Director of Statistics, Pudukkottai.

4.4. Occupational status

The working population determines the magnitude of all economic activities. Hence, the different categories of workers are furnished in the Table 4.2.

Table 4.2. The Occupational Pattern of Pudukkottai District (2001 Census)

SI.No	Particular	Population	Percentage to the total
i	Male workers	417332	61.53
ii	Female workers	260957	38.47
	Total workers	678289	100.00
i	Rural workers	597007	88.01
ii	Urban workers	81282	11.99
	Total workers	678289	100.00
i	Cultivators	247602	36.50
ii	Agrl. Labours	228386	33.67
iii	Household Industry	17352	2.55
iv	Other Workers	184949	27.26
	Total Workers	678289	46.47
	Non workers	781312	53.53

Source: Office of Assistance Director of Statistics, Pudukkottai, 2007-08.

Of the total populations in the district, workers constituted 46.47 per cent, while non workers accounted for the rest 53.53 per cent. In respect of workers' population, 61.53 per cent of total workers were male workers in Pudukkottai district indicating the

dominance of male working force. Further, 88 per cent of the total work force constituted rural workers in Pudukkottai district. 70.17 per cent of workers were cultivators and agricultural laborers in Pudukkottai district.

4.5. Land utilization pattern

The land utilization particulars are given in Table 4.3 which reveals that total geographical area of Pudukkottai district was 466329 hectares. The net area sown accounted for 33.50 percent of the total geographical area. 27.80 per cent of the total area was put to non agricultural uses. But the area sown more than once to the net area sown was only 1.48 per cent and cultivable waste accounted for about 2.33 per cent, but barren uncultivable lands were to the extent of 2.11 per cent. The fallow land accounted for 21.84 per cent. The forest area constituted 5.04 per cent to the total geographical area. This area also included the cashew plantation. The land put under permanent pastures and other grazing lands was negligible, 1.09 per cent only.

Table 4.3. Land Use Pattern in Pudukkottai District 2007-08

SI. No	Classification	Area (in ha)	Percentage to the total
1	**Total geographical area**	**466329**	**100**
2	Forest land	23535	5.04
3	Barren and Uncultivable Land	9863	2.11
4	Cultivable Waste	10408	2.33
5	Land put to non-agricultural uses	129720	27.80
6	Permanent Pasture and other Grazing Land	5125	1.09
7	Current Fallows	9454	2.02
8	Other Fallow Lands	92445	19.82
ii	Net Area sown	156257	33.50
iii	Area sown more than once	2252	1.48
iv	**Gross Cropped Area**	158510	34.00

Source: Office of Assistance Director of Statistics, Pudukkottai, 2007-08.

4.6. Climatic condition

The study area experiences a tropical climate having long arid spell with intermittent summer showers**.** The climatic condition of the district is generally hot and the weather is dry in summer (from March to May) and winter is cold and misty. Maximum normal

temperature during summer months was around 40º C, where as the minimum temperature during the same period was 26º C, a difference of 14º C would reveal that the temperature during the night hours seems to be more pleasant and a variety of crops ranging from cereals to vegetable crops and also high value crops would be grown in the district. During the winter months, the maximum temperature found to be 32º C and minimum was 20º C. It could be seen from the both winter and summer had a difference between 6-8ºC between the maximum and minimum. Hence, it becomes a preferred zone for cultivating many commercial crops. The temperature prevailed in Pudukkottai district is present in Table 4.4.

Table 4.4. Temperature and Humidity of Pudukkottai District - 2007-08

SI.No	Months	Temperature(º C)				Humidity (%)
		Mean maximum		Mean minimum		
		Normal	Actual	Normal	Actual	8.30 hrs
1	June	36.6	38.2	25.8	25.5	76
2	July	35.3	37.3	25.3	24.5	78
3	August	35.1	37.7	24.5	25.1	76
4	September	34.4	36.5	24.2	24.4	81
5	October	32.9	34.7	23.4	23.3	82
6	November	30.2	29.8	22.2	20.4	85
7	December	29.1	30.4	20.6	20.1	81
8	January	30.2	32.3	20.2	18.8	77
9	February	32.7	33.2	20.9	20.0	78
10	March	35.6	37.7	22.6	23.1	74
11	April	39.8	39.3	25.6	24.6	76
12	May	40	39.2	26.3	24.8	71

Source: Office of Assistance Director of Statistics, Pudukkottai, 2007-08.

From the Table 4.4, it is understood that the maximum temperature was recorded during the month of April and May with 38º C and the minimum temperature was recorded from November to February with an average of 31º C being hottest and coldest month respectively.

4.7. Rainfall

The season wise rainfall pattern is presented in Table 4.5. It can be seen from the table that Pudukkottai district received more than 80 per cent of rainfall through South-West and North-East monsoon seasons. The rain received by North-East monsoon alone constituted 53.68 per cent of the total rainfall of the district. The success or failure of a crop in a year mainly depends upon the amount of

North-East monsoon rainfall of the year. There was large variation in the distribution of rainfall during the North-East monsoon period as compared to South-East monsoon period. Instead of the high fluctuation in rainfall during North-East monsoon as a direct bearing with the high variation in the yield of the crops. The total annual rainfall, for the study period 2009-10 was 814.7 mm which slightly lesser than the average rainfall of this region, over the years.

4.8. Irrigation

The source of irrigation in Pudukkottai district was given in Table 4.6

Table 4.6. Source of irrigation in Pudukkottai district

SI.No	Source	Area irrigated in hectares	Per cent
1	Government Canals	10344	9.44
2	Private Canals	-	-
3	Tanks	70506	64.36
4	Wells	6107	5.57
5	Tube wells	22425	20.47
6	Other Sources	167	0.16
	Total	109549	100.00

Source: Office of Assistance Director of Statistics, Pudukkottai, 2007-08.

From the Table, it is evident that the area is mostly dependent on tank irrigation which accounts for 64.36 per cent of the total irrigated area of the district. The tanks received their supplies from the rains in both North East and South West monsoon. So the failure or untimely rainfall effects significantly the water position in the tank, in turn affecting the area that is benefitted by tank irrigation. Well irrigation is only 20.47 per cent. The area benefitted by government canals is only 9.44 per cent.

4.9. Soil Types

The soil including its fertility and topography is of prime importance in determining the range crops and the productivity of such crops that can be grown in region. The most predominant soil in the study area is black soil which accounted for 205100 ha (41 per cent). Red soil accounted for 140000 ha (30 per cent) which is poor in fertility where cashew is predominantly grown. A portion of the district has black and red sandy soil where annual grain crops are cultivated.

4.10. Cropping Pattern

The Table 4.7 reveals that major area was grown with food crops. This indicates the subsistence nature of farming. Among cereals paddy was predominantly cultivated and occupied 58.90 per cent of the total cropped area. Other cereals and minor millets were grown in 1.6 per cent. Among oilseeds, groundnut was grown 15.17 per cent. Area under cashew was 13,802 hectare which accounted 8.70 per cent of the total area.

Table 4.7. Cropping Pattern in Pudukkottai district (2007-08)

SI.No	Crop	Area (ha)	Per cent
A	**Food Grains**		
1.	Paddy	93365	58.90
2	Maize	1555	1.00
3	Cholam	667	0.42
4.	Ragi	213	0.13
5.	Cumbu	58	0.03
B.	**Pulses**		
1.	Green gram	103	0.06
2.	Black gram	890	0.56
3.	Red gram	1288	0.81
4.	Horse gram	125	0.71
C.	**Oil Seeds**		
1.	Ground nut	24039	15.17
2.	Gingili	589	0.40
D.	Sugar cane	10204	4.43
E.	**Fruit Crops**		
1.	Mango	2024	1.28
2.	Banana	4001	2.53
F.	**Vegetable Crops**		
1.	Brinjal	535	0.33
2.	Bhendi	462	0.29
G.	**Plantation Crops**		
1.	Cashew	13802	8.70
H.	**Others**	4590	2.89
	Total cropped area	158510	100.00

Source: Office of Assistance Director of Statistics, Pudukkottai, 2007-08.

4.11. Land Holding Pattern

Land holding pattern of Pudukkottai district was shown in the Table 4.8. It is found that about 3.52 lakh's of farmers cultivating 2.48 lakh's hectares of area. Marginal farmers formed major part of cultivators cultivating 39.69 percentage of area. Small farmers constituted 11.82 per cent and the area under cultivation was 23.35 per cent. Medium and large farmers constituted 1.56 and 0.20 per cent and area under cultivation was 12.9 and 4.9 per cent, respectively.

Table 4.8. Land Holding Pattern in Pudukkottai district (2007-08)

(in ha)

SI.No	Size of land holding	Land holding	
		Number	**Area**
1.	Marginal (up to 1.00 ha)	286513 (81.34)	98470 (39.69)
2.	Small (1.00 to 2.00 ha)	41647 (11.82)	57970 (23.35)
3.	Semi –medium (2.00 to 4.00 ha)	17903 (5.08)	48313 (19.46)
4.	Medium (4.0 to 10.00 ha)	5485 (1.56)	31261 (12.6)
5.	Large (more than 10)	671 (0.20)	12159 (4.9)
	Total	**352219 (100)**	**248173 (100)**

(Figures in the parentheses indicate percentage to total)

Source: Office of Assistance Director of Statistics, Pudukkottai, 2007-08.

4.12. Livestock

Knowledge on animal population of the selected area is useful because it contribute part of power sources in agriculture and it also act as a source of income and manure to the farmers. The particulars about the live stock population are given Table 4.9.

Table 4.9. Livestock population in Pudukkottai district (2007-08)

SI.No	Particular	Number	Percentage to the total
1.	Cattle	68094	9.76
2.	Sheep	151078	21.65
3.	Goats	177816	25.48
4.	Pigs	2022	0.28
5.	Donkeys	1102	0.15
6.	Domestic dog	40381	5.78
7.	Others	257171	36.87
	Total livestock	697664	100

	Total poultry	476110	

Source: 17th livestock population animal husbandry, Pudukkottai

According to livestock census (2001), the total livestock population in the district was 697664 heads, of which 68094 (9.76 per cent) were cattle and 177816(25.48 per cent) were goats. Sheep accounted for 21.65 per cent followed by domestic dog and Pig were constituted 5.78 and 0.28 per cent. Poultry population in the district was reported as 476110.

4.13. Infrastructural Facilities

4.13.1 Transport and Communication

The important categories of road and communication facilities in Pudukkottai district are given Table 4.10.

Table 4.10. Transport and communication in Pudukkottai district (in Km)

SI.No	Particular	Length
A.	**Roads**	
1.	National high ways	86.820
2.	State high ways	291.785
3.	Corporation and municipality road	219.271
4.	Panchayats union and panchayats road	2998.40
5.	Major districts	159.570
6.	Other district roads	1569.65
B.	**Railway**	
1.	Broad Gauge	67
2.	Meter Gauge	26

Source: Office of Assistance Director of Statistics, Pudukkottai, 2007-08.

Pudukkottai district is well connected with network of roads and some extent railways. The district has well developed road connectivity with near 86.820 km of national highways passing through the district. Apart from the above 291.785 km length of state high ways, 160 km lengths of major district roads, 1569 km length of other district roads are available for transport. The district is served by broad gauge railways to a total length of 67 km with 10 railway station.

The district has all communication facilities such as 219 post offices and 63 telephone exchanges, there were 56,914 telephones in use for communications.

4.13. 2.Financial institution

From the Table 4.11, it could be inferred that the district had more number of nationalized banks with 53 (19.06 per cent) and private sector banks were 28 (10.09 per cent) and primary agricultural credit bank societies 137 (49.28 per cent), both institutional and non institutional agencies are playing a vital role in providing the financial support to the farming communities. Primary Agricultural Credit Societies, District Central Co-operative Banks, Primary Land Development Banks and Commercial Banks form the institutional agencies. Co-operative Societies serve the role of extending required credit as well as the source of supply of agricultural inputs like fertilizers and pesticides to the farmers

Table 4.11.Financial institution in Pudukkottai district (2007-08)

(in No's)

SI.No	Particular	Branch	Per cent
1.	Nationalized bank	53	19.06
2	Private bank	28	10.09
3	District Central Co-operative Bank	20	7.19
4.	Primary Agricultural Credit Societies	137	49.28
5.	Other non agricultural credit societies	35	12.58
6.	Pandian gram bank	3	1.08
7.	Urban banks	2	0.72
	Total	**278**	100

Source: Lead bank IOB and Joint registrar co-operative societies, Pudukkottai.

