CHAPTER 2

THEORETICAL BASE AND CONCEPTUAL FRAMEWORK
This chapter deals with the economics of paddy cultivation in kole lands. In addition, other major problems planned to be investigated in the study are the cost and returns, resource use efficiency and the relationship between the size of holding and productivity in kole lands. There are scholars who have examined these problems with reference to Indian agriculture.

2.1. Theoretical Base on the Economics of Crop Production

Research scholars have attempted to explain the economics of crop production either with Net Returns Approach or with Production Function Approach. A number of studies which examine this problem using both these methods are available at present. For the sake of convenience and simplicity, these studies on the economics of crop production are grouped under two heads, viz, studies using Net Returns Approach and those using Production Function Approach.

2.1.1. Net Returns Approach

Farm Management Studies (FMS) has been made in the economics of crop production in terms of cost and returns analysis in India. The studies were launched by the Directorate of Economics and Statistics, Ministry of Food and Agriculture, in the early period of the 1950s until the 1960s. For the accumulation of basic information about different agricultural activities, include animal husbandry investigation has been made into the majority of the crop zones in India. The first survey in this series in Kerala was conducted in 1962-63, in which samples were
selected from two districts in the State, viz. Quilon and Alleppey. The major crops
covered by the survey were paddy, coconut and tapioca. In addition, the milk products
which give an additional income to the farm family were also brought under
investigation. The concepts of cost used in this survey are Cost A1, Cost A2, Cost B,
and Cost C. The income accrued from both crop and milk production has been
examined with different concepts of income such as farm returns, farm business
income, farm labour earnings, family labour income and returns on capital
investment.

The study shows some important facts about crop cultivation in Kerala. On a
detailed analysis of individual crops, it is reported that coconut is the only crop which
has yielded an overall surplus among the selected holdings. Paddy and tapioca, two
important food crops in the state, have incurred loss in the years under reference. Of
the three varieties of paddy crops such as virippu, mundakan and puncha, the puncha
is found to be the most expensive crop, but in the case of yield, it has excelled the
other two.

Next to the Farm Management Studies, the studies made by Pillai and Panikar
(1966), Kuttanad Enquiry Commission (1971), the State Planning Board, Kerala
(1976) and Radhakrishnan (1981) have also attempted to work out the economics of
crop production with net returns approach. These studies, in fact, deal with the
economics of crop production in Kerala agriculture. Further, the studies have two
other common features. Firstly, these studies have always used the same concepts of
cost used by FMS to work out the cost of production. Secondly, in these studies, the
main thrust was on studying the economics of paddy cultivation. Pillai and Panikar
examined the economics of paddy cultivation in Kuttanad, one of the major crop
zones in Kerala and concluded that paddy cultivation in the study area is profitable.
So also, the Kuttanad Enquiry Commission also came to a similar conclusion⁴. After the introduction of High Yielding Varieties Programme in 1966-67, the State Planning Board, at the instance of Programme Evaluation Committee of National Planning Commission, prepared three evaluation reports pertaining to viripu and mundakan seasons, but not in the puncha season. A comparison of benefit cost ratios of co-operative and non-co-operative sector indicates that the benefit-cost ratios work out to be more favourable in respect of the co-operative sector in the puncha seasons. The cost and returns of paddy cultivation in three paddy producing districts in Kerala, viz. Alleppey, Thrissur and Palakkad, is examined by Radhakrishnan. The study is based on primary data collected from a sample of 150 cultivators in these three areas. The cost and returns are worked out for HYVs and traditional varieties. The study reports that both the varieties have ensured a surplus over the cost, imply that both the varieties are profitably cultivated in these districts⁵.

2.1.2. Production Function Approach

Prof. Schultz. explored the allocative efficiency of resources shown by the farmers in primitive agriculture in underdeveloped countries for the first time. He emphasized that “given the land at the disposal of farmers and the state of their knowledge, they are not underutilizing the land by the way they farm. Nor are they misallocating the reproducible capital at their disposal, they are not misallocating their own labour nor other labour that is available to them”⁶. The data used in this study were drawn from Hopper’s study⁷. Hopper came to understand from the study among the farmers in North Indian village, that those who have done agricultural operations such as ploughing, sowing, harvesting etc., only with hired labour, according to Schultz’s study, therefore, does not perhaps reflect the allocative efficiency of peasants who cultivate mostly with family labour⁸.
Raj Krishna (1964), Hopper (1965) and Wellisez (1969), arrived at the same conclusion as that of Schultz regarding the allocative efficiency in Indian agriculture. All these authors invariably used the production function approach in studying allocative efficiency of the factors of production. While Raj Krishna’s study is based on FMS data collected from Punjab for three years from 1954-55<sup>9</sup>. Hopper draws data from a sample of cultivators from Senapur (Uttar Pradesh) for one year<sup>10</sup>. Wellisez examined the allocative efficiency with respect to Andhra Pradesh agriculture<sup>11</sup>. In all these studies, the production function is estimated together for all farms. Basically all farms assume the same input-output relationship. This is, however, a serious assumption. In reality, this may not be the case. It would be better if the allocative efficiency is studied according to different size groups, since there are differences in the factor endowments and marginal efficiency among different size groups.

