CHAPTER – II

Review of Literature
2.1 Introduction

A thorough review of literature is of paramount importance to any research endeavour. It helps to understand the general background to the given field of research. This also helps to find out the available information, which is related to the objectives of proposed research and assists in delineating the problem area. A review of past research also helps in identifying the conceptual and methodological issues relevant to the study. Such an attempt would help the researcher to have better and precise understanding of the perspectives of the research problem and would also facilitate the researcher to modify and improve the present analytical framework in the right direction to suit the problem situation. Review of the concepts used in earlier studies helps us to adopt, modify and improve the conceptual framework and to provide a link with past approaches. This chapter briefly reviews the concepts and findings of the past studies, which are relevant to the present study.

2.2 Review of concepts

In this section, various concepts used in this study are reviewed and broadly defined under the following titles:

1. Growth
2. Instability
3. Structural change in exports
4. Stationarity of time series
5. Co-integration
6. Competitiveness
7. Nominal Protection Coefficient

2.2.1 Growth

Growth rates are the measures of performance of economic variables. They are not developed to predict; but describe the trends in variables over time. Hence, they are commonly used as indicators of trends in the time series data. Price indices, productivity indices and output series are usually discussed in terms of the changing
growth rates over a period of time. Policy decisions are often based on such growth rates which depend on nature and structure of the data.

2.2.2. Instability

In order to study the variability in the area, production and productivity of selected crops, an index of instability was developed as a measure of variability. The formula suggested by Cuddy and Della (1978) was used to compute the index of instability.

2.2.3. Structural change in exports

The structural changes in exports help us not only to know the trend in sustaining existing market over the previous decades but also to know the shifts in shares from one country to another for a period of time. The first order finite Markov model is used the study these structural changes.

2.2.4. Stationarity of time series

As explained by Chatfield (1984) a time series is said to be stationary if there is no change in mean (no trend) and variance and if strictly periodic variation has been removed.

According to Gaynor and Kirkpatrik (1994), a stationary time series is one that does not contain trend. If the original series does contain trend, but not seasonality it can usually be transformed into a series without trend by taking first or second differences of the data.

Gujarati (1995) defined a stochastic process to be stationary if its mean and variance are constant over time and value of covariance between two time periods depends only on the distance or lag between the two time periods and not on the actual time at which the covariance is computed i.e. if a time series is stationary, its mean, variance and auto covariance (at various lags), remains the same no matter at what time we measure them.
Harris (1995) described the series Yt to be ‘stationary’ if it tends to return to its mean value and fluctuates around it within a more or less constant range (i.e., it has finite variance). Suppose that the variable Yt is generated by the following process:

\[ Y_t = \rho Y_{t-1} + U_t \]

where, \( U_t \sim \text{IN} \left(0, \sigma^2\right) \)

The variable Yt will be stationary if \(|\rho| < 1\). If \( \rho = 1 \) then Yt will be non-stationary. A non-stationary process becomes stationary after it is differenced. Yt is said to be differenced stationary or integration of first order, denoted as I(1), when differencing it once produces a stationary series. More generally, the order of integration of a series is the number of times it has to be differenced to yield a stationary series. Stationary series are said to be integrated of order zero and denoted as I(0).

### 2.2.5. Co-integration

As per Granger and Engle (1987) when there is a pair of series \( X_t \) and \( Y_t \) each of which is I(1), a linear combination of these two series will also be I(1). However, if there exists a constant such that \( Z_t = Y_t - \alpha X_t \) is I(0), then the pair of series \( X_t \) and \( Y_t \) are said to be co-integrated and \( \alpha \) is called the co-integrating parameter. This means that there exists a long term, or equilibrium, relationship between the two series. If \( Z_t \) is not I(0) then the two series may diverge from each other indefinitely. Therefore, the basic idea behind co-integration of series is that the presence of co-integration ensures that the series will move closely together in the long run, since the difference between them is stationary with well defined mean and variance. \( Z_t \) is often called the ‘equilibrium’ error. The term ‘equilibrium’ is not used to imply anything about the behaviour of economic agents but rather describes the tendency and economic system to move towards a particular region of the possible outcome space, when distributed from that region. According to Dalado et al. (1990) two variables are said to be co-integrated when three conditions are satisfied, viz,

a) The variable must be integrated of the same order. The order of integration is the number of times each variable has to be differenced in order to turn the series stationary.
b) There should be a linear relationship between them. That is, in an equation $Y_t = \beta X_t + U_t$, $\beta$ coefficient must be significant and

c) The residuals ($U_t$) i.e., the extent by which the two variables deviate from the long run equilibrium relationship given by the equilibrium error ($U_t$) should be stationary. Co-integration means that despite being individually non-stationary, a linear combination of two or more time series can be stationary (Gujarati, 2004).

2.2.6. Competitiveness

Porter (1990) argued that a theory of international trade must move beyond the comparative advantage to competitive advantage. The concept of competitive advantage is more comprehensive involving segmented markets, differentiated products, technology differences, economies of scale etc. Thus price-cum-cost comparisons are the preliminary indicators of competitiveness.

2.2.7. Nominal Protection Coefficient

The Nominal Protection Coefficient (NPC) of a commodity is defined as the ratio of the domestic price to its border price (Tweeten, 1992). Pursell and Gupta (1998) defined NPC of a commodity as the ratio of that commodity’s domestic price to its international reference price and referred to it as an estimate of the extent to which its price has been affected by government interventions in the country’s international trade. NPC determines the degree of export/import competitiveness of commodities by measuring the divergence of domestic price from the international or border price.

2.3. Review of past studies

Lutz and Scandizzo (1980) evaluated the effect of government interventions in agricultural commodity markets for a sample of developing countries using standard partial equilibrium methods. The empirical results indicated that the agricultural sector in developing countries was often heavily taxed. As a consequence, agricultural production was discouraged, while consumption was subsidized and
increase in the Government revenue provided by taxation was balanced by a loss of foreign exchange earnings.