4.14. Agriculture research institution

The National Pulses Research Centre under the aegis of Tamil Nadu Agricultural University was established in 1979 at Vambam in Pudukkottai district. It is the lead centre for the research on pulses in the state. This is one of the identified centres under All India Co ordinated Research Project (AICRP) on Pulses under Indian Council of Agricultural Research. The station comprises of an area of 127.46 ha with 79.47 ha under tree crops, 2.27 ha under annual crops, 6.68 ha under roads and 4.04 ha under buildings. Since its inception, the centre has made significant progress in all spheres of pulses research to improve the yield, stability and food quality of the major pulse crops suited for the rainfed and less fertile soils in the state.

Table 4.5. Season wise distribution of rainfall in Pudukkottai district (for the years 1997-98 to 2009-10)

(in millimeters)

Year	Southwest monsoon (June to September)	Northwest monsoon (October to November)	Winter showers (January to February)	Summer showers (March to may)	Total
1996-97	397.5	406.4	14	74.8	892.7
1998-99	277.3	770.6	15.9	96.3	1160.1
1999-00	383	531	76.3	66.2	1056.5
2000-01	151.8	383.2	43	89.2	667.2
2001-02	303.6	379.1	4	80.5	767.2
2002-03	302.1	373.6	137	62.5	875.2
2003-04	223.5	435.3	0.7	108.8	768.3
2004-05	329.8	384.4	-	257.4	971.6
2005-06	347.5	809.3	4.2	125.2	1286.2
2006-07	312.2	466.3	45	58	881.5
2007-08	225.3	441.1	2.1	43.7	712.2
2008-09	345.3	456	34	53	888.3
2009-10	214.7	467	53	80	814.7
Total	3813.6	6303.3	429.2	1195.6	11741.7
Mean	293.3	484.8	35.76	91.96	903.2
Percentage to total annual rainfall	32.47	53.68	3.65	10.18	100

Source: Season and Crop report of Tamil Nadu 2009-010.

CHAPTER V

RESULTS AND DISCUSSION

In the earlier chapters, a brief review of the past studies, relevant methodology adopted and the general description of the study area were presented. With that background, the data collected during the survey were analyzed in relation to each of the specific objectives of the study and results have been tabulated. In this chapter, the results of the analyses are presented and discussed in the following sections:

5.1 General characteristics of sample respondents

5.2 Cost and return of cashew plantation

5.3 Financial feasibility of investment in cashew orchard

5.4 Resource use Efficiency in cashew cultivation

5.5 Processing of cashew

5.6 Marketing of cashew

5.7 Constraint in cashew production and marketing.

5.1 .General Characteristics of Sample Respondents

A brief description of the characteristics of the sample farmers would provide the necessary setting for the discussion. Therefore, the family type, family size, age distribution, educational status, cropping pattern, livestock particulars and experience in farming as well as in cashew cultivation of the respondents are discussed below.

5.1.1. Family type

Family type, whether it is nuclear or joint, would decide the magnitude of contribution of family labour in farming. Hence, family types of sample respondent are presented in Table 5.1.

Table 5.1. Type of family of sample farmers in Pudukkottai district

(in Numbers)

SI.No	Type of family	No. of family	Percentage to the total
1.	Nuclear Family	77	77.00
2.	Joint Family	23	23.00
	Total	100	100.0

Among the sample farmers, nuclear family type was found to be predominant with 77.00 per cent when compared to joint family type with 23.00 per cent.
It is concluded from the above results that nuclear family type is predominant in the study area.

5.1.2. Family size

The size of the family has important implications with respect to income realization of the sample households. The information on family size is presented in Table 5.2.

Table 5.2. Family size of sample farmers in Pudukkottai district

(in Numbers)

SI.No	Type of family	No. of family	Percentage to the total
1.	Small (<3)	30	30.00
2.	Medium (4-5)	48	48.00
3.	Large (> 5)	22	22.00
	Total	100	100.00

Among the cashew farmers medium sized family was highest with 48 per cent of the total households followed by small sized family with 30 per cent of the total households. Large sized family was lowest with 22 per cent of the household. Hence it could be concluded from the table that medium and small sized families are predominant in the area.

5.1.3. Age of distribution

Age of the farmers would influence the production decision behaviour of the farmers. Hence, the age distribution is given in Table 5.3.

Table 5.3. Age of distribution of sample farmers in Pudukkottai district

(in Numbers)

SI.No	Age group	No. of farmer	Percentage to the total
1.	Up to 30	18	18.00
2.	31-40 years	43	43.00
3.	41-50 years	25	25.00
4.	Above 50 years	14	14.00
	Total	100	100.00

It could be seen from the table that nearly 18 per cent of the farmers were in the age group of below 30 years, 43percent in 31 to 40 years, and 25 per cent in 41 to 50 years. Only 14 per cent of the farmers had crossed 50 years. So it could be seen that majority of the farmers were in their prime productive age of 31 to 40 years. These farmers could venture into cashew growing with confidence.

5.1.4. Educational status of sample farmer

Educational status of the farmers is also an important factor in influencing the decision-making behavior to a great extent. The educational status of the sample farmers is presented in Table 5.4.

Table 5.4. Educational status of sample farmers in Pudukkottai district

(in Numbers)

SI.No	Educational status	No. of farmer	Percentage to the total
1.	Illiterate	15	15.00
2.	Primary	37	37.00
3.	Secondary	25	25.00
4.	Higher secondary	12	12.00
5.	Collegiate	11	11.00
	Total	100	100.00

The level of literacy influences the adoption of new technologies and new crops. As revealed from the table, about 37 per cent of sample farmers had education up to primary level and 25 per cent of farmers up to secondary level. In total around 85 per cent of them were literates and only 15 per cent of them were illiterates.

5.1.5. Experience of sample farmers in cashew cultivation

The experiences of the sample farmers in the cultivation of cashew are presented in Table 5.5

Table 5.5. Experience of farmers in cashew cultivation

(in years)

SI.No	Experience	No. of farmer	Percentage to the total
1.	> 10	19	19.00
2.	10-25	68	68.00
3.	> 25	13	13.00
	Total	100	100.00

It could be seen from the Table 5.5 that 68 per cent of the cashew farmers in the sample had an experience of 10-25 years in cashew production, 13 per cent had more than 25 years of experience, and 19 per cent had an experience of less than 10 years.

5.1.6. Annual income of sample farms

The sample households were post-stratified into three different groups based on the annual income. Households with annual income of below Rs 50,000 were categorized as low income group, households with annual income between Rs 50,000 and Rs 1,00,000 were included under middle income group and those with annual income exceeding Rs 1,00,000 were included under high income group. Details regarding the distribution of households in three different income groups and their percentage share to total number of sample households are furnished in Table 5.6.

Table 5.6.Annual income of sample farmers in Pudukkottai district

(in Numbers)

SI.No	Annual income	No. of farmer	Percentage to the total
1.	Up to 50,000	7	7.00
2.	50,001 to 100,000	32	32.00
3.	>100,000	61	61.00
	Total	100	100.00
	Average annual income	157430.41	

It could be observed from the Table that in high income group, there were 61 per cent of the sample farmers. In low income group there were 27 per cent of the total farmers and in the middle income group farmers there were 32 per cent the farmers. Average annual income of sample household was Rs.157430.41. From the above result it is concluded that among the three categories of income group, most of the sample farmers are in high income group.

5.1.7. Average operational land holding for cashew farmer

Average operational land holding of sample farmers is presented in Table 5.7

Table 5.7. Average operational Land holding of sample farmers in the study area

(Area in ha)

SI.No	Particular	Area (ha)	Percentage to the total
I.	**Owned land**		
a.	Irrigated	0.71	22.40
b.	Un irrigated	2.42	76.34
	Sub total	3.13	98.73
II.	**Leased -in-land**		
a.	Irrigated	0.03	0.95
b.	Un irrigated	0.01	0.32
	Sub total	0.04	1.26
	Total irrigated	0.74	23.34
	Total un irrigated	2.43	76.66
III.	**Gross total(I+II)**	3.17	100

The average operational land holding of cashew farmers in the study area was 3.17 ha and majority of land was owned land which constitutes about 98.73 per cent to the total. The irrigated and un irrigated land were 0.74 ha (23.34 per cent) and 2.43 ha (76.66 per cent), respectively. Very small size of land amounted to 0.04 ha was leased in by sample farmers in the study, while no sample farmer was found to be leased out his land to other farmer.

5.1.8. Land use pattern of cashew growers

The analysis of land use pattern of sample cashew farmers presented in the Table 5.8, indicated that 87.70 per cent, 6.62 per cent and 5.68 per cent of the total land was observed to be cultivated land, fallow and non agriculture land respectively.

Table 5.8. Average land use pattern of sample farmers in the study area

(Area in ha)

SI.No	Particular	Area	Percentage to the total
I.	Area under cultivation	2.78	87.70
II.	Fallow land	0.21	6.62
III.	Non agriculture	0.18	5.68
	Total land	3.17	100.00

5.1.9. Livestock Population

It could be observed from the above Table 5.9 that the farm households showed higher preference towards rearing goat and cow. They constitute 36.93 per cent and 32.52 per cent respectively. Sheep and pig constitute 19.45 per cent and 5.78 per cent respectively. Buffalo and bullock population are on the decline in the region and this is reflected by the population of these categories of livestock in the sample farm households.

Table 5.9. Livestock in sample farms

(in Numbers)

SI.No	Category	Number	Percentage to the total
1.	Cow	214	32.52
2.	Buffalo	27	4.1
3.	Bullock	8	1.22
4.	Goat	243	36.93
5.	Pig	38	5.78
6.	Sheep	128	19.45
	Total	658	100.00

5.1.10. Cropping pattern of cashew farmer

The information on the existing cropping pattern of the sample is presented in the Table 5.10.

Table 5.10. Cropping pattern of sample farmer in the study area (Area in ha)

SI.No	Crops	Total area	Percentage to the total
1.	Paddy	0.31	10.84
2.	Black gram	0.16	5.59
3.	Sugarcane	0.13	4.55
4.	Mango	0.28	9.79
5.	Cashew	0.58	20.28
6.	Ground nut	0.27	9.44
7.	Others	1.13	39.51
	Gross cropped area	**2.86**	100.00
	Net cultivated area	**2.78**	
	Area shown more than once	**0.08**	
	Cropping intensity	**102.8**	

From the Table it is evident that the area under Cashew, Paddy, Mango, Groundnut and Sugarcane formed the major share with 20.28, 10.84, 9.79, 9.44 and 4.55 per cent respectively. Other crops in that area accounts for 39.51 per cent.
The gross cropped area of sample farmers was 2.86 hectare and net cultivated area was 2.78 hectare and the cropping intensity was 102.8 percent

5.2 Cost and return for cashew plantation

5.2.1 Establishment cost of orchards

Establishment cost included all the expenditures incurred right from preparation of land for planting cashew seedling upto the commercial bearing stage of the crop. The establishment of cashew orchard needs four years and the establishment cost per hectare of cashew plantation was estimated considering the quantity of inputs and labourers and their respective market price and wages prevailed in the study area.

The details of findings on establishment cost are presented in Table 5.11.