Sigh (1975) has examined the allocative efficiency separately for all farms. The study was based on different size groups in the Deoria of Uttar Pradesh. It used Cobb-Douglas production function with land (standard acre), human labour (in man days), bullock labour (pair days) and fertilizers (in rupees) as explanatory variables. The study found that the marginal value products are higher than respective factor cost, indicating, thereby, the existence of inefficiencies in the present use of inputs on the sample farm<sup>12</sup>.

According to Rudra (1973) the main problem of the above studies is that by the assumption of the model itself, every individual farm is inefficient. He reported that “the equality of market price to the marginal value products at the average point directly implies that one section of the farmers are over allocating the resource concerned and the remaining under allocating it. In other words, every individual farm
is, by the assumption of model itself inefficient\textsuperscript{13}. While this assertion of Rudra remains controversial, further evidences for the inefficient allocation of resources have been provided by a set of other studies. Some of the important studies in this group are that of Pillai (1967), Dey and Rudra (1973), Hati and Rudra (1973) and Sampath (1979).

Pillai concludes from his study that the resources in paddy cultivation in Kerala are inefficiently used. The data for this study was drawn from the FMS of 1962-63, 1963-64 and 1964-65. The Cobb-Douglas production function with farm size, free human labour, bullock labour, farm yard manure and fertilizers as independent variables has been fitted to test the resource use efficiency in paddy cultivation. Perhaps, this is the pioneering study dealing with resource use efficiency in the cultivation of paddy in Kerala. But this study has one drawback; it did not attempt to examine the resource use efficiency in different size categories. (Pillai, 1967)\textsuperscript{14}.

The study of Dey and Rudra tested the hypothesis that Indian farmers are efficient in allocating resources. The study was based on data collected from 142 farms belonging to 15 villages in Hoogly district of West Bengal. The basic assumption with which they started was that under the hypothesis of profit maximization under Cobb-Douglas technology, the farms could be said to be optimally allocating material and labour inputs, if the observed material and labour inputs fall along a straight line passing through the origin. Starting with this premise, the authors test the relationship between material inputs and labour in the observed forms, using analysis of variance technique and reject the hypothesis that the material and labour inputs fall along a straight line passing through the origin and thereby they reject the hypothesis of allocative efficiency among the Indian farmers\textsuperscript{15}. 

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Economic efficiency is divided into two components, viz. allocative efficiency and technical efficiency. Allocative efficiency refers to proper choice of input combinations, whereas the technical efficiency denotes proper choice of production function. All the articles reviewed so far have dealt with only allocative efficiency, ignoring technical efficiency which is a part of the economic efficiency. Hati and Rudra have examined the economic efficiency study based on primary data collected from 149 farms in Hoogly district of West Bengal, the Cobb-Douglas production function was used to study the problem. With regard to technical efficiency, the study indicates that about sixty percent of the farm produces less than forty percent of what the most efficient farms among them can produce, given the same input. In the matter of allocative efficiency, both under constrained and unconstrained maximization, the authors found that the farmers in the sample are not allocating resources optimally. A more or less similar view has been held by Sampath also in his study relating to the Deoria district in Uttar Pradesh. According to this study, the economic inefficiency of the farms is as high as 36.53%, out of which 24.42% is due to technical inefficiency and 12.11% is due to allocative inefficiency.

India is a vast country where the geographical and climatic conditions vary significantly, not only within a State but also within a district. Further, glaring disparities in the distribution of the size of holding, high dependence of farmers on money lenders for their credit needs, etc. in the agricultural sector in the country are some of the factors which affect the allocative efficiency of the farmers. Moreover, the imperfections in both factor and product markets also influence the allocative efficiency. The studies reviewed above give some attention to these aspects, while examining the resources use efficiency of the farmers (Muraleedharan, 1984).
All the above studies have dealt with only economic efficiency in traditional Indian agriculture. But certain areas found the technological change by the introduction of the HYVS. Both the studies of Singh (1978) and Saini (1979) have attempted to found the allocative efficiency in modern agriculture.

