CHAPTER VI
SUMMARY AND CONCLUSION

Agriculture Sector in India which contributes for nearly one third to the national income provides livelihood to about three fourth of the population. It also supplies bulk of wage goods to non-agriculture sector. It supplies raw materials to the Industry also. It also provides for a substantial portion of the country’s exports. However, the farmers, who are the back bones of these contributions, are the least beneficiaries. Due to instability in the price and inappropriate rain they are not in a position to decide on the type of price which they can expect for their output. Hence it is felt that a perfect forecaster may help them in their planning and also the policy makers.

In view of the familiarity of the researcher in Kanyakumari District, It is decided to take data only from the crops cultivated in this district and hence the researcher chose to analyse those crops which are specific to this district only. Accordingly the crops selected are

1. Rice – T.K.M-9
2. Rice – Samba
3. Coconut
4. Black gram
5. Green gram
6. Tapioca

These are the two types of rice which are the preferred ones in this district and they are less preferred in the other districts and hence these two varieties are considered here. Regarding the Coconut, there is no house without any coconut tree since it is widely consumed mostly only in
this district in Tamilnadu till today. Regarding Black-gram and Green-gram the consideration is only that it is cultivated through out the district however, there is no irrigation and they are summer crops. Tapioca, in other parts of the state is not used as a food crop but is a commercial crop. Here it is cultivated in every place even under trees in the houses. This is a staple food, apart from that it is cooked along with fish in the western part of this district. In view of these peculiarities, these commodities are chosen for prediction.

The overall objective is to help the household by making short term forecast in the essential day to day usable commodities. The specific objectives are:

i. Perfection of the method that suits relatively the best in forecasting the prices

ii. To compare the efficiency of the models used

iii. Using the best model to forecast the probable prices for a few forth coming years

Since the trend is similar for almost all the years except the drought years (which come, under special category) the data for this analysis is taken from the complete one year with observations for each week.

The models are categorized into four types viz:

I. **Regression Models.**

The models considered here are

(i) \( Y_t = b_0 + b_1 t \), linear model

(ii) \( Y_t = b_0 + b_1 t + b_2 t^2 \), quadratic model
(iii) \( Y_t = b_0 + b_1 \log t \), Logarithmic model.

(iv) \( Y_t = b_0 + b_1 t + b_2 t^2 + b_3 t^3 \), cubic model

(v) \( y_t = \exp(b_0 + b_1 t) \), S-Curve model

(vi) \( Y_t = b_0 \exp(b_1 t) \), Exponential growth model

(vii) \( Y_t = b_0 + b_1 y_{t-1} \), Autoregressive (First order)

(viii) \( Y_t = b_0 + b_1 y_{t-1} + b_2 y_{t-2} \), Autoregressive (2\textsuperscript{nd} order)

2. Smoothing models

   i. Simple moving average

   ii. Double moving average

   iii. Fundamental exponential smoothing

   iv. Double exponential smoothing

   v. Triple exponential smoothing

3. Special Models

   (a) Adaptive Filtering model

   (b) ARIMA model or Box – Jenkin’s method.

4. Periodogram Analysis

   In the regression models since paddy has two seasons, the cubic model has fitted well on both of them. On the other hand in the case of coconut, which has only one season for the low yield and hence it has to take care of only one bent in the price curve and hence the quadratic has fitted well.

   Now in the case of summer crops both Green gram and Black gram the linear has fitted very well. This might be due to the fact that there is only one harvest for both in June and the price will be lowest in this period and there is only a constant increase till the next harvest and hence the linearity.
In the case of Tapioca, has no specific cultivation period and hence there is not much of variation in the prices and the small shakes in between might be due to the continuous rain or sun-stroke. Further, the overall small increase might be due to the deflation effect of money and hence here the linear model.

The results obtained from the smoothing, models reveal the following; In the case of two season crops for both varieties of Rice T.K.M.9 and Samba the Double moving average has fitted well. As indicated in the scatter diagram it might be due to the heavy ups and downs in the off and harvest seasons. In the case of coconut since the price curve is almost smooth the double exponential model has fitted well. This might be due to the fact that the price might depend on very short lag values.

In the case of the summer crops Black gram and green gram since there is only one harvest there is a gradual increase and the ups and downs in between were very small and the single moving average was able to bring it smooth and linear and thus for summer crops SMA stands the best.

In the case of Tapioca the ups and downs are more when compared to the summer crops and hence the Double moving average was able to make it more smoothly into linear.

In the case of special models, universally due to the high sensitivity of the parameter the Adaptive filtering became unsuitable for all Agricultural Commodities. Though ARIMA has come as the best in all the 6 cases, in the case of two seasonal crops it accommodates two lags and two moving
averages and also two differencing, with all these things the predictions are very much closer than that in the other two types of models.

Since the coconut has only one season of low harvest the ARIMA in this case has accommodated one lag, one differencing and one moving average. Here also the predictions are closer than that for other models.

In the case of the two summer crops there are two lags, no differencing and single moving average. Here also the estimates are very close than that in the other models.

Tapioca is a non seasonal one. Due to heavy rains and droughts at times its harvest gets affected. As there are heavy downfalls in the production, the prices go higher. This is reflected in the twice differencing and the unique lag and moving average.

The periodogram analysis being a relationship between the time and variances indicates the period of high variability in the prices. This might help farming community to decide on whether to sell or speculate. Sometimes people do not draw any piece of information about the variability. These are the periods with full risk. This is just like whether to sell or speculate in a share market and in such cases this periodogram will be able to guide the farmers. Thus periodogram helps only in decision making.

The Peridogram analysis for both the paddy varieties shows that there is a peak in the variation in the beginning of the year. The price curve shows heavy oscillations for the two crops in the harvesting months of January and February. This shows the insecurity of price in the harvest periods. Thus the peak in the periodogram gives the risk in the price for the farmers in the two
paddy crops. The indication is that in these periods the farmers must be very careful in taking decisions as to whether to sell or to speculate.

In the case of the coconut the beak it is in the middle which is the time of good harvest and that coincides with the peak in periodogram. Thus here also the period of good harvest gives instability in the prices. Similar is the case for all the crops.

Thus the periodogram analysis or the similar spectral density analysis gives indications as to when the farmer should be cautious.

**Policy implications**

The study reveals that in the case of crops with more than one season, the cubic fits very well. The regression models and the Moving average(Single or Double ) fits well in the time series models. Irrespective of all the other things the ARIMA stands very well for all the crops. When one compares the observed with expected results the analysis reveals that ARIMA models are the best in predicting the prices of Agricultural Commodities. This is in view of the maximum number of adjustment factors p,q and d.