Table 5.11. Investment pattern in cashew orchards

(In Rs/ ha)

Sl. No	Particulars	Units	Quantity	Value	Per cent
	A. Investment cost				
1.	Land revenue	Rupees	-	60	0.04
2.	Rental value of land	Rupees	-	2700	1.90
3.	Pump sets	Rupees	-	23,628.02	16.62
a)	**Labour costs**				
1.	Land preparation	ML* (hrs)	5.7	1347.25	0.95
2.	Digging of pits				
	a) human labour	Man days	32.21	4621.45	3.25
	b) machine labour	ML (hrs)	6.61	1532.65	1.08
3.	Fencing	Man days	18.6	2321.7	1.63
4.	Planting charges	Man days	27.2	3174.6	2.23
5.	Fertilizer and manure application	Man days	16.21	1308.4	0.92
6.	Plant protection chemical application	Man days	18.76	2348.09	1.65
7.	Irrigation charges	Man days	8.76	1293.2	0.91
8.	Watch and ward	Man days	2.31	321.02	0.23
b)	**Material costs**				
1.	Planting material	Numbers	171.35	981.2	0.69
2.	Fertilizers	Kgs	137.2	1268.04	0.89
3.	Manures	Tonnes	2.52	2471.8	1.74
4.	Plant protection chemical	Litres	3.21	1634.5	1.15
	Total			**51,011.92**	**35.88**
				Value	**Per Cent**
B.	**Maintenance cost up to bearing period**				
	I year			21,503.76	15.13
	II year			22,024.09	15.49
	III year			23,483.59	16.52
	IV year			24,131.75	16.98
	Sub Total(I+II+III+IV)			**91143.19**	**64.12**
	Total establishment cost			**1,42,155.11**	**100**

ML* =machine labour

The establishment of cashew orchard needs four years. The establishment cost in cashew orchards are classified into investment cost and maintenance cost.
The investment cost includes the cost on rental value of land, pump set, plant material, investment in digging of pits, planting, and manure and fertilizer application.

The maintenance cost includes cost on labour for various operations and material cost upto bearing period.

The investment costs were considered for beginning period of establishment with the maintenance cost for four years period i.e., upto the bearing stage.
The per hectare total cost of establishment were Rs.1,42,155.11 for the orchard in this region.

It was observed from the Table 5.11, that the share of investment cost in the total establishment cost was Rs.51,011.9 which constituted 35.88 per cent. The value of Pump set accounted for Rs. 23,628.02 which constituted 16.63 per cent of the total establishment cost. The other item of costs were digging of pits, planting charges, rental value of land, manure, fencing which constitute 4.33, 2.23, 1.90, 1.74, 1.63 per cent, respectively.

The maintenance cost during the four years period ranges from Rs.21,503.76 to Rs. 24,131.75 and the total maintenance cost for four years accounted for Rs.91143.19 which constituted 64.12 per cent.

5.2. 2. Maintenance cost upto bearing period of cashew orchard

It was observed from the Table 5.12, that the average per ha establishment cost incurred by cashew growers upto bearing period was Rs.91143.19. Labour, material and fixed costs accounted for 50.46, 27.84 and 21.70 per cent, respectively.

The major item of labour cost was on weeding and intercultivation which amounted to Rs.15,616.92 per ha accounting for 17.13 per cent of the total establishment cost followed by cost on fertilizer and manure application amounted to Rs. 13,078.41 per ha which constituted 14.36 per cent of the total establishment cost. The other item of cost were gap filling, irrigation and watch and ward constitute 1.42, 2.50 and 1.2 per cent respectively.

The material cost amounted to Rs. 66,658.6, of which cost of fertilizer accounted for 7.60 per cent followed by cost of manure which constituted 6.04 per cent of the total maintenance cost. Plant protection chemical constituted 5.33 per cent of the total maintenance cost. Seedling cost for gap filling constituted 0.80 per cent of the total maintenance cost.

Fixed cost included the cost of rental value of land which accounted for 11.86 per cent of the total maintenance cost. The fixed cost also included depreciation on equipment

and building, interest on fixed capital and land revenue which account for 7.26, 2.33 and 0.26 per cent respectively.

5.2. 3. Cost of cultivation during bearing period of cashew orchard

The cashew plantations start bearing the fruits after four years of planting and it will give economic yield up to 25 years. For maintaining the orchard during the bearing period the farmers have to incur cost on various items. These costs can be classified as both variable cost as well as fixed cost. The annual cost incurred by the farmers in the study area is presented in Table 5.13.

It could be observed from the Table 5.13, that the total average annual cost incurred by the farmer in maintaining one hectare of the orchard during the bearing period was Rs. 29,115.2, of which variable cost accounted for Rs. 20,174.15 per ha constituting 69.29 per cent and total fixed cost accounted for Rs. 8941.05 per ha constituting of 30.21 per cent of total maintenance cost.

It was observed from the Table, that the labours cost per ha was Rs. 14,166.49 which formed 48.66 per cent of total cultivation cost during the bearing period. Out of items major expenditure was made for harvesting (14.67 per cent) followed by manure and fertilizer application, ploughing, weeding and intercultivation and application of plant protection chemical, which accounted for 14.67, 9.84, 8.16, 8.10 and 3.07 per cent respectively.

In material cost amounted to Rs.4687.86, cost of plant protection chemicals accounted for 8.06 per cent followed by fertilizer cost which accounted for 4.66 per cent. Manures accounted for 3.38 per cent of the total cultivation cost during bearing period.

It could be observed from the table that total fixed cost incurred by the sample farmers was Rs.8941.05 per ha during bearing period. Amortized establishment cost had major share in fixed cost accounting for 12.95 per cent while rental value of land, depreciation on equipment and building, interest on fixed capital and land revenue accounted for 9.27, 4.99, 3.29 and 0.21 per cent of the total cultivation cost during bearing period.

5.2. 4. Cost and return of cashew cultivation

The details of per hectare cost and returns structure are presented in Table 5.14. The maximum items of cost involved in the production of cashew were observed under the category of cost A which accounted Rs. 20089.04. The cost A, comprised of items *viz*., working capital (at 7 per cent),

depreciation, land revenue, plant protection chemical, hire labour charge, machine labour charge and value of manures and fertilizer. Among cost A items, the cost incurred on hire labour charge was observed to be the highest (Rs.10191.8) and followed by other costs such as plant protection chemical (Rs. 2348.01) and interest on working capital (Rs. 1319.80). The items involved in cost B were, interest on fixed capital (at 12 per cent), land rent and annual establishment shares. The total amount for the cost B was worked out to be Rs.7662.9. The imputed family labour cost was observed to be Rs.1598.46. and it was added to cost B and the total cost C was Rs.29115.2

The return from one hectare of cashew plantation included the value of main product namely the raw cashewnut and by product of fruit. Average price of cashewnut at farm gate is Rs.36 per kilogram and the price for cashew apple is Rs.7 per kilogram. It could be seen from table 5.13, that the average yield of cashewnut obtained from the sample farmer worked out to 1854.71 kg per hectare and return was Rs. 67389.35 per hectare and cost of production was Rs.34.71.The net income obtained from cashew cultivation was Rs.38274.15. Farm business income obtained by deducting cost A from gross income was Rs.47300.31. Family labour income was Rs. 39637.41 which is obtained by deducting cost B from the gross return.

5.3. Financial feasibility of investment in cashew orchard

In this section cost and returns of different periods of the growth are discussed. The cost incurred and returns obtained in cashew orchard are presented in Table 5.15. The annual costs per hectare in the district were higher in the first three years mainly because more labour is required during this period for ploughing, application of fertilizers, manure, plant protection chemical, weeding, irrigation etc. The per hectare cost remained the same from fourth to seventeenth year during the bearing period of orchard, since, they were applying same quantity of inputs and also the labour employment remained same for different operations during this period. The returns varied according to age pattern of trees. It increased upto seventeenth year and decreased from eighteenth year onwards till twenty-fifth year. Cashew is a perennial crop, once established continues to bear up to 25 years.

As regards fruits or orchard enterprises, the situation is rather different, growing fruit trees represent long term investment. Only the first few years of such enterprises involve costs and low returns. To handle such difficulty, analytical techniques like NPV, BC ratio and IRR were employed. The cost and return were discounted at the rate which is assumed to be market rate of interest.

5.3.1. Net Present Value

Net present worth of investment is the difference between the present value of series of inflows and out flows over the economic life period of the cashew enterprise. Net present worth for the cashew orchards in study area was Rs. 17397.47 per ha at 18 per cent discount rate. The high positive value indicates the economic viability of cashew cultivation.

5.3.2. Benefit cost ratio

The benefit cost ratio of an investment is the ratio of the discounted value of all cash inflows to the discounted value of all outflows during the life period of enterprise. This criterion indicates the rate of return per rupee invested in cashew enterprises.
The benefit cost ratio at 18 per cent discount rate was 1.10 for the cashew orchards in study area which justifies cashew enterprise.

5.3.3. Internal rate of return

Internal rate of returns represents the average earning capacity of an investment over the economic life of the plantation. Internal rate of return was worked out to be 23 per cent indicating favourable rate of returns and is also higher than the existing market rate of interest 18 per cent.

Thus all the three criteria of investment feasibility analysis revealed that investment in cashew orchards is a feasible proposition.

5.4. Resource use efficiency in cashew cultivation

Cobb-Douglas type of production function was fitted to estimate the resource productivity in cashew cultivation. As explained earlier in methodology chapter, the variable inputs used in the cultivation of cashew in the study area were classified into five major groups viz., age of the plantation, human labour, manures, plant protection chemical and nitrogen. The dependent variable was yield of cashewnut per hectare.
The results of regression analysis in the production of cashew by sample cultivators are presented in the Table 5.16.

The coefficient of multiple determination (R^2) was found to be 0.85728 implying that 86 per of the variation in the yield of the cashewnut was explained by the explanatory variables included in the model, remaining 14 per cent in the yield of cashew was explained error term.

The regression coefficient of age of the plantation was positive and significant at 1 per cent level of significance (0.7542). The regression coefficient of manure (-0.0142) and nitrogen (-0.0316) were found to be negative and non significant at both one and five per cent level of significance. The coefficients of human labour (0.5464) and plant protection chemicals (0.1603) were observed to be positive and statistically significant at one and five per cent level of significance respectively.

The ratios of MVP to MFC were positive and greater than one for human labour and plant protection chemical indicating that still there is still scope to these inputs to increase the yield of cashew.

5.5. Processing of Cashew in the study area

Different stages of cashew processing in this region (Fig 5.1).

Cashew processing involve following stages

I) Sun drying: The raw cashew nuts are simply dried in the sun for few days to remove excess moisture of cashew kernels.

II) Steam cooking: Rawnuts are sun dried for three to four days. Then they are steamed in a boiler for 30 minutes to expand the shell and soften the nuts. After steaming, the nuts are cooled by spreading them on the floor in the shade. This hardens the shell so that it can be cracked, either by machine or with stones. Steam processing preserves the original colour of the kernel.

III) Shelling: The Steam cooked Cashew nuts are de-shelled by hand and leg operated cutters. Two workers work on one cutter, one de-shells the nut and the other worker retrieves the kernels from the cut opened shell.

The nuts are fed one by one manually between the two sets of blades to fit the contour of the fixed blade. The pressing of the pedal pierces the cashew nut on the convex side by means of two blades. The two blades are used to split the nuts by operating the handle of the cutter. After de-shelling, the nut falls freely due to gravity and is collected beneath the cutter. The operator's assistant works upon each de-shelled nut and takes out the cashew kernel embedded inside the shell. A pair of skilled worker normally de-shells about 80kg of raw cashew nuts in 8 hrs, which yields approximately 20 kg of cashew kernels. De-shelling in the mechanical cutter soils the hands of operator, causing corrosion due to CNSL oozing out from the shells due to impact of blades. It is a general practice to rinse the hands with suitable oil, mostly castor oil, to protect the hands from corrosive shell oil. Alternatively,

suitable water soluble and washable protective chemical coating like “Kerodex” cream can be applied to the hands for the purpose. In some places workers use wood ash or white cement for the purpose.

