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CHAPTER THREE

REVIEW OF RELATED STUDIES AND CONCEPTS USED

The review of the empirical findings of various studies relating to production and marketing of different crops including banana covers cost and revenue, resource-use efficiency and yield gap in production on the one hand and market margin through price spread in marketing of agricultural produce on the other. This will help to have an indepth study in production and marketing of banana in Tirunelveli Kattabomman district.
COST AND REVENUE

1. COST: When a farmer undertakes an act of agricultural production he has to pay prices for factors or inputs which he employs for production. The prices of the factors are termed as cost of production. Several studies have been undertaken to explain the cost of production.

In the study of Farm Management\textsuperscript{12} four types of cost have been classified. Cost $A_1$ relates to the value of hired human labour, bullock labour (owned and hired), machine labour, seeds, manures and fertilizers, plant protection, interest paid on working capital and depreciation on implements, machinery and farm buildings. Cost $A_2$ comprises of cost $A_1$ plus rent paid to leased-in land. Cost $B$ consists of cost $A_2$ plus rental value of owned land plus interest on fixed capital excluding land. Cost $C$ equals cost $B$ plus imputed value of family labour.

Thomas and Gupta\textsuperscript{13} have explained that the main items of expenditure in working out the cost of cultivation of banana per hectare in Kottayam district of Kerala were the expenditures on manures and fertilizers and on labour. An encouraging point noted in their study is the significant contribution of family labour which absorbs about 30 per cent of the total labour cost in small size holdings.

Latha Bastine et al.\textsuperscript{14} have made a study on economics of banana cultivation in Irinjalakkuda block in Trichur district of Kerala. They observed that the cost of cultivation of banana was Rupees 36,249 per hectare, returns Rupees 45,068 and net return Rupees 8,819 on cost basis. Both family and hired labour and manures constituted the major items of expenditure per hectare. This study shows that the contribution of family labour goes on decreasing as the size of holding increases.

\begin{enumerate}
\item \textsuperscript{13} "Economics of Banana Cultivation: A Case Study in Kottayam District of Kerala", \textit{Indian Journal of Agricultural Economics}, 42(3), July - September 1987, p.458.
\item \textsuperscript{14} "Economics of Banana Cultivation in Irinjalakkuda Block in Trichur District of Kerala" \textit{Indian Journal of Agricultural Economics}, Vol. XLIII, No.3, July-September 1988, p.154.
\end{enumerate}
Chennarayudu et al.\textsuperscript{15} classified the cost of banana cultivation into (i) operational cost and (ii) fixed cost. According to them, the percentage share of operational cost and fixed cost of banana cultivation per hectare was 70 and 30 respectively in Guntur district of Andhra Pradesh.

ii. REVENUE: Gross revenue is the value of the farm produce actually sold. Net revenue is the gross revenue minus total cost.

Chennarayudu et al.\textsuperscript{16} observed in their study that the net revenue received by the banana growers in Guntur district was Rupees 8,918 per hectare and the benefit-cost ratio was only 0.40 because of the low investment in inputs. They did not consider the revenue accrued from selling banana suckers and banana leaves.

RESOURCE USE EFFICIENCY

Resource-use efficiency in agricultural production was evaluated by Sita Ram Singh\textsuperscript{17} in Dharbhanga

\begin{itemize}
\item \textsuperscript{15} "Land Use Efficiency of Banana - An Application of Frontier Production Function", \textit{Agricultural Situation in India}, Vol. XLV, No.1, April 1990, p.16.
\item \textsuperscript{16} Ibid, p.16.
\item \textsuperscript{17} "Technological Parameter in Agricultural Production Function" \textit{Ashish Publishing House}, New Delhi, 1986, p.130.
\end{itemize}
district of Bihar State. According to him the ratios of Marginal Value Product (MVP) to factor cost for different resources were different from unity. This indicates inefficient use of resources.

Sharma et al.\(^{18}\) have followed the functional analysis to examine resource-use efficiency in order to study the economics of tribal agriculture of Himachal Pradesh. According to them \(R^2\) for wheat was 0.91 and for barley 0.99. The elasticity coefficient of bullock labour was negative. They have observed that the resources were not optimally used and there was under utilisation of area under crop and of human labour.

