CHAPTER IX

SUMMARY AND POLICY IMPLICATIONS

The major findings of the study are summarised in the following sections:

9.1. Productivity Performance of major crops:

The growth in the productivity of major crops in Karnataka over a period of 25 years have been analysed with the help of compound growth model. Among the cereals Rice, Jowar, Maize, Ragi, Bajra, Wheat and Minor Millets were considered. The crops like Rice, Ragi and Bajra experienced a mild significant growth in their productivity at the state level. The productivity of Maize declined marginally (0.5%). Major Rice growing districts like Mandya, Shimoga, Raichur, Mysore, Bangalore, Uttar Kannada and Dakshina Kannada experienced a positive growth in productivity. Bidar, a non-traditional Rice growing district showed a declining productivity.

The predominantly Jowar growing districts like Bijapur, Dharwad, Gulbarga, Belgaum and Bidar experienced a positive growth in Jowar productivity. The districts in which Jowar is not a major crop have shown a decline in its productivity. Most of the major Maize growing districts except Chitradurga and Bellary showed a declining Maize productivity.

Ragi is a predominant crop in Southern part of State. There has been a substantial growth in productivity of this crop in the districts of Bangalore, Hassan, Kolar and Chickmagalure. The non-traditional districts like Gulbarga and Bellary where the area under this crop is very meagre showed a declining productivity.
Bajra is predominantly grown in Bijapur, Gulbarga and Belgaum districts. Bijapur and Gulbarga districts shown a high annual growth in productivity of Bajra. The area under Wheat is mostly concentrated in the districts like Bijapur, Belgaum and Dharwad. These districts experienced a high productivity growth which was around 2 per cent per annum. Some of the non-traditional areas experienced a negative growth in productivity.

The growth in the productivity of Groundnut was more than 1.5 per cent in the districts of Bangalore, Belgaum, Bijapur, Kolar, Shimoga and Dharwad. Only Chitradurga which is one of the predominantly Groundnut growing district experienced a negative productivity growth. At the State level, the Groundnut productivity was found to increase by 1.3 per cent per annum. The productivity of Sunflower across the districts baring Uttar Kannada declined substantially. As a result the productivity at the State level was found to decrease by more than 3.5 per cent per annum. Other Oil seeds showed a positive growth in productivity across the districts as well as the State level.

The growth in productivity of Tur, a major Pulse grown in State was negative in all the districts with an exception of Bidar district. At the State level the crop experienced a steep fall in the productivity by around 2.35 per cent.

Cotton and Sugarcane were considered for the study under cash crop groups. The growth in the productivity of Cotton was substantial in most of the traditional Cotton growing districts. At the State level the productivity increased by 4.87 per cent. There was a marginal growth in the productivity of Sugarcane
at the State level. Mandya, Mysore and Shimoga districts where most of the Sugarcane area is concentrated showed relatively higher growth rate. At the State level, the productivity performance of most crops was better in the latter period than that in the early period.

9.2. Instability in the production of major crops:

Looking to the productivity performance of crops at the State level the study period was divided into two sub periods and the sources of instability during these periods were analysed using Hazell’s scheme of decomposition.

Change in mean yield contributed 18 per cent of variation in Rice production in the State. The change in area yield co-variance contributed to the extent of 47 per cent to the Rice production. The contribution of change in mean area to the Jowar production at the State level was to the extent of 88 per cent, whereas, change in area yield co-variance contributed to the tune of 236 per cent. In view of the declining productivity growth for Maize at the State level change in mean yield was found to contributed negatively. Change in mean yield of Ragi at State level was one of the major contributor to the State's Ragi production. The Wheat production at the State level was found to be influenced significantly by the extent of contributions of change in area, yield co-variance and change in mean yield. Change in mean area contributed negatively to the Wheat production at the State level. Change in mean yield, change in mean area variance and change in area yield co-variance were the major sources of variance in Bajra production.
Among the different sources of change in variance of production of non-cereal crops. Change in mean yield was the highest in the case of Groundnut, while the change in mean area was a major source in the case of Cotton. The contributions of change in yield variance was around 10 per cent in the case of Groundnut, where it was less than 1 per cent for most of the other non-cereal crops. Change in area variance was the largest contributor in the case of Sunflower, Sugarcane and Groundnut. The contribution of interaction between changes in mean yield and mean areas was of less importance. Among the other sources of change, changes in area yield co-variance and interaction between mean area and area co-variance in the case of Groundnut, interaction between change in mean area and mean variance in the case of Sunflower are the major sources of instability in the production of non-cereal crops in the State.