IV) Borma (oven heating): Once removed from their shells, the kernels have to be dried to loosen the red outer skin. This drying process is known as borma treatment and present day borma machines are electric. The system ensures uniform heating and does not require periodic changing of trays during heating. It preserves the original colour of the kernel and consistency in quality is achieved easily.

V) Humidifying unpeeled kernels: Humidifying helps to dislodge the skin from the kernel. Some processors have electric humidifiers, but most of the small processors use an ingenious method to humidify kernels. The kernels are spread over a soaked mat on the floor and covered with soaked gunny bags. Kernels are spread again above the gunny bags. It is again covered with soaked gunny bags. Several layers of kernels are spread like that one above the other. Layers are kept damp and intact for 12 hours. Then the kernels are packed in gunny bags and kept for another 12 hours. After that the kernels are sun dried.

VI) Peeling: The cashew kernels conditioned as above are now ready for peeling. Peeling of the testa is done manually; usage of sharp edges of knife is discouraged as it causes scraping of kernels. Scrapping spoils the look of the cashew kernel and is more pronounced after oil roasting. However knives are very selectively used on a very small quantity of cashew kernel, whose skin does not peel off easily in manual peeling.
Major classification or grading of kernels into wholes, broken and rejections are done at this stage. A skilled labourer can peel approximately 6 to 8 kg in a day.

VII) Grading: Peeled kernels are manually graded by skilled labour employed only for grading. They are graded on the basis of size. The export Act 1963 prescribes 33 different grades of cashew kernels of which 23 are commercially available and exported.

VIII) Packing: The weighed tins are “Vita Packed”. Vita packing is the process of vacuumizing and injecting inert gas viz. Carbon-di-oxide or Nitrogen into the cashew kernel filled tins. Now days buyers prefer kernels in flexible packing. Considering the cost efficiency and consumer preferences, the industry may be persuaded to go for flexible packing for which modern machinery available.

5.5. 1. Establishment cost of sample cashew processing unit

From the Table 5.17 it could be observed that the total establishment cost for a processing plant of 1600 quintals processing capacity was Rs.31.3 lakhs. Cost of processing machines and accessories alone accounted 43.14 per cent of total establishment cost. Cost of building and land were 41.53 per cent and 10.86 per cent respectively. The other items accounted for lesser percentage (4.48 per cent) of total establishment cost.

Table 5.17. Establishment cost of sample cashew processing unit

(In lakh Rs.)

Sl.No	Item of cost	Value	Per cent
I.	**Fixed capital**		
a).	Land	3.4	10.86
b).	Building	13	41.53
c).	Furniture and office equipments	0.45	1.44
d).	Cost of processing machines	13.5	43.13
f).	Other fixture	0.95	3.04
	Grand Total	**31.30**	100

5.5. 2. Cost and returns from cashew processing unit per annum

The details of findings on Cost and returns from cashew processing unit per annum are presented in Table 5.18.

Table 5.18. Cost and returns from cashew processing unit per annum

(In lakh Rs.)

II	**Annual processing expenditure**	**Amount**	**Per cent**
A).	**Total annual variable cost**		
a).	Raw nuts	55.2	58.72
b).	Labour charge	11.15	11.86
c).	Utilities	8.6	9.15
d).	Packing	0.64	0.68
e).	Other charges	0.58	0.62
	Sub total	76.17	81.03
f).	Interest on working capital 10 %	7.62	8.10
	Total variable cost	**83.79**	**89.14**
B).	**Total annual fixed cost**		

a).	Salaries of permanent staff	3.41	3.63
b).	Administrative expense	0.97	1.03
c).	Maintenance and repair cost	2.76	2.94
	Depreciation charges on		
d).	Machinery and equipments (@10 per cent)	0.9	0.96
e).	Building (@5 per cent)	0.83	0.88
f).	Furniture and office equipments (@10 per cent)	0.25	0.27
	Sub total	9.12	9.70
g).	Interest on fixed capital 12 %	1.09	1.16
	Total fixed cost	**10.21**	**10.86**
III	**Total annual processing cost (A+B)**	**94.00**	100
IV	**Gross return / year**	**120.2**	
V	**Net return / year**	**26.20**	

It could be seen from the Table 5.18 the total variable cost of cashew processing unit was worked out to 89.14 per cent of the total annual processing cost. Here the value of raw nuts was arrived by multiplying the annual average price and the quantity of raw nuts used. The total fixed cost incurred for cashew processing unit was Rs. 10.21 lakh which accounted for 10.86 per cent. The total fixed cost constituted salary of permanent staff, depreciation of machineries and building and interest on fixed capital. The total annual processing cost was Rs. 94.00 lakh. The gross return was Rs.120.2 lakh and net return was Rs.26.20 lakh after deducting the total cost.

5. 5.3. Total cost of cashew processing unit per quintal

The details of per quintal cost of cashewnut processing are presented in Table 5.19.

Table 5.19. Cost of cashewnut processing per quintal (In Rs.)

Sl.No	Particulars	Amount	Percent
I.	**Input cost**		
a).	Raw nuts	4300	61.51
b).	Labour charge	382.12	5.47

c).	Utilities	241.34	3.45
a).	Packing material	86	1.23
b).	Chemicals	22.4	0.32
d).	Other charges	46.12	0.66
.	Total	5077.98	72.64
	Interest on working capital @ 10 %	507.80	7.26
	Total variable cost	**5585.78**	**79.90**
III.	**Fixed cost**		
a).	Salaries of permanent labour	251.13	3.59
b).	Administrative expenses	51.34	0.73
	Depreciation charges on		
a).	Building	87.6	1.25
b).	Machinery and equipments	55.16	0.79
c).	Furniture and office equipments	7.64	0.11
	Sub total	662.87	9.48
	Interest on fixed capital @ 12 %	79.54	1.14
	Total fixed cost	**1405.28**	**20.10**
IV.	**Total cost(I+II+III)**	**6991.05**	**100**

The Table 5.19 shows that the total cost of processing for one quintal of raw cashew nut was Rs.6991.06. The Percentage share of variable cost and fixed cost was 79.90 and 20.10 respectively

It could be observed from the table that, the total variable cost of processing was Rs.5585.78 per quintal. The cost of raw materials was the important cost component of the variable cost which accounted for 61.51 per cent of total variable cost. Interest on working capital and labour charges were 2.26 per cent and 5.47 per cent respectively.

Fixed cost includes maintenance and repair cost. Salaries of permanent labour, administrative expense, depreciation and interest on fixed capital. The fixed cost worked out to Rs.1405.28 per quintal. Salaries of permanent staff had major share in fixed cost accounting for 3.59 per cent followed by maintenance and repair cost accounted 3.00 per cent.

5.5.4. Economics of cashew processing per quintal

The economics of cashew processing is presented in Table.5.20. The sample processors obtained a total 23.6 kg of processed kernels, 50.8 kg of shells and 3.4 kg of husk from a quintal. The main

products were sold to traders at the rate of Rs. 300.67 per kg of kernels. The shells were sold to the cashewnut shell liquid (CNSL) units at Rs. 6.5 per kg. Similarly, the husk was sold to the traders at Rs. 12 per kg in Pudukkottai. The value realized from processed kernels and by product were considered as total return. Overall gross return received from per quintal was Rs.7466.81. After deducting the total cost from gross return, the net return obtained was Rs.475.75.

5.6. Marketing of cashew

In the effort to study marketing aspect of cashew nut, marketing channels were identified and marketing cost, marketing margin, price spread and marketing efficiency have been worked out. A major portion of the cashewnut reaches the consumer in the form of kernels and liquid oil after processing. Four channels were identified and preferences of producer for different channels were assessed in the study area. They are as follows (Fig 5.2).

(i) Farmer→ pre harvest contractor→ Commission agent→ Wholesaler→ processor→ retailer →Consumer

(ii) Farmer → Commission agent→ processor → retailer →consumer

(iii) Farmer → Wholesaler→ processor→ retailer →consumer

(iv) Farmer → processor→ retailer →consumer

A majority of the farmers sold the produce in the village itself to the commission agent/ Wholesaler / Pre-harvest contractor.

In the first channel, the pre harvest contractor used to enter in to contract with the farmer. The farmer who is in need of money gets advance payment from him. Though this channel only 23 farmers sold their produce. The second channel was the popular channel in the study area as the farmer sold the produce to the commission agent and consequently to the processor. In this channel 45 farmers sold heir produce.

It was observed that the channel three contained intermediary namely wholesalers. Through this channel only 15 farmers sold their produce. In the fourth channel, farmers themselves took the produce to the processing point and sold it directly to the processors. Through this channel only 17 farmers sold their produce.

5.6.1. Price spread

The intermediaries rendered a variety of services in the process of marketing and at the same time expected the rewards for their services. The margin of the intermediaries could be considered as an indicator of the efficiency of the marketing system.

The price spread include marketing cost incurred by various intermediaries and farmers besides the profit margin of intermediaries. The net price received by the farmer was expressed as a per cent of the consumer's rupee.

Marketing Channel I

The price spread analysis for the marketing channel-I is furnished in the Table 5.21. When farmers leased out the orchards to the pre- harvest contractors, they received Rs.2435 per quintal of sale as average net price received by farmers. It was constituted 28.43 per cent of the price paid by the consumer. The cost incurred by the pre harvest contractor was worked out as Rs. 259.03 per quintal of cashewnut sale which was accounting for 3.02 per cent of the consumer price. The marketing margin earned by the pre harvest contractor was Rs. 94.09 accounting for 1.10 per cent of the price paid by the consumer. the cost incurred by the wholesaler towards packing, loading, unloading and transport was estimated as Rs. 208.98 constituting 2.44 per cent and marketing margin by the wholesaler was Rs. 127.2 accounting for 1.49 per cent of the consumer price. The purchase price of processor was Rs. 3124.5 per quintal and incurred cost Rs. 4828.62 and keeping a profit margin of Rs.275.48 he sold the produce to the retailer was Rs.8228.6 per quintal and cost incurred by the retailer was Rs. 209.21 per quintal and keeping a profit margin of Rs. 129.39 per quintal he sold the ultimate consumer at Rs.8564.2. per quintal. The net price received by the farmer after reducing the cost incurred by farmer was RS. 2435.2 Per quintal. The Farmer received 28.43 per cent of the consumer price and price spread was 71.5 per cent.

Marketing Channel II

The price spread analysis for marketing channel-II is furnished in Table 5.22. It could be seen from the table that the farmers sold their produce to the processor through commission agent. The farmers had received net price of Rs. 2922.23 per quintal which constituted 33.83 per cent to consumer's price. The marketing cost incurred by farmers was Rs. 232.5 per quintal which constituted 2.69 per cent to consumer's price. The marketing cost of processor was Rs. 4928.62 per quintal which constituted 57.06 per cent to consumer price. The cost incurred by retailer was Rs. 163.3 per quintal which constituted 1.89 per cent to consumer price and his marketing margin was Rs. 133.32, which

constituted 1.54 per cent to consumer's price. Thus, the farmers share in consumer rupee was 36.52 per cent and price spread was 66.17per cent.

Marketing Channel III

It was observed from the Table 5.23, that in channel-III farmers sold their produce to the wholesaler. The farmers had received net price of Rs. 3079.62 per quintal which constituted 35.35 per cent to consumer's price. The marketing cost incurred by farmers was Rs.52.72 which constituted 0.61 per cent of the consumer's rupee. The purchase price of wholesaler was Rs.3132.34 per quintal and incurred a cost Rs.130.19 per quintal. The purchase price of processor of processor was RS.3414.6 per quintal and keeping a profit margin of 203.2 per quintal. He sold the produce to the retailer was Rs.8432.8 per quintal and keeping a profit margin of Rs.130.13 per quintal he sold the ultimate consumers at Rs. 8712.2 per quintal.
Thus, the farmer share in consumer rupee was 35.95 per cent and price spread was 64.65 per cent.

Marketing Channel IV

The price spread analysis for marketing channel-IV is furnished in Table 5.24.