As per the basis of data from Deoria district of Uttar Pradesh for the year 1967-68, the farmers did not use efficiently the factors of production in their own farms especially in the study area. According to Saini’s recommendation the allocative efficiency in traditional and modern agriculture with FMS data of 1955-56, 1956-57 and 1957-58 relating to Punjab and Uttar Pradesh agriculture. In traditional agriculture the Punjab farmers were generally using the available resources in efficiently, but the Uttar Pradesh farmers stand to gain through adjustment in respect of crop combinations. Yet, he concluded that in both of these states, farmers showed inefficiency in modern agriculture. There is a common drawback in both the studies they have used data pertaining to 1967-68. They were the second year of High Yielding Varieties Programme in India. Although HYVs could have broken the equilibrium attained by the traditional agriculture, it is difficult to believe that, within a short period of two years, it could attain its own equilibrium. The conclusion regarding allocative efficiency in modern agriculture could, therefore be viewed with serious reservation. Obviously, inorder to know about the allocative efficiency in modern agriculture, a series of new studies using data pertaining to recent years are called for (Muraleedharan, 1984).

2.1.3. Size – Productivity Relationship

The relationship between the farm size and productivity in Indian agriculture has been a topic of discussion ever since the publication of the Farm Management...
Survey data of 1950s, partly due to the importance of the topic and partly due to the conflicting results shown by some of the earlier studies. A number of scholars have been attracted to this area of study. Their studies dealing with this relationship in Indian agriculture, so far carried out, can broadly be classified into two groups: (1) studies on the relationship in traditional agriculture and (2) those in modern agriculture.

2.1.3.1. Size – productivity Relationship in Traditional Settings

Some scholars who have examined this relationship in traditional Indian agriculture are Sen (1962), Depak Mazumdar (1963), Khusro (1964), Raj Krishna (1964), Hanumantha Rao (1966), Rao (1967), Rudra (1968), Saini (1969) and Krishna Bharadwaj (1975). While Sen, Mazumdar, Khusro, Hanumanth Rao, Raj Krishna and Krishna Bharadwaj, used aggregate or classified data for the analysis, the rest of them used disaggregate or farm level data.

The supporters of the inverse relationship established for the first time by Sen using FMS data of fifties also suggested three detailed explanations for the existence of the inverse relationship.

a. Small farms are more fertile than large farms.

b. Small farms have surplus family labour, therefore they use more family labour which causes higher productivity in these farms.

c. Small farms use better techniques than large farms.

Several scholars were influenced by the assumptions and explanations given by Sen. Although it is one of the guiding studies in this area, some of the assumptions have been questioned as they appear rather unsatisfactory. Sen found that family labour is found only in small farms, but large farms use hired labour. This is
absolutely correct because the data FMS data of the 1950s in the class evidences that a good percentage of small farms in India use only family but not all the farmers.

Following Sen, some systematic analysis in the area have been done by Depak Mazumdar (1963), Khusro (1964), Rajkrishna (1964) and Hanumantha Rao (1966). All of them have invariably agreed with Sen regarding the nature of relationship between the farm size and productivity by using the FMS data. But they do not agree with Sen’s explanation. According to Mazumdar, the productivity of the small farms is very high because these farm types are owned and operated by the owner or tenant holding with lower incidence of rent. But Khusro pointed out that as farm size increases, the proportion of bad and indifferent land to the total land would be high; according to him, this is the main reason for the inverse relationship. Rao brought another explanation about the inverse relationship. His observation is that the yield produced from one acre in large farms is low because of the management of large farms and their narrow administration. The hired labourers are supervised by insufficient number of paid managers.

Raj Krishna, studied some production functions in Punjab agriculture, and found the same inverse relation. However, he does not seem to be inclined to give any specific explanation to this phenomena.

Some scholars speak about the aggregate data for analyzing this relationship. Their argument is that the aggregate data in some cases give spurious statistical result. They suspect propriety of using the aggregate data for analyzing the relationship during the end of the 1960’s. So they have questioned the validity of the earlier conclusion. They tried to examine this relationship with disaggregate data.
which, according to them, would give a more realistic picture regarding this relationship.