9.3. Contribution of different inputs to the growth in the crop productivity:

To study the contribution of different inputs to the growth in the productivity of various crops, Cobb Douglas type of production function was used. From this the growth decomposition model was derived.

There was a decline in productivity of Paddy at the State level by 1.3 per cent. Seeds in terms of varietal improvement was found to increase Rice productivity by 27 per cent. Similarly the growth in fertilizer and pesticide consumption were found to increase productivity by around 4 per cent and 3 per cent, respectively. However, the major cause for the Rice productivity was the
residual factor which include the changes in environmental factors including irrigation and the management practices. The productivity of Jowar at the State level during the period under reference has declined by 4.35 per cent. The growth in the use of major inputs like seed, FYM and fertilizer have caused the decline in the productivity. The contribution of residual was high. Ragi productivity at the State level has decreased marginally. The growth in fertilizer, labour and capital use have significantly contributed to this decline. If these inputs are used in increased quantities per unit of area without the matching increase irrigation, it is likely that increased use of inputs would result in declined productivity. There was a substantial growth in the productivity of Bajra at the State level. The growth in the use of all inputs have contributed to this growth. Among the quantifiable inputs the contribution of growth in seeds to the growth in productivity was the highest.

Groundnut productivity at the State level was found to decline by 4 per cent during the period from 1980-81 to 1992-93. However, the growth in the use of seeds, fertilizer and labour were found to increase the Groundnut productivity by more than 2.5 per cent, 3 per cent and 6.9 per cent, respectively. The growth in the use of FYM was found to suppress the growth in productivity by more than 3.6 per cent. There was a marginal improvement in the productivity of Sunflower at the State level. However, the growth in use of seeds and fertilizer were found to depress the productivity by more than 30 per cent and 19 per cent, respectively. The growth in the factors like rainfall or irrigation and other factors not included in the model appeared to improve the Sunflower productivity.
Among the Pulse crops the productivity of Tur was found to increase by 2 per cent. The growth in the use of Seed in the case of Tur was found to cause a decline in the productivity. The growth in the use of labour was found to improve Tur productivity by more than 25 per cent.

There was a substantial (11.26%) growth in the productivity of Cotton at the State level. The growth in the use of pesticides, seeds and labour were found to contribute positively to the growth in its productivity. However, the growth in the use of plant nutrients alone was found to depress the Cotton productivity. At the State level Sugarcane productivity increased marginally. The growth in the use of all inputs barring seeds was found to cause a favourable growth in the productivity of Sugarcane.

9.4. Technical Efficiency in Crop Production:

To assess the influence of selected factors on Agricultural output at the State level Error Component model and Frontier Production functions were used. For this analysis the data from 1990-91 to 1993-94 was used. The per cent of area under crop the per cent of area under irrigation, fertilizer consumption in Kgs/ha, annual rainfall in mm and time variable were regressed on crop productivity (kgs/ha). Further, production frontiers were developed to arrive at maximum potential yield. These results were used for the purpose of measuring technical efficiency levels of the districts in crop production. The number of districts falling below efficiency rating of less than 0.4 were found to decrease over the years. The average technical efficiency of all the districts was found to
decrease from 0.71 in 1990-91 to 0.66 in 1993-94. About 25 per cent of the total number of districts were found to operate at the technical efficiency level ranging from 0.60 to 0.70. The number of districts operating at the technical efficiency level above 0.8 decreased from seven in 1990-91 to four in 1993-94.