Among all of four channels, channel –IV observed as most efficient channel as the producers receive 43.34 per cent of the consumer rupee which is highest among all the channels. The total marketing cost is observed as minimum i.e.Rs.4605.92 per quintal due to produce is going from farmers to processors directly. The margin earned by processors and retailers was Rs.330.67 per quintal. Thus, the farmer share in consumer rupee was 43.34 per cent and price spread was 58.25 per cent.

5.6.2. Marketing Efficiency

It is revealed from the Table 5.25 that the marketing efficiency was higher in channel-IV (1.72) because less intermediaries involved in channel- IV followed by market intermediaries in the channel-III (1.59), channel-II (1.51). The higher marketing margin intercepted by the intermediaries in the channel-I highlight the poor efficiency.

Table 5.25. Marketing efficiency under shepherds method

Sl.No	Particular	Marketing channel			
		I	II	III	IV

1.	Consumer Price	8564.2	8638.3	8712.2	8473.52
2.	Total marketing cost`	5505.84	5324.42	5016.99	4605.92
3.	Total marketing margin	623.16	391.75	463.32	330.67
4.	Marketing efficiency	1.40	1.51	1.59	1.72

5.7 Constraints in cashew production

The farmers in the study area faced several constraints in the production of cashew. Hence it was decided to study the major constraints in cashew constraints in the study area. The six constraints identified by the sample cashew farmers were ranked using Garrett's ranking technique and the details are furnished in the table 5.26.

Table 5.26. Cashew farmers' production constrains

Sl.No	Constraints	Mean Score	Rank
1.	Labour shortage	70.05	I
2.	High wage rate	69.19	II
3.	High cost of plant protection chemical, fertilizer and manure	48.54	III
4.	Water scarcity	45.40	IV
5.	Lack of quality seed material	42.70	V
6.	Lack of technical guidance	23.58	VI

It was observed from the table that majority of the cashew farmers (70.05) expressed labour shortage as major constraint. The other important constraint experienced in cashew production was high wage rate (69.19) followed by cost of plant protection, manure and fertilizer (48.54) was the third constraint. The fourth constraint identified by the sample farmers in the production of cashew was the water scarcity (45.40).
The other constraints experienced in cashew production were lack of seed material (42.70).followed by sixth constraint of lack of technical guidance (23.48).
Which results in the declined production in following year.

5.7.1. Constraints in cashew marketing

The cashew farmer in the study area faced marketing constraints. Six major marketing constraints were identified and they were ranked using Garrett's' ranking technique and the results are presented in Table 5.27.

Table 5.27. Cashew farmers' marketing constraints

SI.No	Constraints	Mean Score	Rank
1.	Price fluctuation	67.63	I
2.	Improper market information	61.85	II
3.	Weighment problem	58.51	III
4.	High transport charge	48.10	IV
5.	Lack of Grading facility	45.43	V
6.	High Commission charges	37.54	VI

The fluctuation of price was given the first rank. The price during harvesting period was found to be unremunerative to the growers. So the farmers, who are forced to sell immediately, were at loss. The second most important constraint faced by the cashew farmers was improper market information at farmer's level. The market for cashewnut in the study area was not an organized one. The market was mainly controlled by some wholesalers and commission agents whose do not leak the information to the farmers. Hence the farmers depend upon the market intermediaries to sell their product. Lot of the farmers faced the problem in weighment. Most of market intermediaries do use the accurate weighing tools like weighbridge. But the farmers were unable to protest against them because of the fear of rejection of produce and it was ranked third. The fourth rank was given to high transport charge.

The fifth rank was given to absence of grading. Most of the farmers experienced the problem of lack of grading facility at farmer level. Market intermediaries purchased the commodity at low price without grading and they sold the commodity at distant market after grading at high prices. Even the farmers do not have any other alternatives to dispose their goods hence they were not able to protest against all those activities of market intermediaries in study area. The sixth major constraint ranked by the sample farmers was higher commission charges accounting for 10 percent of the value of products sold.

Table 5. 12. Maintenance cost of cashew orchard up to bearing period (Rs. /ha)

Sl. No	Particulars	Unit	I year		II year		III year		IV year		Total for four years	
			Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Value	Per cent
I.	**Variable Cost**											
A.	Labour Cost											
1.	Gap filling	Man days	4.71	675.4	2.72	378.02	1.56	243.61	26.58	3877.41	1297.03	1.42
2.	Fertilizer and manure application	Man days	22.6	2788.6	24.03	3287.38	20.35	3125.02	24.17	4222.36	13078.41	14.36
3.	Weeding and Intercultivation	Man days	28.03	3487.18	31.41	3728.08	25.69	4174.3	19.11	3437.84	15616.92	17.13
4.	Irrigation and plant protection	Man days	17.31	2887.68	16.37	2973.52	18.32	3288.3	5.87	748.18	12587.34	13.81
5.	Watch and ward	Man days	4.2	674.4	2.88	368.22	3.91	487.64	2.41	342.64	2278.44	2.50
6.	miscellaneous	Man days	1.75	215.05	1.89	234.37	2.82	312.56	1.2	55.4	1160.02	1.27
B.	Material Cost											
1.	Seedling for gap filling	Numbers	54.8	432.08	24.01	184.67	12.1	113.39			730.14	0.80
2.	Manures	Tonnes	1.31	1351.43	1.46	1551.78	0.78	1277.4	1.4	1322.6	5503.21	6.04
3.	Fertilizers	Kgs	136.8	1376.4	143.52	1568.82	145.05	2214.35	155.61	1764.21	6923.78	7.60
4.	Plant protection chemicals	Litrs	4.57	1026.8	4.71	1121.3	4.52	1340.7	5.23	1367.2	4856	5.33
5.	Others	Rupees		456.8		566.3		782.01		877.6	2682.71	2.94
	Sub total			15,371.82		15,962.46		17,359.28		17,965.04	66,658.6	73.19
	Interest on working capital @ 7 %			1076.03		1117.37		1215.15		1257.55	4666.102	5.12
	Total variable cost (A+B)			16,447.85		17,079.83		18,574.43		19,222.59	71,324.70	**78.31**
II.	**Fixed Cost**											
1.	Rental value of land	Rupees		2700		2700		2700		2700	10800	11.85
2.	Land revenue	Rupees		60		60		60		60	240	0.26
3.	Depreciation	Rupees		1754.21		1654.52		1623.18		1578.18	6610.09	7.25
4.	Interest on fixed capital @ 12 %	Rupees		783.03		794.56		807.86		520.58	2118.01	2.32
	Total fixed cost	Rupees		5055.92		4944.26		4909.16		4858.76	19,768.10	**21.69**
	Total cost (I+II)	Rupees		**21,503.76**		**22,024.09**		**23,483.59**		**24,131.75**	**91,148.19**	**100**

Table 5.13. Cost of cultivation of cashew orchard in bearing period

(Rs. /ha)

Sl. No	Particular	Unit			Per cent
			Quantity	Value	
I.	**Variable Cost**				
A.	**Labour Cost**				
1.	Ploughing	ML(hrs)	3.41	2376.3	8.16
2.	Manure and fertilizer application	Man days	22.57	2866.01	9.84
2.	Weeding and Intercultivation	Man days	21.02	2359.13	8.10
3.	Plant protection	Man days	7.5	892.5	3.07
4.	Irrigation	Man days	5.28	823.47	2.83
5.	Harvesting	Man days	42.5	4271.4	14.67
6.	Watch and ward	Man days	5.83	577.68	1.98
	Total Labour Cost(A)			**14166.49**	**48.66**
B.	**Material Cost**				
1.	Manure	Tonnes	1.64	984.2	3.38
2.	Fertilizer	Kgs	156.08	1355.65	4.66
3.	Plant protection chemical	Liters	5.73	2348.01	8.06
	Total Material Cost(B)	Rupees		**4687.86**	**16.10**
	interest on working capital@ 7 Per Cent	Rupees		1319.80	4.53
	Total Variable Cost(A+B)	Rupees		**20174.15**	**69.29**
II	**Fixed Cost**				
1.	Rental Value of Land	Rupees		2700	9.27
2.	Land Revenue	Rupees		60	0.21
3.	Depreciation	Rupees		1453.28	4.99
4.	Annual establishment shares	Rupees		3769.8	12.95
5.	interest on fixed capital @12 per cent	Rupees		957.97	3.29
	Total Fixed Cost	**Rupees**		**8941.05**	**30.71**
	Total (I+II)	**Rupees**		**29115.2**	**100**

Table 5.14.cost and return cultivation of cashew orchard

(Rs. /ha)

SI.No	Particular	Cost (Rs)
1.	Hire labour charges	10191.8 (35.01)
2.	Machine labour	2376.3 (8.16)
3.	Value of manures and fertilizers	2339.85 (8.04)
4.	Plant protection chemical	2348.01 (8.06)
5.	Land revenue	60 (0.21)
6.	depreciation	1453.28 (4.99)
7.	Interest on working capital	1319.80
	Cost A	**20089.04** **(69.00)**
8.	Rental Value of Land	2700 (9.27)
9.	Interest on fixed capital	1193.10 (4.10)
10.	Annual establishment shares	3769.8 (12.95)
	Cost B	**7662.9** **(26.32)**
11.	Imputed family labour	1598.46 (4.68)
	Cost C	**29115.2** **(100)**
12.	Yield (kg/ha)	1854.71
13.	Gross return	67389.35
14.	Cost of production (kg/ha)	34.71
15.	Farm business income	47300.31
16.	Farm labour income	39637.41
17.	Net income	38274.15

Table 5.15. Financial feasibility of investment in cashew orchard **(Rs. /ha)**

Year	Costs	Returns	Net income	Discount factor at 18 %	Present worth of cost @18%	Present worth of benefit @18%	NPW @18%
0.	51011.9	-	-51011.9	1	51011.9	0	-51011.9
1	21503.76	-	-21503.76	0.847	18223.53	0	-18223.53
2	22024.09	-	-22024.09	0.718	15817.36	0	-15817.36
3	23483.59	-	-23483.59	0.609	14292.84	0	-14292.84
4	24131.75	-	-24131.75	0.516	12446.89	0	-12446.89
5	29115.2	67389.35	38274.15	0.437	12726.52	29456.51	16729.98
6	29115.2	69928.3	40813.1	0.370	10785.19	25903.65	15118.46
7	29115.2	72320.1	43204.9	0.314	9139.99	22703.09	13563.10
8	29115.2	74276.91	45161.71	0.266	7745.75	19760.49	12014.74
9	29115.2	75955.8	46522.88	0.225	6564.20	17053.06	10488.87
10	29115.2	76532.13	46840.6	0.191	5562.88	14512.45	8949.57
11	29115.2	77367.53	47416.93	0.162	4714.31	12392.01	7677.70
12	29115.2	78583.05	47742.36	0.137	3995.17	10546.36	6551.18
13	29115.2	81127.06	47873.12	0.116	3385.74	8952.80	5567.06
14 to 25	289453.2	1110805	821396.7	0.687	16627.47	54723.84	38096.371
					189654	**207051.5**	**NPW**=17397.47

1. Net present worth (At 18% discount rate) = 17397.47 Rs./ha
2. Benefit cost ratio (At 18 % discount rate) = 1.10
3. Internal rate of return = 23 per cent

Table 5.16. Estimated Cobb-Douglas production function coefficients and MVP to MFC ratio for cashew

SL.No	Particulars	Parameter	Regression Coefficient	Standard error	Statistical significant	MVP/MFC
1	Intercept(a)	β0	2.531	0.7362	NS	
2	Age of the plantation (year)	β1	0.7542	0.1819	**	
3	Human Labour (man days.) per ha	β2	0.5464	0.1751	**	1.83
4	Manures(Tonnes.) per ha	β3	-0.0142	0.0891	NS	
5	Plant protection chemical(liters.) per ha	β4	0.1603	0.2306	*	1.37
6	Nitrogen(Kg) per ha	β5	-0.0316	0.0541	NS	
7	Co efficient of multiple determination	R^2	0.86			