Atkin and Blandford (1982) studied structural changes in import market shares for apples in U.K. The changes in the composition of U.K. apple imports during the period from 1963 to 1974 were analyzed using a first order Markov model. The study indicated that changes in market share had been systematic, stable and of long duration. The estimated transitional probability matrix could explain the nature of change by indicating the relative competitive strength of different exporters. The results showed that E.C membership increased French market share in the U.K. market by more than 26 per cent points and decreased the share of Australia and South Africa by 18 and 10 per cent points respectively.

Lundahl and Peterson (1982) studied the market integration for major food grains for the period of 1969-74. The number of markets for each product considered was 19 for rice, eight for grain millet, 20 for grain corn, 11 for ground corn and 15 for seed beans. Monthly price series were detrended and the residuals were correlated. The results showed that there was not high correlation between the residuals. For all the food grains, there was a tendency for the correlation to be full towards the end of each year.

Reddy and Reddy (1983) while analyzing the trends in agricultural growth in Andhra Pradesh estimated the linear growth rates of area, production and productivity of groundnut for coastal, Rayalaseema, Telengana and for the entire state of Andhra Pradesh for the pre-green revolution period (1956-57 to 1964-65), for post-green revolution period (1964-65 to 1977-78) and for the whole period (1956-57 to 1977-78). They found that the growth rates of production and yield increased for coastal Andhra and Rayalaseema during the green revolution period. While the growth rates of area fell drastically in Coastal Andhra region during green revolution period compared to the pre-green revolution period, the growth rate of yield declined in Telengana region during the same period. For the entire state of Andhra Pradesh, only the yields registered an increase during the green revolution period.
Mahender Reddy, J. (1983) analyzed district wise and region-wise growth rates of area, yield and output of food grains and one commercial crop namely, groundnut in A.P. The main objectives of the study are (i) to find the growth rates during post-green revolution period 56-64, (ii) to examine the extent of fluctuations after green revolution in A.P and in its three regions and (iii) to find out whether there has been any change in the production of yield since the formation of the state. According to his study food production has increased from an average annual output of 6.35 million tonnes during 56-61 to 9.32 million tones during five year period covering 76-81. During this period the share of A.P in all India production of food grains has declined from 8.58 percent to 7.65 percent. Growth of output of food grains and total agricultural output of A.P was not commensurate with the growth of inputs. Fertilizer consumption in A.P accounts for about twelve percent of all India fertilizer consumption.

Brorsen et al. (1984) analyzed the relationship among weekly prices at Rotterdam, Netherlands of rice imported into Europe from the Unites States, Thailand and Argentina. A theoretical model of price determination was developed to explain the hypothesized direction of dynamic influence. Causality tests among the price series were applied. The dynamics of price relationships were then analyzed using dynamic multipliers. Argentinean and the US prices were found to move together. These two prices responded quickly (one to two weeks) to changes in Thailand prices. Thai prices were found to react slowly (taking 10 to 20 weeks) to changes in Argentinean and US prices.

Jhala (1984) computed the state-wise average area, production and yield of groundnut for the period 1971-72 to 1978 and 1979-80 to 1981-82 for Andhra Pradesh. The percentage of change in period I over period II was found to be 3.18, 2.17 and -0.95 per cent. He studied the acreage response, yield response, production response, demand/supply response, price response and seasonal price response of edible oil seed crops by employing an ordinary least squares method for the periods 1951-52 to 1978-79 and 1961-62 to 1981-82 in the case of seasonal price response. He observed that the response of acreage to lagged relative price was positive but low and uncertain. The main cause for the fall in acreage was found to be stagnant yield
and its steeper fluctuations over time, besides the stable and increased yields of competing crops. The response of acreages to lagged acreages was positive and highly significant, implying that under the situation of uncertainty the farmer would be guided more by techno institutional factors rather than by price factors. In the yield response equation the rainfall variable was also positive, while that of irrigation was positive but not statistically significant. The farm price response equation revealed that the farm price of groundnut is determined by the expected overall supply/demand of edible oils in the year under consideration.

Fialor (1985) analyzed the market share of Ghananian cocoa exports for the period from 1951 to 1981 using the Markov model. He decomposed the total change in export into the overall market share effect, the direction of trade effect, and the individual market effect. It was observed that there was an overall contraction in Ghana’s cocoa exports during this period to the tune of about 38,000 tonnes. Even though there was an expansion in exports due to increase in the overall market share effect as a consequence of increased world demand to the extent of about 2,26,000 tonnes and another 15,000 tonnes due to the direction of trade effect; yet the loss through the individual market share effect was large, being 2,78,000 tonnes and this had resulted in the contraction of Ghana’s exports.

Mishra (1986) evaluated protection versus under pricing of agriculture in India for two major cereals, wheat and rice, from 1955 to 1980. Nominal protection indices (NRD and NPC) were estimated for six time points. Besides showing changes over time in the levels of protection or exploitation, the aim was to see whether some comparative statements vis-à-vis industrialized and industrializing countries could also be made.

Pal (1986) studied instability in agricultural production in India. He found that increase in area and yield contributed to increase in production of rice, wheat, maize, rape seed, mustard and non-food grams whereas, the decrease in area reduced total pulses production during the period 1967-68 to 1983-84.
Jamal (1987) examined the cotton pricing policies pursued by the Pakistan Government and the nature of its intervention in the cotton trade and quantified the effects of price distortions over the period 1977-78 through 1982-83. Support prices were found to be closer to revenue maximization prices than to the border prices adjusted to farm gate level. Two distinct phases in the trends of NPCs indicated the Government’s divergence in maximizing foreign exchange in earlier years to revenue maximization in the later years.

Ninas (1987) estimated the linear growth rates of area, production and yield of groundnut during the period 1954-55 to 1983-84 for all India. He found that the growth rates and production of groundnut have fallen during the period 1967-68 to 1978-84 compared to the period 1954-55 to 1964-65. For the whole period 1954-55 to 1983-84, the growth rate of area and productivity was negligible whereas the growth rate of production was very less. He inferred that since area was the main source of growth in output of oilseeds, an area response function can truly represent the output supply functions in the case of oilseeds. Hence, he used an improved version of Nerlove’s Adjustment lag Model to examine the area allocation decision of farmers, by replacing yield with planted area in the original model. The supply response analysis revealed that factors like yield, irrigation, price, technology and rainfall had much influence on expansion of groundnut area.

