CHAPTER V

Summary and Conclusions:

Every farmer is aware of the fact that quality seed, fertilizer and the technology are the important factors needed to boost the Agriculture production in order to meet the need of the growing population. Thus it becomes necessary to know how much the farmers are in using these resources to promote the production. That is to know how much they are in their technical and allocative efficiencies. The general feeling is that not all farms are capable of reaching the potential optimum in their farms. The average performance in general is much below the optimum level. The productive farm to farm differences might be due to lack of use of the recommended practices and partly due to the technical inefficiency. ie, farmers might not be fully aware of the low-cost technologies. With these in view the present study was undertaken in the Tamiraparni command area of the Tirunelveli District, Tamilnadu with the following objectives.

(i) To study the existing input behaviour of the farms
(ii) To measure the technical efficiency, allocative efficiency and economic efficiency through frontier models and
(iii) To suggest policy options to improve farming efficiency of farmers and to increase the food grain production.

Methodology:

Tirunelveli district is purposively selected, since this district is one of the largest paddy cultivating centers in Tamilnadu. The sampling design was a
three-stage stratified random sampling with taluks as the first stage; cluster of villages as the second stage and holdings as the third stage units. Since the cost of cultivation of principal crops (CCPC) scheme operating on this area has only 25 clusters uniformly distributed over the entire district, all the 25 clusters were selected wherein each cluster has 10 farms, there were 250 farms totally. In order to make comparisons these 250 farms were classified into progressive and non-progressive as per the norms laid down by the Agriculture University. There were 85 progressive farms and 165 non-progressive farms. All the 250 farms are growing paddy as their main crop.

The data collected by the CCPC scheme during 1998-99 was used fully for the entire study since 1998-99 was a normal year as far as the paddy crop is concerned in the Tirunelveli District.

Based on the need of the main objective the production function was chosen since it can give the marginal productivity of the resources and also the returns to scale. Since OLS estimation of the production function can only give the average production and not the maximum, the frontier production function was also used. Since it can give the technical and allocative efficiencies of each one of the components and also the overall technical and allocative efficiencies of the production function also. The Cobb-Douglas production function is chosen purposively since it alone can answer the questions proposed more effectively.
A major limitation of the frontier production is its assumption of deterministic relationship which ignores the possibility that a farm's performance may be affected by factors entirely outside its control as well as by those under its control. The favourable and unfavourable exogenous shocks, which the farm receives, are mostly due to his inefficiency in the use of technology. Thus to know the real effect of inefficiency the errors coming out of these two sources must be separated. Only to do this the stochastic frontier production function (SFPF) was chosen.

The probabilistic frontier production function (PFPF) is a deterministic model in which the parameters are estimated by applying chance constrained programming to the inequality restrictions so that some output observations could be permitted to lie above the estimated frontier.

For a given technology and endowment of fixed factors of production the profit function expresses the maximized profit of a farm as a function of the quantity of the fixed factors of production. In the present study the profit function was used as an operational model to measure and compare the economic efficiency and its components of technical efficiency and price or allocative efficiency for the sample farms.

**Summary of finding:**

The average operational area is 4.21 ha for the progressive farms and it is 2.18 ha for the non-progressive farms. The paddy field is the major asset for
all the residents in the study area. The average family size is 3.92 for the progressive farms and it is 6.54 for the non-progressive farms. The average education level is 12.82 for the progressive farms and it is 9.61 for the non-progressive farms. The estimated parameters of PFPF, SFPF by ML and COLS methods and average production functions for both the progressive and non-progressive farms showed good fits with R-square greater that 0.85 which is significant at one percent level of probability. In the case of the progressive farms the elasticity coefficient is significant for labour in all the functions indicating the possibility of higher productivity by adding more labour in these farms. The elasticity coefficient for Fertilizer is also significant indicating the possibility of higher production by adding more fertilizer. The elasticity coefficients are not significant for Land and Animal and Machine power. In this the sign of the coefficients are negative for the land indicating that the land is not fully utilized and that additional land will not increased their production since the average size of these holdings is much higher and more over in the existing land there is under utilization of human labour and fertilizer use. In the case of the non-progressive farms the elasticity coefficients are significant for the land. This implies that if more land is provided these farms could bring out more production, since already there is over utilization of human labour and fertilizer as indicated by the elasticity coefficients. One peculiarity noted in this is that the behaviour of the elasticity coefficients are identical for each variable in all the types of functions indicated except the constant intercept terms, indicating the fact that though there are some basic difference, the over all
behaviour is almost in the same proportion in both the type of farms in the study area.

The $\sum\beta_i$, the returns to scale is just greater than one for the progressive farms and it is just less than one in all the non-progressive farms, however both of them are not significantly different from one statistically. This supported the basic assumption of constant returns to scale in the estimation of PFPF. The parameters of the estimated SFPF by ML method seem to be almost equal to that in the final PFPF in both the cases except in the intercept term. In all the cases the values of the coefficients in SFPF were larger than that is OLS. The higher intercept is an indication of the neutral shift in the best practiced farms. The study also reveals that at least some of the farmers in both the groups have exploited the potential practice of the production. The significant r value in both the farms are indications that the deviations of farm’s yield from the maximum feasible yield might be mostly due to farmer’s failure to use the best practices.

There was no significant difference in the levels of inputs used by the sample farmers in both the groups. Hence the average yield obtained remained almost the same. This might be due to the fact that the crop studied is paddy, which required specific levels of inputs under irrigated conditions.

The economic behaviour of the sample farms in the study area is examined in terms of economic efficiency of cultivation using the profit functions and factor demand functions. The efficiency ratings for overall
measures of technical efficiency ranged from 40 percent to 100 percent with three and nine sample farms in the progressive group and in the case of non-progressive farms the efficiency ranged from 35 percent to 100 percent with eighteen and 24 farms in each. The overall mean efficiency is 0.688 for the progressive farms and it is 0.679 for the non-progressive farms. In the case of progressive farms thirty six percent of the farms are operating below the mean efficiency level and only twenty percent is operating above 90 percent efficiency level where as in the non-progressive group only seventeen percent are above 90 percent level and forty eight percent below the mean level. This discrepancy might be due to the variations in the management skill, incomplete information on technology and the applications of appropriate inputs in time.

The relative economic efficiency in the context of Cobb-Douglas production and unit output profit functions was judged by testing whether the UOP of the two groups differed from one another significantly. Given equal access to all the inputs and technology the two groups of farmers operating in the same area are expected to have equal economic efficiency. The result also justifies this since the coefficient of D is not significant. The non-significant Chi-square value for λ also ascertains the fact that the three is no relative price efficiency in the two groups. Hence it can be concluded that the farmers of two groups have the same degree of profit maximization. It is also evident that the farmers in both the groups have maximized their profit with respect to the level of use of the variable factors of production. The analysis also indicated equal technical efficiency and constant returns to scale in the use of factors of
production, which confirms equal relative production efficiency in the two groups.

Policy options:

- The results indicate that in the case of the progressive farms additional labour and fertilizer will be more productive and existing levels of use in animal and machine power is sufficient. It also indicates that land holding beyond some limit makes the farmer unproductive.

- The mean efficiency level (0.68) is almost on par in both the groups implying the necessity for improving management skills, training needs and method demonstrations by the Department of Agriculture in this area.

- The constant returns to scale is the main constraint in the investment of farmers on paddy fields. Hence production strategies suitable to this area should be separately developed by the Research Centres of Tamilnadu Agricultural University and regular training to these farmers by the staff of the research centres to make the returns to increasing scales.