Tej Bahadur et al.\(^{19}\) have conducted field investigation in two villages under the Pilot Project in dry land agriculture of Ibrahimpatam in Hyderabad district and evaluated resource use efficiency. They have observed that the elasticity coefficients of human labour, bullock labour and manures and fertilizers were significant on small farms. But, on medium farms the coefficient of human labour and bullock labour were significant. The coefficients of bullock labour and

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manures and fertilizers on large farms and of the sample as a whole were significant. Thus it was evident that bullock labour had its influence on production irrespective of farm size.

Diminishing factor returns were found to be in operation for manures and fertilizers on all farm-size groups with a sole exception of medium farm. Thus, contrary to the operation of diminishing factor returns in Indian agriculture, their study is a pointer in favour of increasing factor returns of many selected variables and diminishing factor returns in case of manures and fertilizers.

The returns to scale ($\sum bi$) though indicated different magnitudes, when tested against unity, they were found to be not different from unity. This indicates the operation of constant returns to scale in dryland farming.

The ratio of MVP to factor cost for human labour on medium farms was equal to one indicating optimum efficiency of that input. The ratio for bullock labour on small farms was more than one indicating too little use of this resource. By increasing the use of this resource, profits can be increased on small farms. For other resources, the MVP to factor cost ratios were
less than unity indicating too much use of these resources.

Chandra Reddy et al. 20 have attempted to study the resource use efficiency in betelvine cultivation for three years in Cuddapah district of Andhra Pradesh. This study shows that there is a potential for further use of labour, manures and fertilizers up to the optimum level. Further investment in seed and miscellaneous costs is not desirable as revealed from their insignificant elasticity coefficients.

Thakur et al. 21 have observed in their study that the MVP to factor cost ratios were different from unity in all size of holdings. This implies that there has been scope for increasing all the inputs. Out of the seven crops studied, four crops have been operating under diminishing returns to scale and the rest increasing returns to scale.


Semban has made an attempt to study resource-use efficiency in banana cultivation in Tiruchirapalli district for three years from 1985 to 1988. Three varieties of banana were studied in three blocks. For Poovan banana the yield has been influenced by the land size and seed in the blocks. Constant returns to scale has been operating in Poovan banana. The MVP to factor cost ratios were greater than unity for land and the support pole, bamboo and less than unity for seed.

The output of Rasthali has been influenced positively by the size of land, fertilizers and manures and seed and negatively by labour. The magnitudes of production elasticities of inputs of Rasthali have been less than unity indicating the operation of law of diminishing returns. Sum of the regression coefficients ranges from 0.59 to 1.82 in the three blocks respectively for different varieties.

The yield of Nendran has been influenced by land, labour, bamboo and fertilizers and manure. The marginal productivities of these inputs were less than

one in one block which indicated decreasing marginal returns to their application. And, in the other blocks land had positive regression coefficient and its value was greater than one indicating increasing marginal return. Fertilizers and manure had positive coefficient but less than one showing diminishing marginal return to its application.

As the ratios of marginal value productivity to factor cost for land and fertilizers and manure were significant, there has been scope for increasing land and fertilizers and manure in the cultivation of Nendran.

Cobb-Douglas production function has been fitted by Randev et al.\textsuperscript{23} to evaluate the resource-use efficiency in Kinnaur district of Himachal Pradesh. According to this functional analysis all the regression coefficients of inputs except manures and fertilizers is found positive and significant in small apple orchards in the age group of 8-14 years. On large apple orchards in the age group of 15-40 years, the coefficient of manures and fertilizers is negative.

Sum of elasticity coefficients is greater than one on small and large orchards in the age group of 8-14 years indicating increasing returns to scale. But, law of diminishing returns operates on medium orchards. Diminishing returns to scale is found in all the size-groups in the age group of 15-40 years which indicates that the cultivators have been operating in the rational zone of production function. This analysis indicates that there is scope for increasing production by using more labour and plant protection measures.

Sunandini et al.24 have studied the resource-use efficiency of paddy farms in three regions in Andhra Pradesh following Cobb-Douglas production function model. They have observed that none of the resource in the regions has optimum efficiency since MVP to factor cost ratios are not equal to one. This ratio for human labour is less than unity indicating overutilisation of this resource and for seed greater than unity in Rabi season (but negative in Kharif season). Manures and fertilizers show higher MVP to factor cost ratio in all the regions denoting underutilisation of this resource.