Indira (1988) studied the extent of price relationship for coffee between three pool sale centers, Bangalore, Coimbatore and Vijayawada. It was assumed that prices were set at Bangalore auction centre and information passed from Bangalore to other centres. The results indicated that Bangalore prices were showing positive relationship both with Coimbatore and Vijayawada prices. Coimbatore and Vijayawada prices were also showing positive relationship with each other. Eighty four per cent of the variation in the pool sale prices at Coimbatore auction was explained by the variations at the Bangalore auctions, 88 per cent was explained in Vijayawada prices. It indicated relatively lower influence of Bangalore prices on Coimbatore prices than on Vijayawada prices.
Raju et al. (1988) while examining the growth trends and acreage response of commercial crops in varied agro-climatic regions of Andhra Pradesh, found that in Anantapur district there was a significant growth in area and production of groundnut. They observed that lagged price was the prime factor in the acreage allocation to groundnut by the cultivators. Further, overall rainfall during the sowing period had a positive impact but not significant on acreage allocation to groundnut in the three different agro climatic regions of Andhra Pradesh. They concluded that on the whole remunerative price can act as catalyst for positive response of acreage and better farm economy.

Narang et al. (1989) in their study on performance and prospects of major oilseed crops in India, estimated the compound growth rates and the coefficients of variation of area, production and productivity of groundnut in the state of Andhra Pradesh and at all India level during the period 1967-68 to 1984-85. Their study revealed that both at the all-India level and at the state level the groundnut crop has not recorded any significant growth rate in any of the three components namely area, production and productivity. The coefficients of variations in area, production and productivity of groundnut crop for the state of Andhra Pradesh were found to be 11.9 per cent, 2.15 per cent and 15.1 per cent respectively. At all-India level, the variability in production and productivity was found to be quite high, with very less variability in area under this crop. They observed that high fluctuations in productivity in turn are due to low level use of important inputs like inadequate water and irrigational facilities, and cultivation of oilseed crops in rain-fed marginal lands with low fertility.

Bandyopadhyya (1989) has explored a certain hypothesis regarding growth pattern and instability at the district level in the production of rice in West Bengal in Punjab-Haryana over the period 1950-51 to 1984-85. He divided the study period into two periods viz., pre-green revolution period (1950-51 to 1966-67) and post-green revolution period (1967-68 to 1984-85). Results revealed that in Punjab and Haryana there had been an outward shift of frontier wheat production during the post-green revolution period, and there were different signs of diminishing from year to year and fluctuations in production. In contrast, in West Bengal, the rate of growth of production of rice declined, particularly in three northern districts of the states. More
disturbing is the widening year-to-year fluctuation in the production of rice in the post-green revolution period. The gravity fed irrigation network, dependent on South West monsoon in West Bengal, shows that there are serious constraints to growth and stability of rice production in the state.

Arshad (1990) made use of Ravallion’s regression model to study the integration of palm oil market in Peninsular Malaysia. The crude palm oil market was observed to be spatially efficient. The high integration of the crude palm oil markets was not surprising in view of the efficient and adequate infrastructure facilities available. The standardization of crude palm oil futures contract made the product homogeneous leading to efficient price discovery thereby enhancing pricing efficiency.

Chaitip and Prasert (1990) used a special equilibrium model to analyze the effects of trade liberalization on the Asian and the United States rice markets. They indicated that under rice trade liberalization, the East Asian region became the major milled rice deficit area, drawing most of the supplies from major Asian exporters. They asserted that US rice exports to East Asia markets will also rise. Further, if the level of subsidies in rice production in the US declines there would be better chance for the US rice industry to rely on the high level of world rice price.

Hazell et al. (1990) studied the relationship between world price instability and the farm prices in developing countries. They observed that world prices for agricultural commodities were traditionally unstable, but they were particularly turbulent during late 1970s and early 1980s. The available post war data on individual commodity prices has been used to test whether world price instability was increasing and to examine its impact on the producer prices in developing countries. It was found that the recent turbulence was more of a statistical fluke than the beginning of any long-term increase in market instability. Further, while the variability in world prices had been entirely transmitted to developing countries in dollar equivalent of their export unit value, it had not been fully transmitted to the average producer’s prices. Real exchange rates, domestic marketing arrangements and Government intervention
resulted in controlling price movements in favour of producers in many developing countries.

Gulati et al. (1990) studied the effective incentives for wheat cultivators in India by selecting four wheat-growing states (Haryana, Madhya Pradesh, Punjab, Uttar Pradesh) under importable hypothesis. The NPCs for four states averaged for the period 1980-81 through 1986-87 were found to be 0.84, 0.75, 0.85 and 0.77 in the case of Haryana, Madhya Pradesh, Punjab and Uttar Pradesh respectively. These results indicated that wheat cultivators in India had been taxed on pricing front compared with imports. But under export competition hypothesis only one state namely, Punjab was taken for calculation of NPCs. It averaged 1.34, which implies that cultivators in Punjab state were protected.

Gemtessa (1991) analyzed the direction of trade in coffee using Markov model. The share of Ethiopian coffee exports to U.S.A. drastically declined during 1979 to 1989. However, West German market indicated to be the potential market for Ethiopian coffee. Further, the loss in the market share of Ethiopian coffee in U.S.A., France, U.S.S.R. and other countries was diverted to West Germany’s market. It was also projected that market share of Ethiopian coffee exports to West Germany would increase to 32 per cent by 2000 mainly because of West Germany’s preference for Ethiopian mild coffee.

He further analyzed the integration of Ethiopian coffee prices with world prices using the correlation coefficient. The correlation coefficient for the monthly average prices secured at domestic and world markets for 12 months lag was calculated. The bi-variate correlation coefficient of the two market prices revealed that they move together in the same direction. The lagged cross correlations of domestic and world prices also revealed that they move together in the same direction.