N = 100
* = Significant at 5 percent level
** = Significant at 1 percent level
NS = Non-significant
F-value = 13.37

MVP = Marginal value product
MFC = Marginal factor cost

Table 5.20. Economics of cashew processing

Sl.No	Particulars	Value
I.	**Cashew nut kernels**	
a).	Recovery **(**Kg/Qt)	23.6
b).	Price of kernel (Rs./Kg)	300.67
c).	Value of kernel (Rs.)	7095.81
II.	**Cashew shells**	
a).	Recovery **(**Kg/Qt)	50.8
b).	Price of shell (Rs./Kg)	6.5
c).	Value of shell (Rs.)	345.07
III.	**Husk**	
a).	Recovery **(**Kg/Qt)	3.4
b).	Price of husk (Rs./Kg)	12
c).	Value of shell (Rs.)	40.08
IV.	**Gross return(**Rs./Qt)	7466.81
V.	**Total cost(**Rs./Qt)	6991.06
VI.	**Net return(**Rs./Qt)	475.75

Table 5.21.Price Spread of cashew in Market channel-I

(Rs/quintal)

Sl.No	Particulars	Amount	Per Cent
I.	**Farmer**		
	Net price Received	2435.2	28.44
II.	**Pre-harvest contractor**		
i)	Harvesting charges	23.5	0.27
ii)	Loading and unloading	8.78	0.10
iii)	Cost of watch and ward	12.23	0.14
iv)	Commission charges	188.6	2.20
v)	Transportation	15.31	0.18
vi)	Miscellaneous	10.61	0.12
a)	Total Marketing cost	259.03	3.02
b)	Marketing margin	94.09	1.10
III.	**Wholesaler**		
i)	Purchase price	2788.32	32.56
ii)	Loading and unloading	8.53	0.10
iii)	Transportation	15.7	0.18
iv)	Watch and ward	9.84	0.11
v)	Shop rent	2.95	0.03
vi)	License fee	148.36	1.73
vii)	Miscellaneous	23.6	0.28
a)	Total Marketing cost	208.98	2.44
b)	Marketing margin	127.2	1.49
IV.	**Processor**		
i)	Purchase price	3124.5	36.48
ii)	Handling and processing cost	4828.62	56.38
iii)	Marketing margin	275.45	3.22
V.	**Retailer**		
i)	Purchase price	8228.6	96.08
ii)	Transportation	24.71	0.29
iii)	Labour cost	13	0.15
iv)	Shop rent	5.38	0.06
v)	Miscellaneous cost	166.12	1.94
a)	Total Marketing cost	209.21	2.44
b)	Marketing margin	126.39	1.48
VI.	Retailer sale price /consumer price	8564.2	100
	Price spread	**6129**	**71.56**

Table 5.22. Price Spread of cashew in Market channel II

(Rs/quintal)

Sl.No	Particulars	Amount	Per cent
I.	**Farmer**		
	Gross Price Received	3154.63	36.52
i)	Harvesting charges	21.34	0.25
ii)	Loading and unloading	7.63	0.09
iii)	Cost of watch and ward	8.91	0.10
iv)	Commission charges	167.6	1.94
v)	Transportation	15.42	0.18
vi)	Miscellaneous	11.6	0.13
a)	Total Marketing cost	232.5	2.69
b)	Net price received	2922.13	33.83
III.	**Commission agent**		
IV.	**Processor**		
i)	Purchase price	3154.63	36.52
ii)	Handling and processing cost	4928.62	57.06
iii)	Marketing margin	258.43	2.99
V.	**Retailer**		
i)	Purchase price	8341.68	96.57
ii)	Transportation	26.4	0.31
iii)	Labour cost	12.8	0.15
iv)	Shop rent	7.8	0.09
v)	Miscellaneous cost	116.3	1.35
a)	Total Marketing cost	163.3	1.89
b)	Marketing margin	133.32	1.54
VI.	Retailer sale price /consumer price	8638.3	100
	Price spread	**5716.17**	**66.17**

Table 5.23. Price Spread of cashew in Market channel -III

(Rs/quintal)

SL.No	Particulars	Amount	Per Cent
I.	**Farmer**		
	Gross Price Received	3132.34	35.95
i)	Harvesting charges	17.21	0.20
ii)	Loading and unloading	6.3	0.07
iii)	Cost of watch and ward	2.31	0.03
iv)	Transportation	11.4	0.13
v)	Miscellaneous	15.5	0.18
a)	Total Marketing cost	52.72	0.61
b)	Net price received	3079.62	35.35
III.	**Wholesaler**		
i)	Purchase price	3132.34	35.95
ii)	Loading and unloading	9.23	0.11
iii)	Transportation	16.2	0.19
iv)	Watch and ward	4.68	0.05
v)	Shop rent	5.76	0.07
vi)	License fee	88.2	1.01
vii)	Miscellaneous	28	0.32
a)	Total Marketing cost	152.07	1.75
b)	Marketing margin	130.19	1.49
IV.	**Processor**		
i)	Purchase price	3414.6	39.19
ii)	Handling and processing cost	4815	55.27
iii)	Marketing margin	203.2	2.33
V.	**Retailer**		
i)	Purchase price	8432.8	96.79
ii)	Transportation	12.92	0.15
iii)	Labour cost	10.32	0.12
iv)	Shop rent	2.83	0.03
v)	Miscellaneous cost	123.2	1.41
a)	Total Marketing cost	149.27	1.71
b)	Marketing margin	130.13	1.49
VI.	Retailer sale price /consumer price	8712.2	100
	Price spread	**5632.58**	**64.65**

Table 5.24. Price spread of cashew in Market channel -IV (Rs/quintal)

Sl.No	Particulars	Amount	Per Cent
I.	**Farmer**		
	Gross Price Received	3672.13	43.34
i)	Harvesting charges	23.5	0.28
ii)	Loading and unloading	18	0.21
iii)	Cost of watch and ward	22	0.26
v)	Transportation	48.5	0.57
v)	Miscellaneous	23.2	0.27
a)	Total Marketing cost	135.2	1.60
b)	Net price received	3536.93	41.75
III.	**Processor**		
i)	Purchase price	3672.13	43.34
ii)	Handling and processing cost	4332	51.12
iii)	Marketing margin	277.79	2.29
IV.	**Retailer**		
i)	Purchase price	8198.12	96.75
ii)	Transportation	13.32	0.16
iii)	Labour cost	15	0.18
iv)	Shop rent	5.4	0.06
v)	Miscellaneous cost	105	1.24
a)	Total Marketing cost	138.72	1.64
b)	Marketing margin	136.68	1.61
V.	Retailer sale price /consumer price	8471.52	100
	Price spread	**4934.59**	**58.25**

CHAPTER VI

SUMMARY AND CONCLUSION

Cashew is one of the most valuable processed nuts traded on the global commodity markets and is also an important cash crop. It has the potential to provide source of livelihood for the cashew growers, empower rural women in the processing sector, create employment opportunities and generate foreign exchange through exports. During 2008-09, cashew covered an area of 8.93 lakh hectares in the country with a production of 6.95 lakh tons. Thus India's share in cashew area is about 22 per cent of total global area. The average yield in India is around 1.5 kg nuts per tree. Cashew is primarily an export-oriented commodity and accrued an export earning of Rs. 2,28,890 lakh (cashew kernels) and Rs.1197 lakh cashew nut shell liquid extraction (CNSL) during 2007-08. In view of the economic importance of cashew the present study was taken up with the following specific objectives.

- To find out the costs and returns of the cashew cultivation
- To study the Resource use efficiency in cashew farms
- To study the economics of cashew processing
- To study the price spread and marketing efficiency in different marketing channels and
- To identify the constraints in cashew production and marketing and suggest suitable policy measures.

6.1 METHODOLOGY

Pudukkottai district was purposively selected for the present study. In the second stage, two taluks viz., Gandarvakkottai and Alangudi were purposively selected based on area under cashew cultivation. From each taluk five villages were selected. Finally ten villages were selected for the study. Then ten cashew growers, from each of the selected village, were selected by random sampling technique. The intermediaries involved in marketing of cashew namely commission agents, wholesaler, pre-harvest contractor, and retailer were selected at the rate of ten from each category making the

total sample size of forty. Five cashew processing units were randomly selected from the district for studying processing aspect of cashew. Thus the total sample included 100 farmers, 40 intermediaries and five cashew processors.

The data collected in respect of production, processing and marketing of cashew pertains to the agricultural year 2009-2010. The selected sample farmers, processors and intermediaries were personally contacted and required primary data were collected through interview method by using pre tested interview schedules. Secondary data on general information related to Pudukkottai district and primary data on socio-economic conditions of the sample farmers were collected. The data collected were tabulated, processed and subjected to statistical analysis. The summary of the findings and conclusions along with policy drawn are presented in this chapter.

6.2. GENERAL CHARACTERISTICS OF THE SAMPLE FARMS

The details on family type of sample farms revealed that nuclear family type was found to be predominant with 77.00 per cent to total households as compared to joint family type with 23.00 per cent. The family size of sample farm households showed that medium sized family was highest with 48 per cent followed by small sized family with 30 per cent.

Head of the households with age of 31- 40 years and 41-50 years was highest with 43 per cent and 25 per cent to total respectively. Below 30 aged head of the households was next highest with 18 per cent to total.

The proportion of sample farmer with education up to primary level was highest with 37 per cent followed by higher secondary level of education with 25 per cent. In total around 85 per cent of them were literates and only 15 per cent of them were illiterates.

The farmers with 10-25 years of experience were highest with 68 per cent followed by farmers with 25 years of experience with 13 per cent to total sample farmers.

Majority of the farmers were of high income group with 61 per cent of the sample farmers. Low income group and middle income group farmers with 7 and 32 per cent, respectively. Average annual income of sample household was Rs.1, 57,430.

The average operational land holding of cashew farmers in the study area was 3.17 ha. The irrigated and unirrigated land area was 23.34 per cent and 2.43 ha, respectively. It was very small size of land amounted to 0.04 ha was leased in by sample farmers in district, while no sample farmer was found to be leased out his land to other farmer.

The analysis of land use pattern of sample cashew farmers revealed that 87.70 per cent, 6.62 per cent and 5.68 per cent of the total land was observed to be cultivated land, fallow and non agriculture land, respectively.

The livestock particulars revealed that goats and cows formed the highest proportion in livestock as accounted for 36.93 and 32.52 per cent, respectively. Sheep and pig formed lowest with 19.45 and 5.78 per cent respectively. Buffalo and bullock population are on the decline in the region.

From the analysis of cropping pattern, it was found that cashew was the first principal crop followed by paddy, mango and groundnut.

6.3. Costs and Returns for cashew plantation

6.3.1 Establishment cost of orchards

The establishment cost in cashew orchards are classified into investment cost and maintenance cost. The investment costs were considered for beginning period of establishment with the maintenance cost was four years period i.e., upto the bearing stage. The per hectare total cost of establishment was Rs.1,42,155.11 for the orchard in this region.

The investment cost in the total establishment cost was Rs.51,011.92 while the maintenance cost for four years was Rs.91143.19. The maintenance in the four years period increased from Rs.21503.76 to Rs. 24131.75.

6.3.2. Cost of cultivation during bearing period of cashew orchard

The total average annual cost incurred by the farmer in cultivation one hectare of the orchard during the bearing period was Rs.29,115.2, of which variable cost accounted for Rs. 20,174.15 per ha constituting 69.29 per cent and total fixed cost accounted for Rs. 8941.05 per ha constituting of 30.21 per cent of total maintenance

cost respectively. The average use of labours per ha was amounted Rs.14,166.49 which formed of 48.66 per cent of total maintenance cost during the bearing period.

In material cost amounted to Rs.4687.86, cost of plant protection chemicals accounted for 8.06 per cent followed by fertilizer which accounted for 4.66 per cent and manure accounted for 3.38 per cent of the total maintenance cost during bearing period.