Rao (1967), in his study selected 5 villages covered by the FMS, for the detailed analysis and came out with conflicting results. He did not find any uniform relationship between farm size and output per acre in the sample villages. Rudra (1968) examined this relationship in 20 villages. In 18 out of 20 villages, yield per acre has not depended upon the farm size, in one village there is a positive relationship and in the remaining one, no systematic relationship is observed.

As per the study conducted by Saini (1969), the existed opposite results of the former studies in this group. Drawing data from FMS of 1950s, he correlated net yield per acre to net area. However, the result supports the inverse relationship between the farm size and productivity.

Attempts have been made by scholars to examine the validity of inverse relationship both at macro (combined all crops) and micro (individual crop) levels in traditional settings. The study of Krishna Bharadwaj (1975) belongs to this category. Her study, using the aggregate FMS data of 1950s, establishes an inverse relationship between the yield per acre and farm size at macro level, but micro level relationship is not seen. While analyzing this result, she, however, suspects that the recent technological change in the agricultural sector may alter this relationship.

2.1.3.2. Size–Productivity Relationship in the Context of Modern Technological Development

Another important factor which influences the productivity is the technological development in the agricultural sector. In fact, this has been visible at least in certain areas in Indian agriculture, especially since the introduction of High
Yielding Varieties in 1966-67. Nevertheless, none of the above mentioned studies have examined the role of technology in determining the size-productivity relationship. The reason for this are: (i) majority of the studies were conducted during the early 1960s and (ii) the data base of these studies except that of a few was the FMS data of 1950s.

The relationship between the farm size and productivity in the context of new technological development has been examined by Usha Rani (1971), Rajveer Singh and Patel (1973) and Chadha (1978). Usha Rani, whose data base of the study was the FMS of 1967, selected 15 IADP districts for detailed study. The result shows that though the correlation coefficients in 14 out of 15 cases are negative. They are statistically insignificant. Thus, the study concluded that in the context of new technology, the yield per acre remained constant over different size groups. Using primary data collected from cultivators of Mexican varieties of wheat in Meerut district of Uttar Pradesh, Singh and Patel point out that there is no indication of a decrease of output per hectare with an increase of farm size. One drawback of this study is that while analyzing the relationship in the context of modern technology, it takes only high yielding varieties of seeds and ignores the impact of other improved inputs such as fertilizers, pesticides, etc., on yield. A systematic discussion on this relationship in Punjab agriculture is given by Chadha. Data are taken from secondary sources like FMS of 1967 and the Agricultural Census data of 1971. The study area, according to differences in capital: labour ratios, is divided into four. The study observes that in areas where the capital expansion in relation to labour inputs is yet at comparatively low rate, the inverse relationship still holds good. It may, however, be said that the division of region, according to capital: labour ratio is not beyond controversy, as it may change from region to region and even from farm to farm. 
2.2. Concepts and Definitions

The concepts reviewed in this section relate to cost and returns, production, resource use efficiency, and the like.

2.2.1. Concepts Related to Cost and Return

2.2.1.1. Cost of Cultivation

Cost of cultivation is of vital importance in agriculture because costs measure efficiency in production. The term ‘cost’ generally refers to the outlay of funds for productive services (Alam and Gilpin, 1971). In agriculture, cost of production refers to the expenditure incurred by the various inputs to obtain the final produce (Sadhu and Singh, 1999).

The total cost of cultivation is made up of total variable cost and total fixed cost.

2.2.1.1.1. Variable Costs

Farming expenses, which are a function of farm output, are known as variable costs. There will be no variable cost if a farmer decides to leave his land idle for a year. These costs change with the quantity of farm output turned out in the production process. Variable costs include payments such as wages paid to hired labour, the price of seed, fertilizer, manure, pesticides, fuel and power used expenses on transport and the like. Since variables cost are a function of output, total variable cost increases with the level of farm production.

2.2.1.1.2. Fixed Costs

Fixed costs are those costs that do not change when output changes. These costs are independent of output and are a fixed amount, which must be incurred by a
farm irrespective of the size of the output. Fixed costs are constant over time and do not vary with the changes in output. They exist even in the absence of cultivation (Subramanian, 1987)\textsuperscript{38}. Fixed costs, on an Indian farm for a period of one year, include

1. Land revenue and rent of land
2. Interest on investment in equipment
3. That part of depreciation on building, machines

2.2.1.2. Returns

The estimation of returns from farm enterprises in its proper perspective is essential as it helps in assessing the efficiency of farm business as whole and also the efficiency of resource-use in farm.

Kaul and Mehta defined gross income as the value of cash, the value of produce actually sold and the value of produce remaining in stock, all valued at harvest prices prevailing in that village (Kaul and Mehta, 1972)\textsuperscript{39}.