Panda (1992) studied the instability and erratic growth in agriculture in Orissa, India. Time series data on three principal crops (cereals, pulses and oilseeds) is used to measure growth performance of the agricultural sector in four topographically distinct regions of Orissa state, India. Growth performance is defined in terms of change in area under cultivation of each crop group, production and yield.
At state level, area under cereals is shown to have declined while; area under pulses and oilseeds has grown in terms of production growth. Cereals have shown an increase although at a slower rate than pulses, with oilseeds production experiencing the fastest growth across the regions. This is true in terms of yield in performance: although oilseeds are subject to the greatest yield instability with pulses cultivation demonstrating the lowest (crop-wise) variability. The higher production growth for pulses and oilseeds compared to cereals suggests the need for greater increase to bring more area under pulses and oilseeds. Programmers should also concentrate on raising the yield of oilseeds in the fertile central table region and extension service and new techniques and technologies should be introduced to combat the problem of yield instability.

Veena (1992) analyzed the direction of trade of Indian coffee exports using Markov chain model. It was observed that India could not retain its previous market share to U.S.A., Netherlands, Yugoslavia and other importers. India retained its market share to former West Germany, erst-while U.S.S.R. and Italy.

Lakshminarayana (1993) made an attempt to study the direction of trade of Indian silk exports by employing first order Markov process. The major importing countries considered for the analysis were the USA, West Germany, United Kingdom, France, Italy and Japan. He revealed that exports to the USA were very stable and would remain highly loyal to Indian silk. In addition, he indicated that the probability of exports to the United Kingdom, West Germany and Japan switching over to the USA was unity implying that entire quantities of exports of these countries would drift to the USA over a period of time.

Baharumshah and Habibullah (1994) employed the co-integration technique to analyze the long run relationship among pepper prices in six different markets of Malaysia. The co-integration technique was applied to weekly pepper prices for the period 1986-91. The empirical findings of the study indicated that regional pepper markets in Malaysia were highly co-integrated and prices of pepper tended to move uniformly across spatial markets indicating competitive pricing behaviour.
Jalajakshi (1994) pointed the changing pattern of Indian shrimp exports between two periods (1970-80 and 1980-90). It was observed that during 1970-80, India could not retain its previous market share in the EEC countries. Nearly 90 per cent of India’s share was directed to Japan and seven per cent to the UK. During 1980-90, India could retain only 11 per cent of its previous market share in the EEC countries due to the gradual acceptance of tropical shrimps in these countries.

Khatkar et al. (1994) found that the international prices of wheat were higher than domestic prices, thereby showing that the farmers were unprotected and taxed. This was further testified by the nominal protection coefficients (NPC) which remounted below unity. The lower NPC also indicated that after 1987-88 wheat, and in eighties in general, rice, have become efficient exportable commodities. The non-significant relationship between export and international prices showed the ad-hocism and non-judicious export policy in regard to these commodities. Thus, the study showed the need to encourage the production of exportable varieties like wheat durum and basmati rice which have a comparative advantage in the world market and to reorient the export policy in the context of globalization of the economy.

Sinha Roy and Nair (1994) using the co-integration approach analyzed the pepper price variations in the world market. It was observed that due to open trade status of pepper, its prices had moved synchronously, indicating integration of the world pepper market. It was pointed out that due to the oligopolistic nature of the world market for pepper; its prices did not deviate much. The domestic supply variables were found to be responsive to the international market conditions.

Bhalla (1995) examined the implications of globalization of Indian agriculture, keeping in view the dimensions of domestic demand and supply of food grains and some other important agricultural commodities in India. He asserted that the amount of food grain surplus over domestic demand is not likely to be substantial. Hence, he concluded that instead of export of food grains, it is realistic to concentrate on the export of floriculture products, fisheries etc., which besides being highly valued, would help in generating more employment.
**Gulati and Sharma (1995),** while analyzing the input subsidies in Indian agriculture revealed that the subsidies on key inputs have lost their rationale and are throwing out productive investment, damaging environment, accentuating inequity and promoting inefficient cropping pattern. They concluded that in order to have an accelerated and sustainable growth of Indian agriculture, the reforms in agricultural subsidies must start from liberalizing the output markets, opening them to export markets and thereafter involving farmers in carrying out reforms in input markets.

**Nasurudeen and Subramanian (1995)** observed the price integration of oils and oil seeds. The price integration in most cases was bi-directional except in castor oil. The contemporary belief of influence of groundnut oil price on all edible oil prices was also established. The results of vertical integration confirmed the hypothesis that changes in oilseed price is linked to changes in its oil and cake prices. The vertical integration in oilseed price was much quicker as compared to horizontal integration.

**Parikh et al. (1995)** examined the impacts of liberalization, agricultural input subsidy reductions and safety net programmes for India with an applied general equilibrium model with nine agricultural sectors, one non-tradable non-agricultural sector and one tradable non-agricultural sector with five rural and five urban income classes. The result showed that non-agricultural trade liberalization is more important for agriculture than even agricultural trade liberalization, both of which help accelerate growth. A policy package involving trade liberalization with moderate residual tariff as permitted under GATT and agricultural inputs subsidies removal, accompanied by targeted safety net programmes, along with stepped up investment in irrigation, with the expected additional foreign inflows materializing, producing foreign inflows materializing, produces a scenario that is superior from the point of view of growth, welfare and distribution.

**Mamatha (1995)** used the co-integration analysis for examining the market integration of selected spices between Indian and New York prices. The results indicated that the co-efficients were found to be negative and significantly different from zero in case of Indian and New York prices of pepper, chillies, turmeric and
ginger confirming the stationarity of the series. It also revealed that both the Indian and New York price series for selected spices had the same order of integration.

Rao (1995) analyzed the export competitiveness of Indian onions in major markets using constant market share model over a period, 1979-82 to 1989-92. The importing countries for analysis were Malaysia, Singapore, Srilanka, UAE and the rest of the importing countries grouped as ‘others’. Onion exports to Malaysia were fairly competitive wherein 26 per cent of total change in exports was due to competitiveness of our exports in that market. The UAE was the only country where India’s onions were not at all competitive. Regarding onion exports to the world as a whole, only one per cent of the total change in exports was found to be due to competitive effect.

In the study involving estimation of nominal protection coefficients (NPCs) for DCH-32 seed cotton in Karnataka for the period 1983-84 through 1992-92 under both exportable and importable hypothesis, Umapathi et al. (1995) indicated an overall situation of disprotection to the cotton cultivators of the area studied. The NPCs were found to be much below unity and implied that DCH-32 seed cotton would be an efficient export crop as well as an efficient import substitute, but for the barriers that delink the domestic market from the world market.