The total fixed cost incurred by the sample farmers was Rs.8941.05 per ha during bearing period. Amortized establishment cost had major share in fixed cost accounting for 12.95 per cent while rental value of land, depreciation on equipment and building, interest on fixed capital and land revenue accounted for 9.27, 4.99, 3.29 and 0.21 per cent of the total cultivation cost during bearing period.

6.3.3. Cost and return of cashew cultivation

The maximum items of cost involved in the production of cashew were cost A which accounted Rs.20,089.04. Among cost A items, the cost incurred as hire labour charge was observed to be the highest (Rs.10191.8) followed by other costs such as plant protection chemical (Rs.2348.01) and interest on working capital (Rs. 1319.80). The items involved in cost B were, interest on fixed capital (at 12 per cent), land rent and annual establishment shares. The total amount for the cost B was worked out to be Rs.7662.9. In case of Cost C, the imputed family labour cost was observed to be Rs.1598.46. The imputed family labour cost was observed to be Rs.1598.46. and it was added to cost B and the total cost C was Rs.29115.2.

The average yield of cashewnut obtained from the sample farmer worked out to 1854.71 kg per hectare and return was Rs.67389.35 per hectare and cost of production was Rs.34.71 per kg.

The net income was Rs.38,274.15 per hectare. Farm business income obtained by deducting cost A from gross income was Rs.47,300.31. Family labour income was Rs.39,637.41 which is obtained by deducting cost B from the gross return.

6.4. Financial feasibility of investment in cashew orchard

Net present worth for the cashew orchards in study area was Rs. 17,397.47 per ha at 18 per cent discount rate. The high positive value indicates the economic viability of cashew cultivation. The estimated benefit cost ratio was 1.10 for the cashew

orchards in study area. Internal rate of return was worked out to be 23 per cent indicating favourable rate of returns and is also higher than the existing market rate of interest (18 per cent). Thus all the three criteria of investment feasibility analysis revealed that investment in cashew orchards is a feasible proposition.

6.4. Resource use efficiency in cashew cultivation

Cobb-Douglas type of production function was fitted to estimate the resource productivity in cashew cultivation. The regression coefficient of age of the plantation was positive and significant at 1 per cent level of significance (0.7542). The regression coefficient of manure (-0.0142) and nitrogen (-0.0316) were found to be negative and non significant at both one and five per cent of significance. The coefficients of human labour (0.5464) and plant protection chemicals (0.1603) were observed to be positive and statistically significant at one and five per cent level of significance. The ratios of MVP to MFC were positive and greater than one for human labour and plant protection chemical indicating that still there is scope to these inputs to increase the yield of cashew.

6.5. Processing of Cashew in the study area

6.5.1. Different stages of cashew processing in this region

Cashew processing involve following stages, Sun drying Steam, Cooking, Shelling Borma (oven heating), Humidifying unpeeled kernels, Peeling, Grading and Packing.

6.5.2. Establishment cost of sample cashew processing unit

The total establishment cost was Rs.31.3 lakhs. Cost of processing machines and accessories alone accounted for 43.13 per cent of total establishment cost. Cost of building and land were 41.53 per cent and 10.86 per cent respectively. The other items contributed lesser percentage (4.48 per cent) of total establishment cost.

6.5.3. Cost and returns from cashew processing unit per annum

The total variable cost of cashew processing unit was worked out to 89.14 per cent to the total annual processing cost. Total fixed cost incurred for cashew processing unit was Rs. 10.21 lakh which accounted for 10.86 per cent. The total

annual processing cost was Rs.94.00 lakh. The gross return was Rs.120.2 lakh and net return was Rs.26.20 lakh after deducting the total cost.

6.5.4. Total Costs of cashewnut processing per quintal

The total cost of processing unit was Rs.6991.06 per quintal. The total variable cost of processing unit was Rs.5585.78 per quintal. The cost of raw materials was the important cost component of the variable cost which accounted for 61.51 per cent of total variable cost. The fixed cost works out to be Rs.1405.28 per quintal. Salaries of permanent staff had major share in fixed cost accounting for 3.59 per cent followed by maintenance and repair cost accounted 3.00 per cent.

6.5.5 Economics of cashew processing per quintal

The sample processors obtained a total 23.6 kg of processed kernels, 50.8 kg of shells and 3.4 kg of husk from one quintal. The main products were sold to traders or export at the rate of Rs.300.67 per kg of kernels. The shells were sold to the CNSL units at Rs.6.5 per kg. Similarly, the husk was sold to the traders at Rs.12 per kg in Pudukkottai. Overall gross return received from per quintal was Rs.7466.81. After deducting the total cost from gross return, the net return amounted to Rs.475.75.

6.6. Marketing of cashew

6.6.1. Marketing channel

Four channels were identified and preferences of producer for different channels were assessed in the study area. They are as follows.

(i) Farmer→ Pre harvest contractor → Commission agent→ Wholesaler→ Processor→ retailer → Consumer

(ii) Farmer → Commission agent→ Processor → Retailer →Consumer

(iii) Farmer → Wholesaler → Processor → Retailer →Consumer

(iv) Farmer → Processor→ Retailer →Consumer

6.6.2. Price spread analysis

From the analysis of price spread the marketing Channel IV observed as most efficient channel as the producers receive 43.34 per cent of the consumer rupee which is highest among all the channels. The total marketing cost is observed as minimum

i.e.Rs.4605.92 per quintal since the produce is going from farmers to processors directly. The margin earned by processors and retailers was Rs.330.67 per quintal. Thus, the farmer share in consumer rupee was 43.34 per cent and price spread was 56.66 per cent.

6.6.3. Marketing Efficiency

The marketing efficiency was higher in channel-IV (1.72) because less intermediaries involved in channel- IV followed by market intermediaries in the channel-III (1.59), channel-II (1.51). The higher marketing margin intercepted by the intermediaries in the channel-I highlight the poor efficiency.

6.7. Constraints in cashew production

It was observed that, majority of the cashew producers (70.05) expressed labour shortage as major constraint. The other important constraint experienced in cashew production was high wage rate followed by cost of plant protection, manure and fertilizer. The other constraints experienced in cashew production were water scarcity, poor quality of nuts and no technical guidance.

6.8. Constraints in cashew marketing

The most important constraint identified by the cashew growers was higher price fluctuation in turmeric market. The second major constraint ranked by the sample farmers were improper market information at farmer's level. Weighment problem, High transport charge, Lach of Grading facility and higher commission charges were the other constraints faced by the cashew growers in marketing of cashew.

Conclusion

From the above summary of findings enabled verification of the hypotheses and to draw specific conclusion.

The first hypothesis is that Cashew production is a profitable enterprise. The results indicated that the total cost of production per hectare was Rs. 29115.20 and gross income realized from cashew cultivation was Rs.67389.35 per hectare. The net income was Rs.38274.15 per hectare. This provides the first hypotheses of the study to be true.

Second hypothesis is that resource are used efficiently. The coefficients of human labour and plant protection chemicals were observed to be positive and statistically significant at one and five per cent level of significance. The ratios of MVP to MFC were positive and greater than one for human labour and plant protection chemical indicating that still there is scope to these inputs to increase the yield of cashew. The results confirm the second hypothesis of the study to be true.

The third hypothesis is that there are some constraints in production and marketing of cashew. The results of Garrett's ranking technique revealed that labour shortage, high wage rate were the major constraints in production and price fluctuation, improper market information ranked top constraints in marketing of cashew.

Policy implications

Based on the findings discussed earlier, few implications for policy could be discerned. They are,

- The present level of productivity is 800kg/ha whereas the new varieties have a potential of 2000 kg/ha. Technologies like use of vegetative propagated planting materials may be used for increasing the production and productivity of cashew. Better cultivation practices like pruning, top working for rejuvenating cashew trees, improved planting material, adequate disease and pest control, etc. are required to increase yield.

- Cashew crop was found to be profitable with gross income of Rs.67389.35 per hectare and net income of Rs.38274.15 per hectare. Hence efforts should be taken by Agriculture Department to bring more area under cashew cultivation in Pudukkottai district.

- Cashew was found to be a labour using enterprise. In this study area more of labours were engaged for the harvesting and processing of rawnuts. Thus, cashew should be the choice crop to generate employment potentials in rural areas.

- The financial feasibility analysis of the cashew processing unit had shown that it is most profitable venture and hence encouragement should be given by the State Government for this industry and also financial institutions should lend adequate credit for this venture.

- The producer's share in the consumer's rupee was more when the produce/ raw nuts directly sold to processing units (Channel- IV), than in any other channels. Hence, the farmers should be encouraged to sell through Channel-IV.

- Price fluctuations found to be a severe constraint in marketing of cashew; steps should be taken to minimize it. Improvement in marketing may help this cause too.

- There is a need for yield and area stabilizing policies through appropriate Crop Insurance Scheme for cashew in order to protect the cashewnut producers from high fluctuations.

- There was no contract farming arrangements for cashew cultivation in the study area, as cashew has not developed into organised plantation. Contract farming can evade middlemen between the farmers and the processors and ensure adequate prices to cashew farmers.

REFERENCES

I. JOURNALS/PERIODICALS

Abdul Salam, M.," Cashew plantation –Establishment and management", **The Cashew**, 11(3):13-32, 1997.

Anantrama verma, "Economics of processing and marketing of gur in the district of Indore (Madhya Pradesh)", **Indian Journal of Agricultural Economics**, 44: 369-372, 1989.

Anil M. Ahire and S. R. Bhonde, "Marketing Channel and Price Spread of Grapes- A Study of District Nashik, Maharashtra", **Financing Agriculture**, 40(4): 27-30, 2008.

Apparao, R. and Krishnaiah," Cost of production of cashewnut in Srikakulam district of Andhra Pradesh", **The Cashew**, 15(1):21-28, 2001.

Balaji. P, N. Raveendran and D. Suresh Kumar," Production and Marketing of Groundnut in TamilNadu: Problems and Prospects", **Agricultural Situation in India**, LX (1): 35-36, 2003.

Balasubramaniam, D.," Cashewnut processing and its economic feasibility in Kolar district of Karnataka", **The Cashew**, 17(4):6-11, 2003.

Chinappa and R.Ramana," An economic analysis of guava production", **Agricultural Banker**, 21(8); 29-33, 1997.

Chitra, P.and K.Bal Reddy,"Econmics of ber production in around Hyderabad city of Andhra Pradesh", **Indian Journal of Agricultural Economics**, 52(3):623-624, 1997.

Dalvi, V.D., G.G. Thakare, and S.G.Borude," Economics of processing cashewnut in Sindhudurg district of Maharashtra", **The cashew**, 6(3): 14-19, 1991.

Dayanand, G. Sathihal and G. K. Hiremath, "Resource Use Efficiency in Ber orchards", **Agricultural Banker**, 19(3):13-15, 1995.

Deepak shah,″ Production and marketing pattern of grapes in Maharashtra″, **Indian journal of Agricultural marketing,** 14(1):40-41, 1996.

Deorukhakar, A.C., P.D. Veerkar and J.M. Talathi," Yield gap and constraints in technology adoption of cashewnut cultivation in the Konkan region of Maharashtra", **The cashew,** 9(4):13-7, 1995.

Ganguar, L.S., Dinesh Singh and Gautam mantal," Economic Evaluation of peach cultivation on north Indian plains", **Agricultural Economics Research Review,** 21:123-129, 2008.

Goswami, S.N. and O. Challa," Economic Analysis of small holder rubber plantation in west Garo Hills district of Meghalaya", **Indian Journal of Agricultural Economics,** 62(4): 649-663, 2007.

Goyal, S.K., "Economics of rose cultivation and its marketing in Sonepat district of Haryana state", **Indian journal of Agricultural marketing,** 13(3): 44-51, 1999.

Guledgudda, S.S and B.L. Patil," An appraisal of financial feasibility of investment in cashew plantation", **Agricultural situation in India,** LXII (12): 777-782, 2006.

Gulnmagolmoth, K.C., G. Hiremath and K.Basavraj," Mango cultivation in Dharwad district –An analysis of cost and resource productivity", **Indian journal of H,** 10(2):148-152, 2002.