Pesticides show overutilisation. As the ratios are different from unity for all inputs, the resource structure are to be reorganised on paddy farms.

Velayutham et al. 25 have made a study of resource-use efficiency in *sesamum* production in Vridhachalam Taluk of Tamil Nadu in the year 1989-90. The coefficient of determination $R^2$ is 0.87 implying that 87 per cent of variations in the yield of *sesamum* are explained by the independent variables included in the model. Among these variables, only two variables namely land and human labour have positive elasticity coefficients which have influenced the *sesamum* production significantly.

The coefficient of land indicates that one per cent increase in the area of land under *sesamum*, keeping other variables constant at their mean levels, will increase the production by 0.98 per cent. The coefficient of human labour shows that a one per cent increase in the use of human labour, keeping other variables constant, will increase the production by 0.27 per cent. Sum of elasticity coefficients of these two variables is 1.25 indicating the prevalence of increasing returns to scale in *sesamum* production.

Sekar et al. have examined the relationship between farm size and productivity in paddy farms of Tamil Nadu on the basis of production function analysis. They have inferred that 86 per cent of the variations in production of paddy has been explained by the independent variables. F-test for significance of $R^2$ shows a value of 95.72 and so it is a good fit. Among the independent variables, human labour, seed cost, fertilizer cost and cost of plant protection chemicals have significant influence on paddy production. The results reveal that increase of labour use by one man day will increase production of paddy by Rupees 22.93. Increase in seed cost by one rupee will increase the production of paddy by Rupees 10.47 and an increase in fertilizer use by one rupee will increase the paddy production by Rupees 15.48.

YIELD GAP

The difference between potential yield and actual yield is termed as yield gap. Very few studies have been undertaken so far for different crops to estimate the yield gap in agricultural production at the farm level.

Suryawanshi and Gaikwad have attempted to study the yield gap in Rabi Jowar in Drought Prone Area of Ahmednagar District of Maharashtra. They estimated the yield gap in three ways: Gap I is the difference between the demonstration plot yield and the yield obtained due to partial adoption of new technology. This gap has been estimated as 3.60 quintals per hectare. Second is the difference between the farm yield obtained from the traditional method of cultivation and from partial adoption of known technology. This gap has been estimated as 1.30 quintals per hectare. Finally, Gap III is the difference between the yield obtained from traditional method of cultivation and from the adoption of new technology on demonstration plots. This gap has been estimated as 4.90 quintals per hectare.

Fale et al. mentioned in their paper four components of yield gap. Gap I, termed as research gap refers to the gap between possible yield and the best yield so far achieved on experiment stations. Gap II, referred to as research-cum-management gap relates to


the gap between the best yield obtained in research farm and potential farm yield as obtained by a good farmer. Gap III, termed as extension gap refers to the gap between maximum potential yield in the farmer's environment and farmer's actual yield. Gap IV, the resource-cum-management gap is the gap within the farmers themselves due to variations in resource position and managerial abilities.

Pandey and Tewari29 conducted a study on the analysis of economic yield gap in sugarcane production in West Uttar Pradesh in 1987. They observed that the best sugarcane growers were fairly close to the most efficient economic yield level of 925 quintal per hectare. Such farmers constituted only 20 per cent of the total sample. However, the economic yield gaps in the progressive and backward categories of sugarcane growers were conspicuously very high, being 317 and 522 quintals per hectare respectively, which formed 34.3 per cent and 56.4 per cent of the economic potential yield.

PRICE SPREAD AND MARKET MARGIN

Efficiency in marketing agricultural produce is assessed by the size of share which the producer obtains in the ultimate price paid by the consumer. Various studies have been undertaken in relation to price spread and marketing margin.

Chand and Sikka\textsuperscript{30} made a study on the marketing of eggs in Himachal Pradesh for the year 1977-78. They have observed that the producers got 71.38, 70.67 and 81.19 per cent for eggs from Chandigarh, Ambala outstation and Simla respectively. According to them these shares were fair to the producers.

Sidhu and Rangi\textsuperscript{31} observed that the producers got 94 per cent through direct sale, 78 per cent through commission agents and 77 per cent through cooperatives in marketing eggs in Ludhiana in 1979.