Datta (1996) calculated NPC and DRC of Indian Basmati and Non-Basmati rice. The results revealed that India had very slender competitive strength in export of Basmati rice. However, DRC analysis revealed that an Indian exporter had some amount of buffer, because India required spending of only Rs.0.89 on non-tradable goods in order to earn one rupee of foreign exchange. In case of non-Basmati rice these two ratios were below one.

Gill and Brar (1996) examined the competitiveness of some selected agricultural crops in the light of empirical evidence of domestic and international prices, the world commodity situation and the structure of the global market for agricultural commodities. They asserted that the globalization of agriculture will create increased international trading opportunities for those countries/regions which produce a large surplus both in wheat and rice crops, but to be internationally
competitive in wheat and rice, a country like India will have to increase farm productivity, introduce efficiency in market handling and lower the tax rates in marketing of these crops. They suggested concentration on the export of processed materials instead of non processed agricultural commodities which will not only retain a large portion of the value added with in the country but also help in generating more employment.

Mamatha and Chengappa (1996) conducted a study on competitiveness of Indian pepper exports by applying constant market share model for the period 1988-92. The results showed that import growth effect for Indian pepper was positive in USA and Canadian markets implying increased exports to these countries. However it was negative in the case of CIS, Italy and Germany implying favourable import demand conditions in these countries. On the whole, a negative competitive effect was observed.

Sarma and Sarma (1996) analyzed the growth of cereals (rice, wheat, barley and maize) in various climatic zones of Utter Pradesh. This study was undertaken from 1979-80 to 1988-89. Results revealed that in terms of compound growth rate production and productivity showed an increasing trend whereas the compound growth rate per unit area decreased over the period understudy in Bhabar and Tarai, Western plain, Bundelkhand, North and Eastern plain zones. Yield stability was highest in Bundelkhand, Narth and Eastern plain zones, Vindhyan, Eastern plain, Bhabar and Tarai zones with a coefficient of variation is greater than 60 per cent. Though the productivity of cereal crop increased over 10 years, this increase did not increase the area under cereal production. This was attributed to a shift in the preparation of land under lucrative commercial crop, which gave higher cash returns than cereal crops. The growth in yield was linear in hill, Bhabar and Tarai, western plain and Budaelkhand zones and exponential in Vindhyan zone. In Mid-western plain, S and W. Semi-arid, central plain N and E. plain and eastern plain zones the growth in yield was quadratic.
Gulati and Sharma (1997) expressed that if India frees up imports and exports of agricultural products at zero duty, there is a possibility of reaping significant gains from trade, while promoting resource use efficiency in domestic cropping patterns. The declining share of cereals in gross cropped area may slow down and even see reversal in some pockets. Similarly, area expansion under oilseeds will decelerate. India may emerge as a marginal exporter of cereals and cotton, while importing edible oils and pulses. From overall efficiency point of view, agricultural trade liberalization would benefit India.

Nagaraja (1997) analyzed the direction of trade of the Indian horticultural commodities exports by employing a first order Markov process which helped in identifying the gains and losses in export value. It revealed that other fresh fruits, vegetables and processed fruits and vegetables export retained their share of 56.7 per cent and obtained 68.5 per cent and 24 per cent for onions and garlic respectively. The results indicated that grapes, onion and mango juice sustained their original share of 59.8 per cent, 19.4 per cent and 49 per cent respectively.

Reddy (1997) worked out the NPC for groundnut, maize, jowar and sunflower in Karnataka. The NPCs of jowar and maize under importable scenario were less than one indicating that jowar and maize were efficient import substitutes. The NPCs under exportable scenario were greater than one. The NPC of groundnut and sunflower under importable and exportable scenario was greater than one, reflecting that groundnut and sunflower were neither import substitutes nor efficient exportable commodities.

Shah and Shah (1997) studied food grain production in India. They evaluated the growth rate of area, production, and yield of food grains crops in India over the period 1975-76 to 1990-91; studied the magnitude of instability of these variables for each crop and examined the relative contribution of effect of basis components (area, yield and their interaction) to food grain production. The increase in food grains production over the period has been substantial but has brought in its wake uneven development across regions and crops. While rice and wheat output has grown considerably, there has been a considerable decline in the output of pulses and coarse
cereals. Comparison of various demand estimates with estimated food grains production projection for the year 2000 indicate that India will have a surplus of food grains but a deficit in pulses. They stated that task attaining self-sufficiency in pulse production looks difficult without expansion and irrigation.

Ajjan et al. (1998) studied the direction of export of senna and periwinkle by using Markov chain model for the period from 1985 to 1995. Seven major countries viz., Germany, Belgium, USA, Japan, Italy, Hongkong, and others, importing Indian senna and periwinkle were considered. In the case of senna, the probability of Germany and USA to retain their import shares in the years to come were estimated to be 0.8258 and 0.8688 respectively, which clearly indicated that these two countries would retain their import share in the same position. In the case of periwinkle, France had a high retention of export share (probability of 0.8826) while Germany and others had a retention of as low as 0.026 and 0.054 respectively which clearly indicated that the chance of maintaining the import share of France was 88.26 per cent and in other two cases the chances of maintaining the import share was practically low.

Behura and Pradhan (1998) used bivariate price series correlation and Engle-Granger test to analyze the market integration for Orissa marine fish markets. The bivariate correlation coefficients for six selected market pairs ranged between 0.60 and 0.85. The test statistic obtained for all the pair-wise markets were found to be less than the asymptotic critical value even at 10 per cent level excepting that of Cuttack-Paradip pair. Thus the marine fish markets in the state were assumed to be not integrated and, hence, quite uncompetitive. This was mainly attributed to poor infrastructure facilities at landing centers as well as the terminal secondary markets.