Gunjate, R.T.," Cashew plantation management: problems, prospects and Approaches", **The cashew,** 11(2): 15-19, 1997.

Gupta S.P. and D. S. Prasant,″ Marketing and processing of cashewnut in Goa state″, **Agricultural marketing,** XLVII (1):20-29, 2004.

Haldankar, P.M., V.G. Chalan and S.B. Deshpande," Strategies and constraints for cashew production in Maharashtra", **The cashew,** Agricultural marketing, 30:13-19, 2004.

Hassan, S. and P.Raghuram," Cashew processing and marketing in Prakasam district of Andhra Predesh," **Agricultural marketing, 30:**13-19, 1987.

Hiremath, G.M.," Economics of production and marketing of lime in Bijapur district of Karnataka", **Agricultural Banker** 18(2): 14-16, 1994.

Hugar, L.B., P.S. Umesh and B.S. Reddy," Economic feasibility of guava cultivation under scientific management - An empirical evidence", **Agricultural situation in India**, 46(4):211-214, 1991.

Ipte, P.G. and S.G. Bourde," Economics of marketing and processing of cashewnut in Ratnagiri and Sindhudurg districts of Maharashtra, "**cashew causerie**, 4:22:27, 1982.

Ismin, H.S., "Intangible side of Agricultural Markets: A Neglected area of research", **Journal of Farm Economics**, XXV (3): 809-819, 1973.

Khunt, K.A., H. M. Gagipara and B.K. Gadhvi," Economics of production and marketing of pomegranate", **Indian journal of Agricultural marketing**, 17(1):100-107, 2001.

Koujalagi, S.B. and L.B.Kunnal," Input use efficiency in pomegranate", **Indian Journal of Agricultural Economics**, 47(3):527-530, 1992.

Krishnamurthy, A.N., C.S. Chandrasekhar, and H.G. Shankarmurthy, "Economics of production and marketing of oranges in Karnataka," **Indian Journal of Marketing**, 11 (3): 25-29, 1978.

Ladaniya, M.S. and Wanjari Vinod.," Marketing pattern of Mosambi sweet orange in selected district of Maharashtra," **Indian journal of Agricultural marketing**, 17(1):52-62, 2003.

Mahesh, M. and S. Krishnamoorthy," Resource use efficiency and return to scale in seedless grape vine yards", **Agricultural Banker**, 23(2):13-15, 1999,

Nagaraj and Prakash," Economic analysis of Karnataka fruit processing in case of Karnataka agro fruits ltd", Indian journal of marketing, 4(2): 173-177, 1990.

Nagesh., A.Raikar and R.K.Murthy," Price spread of cashew in Karnataka", **Indian journal of Agricultural marketing,** 4(2):173-177, 1990.

Namasivayam, N. and V. Richard Paul," Price spread in marketing of coconut in Tamil Nadu", **Journal of marketing,** XXXVI (7):3-5, 2006.

Naphade, S. A. and A. S. Tingre, "Economics of Production and Marketing of Guava in Buldhana District of Maharashtra", **Indian Journal of Agricultural Marketing**, 22(2): 32-41, 2008.

Navadkar, D.S., D. L. Sale and U.D. Patil," Marketing of vegetables grown around Pune city", **Agricultural situation in India,** 62(3):259-262, 2005.

Nirban, A.J. and P.A. Sawant,"Constraint analysis of cashewnut growers", **The cashew**, 14(1):45-49, 2000.

Paranjape,A.L and S.G.Borade," Resource productivity in Alphanso mango production in Deogad taluk of Ratnagiri district", **College Magazine,** college of Agrl. Dapoli, 78:36-42, 1978.

Patil, H.N."Marketing of alphonsa mangoes in Maharashtra", Journal of Maharashtra agricultural university, 14:244-245, 1989.

Pawandahiya., I.J. Singh and K.N.Rai," cost-benefit analysis of ber cultivation in Rohtak district of Haryana", **Indian journal of Agricultural marketing,** 16(2):49-52, 2002.

Rajan, S.," Resource efficiency in tea plantation", **Agricultural situation in India,** XLIX (11):16-18, 1992.

Rajgopal, N.A., "Economics of fruit production and marketing of India," Indian journal of agricultural science," 42: 465-470, 1987.

Ravikumar, K.T., S.B. Hosamani and N.R. Mamle desai," Investment pattern and maintenance cost in pomegranate orchards in Karnataka," **Karnataka journal of agricultural science,** 24(2):164-169, 2011.

Saraswat, S.P., "Organization of production and marketing of apple in Himachal Pradesh", **Indian Journal of Agricultural Economics,** 52(3):630-631, 1997.

Senthilnathan, S. and R. Srinivasan,"Production and marketing of povan banana in Trichirapali district of Tamil Nadu", **Indian journal of Agricultural marketing,** 8(1):46-53, 1994.

Sharma, G.D. and H.K. Pandey," Economics of guava production and marketing: a case study", **Indian Horticulture**, 17(1):5-6, 1972.

Singh, R.S., "Marketing citrus fruits in mid hills of Jammu and Kashmir", **The Bihar journal of agricultural marketing,** 4(3):242-249, 1996.

Singh, V.K., and Jai Singh," Profitability of ber cultivation in arid region Haryana", **Indian Journal of Agricultural Economics,** 52(3):625-626, 1997.

Sivanantham, M., S.Jeeva and Pugalendhi, "An economic analysis of cashew cultivation in south Archot district, Tamil Nadu" **The cashew,** 6:34-36, 1991.

Sivanantham, R., A. Kandaswamy and Ramaswamy, "Economics of forest plantation-cashew", **Kisan World,** 7:40-42, 1980.

Sreenivasamurthy, D., T. M. Gajanana, M. Sudha and V. Dakshinamoorthy, "Marketing losses and their impact on marketing margins: A case study of banana in Karnataka" **Agricultural Economics Research Review**, 19: 259-275, 2007.

Srinivas, T., V.T. Raju and S.M. Shareef, "Economic analysis of cashew nut production in Prakasam district of Andhra Pradesh", **Agricultural situation in India,** XLI (3):195-200, 1994.

Srinivas, T., V.T. Raju," Economics of processing of cashewnut", **The Bihar journal of agricultural marketing,** 3(3):284-288, 1995.

Subrahmanyam, K.V.," Economic of investment in mango cultivation in Karnataka", **The Mysore journal of Agricultural Sciences,** 211:96-100.1987.

Sudha, M. and M.V. Reddy," A study on the cost and returns of acid lime in Andhra Pradesh, **The Andhra agricultural journal,** 35:253-257,1985.

Sundaravaradarajan, K.R. and G.Ramanathan," Cost, Returns and economic viability of cashew plantation in Tamil Nadu", **Agricultural situation in India,** 59(11):709-715, 2003.

Sundaravaradarajan, K.R. and K.Jahanmohan," Marketing cost, margin, price spread and Marketing efficiency of cashew in Tamil Nadu", **Agricultural situation in India,** 59(1): 9-16, 2002.

Umesh, K.B., Vishnuvardhana and G.T.Thirumalaraju," Business opportunities in Cashew industry", **Agro India,** 6(9&10):16-18, 2005.

Vandana, K.V., V.T.Raju., Bhavani Devi and Munisamynaidu," Economic analysis of acid lime cultivation in Guntur district of Andhra Pradesh," **Agricultural situation in India,** LII (3):135-137, 1995.

Varghese, K.V.," Economics of cardamom cultivation on Kerala", **Indian Journal of Agricultural Economics**, 62(1):99-112, 2007.

Veerkar, P.D. and S.G. Bourde," Economics of mango products in Ratnagiri district of Maharashtra", Maharashtra Agricultural.Univ. Journal, 20(1):105-108, 1995.

Velavan C.," Performance of cashew-A growth rate analysis", **The Cashew,** 18(3):27-31, 2004.

Vitonde, A.R. and P.N.Bhargave," Marketing of mandarin orange in Nagpur district", **Indian journal of Agricultural marketing,** 5(2):212-215, 1991.

Wadhwani, M.K. and T.S.Bhogal," Economics of production, post harvest management and price behaviour of cole crops in western U.P. An Empirical Analysis", Agriculture marketing, 156(1): ISSN-002-1555, 2003.

Wadkar, S.S. and P.A.Sawant," Employment potential of production and processing of cashew in the Konkan Region, **The Cashew,** 8(3):19-22, 1994.

Yadukumar, N., K.R. Swamy and EV. Late bhaskara rao," Projection on economics of cashew plantations," **The Cashew,** 17(3):6-16, 2003.

II. BOOKS

Acharya.S.S and N.L.Agarwal., **Agricultural Marketing in India**, (New Delhi: Oxford & IBH Publishing Co.Pvt.Ltd, 2004).

Bilas, A. Richard, **Micro Economic Theory**, (Tokyo: International Students Edition, McGraw Hill, Kogakusha Ltd., 1971).

Chopra, D.N., **Advanced Economic Theory**, (Delhi: Kalyani publishers, 1978).

Dewett, K.K., **Modern Economic Theory**, (New Delhi: Ram Nagar, Nagar, Shyam Lal charitable Trust, 1969).

Dhondyal, S. P. **Farm management-** An Economic Analysis (Friends Publications, 1991).

Dhondyal, S.P., **Farm Management – An Economic Analysis,** (Meerut: Friends Publications Private Ltd., 1981).

Johl, S.S and T.K. Kapur, **Fundamentals of Farm Business Management**, (Ludhiana: Kalyani Publishers, 1977).

Kahlon, A.S. and Karan Singh. **Economics of farm management in India**, (Allied publishers limited, 1982).

Kohls.R.L. and J.N.Uhl., **"Marketing of Agricultural Products",** (New York: Mac Millan Publishing Co.Inc, 1980).

Koutsoyiannis, A., **Modern Micro Economics,** (HongKong: Mac Millan Press, 1994).

Samuelson, A. P. and Nordhans, **Economics**, (New Delhi: Mc Graw Hill Publishing Company Ltd, 1973).

III. UNPUBLISHED MATERIALS/DESSERTATIONS

Balasubramanian S.V, "**A Study on Resource Use Efficiency in Garden Land Agriculture in Dindigul Division, Madurai District – A Normalised**

Approach", (Unpublished MSc (Ag) Thesis submitted to Tamil Nadu Agricultural University, Coimbatore, 1975).

Gummagolmath, K.C**.**," **Economics of production and marketing of mango in Dharwad district of Karnataka**," (Unpublished M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Dharwad, 1995).

Jeyaraman, U. "**An Economic Analysis of Production and Marketing of Cashew in Jayamkondam block of Thiruchirapalli District, TamilNadu**" (Unpublished M.Sc. (Ag.) Thesis submitted to TamilNadu Agricultural University, Coimbatore, 1981).

Mohan, K, "**Production, Marketing and Price behaviour of Pepper in Vayhoor block of Kerala State**", (Unpublished M.Sc, (Ag) Thesis, TNAU, Coimbatore, 1973).

Mohanram, C.L., "**An Economic Analysis of Mango and Tomato Processing industry in the north western of Tamil Nadu**," An Unpublished M.Sc. (Ag) Thesis, Department of Agricultural Economics, TNAU, Coimbatore, 1992.

Siju, T., "**An Economic Analysis of Cashew processing industry in Kerala**", An Unpublished M.Sc. (Ag) Thesis**,** Department of Agricultural Economics, TNAU, Madurai, 2001.

Sundarajan, G, "**Returns to investment in Viticulture. A study in Uthamapalayam Taluk**", (Unpublished M.Sc. (Ag) Thesis, Department of Agricultural Economics, TamilNadu Agricultural Universit**y**, Coimbatore, 1990).

IV. REPORTS/CONFERENCES/SEMINARS

Bhat, M. G., Present Status, Constraints and Opportunities in Import and Export of Cashew. Paper Presented at International Trade in First Indian Horticulture Congress, *2004*, held on 6-9 November 2004, New Delhi, 2004.