According to Swarup et al.\textsuperscript{32} the net price


received by the grower of apples in Himachal Pradesh decreased during 1975-79 whereas during 1979-84 it has shown an increasing trend but not significantly.

The study by Gopal Naik and Arora\textsuperscript{33} reveals that the producer's share in \textit{Areca nut} market in Nagpur and Kanpur was 68.75 per cent and 57.89 per cent respectively. They observed that this share was inadequate.

Gangwar and Pandey\textsuperscript{34} have studied the price structure of rice and producer's share in consumer's rupee in Haryana during 1966-67 and 1982-83. They observed that the producer's share was affected because the increase in consumer's price was less than the marketing cost of the producers.

Dalwi et al.\textsuperscript{35} observed that the producers' share in the consumer's rupee was the highest (95.10 per


cent) in Channel II (Channel II: Producer - Cooperatives - Consumer) and the lowest (59.70 per cent) in Channel III (Channel III: Producer - wholesaler - consumer) in the marketing of coconut. According to them, the producers have received the lowest share from the consumer's price in channel III because in this channel there were a number of middlemen with profit-motive.

The study of price spread made by Ashturkar and Deole shows that in banana marketing the producer's share in consumer's rupee under different marketing channels varies between 45 per cent and 70 per cent in Marathwada. The pre-harvest contractors earn higher profit thereby reducing the producer's share in the consumer's price.

In the present study, the cost classification already made by the Farm Management studies is followed. As there was no tenant farm in the sample farms selected, cost A2 is irrelevant and ignored and the remaining costs are considered to make cost structure for different varieties of banana and size-groups of farm.

Gross revenue is defined as the total value of output of banana, suckers and banana leaf sold. Farm business income is gross revenue minus cost A1. The revenue to family labour and management is obtained by deducting cost B from gross revenue. Net revenue is calculated as gross revenue minus cost C.

Resource-use efficiency is evaluated by fitting modified Cobb-Douglas production function with a view to the ratio of Marginal Value Product of each input to its acquisition cost. Further, the returns to scale is found by checking whether the sum of elasticity coefficients is <1 or =1 or >1.

As far as the yield gap is concerned, the study already conducted by Fale et al. is followed in the present study in estimating the yield gap in banana production at the farm level.

An attempt is made to estimate the producer's share or margin in consumer's price analysing price spread in banana market in the study area.

CONCEPTS USED

The explanation of concepts used is considered necessary to collect required information and reliable data so as to infer meaningful interpretation. In
addition, the description of the selected banana varieties is made.

COST OF BANANA PRODUCTION

The cost classification as already made by the Farm Management Studies is followed in the present study except the Cost A2 because no tenant cultivation was found in leased-in land among the sample farms. The following costs are calculated in banana cultivation per hectare.

Cost A1 includes hired human labour, suckers, manures and fertilizers, plant protection, interest on working capital, depreciation and land revenue and other taxes.

Cost B includes Cost A1 and interest on fixed capital invested.

Cost C includes Cost B and the imputed value of human labour provided by the household.

Cost of production per unit or per banana tree is arrived at by dividing the total cost of production per hectare by total trees planted per hectare.
REVENUE FROM BANANA PRODUCTION

The gross revenue in the present study is defined as the total value of the banana bunches sold or contracted, leaves and the suckers sold. Farm Business Income is defined as the gross income minus cost A. Return to Family Labour and Management is computed by subtracting cost B from the gross revenue. Net revenue is equal to gross revenue of banana minus cost C. These are calculated for different varieties and farm size-groups per hectare. Benefit-cost ratio is obtained by dividing the net revenue by the total cost of production per hectare.

RESOURCE USE PATTERN

Resource-use pattern is specified as the type and amount of scarce resources used in crop production. This will provide a clear picture about the nature of use of the resources for different varieties of banana and size-groups of farm. On these lines, resource-use pattern is discussed.

RESOURCE USE EFFICIENCY

Marginal Productivity per unit of each resource is one of the measures of efficiency for the resources used. This efficiency is evaluated with the aid of the fitted modified Cobb-Douglas production function.
Efficiency in agricultural production deals with the extent to which a farm maximises net revenue and consists of two components namely allocative efficiency or price-efficiency and technical efficiency. A farm is said to be price efficient if it maximises net revenue, since maximisation of net revenue implies equalisation of the marginal value product of each input to its price or opportunity cost. A farm is said to be more technical efficient than other if it consistently produces larger quantities of output from the same quantity of measurable inputs or produces a given quantity of output with lesser quantity of measurable inputs. Consistent production of larger quantities of output is not possible in agriculture because uncontrollable factors play an important role in influencing agricultural crop production. Therefore, in the present study the allocative efficiency of farm is analysed in banana production.