Bhatta and Bhat (1998) studied the extent of price relationship for areca-nut between selected markets of Mangalore and Sira using the correlation coefficient method. The results revealed that the Mangalore market was more efficient than Sira market. The commercial nature of the crop and its diversified market conduct was clear from the fact that there was a direct relationship between supply and price.
Mandanna et al. (1998) analyzed the structural change in India’s tobacco exports for the period 1980-81 to 1994-95 using the Markov chain analyses. The study reveals that the USSR, the largest market for Indian unmanufactured tobacco, showed a high degree of loyalty to Indian tobacco during the period 1980-81 to 1985-86. This diminished substantially during the periods 1985-86 to 1994-95. The markets of Western Europe, Asia and the Middle East have taken the place of the USSR. However, in the case of manufactured products, only cigarettes had a dominant presence in the export basket. The diversification of export markets is clearly evident, necessitating efforts in the direction of brand building for Indian tobacco.

Pursell and Gupta (1998) found very large changes in the nominal protection of sugar and sugarcane production in India which were due to fluctuations in international market prices. Nominal protection was very high during periods of low world price in the 1960s and the mid 1980s and was negative for a number of years of high world prices in the mid 1970s and early 1980s. It was moderate to low by previous standards between 1989 and 1994.

Ravi and Reddy (1998) examined the comparative advantage of selected agricultural commodities in domestic and international markets with particular reference to Karnataka. The export competitiveness of six important crops grown in the state, namely, jowar and maize as food crops, groundnut and sunflower, cotton as a commercial crop and coffee as a plantation crop is examined using the NPC (Nominal Protection Coefficient) as a measure of competitiveness. Among six commodities studied, Karnataka lacked comparative advantage in most of the crops except cotton. The export potential of jowar, maize, groundnut and sunflower were significantly low. Even though Karnataka is the leading coffee exporting state, in recent times the domestic market seems more favourable than the export market. Unlike cereals and oilseeds, Karnataka has an absolute advantage in the case of cotton export. India needs to capitalize on this advantage by ensuring its position as a dependable long term supplier of quality cotton through progressive export policies.
Reddy et al. (1998) analyzed export competitiveness of groundnut with particular reference to Karnataka using nominal protection coefficient technique under importable and exportable hypotheses. Results of the study showed that groundnut had been receiving significant protection by then existing policies as indicated by coefficients greater than unity. Thus, groundnut is neither an efficient import substitute nor an exportable commodity, which should be a cause for concern as it is widely grown in dry land areas, where alternative profitable crops are few.

Selvaraj et al. (1998) conducted a study in Tamil Nadu under liberalized trade economy by using protection coefficients (NPC, EPC, ERP and DRC). It was found that rice and cotton had comparative advantage justifying further protection. The above protection coefficients showed that sugarcane and groundnut were highly protected and had comparative disadvantage domestically as compared to world trade.

Reddy et al. (1998) analyzed the competitiveness of major dry land crops of India (sorghum, maize, groundnut and sunflower) by using the nominal protection coefficient (NPC). The pricing policies have allowed domestic prices to deviate from world market prices. The NPCs revealed that with the exception of groundnuts, all the crops are good import substitutes, although none have food export prospects currently. Groundnut which occupies around 10 per cent of the gross cropped area in the country has an NPC of greater than one, both under importable and exportable hypotheses. Therefore, in a liberalized trade regime, groundnut producers can be seriously affected through cheaper imports, forcing them to switch over to other crops.

Selvaraj et al. (1998) studied the level of protection and comparative advantage of agriculture in Tamil Nadu under liberalized trade economy with reference to rice, groundnut, sugarcane and cotton. The results showed that rice has comparative advantage justifying further protection. The protection coefficients and domestic resource costs showed that sugarcane is highly protected and has comparative disadvantage domestically as compared to world trade. The results showed that groundnut is highly protected and has comparative disadvantage. In case of cotton, it is disprotected and has comparative advantage.
**Sharma *et al.* (1998)** studied the annual prices of milk, butter and ghee in 6 markets (Delhi, Kanpur, Bombay, Patna, Calcutta and Madras). The price correlation coefficient between the markets ranged from 0.9529 to 0.9917 for milk, 0.8106 to 0.9891 for butter and 0.9573 to 0.9991 for ghee, indicating that prices of milk, ghee and butter in the different markets are highly correlated. This implies that there is a high degree of market integration for milk and milk products and those prices of milk products cannot be determined in isolation in a single market as they are influenced by price variation in other markets. This is true in the case of products such as butter and ghee that have a long shelf life and are easily transportable.

**Subramanyam *et al.* (1998)** examined the major changes brought about in the agricultural sector of Andhra Pradesh in terms of irrigation, cropping pattern and landholding distribution and the impact of each of them on energy use.

**Datta and Gupta (1999)** analyzed the global competitiveness position of the Indian sugar industry using nominal protection coefficients (NPCs). The results indicate that Indian sugar is highly import-competitive in all three years, while the extent of this competitiveness is highest in the states of Gujarat, Karnataka and Maharashtra in 1995. All the major states and the country as a whole are export competitive in 1995.

**Kudachikar and Janagouder (1999)** conducted a study on eleven cotton (Gossypium hirsutum) genotypes grown at Dharwad, Karnataka in the year 1990-91, and different yield components and relationships between growth and yield parameters were determined. The highest seed cotton yield in cotton variety DRC19 was associated with high yield per unit leaf area, high harvest index and high boll numbers.

**Murthy and Subrahmanyam (1999)** analyzed the direction of onion trade by using Markov chain model during the years 1980-81 to 1994-95. The major gainer among importers of Indian onions over the period of time was Malaysia which was having a transitional probability of 0.6459 from Saudi Arabia and 0.3488 from U.A.E. Sri Lanka in addition to having high probability of retention of its own share, was also likely to gain from Saudi Arabia with a moderate probability and gain of 0.3488. On
the other hand, Saudi Arabia which was having zero probability of retention of own share of exports of fresh onion was likely to gain to some extent from Bangladesh and other countries.

**Ghosh (2000)** investigated intra-state spatial integration of rice markets in India. This study used ML method of co-integration. Intra-state regional integration of rice markets was evaluated by testing the long run linear relationship between the prices of the state-specific variety of rice quoted in spatially separated locations in four selected states. The co-integration results for Uttar Pradesh indicated that the regional markets are integrated to such an extent that the Law of one price (LOP) holds for III / IV ARWA variety of rice. However, no evidence was found in favour of the LOP for the course or common variety of rice marketed in Bihar, Orissa and West Bengal, even though the regional rice markets were found to be integrated. The results pertaining to inter-state regional integration of rice markets represented by four market centers chosen from the four selected states revealed that even though the markets are integrated, the LOP does not hold.