Tandon and Dhondyal defined net income as the gross income minus total expenses of production, namely, cost of seeds, manures, irrigation charges, wages of hired labourers and imputed value of unpaid family labour, depreciation, rent, interest on owned and working capital and marketing cost (Tandon and Dhondyal, 1971)\textsuperscript{40}.

Gupta explained net income as the income to the operator of land after deducting all items of expenditure such as paid out costs both in kind and cash, depreciation charges, land rent, interest on capital and imputed value for family labour from the total income of the farm (Gupta, 1971)\textsuperscript{41}. 

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In the present study, gross income is worked out by adding all sources of income, like income from paddy, fish farming, duck farming etc. The net income is worked out from the gross returns minus the total cost which includes both fixed and operational costs.

2.2.2. Concepts Related to Production

2.2.2.1. Production

According to Kohls and Damey, production can be defined as the creation of utility in the process of making useful goods and services (Kohla and Damey, 1972)\(^42\). Again production can be defined as the process where in some goods and services called inputs are transferred into other goods and services called output (Bishop and Joussunit, 1958)\(^43\).

According to Hansen, production covered the activities of changing the form of raw material to the finished product, changing the situation of goods, changing the position of goods in time and the provision of some kind of services such as retailing, banking, entertainment and the like (Hanson, 1963)\(^44\). Production in the economic sense related to working on raw material or natural resources in such a fashion that caused them to change their form from their chemical or physical capacities, to store them until their desire for them has become more urgent (Curtis, 1963)\(^45\).

In the present study, production represents the output of paddy resulting from the application of different inputs.

2.2.2.2. Production Function

Production function helps to identify the uneconomic use of resources by the farmers. Chand defined production function as an algebraic relationship expressing an
output in terms of a number of determinants-inputs or factors of production (Chand, 1967)\textsuperscript{46}

Samuelson defined production function as one which indicated the maximum amount of output that could be produced by each of the specified inputs or factors of production and it was defined for a given state of technical knowledge (Samuelson, 1973)\textsuperscript{47}.

In the present study, production function is defined as the Cobb-Douglas Production Function, is the technological relationship between the input of paddy and the inputs, viz, area under paddy, human labour, seeds, manures and fertilizers and plant protection chemicals and the like.

\textbf{2.2.2.3. Productivity}

Productivity – is a measure of the change in output that is not accounted for by the growth of inputs used for production. Bhattacharjee defined the term productivity to denote the output per unit of input in farm business (Bhattacharjee, 1955)\textsuperscript{48}.

Maximizing agricultural production is the ultimate objective of all research extension activities in India. Production in agriculture can increase either by bringing more area under cultivation. In the present study productivity is used as the quantity of output turned out per hectare in the study area.

Technology- is useful knowledge pertaining to the art of production.

\textbf{Conclusion}

To sum up, in all of the earlier studies performance of agricultural crops are assessed by examining the growth rates in area, production, and productivity. Similarly area, yield and production changes are regarded as the pure components of
changes in agricultural output. The proportion of irrigated area size of holdings, coverage of HYV seeds, extent of fertilizer use and mechanization are taken as the major sources of productivity. Many of the studies point out that Green Revolution has not made much impact in the performance of kharif crops in general and that of paddy crop. Inadequate infrastructural facilities and environmental degradation are the major causes of agricultural stagnation in Kerala. Poor performance of paddy crop in the state since mid 70’s is attributed to factors like high cost of cultivation, negative growth trends in paddy prices, low profitability of the crop compared to its alternative crops, use of paddy lands for non-agricultural purposes etc.
Notes and References

1. Cost A1 is defined as the sum of the expenditure on seed, manure, implement charges, hired labour charges and land revenue. Cost A2 covers Cost A1 plus rent paid on land revenue. Cost A2 covers cost A1 plus rent paid on land leased in, Cost B is Cost A2 plus imputed value of rent on owned land and interest on fixed capital. Cost C is the sum of Cost B and imputed value of family labour.


8. The sample was composed entirely of high caste land owners who do not touch plough, therefore, most of the labour inputs were hired among the landless (or relative landless) low caste labour pool of village, see Ibid. pp. 613


22. Generally, the productivity has been defined as either output per acre or yield per acre and they are used interchangeably in most of the studies.


27. Rajkrishna, op.cit.


32. Krishna Bharadwaj, (1975): *Production Conditions in Indian Agriculture*, Oxford University Press, Delhi