Mandya, Mysore and Kodagu districts appeared in high level of technical efficiency while Bidar, Chikkamagalore, Chitradurga and Dakshina Kannada districts were found to be in the medium level of technical efficiency and Bangalore, Bellary, Dharwad and Raichur districts, consistently appeared under low level of technical efficiency for all the four years studied. Bijapur, Hassan and Kolar districts appeared under medium level of technical efficiency for three out of four years. Gulbarga district appeared in low level of technical efficiency for three out of four years. Bangalore Rural, Belgaum and Tumkur appeared in high level of technical efficiency, for three out of four years.

Theils Index of fertilizer consumption Karnataka were worked out from 1972-73 to 1995-96 to know the distribution pattern over the years. The index were around 0.9 indicating equitable distribution in the consumption of fertilizer over the years.

District wise agricultural performance index was computed to evaluate agricultural performance in the district. Only three district showed a high performance (more than 77 per cent). As many as eight districts were found to have an index ranging from 40 to 45 percent. Chitradurga and Raichur districts happened to be the districts with very low performance.
9.5. Policy Implications:

Results of the study have good decision input value for the planners of Agriculture Development, Agricultural researchers, Agricultural input agencies and Extension workers. The revealing factors are:

- Combined contribution of all inputs has led to significant increase in crop productivity. This indicates the need to integrate the inputs channelising to each District in a judicious manner. Installing delivery systems to make available all inputs under one umbrella including the technical advise, seeds, fertiliser, credit and other needs for the agriculture professions.

- The study has confirmed that among all inputs (seed, fertiliser, labour, etc.,) "Seed" has relatively higher and significant contribution to crop productivity. This points to the criticality of seed as an important input in agricultural production which is to be made available to the farmers. A policy decision at the State level is very essential defining a long term plan for sustainable supply of quality seeds required in each agro-climatic zone. This may also warrant the Government to consider revolving fund at each Grama Panchayath and Taluk Panchayath levels, Buffer stocking of seeds in each agro-climatic zone may have to be considered.

- The District crop productivity matrix mirrors the high productivity crops in each district and indicates certain factors for low productivity crops. This could be utilised for a rational application of resources for agriculture development and to formulate district-crop specific scheme to achieve targeted improvements in productivity.

- The study indicates that in case of certain crops and districts, specific inputs are causing depression in the productivity, for example the Oil seeds and Pulses grown in marginal and sub-marginal lands with highly erratic rainfall situation, leading to stagnation in the productivity over years. This situation requires strategies to redress such problems which could be chalked out to improve the quality of the inputs or efficient use of input or any other specific measure that is required to restore desired level of productivity.
• The study has shown that the technical efficiency of the districts in crop production is related to efficiency of the extension system, the level of adoption of technologies, sustained use of technology and efficiency of the technologies adopted. The districts having low score on technical efficiency should be considered to tone up the extension system. These have implications in man power planning, technology dispensation plans, the appropriateness of the media and degree of synchronisation of the technology adoption with that of other factors such as input availability and desirable climatic conditions.

• The study has brought out several interesting results which needs further probing. However, lack of strong data base had been a major constraint in such an attempt. For instance, in the latter part of the study period crops like Sunflower have shown declining productivity, since data base is lacking on the aspects like, type of lands used for Sunflower cultivation, area under irrigated Sunflower crop, area under rainfed Sunflower crop which could throw light on why productivity of the crop is decreasing. Therefore there is need to build a broad based strong data base on all aspects of crop production which would be of value to agricultural sector.

• An attempt has been made in this study to employ scientific tools of statistical analysis to analyse enormous amount of data thereby to bring out the significance of the trends observed. The study has established that the contribution of residual factors not included in the present study is quite substantial. Therefore the future probe should be in the direction of some more quantifiable factors like qualifiable aspects of inputs, soils nutrition status etc., which would help better understanding of role of each such factors. In view of the data limitation during the study period all factors could not be considered for analysis.