**Jha (2000)** opines that India had comparative advantage in producing a large number of commodities due to lower resource costs. The comparative advantage is high for commercial crops like cotton, tobacco, jute, spices like tea and coffee. The country has also advantage in producing labour intensive crops like rice. The country has, however, no comparative advantage in producing coarse cereals like maize and sorghum. In wheat, the country was at the margin.

**Kumar (2000)** analyzed the relationship between prices of rice in domestic market (New Delhi) with major rice markets of the world viz., Bangalore and Houston (USA) by using the co integration approach. The results clearly revealed that all the price series were not stationary and were not integrated in the long run.

**Mahesh (2000)** analyzed the direction of trade of Indian tea exports using Markov chain model during the period 1979-80 to 1998-99. The transition probability matrix indicated that the countries like United Kingdom, U.S.S.R., Iran, U.A.E., Saudi Arabia and other importing countries retained their previous shares of Indian tea while
the rest of the countries like Germany, Poland and U.S.A could not retain their previous shares of Indian tea.

He also studied the export competitiveness of Indian tea by estimating the NPC and DRC under both importable and exportable hypotheses during the year 1998-99. The results revealed that, under importable hypothesis the NPC and DRC were 0.71 and 0.66, respectively. The NPC was below unity, which indicated that the domestic tea is an effective import substitute, whereas the DRC was also less than one implying that the tea growers spend less than a rupee equivalent of foreign exchange on the production. Hence, it is profitable to use non-tradable inputs in the production of tea in India. Under exportable hypothesis, the NPC and DRC were 0.98 and 0.93 respectively. The NPC was less than unity which reveals that tea is competitive in the international market and it represents an effective export commodity where as DRC was less than one implying its export competitiveness in the international market.

Ramakumar and Sundaresan (2000) studied horizontal integration in the pricing of coconut copra and coconut oil between the regional markets with Kerala and between Kerala and Mumbai markets. The results demonstrated that the prices in the major markets within Kerala were spatially integrated. But, in the prices between Kerala and upcountry market, Mumbai which clearly indicated that the price changes in one market were not transmitted immediately to the other market.

Rama Rao (2000) in a study of the growth and efficiency in crop production in Andhra Pradesh, India had collected data for the period 1980-81 to 1996-97. Further this time period was divided into two sub periods viz., Period I (1980-81 to 1989-90) and Period II (1990-91 to 1996-97). He employed exponential time trend equation for estimation of growth rates in area, production and productivity of three crops viz., rice, cotton and groundnut. Results revealed that at state level, production and productivity of rice increased at an annual rate of 1.96 and 2.51 per cent respectively, with area showing no significant growth. The production was observed to be as a result of productivity growth in a majority of districts. With regard to groundnut, growth in area varied from -7.81 per cent (in East Godavari) to 9.71 per cent (in Adilabad) with state average growth rate 3.66 per cent. In the case of
production and productivity also, positive trends were observed. But productivity
growth rates were not as high as the production growth rate.

Reddy and Achoth (2000) applied Markov chain approach and results show
that from 1980’s, the Indian agriculture sector has witnessed considerable
transformation in terms of cropping pattern, technological advancements, and market
demands at both domestic and international levels. In this regard, an attempt has been
made to analyze the structural change in Karnataka’s agriculture during the period
1980-81 to 1989-90 and 1990-91 to 1993-94 using Markov chain analysis. The study
revealed that, though most of the crops have shown stability in the study period, the
proportion of area under oilseeds and other commercial crops has increased in the
1980s at the cost of food grains. This may be due to the government’s deliberate
policy to increase the production of edible oils to reduce the demand-supply
imbalances.

Singh and Agarwal (2000) examined the existence of integration between the
markets of cumin seed located at different places in Rajasthan state and concluded
that the firms in the markets were more actively related to each other. The value of
correlation coefficients in weekly wholesale prices of cumin seed in all the selected
market pairs of Rajasthan was positive and ranged between 0.36 and 0.09, which
showed the existence of integration in the selected market pairs but it was not very
high. None of the market pairs were perfectly integrated.

Suratha Nayak (2000) studied the export competitiveness and determinants
of India’s agricultural exports during 1970-71 to 1996-97. As far as the official
exchange rate is concerned; it was found that India possessed both comparative and
competitive advantage than in exporting nontraditional commodities. The
commodities which possessed export competitiveness included fine cereals, coffee,
oil cakes, fresh fruits, processed fruits and vegetables, spices, processed dairy
products and marine products. The commodities which did not possess comparative
and competitive advantage included tea, sugar and edible oil. It has also been
observed that annual compound growth rate of agricultural export was lower during
the 80s (10.5 per cent) than in the 70s (18.9 per cent). A significant growth of 26.3 per
cent was observed during 1993-94 and 1994-95 but 16.7 per cent till 1996-97. The analysis brought out clearly that the share of the agricultural export has declined over the period which may be attributed to the stagnant output, low yield rates and not much competitiveness in the world market.

Ishizaki (2001) studied integration of the food grain market by using data from 13 markets in India. Levels of integration were estimated for rice and wheat markets and the level compared for 1986 and 1997. Changes in the integration level were estimated and the role of government in these changes also studied.

Mahesh et al. (2001) analyzed the export performance of the Indian tea industry under the new economic environment. Under importable hypothesis, the nominal protection coefficient (NPC) and domestic resource cost (DRC) were 0.71 and 0.66 respectively, and under exportable hypothesis, the NPC and DRC were 0.98 and 0.93 respectively, implying that Indian tea exports were moderately competitive and also food import substitutes.

Balappa et al. (2002) conducted integration tests among all the selected markets in Karnataka (India) both in onion and potatoes. These were governed not only based on arrivals and other factors in the given market but also those prevailing in other markets. This might be due to the movement of produce from one market area to another depending upon price prevailing in the selected markets which might have influenced the movement of prices in the same direction. The individual buyer had practically less influence over the market price. Thus, it can be concluded that prices of onion and potato were stable across the selected markets in the study area. Therefore, to continue the present system of market integration, there is a need to establish cells for vegetables to generate market intelligence which would provide a better platform for guiding the farmers in marketing their produce.