YIELD GAP

The difference between the potential yield and actual farm yield is termed as yield gap. In the present study, the yield gap is estimated, on an average, to find how far the actual farm yield of different varieties of banana varied from the forecast estimated yield or potential yield per hectare.
Further, the yield gap of different size-groups of farm is estimated on the basis of forecast estimate of average yield per hectare. Moreover, the yield gap between best farmers and backward farmers is estimated and examined.

**PRE-HARVEST CONTRACT SYSTEM**

Under the pre-harvest contract system an agreement is made between banana growers and pre-harvest contractors. The banana bunches, when they reach certain stage of fruit development, are inspected by the pre-harvest contractors and the terms and conditions of contract are finalised with the banana growers.

Once the contract is finalised, the right of harvesting the bunch is vested with the contractor while the grower has to look after the banana garden including watch and ward. The price per bunch is negotiated on the basis of the visual assessment of the size and quality of the bunches. This system has been an established practice in the study area.

**PRICE SPREAD**

Price spread refers to the relationship between the price received by the banana grower and the price
paid by the ultimate consumer including the intermediaries involved in marketing the banana. The specific marketing channel prevailed in the study area is: Producer- Pre-harvest contractor - Wholesaler - retailer - consumer.

MARKET MARGIN

Market margin refers to the amount of share received by each intermediary including the banana grower from the ultimate consumer's price. The wider the market margin, the larger would be the inefficiency in the marketing system and the lower would be the share of the producer.

DESCRIPTION OF THE SELECTED VARIETIES OF BANANA

a. THOZUVAN: Thozhuvan banana is the foremost and popular commercial variety in Tirunelveli Kattabomman district. The fruits are small to medium in size and more rounded without shade. The ripe rind is thin and golden yellowish white in colour. The ripe fruits will easily drop from the bunch. The average bunch weight is about 9 kg. containing 40 to 50 fruits in five to seven hands. The flesh is white and tasty with a pleasant apple flavour. The duration of this variety varies from 10 to 12 months from planting to maturity. This variety
requires support pole and pesticides to resist wind and diseases.

b. KADALI: This variety is similar to Thozhuvan in size and colour, but the taste is entirely different. The pulp is cream colour with an agreeable sub acid taste. The ripe fruits are eaten and the raw or tender fruits are used for preparing dishes, especially in wedding ceremony. Due to its better root system, it can resist wind better than other varieties. The average bunch weight is about 12 to 14 kg, containing 100 to 120 fruits in eight to ten hands. The duration of this variety varies from 11 to 12 months from planting to maturity.

c. PEYEN: Peyen is a choice table variety. The plants are moderate and do not bear as heavily as Kadali. The fruit is somewhat angular in size. The ripe fruits are less tasty compared to the fruits of other varieties. But, the flesh is harmless and easily digestible. So, this fruit is liked by the people of all ages. Peyen fruits are used to prepare snacks, especially 'Baggie' as it is angular in shape.

The root system of this variety is not strong. So, it requires support pole for resisting wind. The
duration of this variety ranges from 10 to 11 months from planting to maturity. The fruits develop well and bunches weigh up to 10 kg, containing 50 to 60 fruits in five to seven hands.

d. NENDRAN: Nendran fruit is relatively longer and thicker than most of other banana fruits. The bunch weighs 8 to 10 kgs. with about 40 to 50 fruits per bunch. The duration of this variety is about 12 months. The fruits are curved and somewhat angular. The rind is thick and buff yellow when the fruits ripe. The yellowish pulp is firm with a characteristic taste. The flesh when ripe becomes soft and palatable. Nendran fruits can be kept for as long as seven to ten days after ripening.

The fruits are mostly used for preparing chips. Nendran chips are very popular on the west coast and in Kanyakumari district. Most of the Nendran bunches are loaded to Vadaseri shandy, Nagercoil and Trivandrum.