Blake (2002) evaluated the impact on Uganda of the liberalization of world trade, especially in agricultural commodities, as proposed in the Uruguay Round and of unilateral liberalization of Uganda’s own import tariffs. A CGE model of Uganda is used to model the effects of trade liberalization, taking into account the distribution effects by household types. The impact of multilateral liberalization on a low-income
country such as Uganda appears to be quite slight, albeit positive, largely because there is only a slight impact on the world prices of the agricultural commodities it exports. The principal gains actually arise from trade reforms that are essentially unilateral in nature. The impact is likely to be pro-poor. Although the largest proportional gains are to the urban self employed, there are significant gains in agriculture that benefit almost all categories of rural households.

**Gaddi et al. (2002)** in their study, “Resource Use efficiency in Groundnut Production in Karnataka –An Econometric Analysis” revealed that average level of technical efficiency achieved by sample farmers in ground production was fairly high (81.12 per cent). The Koop measure used to calculate the frontier usage of inputs across different categories of farms indicated that all inputs were used in higher quantity than in frontier usage. The quantum of excess usage of inputs ranged from 7.97 to 19.36 per cent. Additional use of excess of bullock labour, human labour and seed inputs over the existing level would result in 26.41 kg and 5.12 kg and about 3 kg of output. The profitability ratio was more than unity for all the inputs over different categories of farm barring capital on small and over all farms (0.84). Only bullock labour (small farms) and human labour (large farms) were optimally used. Hence, there is a scope to push up groundnut production in the study area, as most of the inputs were underutilized.

**Gulati (2002)** observed that Indian agriculture is gradually being integrated into world agriculture. But the volatility of world prices, especially in their downswing, worries the Indian policy makers as it results in gushing imports and undermines the production base of millions of small and marginal farmers. It is more disturbing when exporting countries subsidize their exports or are able to compensate their farmers for fall in world prices.

**Naik and Chaturvedi (2002)** computed the NPC for rice under the exportable hypothesis for the period 1992-93 to 2000. They examined the total cost of delivering (including the price) rice for India and the competitor (Thailand) to a common port of an importing country, Ivory Coast. The export competitiveness was assessed for Parmal variety in Delhi market and international prices of Thai white rice. Wholesale
price was considered as domestic price. The NPC values remained well below one till 1998-99 and after that it was marginally higher than one.

**Ramakrishna et al. (2002)** studied the impact of globalization on growth, poverty and inequality in Ethiopia and India. The results indicated that both countries have benefited significantly and have shown improved economic performance due to globalization policies. Globalization has resulted in increasing growth in both the countries. The general poverty had declined and human development improved in both the countries.

**Basu and Dinda (2003)** evaluated empirical spatial integration of potato markets in Hooghly district of West Bengal. The results showed that the potato markets of Hooghly district were integrated and the high degree of integration showed that the potato markets in the state were competitive and efficient at the wholesale level.

**Brauw et al. (2003)** studied both flexibility and supply responsiveness of Chinese farmers using pooled cross section and time-series data for the period 1975-1995. Supply responsiveness of Chinese farmers has been studied introducing a new concept of degree of flexibility in the adjustment of quasi-fixed factors. From the findings, it is confirmed that land and labour are less flexible for adjustment in the early reform period and the flexibility has significantly increased in the late reform period where market is fully liberalized. By introducing a period dummy-price interaction term, the study allowed the price response to change between early reform and late reforms periods. The results show that the own price response variable displayed significant increase in the late reform period especially for labour but not much change is seen in the case of area response. However, farmers increased their speed of adjustment between early and late reform periods. The study confirmed that gradual reform process has worked to the advantage of Chinese agriculture.

**Mohanty and Langley (2003)** analyzed the integration between US and Canadian grain prices using co-integration and error correction approach. A free trade agreement implemented in 1989 that later folded into NAFTA affected price integration in the North American Grain Market, but Canada’s elimination of freight
subsidies in 1995 strengthened it. Empirical results indicated that long term relationships exist among the 4 sub periods. However, co-integration analysis shows significant post-WGTA improvement in market integration, particularly in the speed at which the market adjusts to departures from its long run equilibrium.

Pramod Kumar et al. (2003) conducted price integration test on paddy crop in Haryana and this study aims to check the efficiency of regulated wholesale markets by examining the functioning of regulated markets in Haryana state. The study concluded that all the four regulated markets were co-integrated and had a strong long run relationship. However, price transmission was found to be lacking in the short run. At the macro level, the agricultural markets of both the districts surveyed appeared to be efficient. This analysis also concluded that though markets of the regions surveyed appeared to be efficient, they were not perfectly over space.

Shanmugam (2003) attempted to measure the farm specific technical efficiency of raising major principal crops viz., rice, groundnut and cotton by using the stochastic frontier production function technique. He also tried to identify the factors which determine the technical efficiency of farms in producing these crops. In this study, the farm level data collected under the scheme of cost of cultivation of principal crops has been used. The data refer to the input and output details and other socio-economic characteristics of farm households in Tamil Nadu. The results indicate that land and labour inputs are the significant determinants of output of almost all crops in the state. Fertilizers also influence positively the yield levels of rice and cotton crops. The technical efficiency of raising irrigated groundnut is relatively high in own land cultivation as compared to that of leased land cultivation.

Suseela and Eswara Prasad (2003) examined the proportion of turmeric exported by India to different countries over a period of time and the changing pattern of trade among different countries. Analysis of direction of trade showed that UAE was the major importer of Indian turmeric followed by USA, UK, Iran, Bangladesh and Japan. If the present trade continues, the total value of exports would touch a high of 76.2 crores by the year 2010 AD from the present export value of 15.24 crores.
Veerkar et al. (2003) conducted a study to identify the countries competitiveness for export of sapota. The NPC value for the year 1999-2000 indicated that the export of sapota was most profitable to UK, Oman, Switzerland, Mangolia, Hongkong, Canada and Spain, whereas USA, Kuwait, Bahrain, Australia and Qatar were found to be moderately competitive (NPC between 0.5 – 1) and it was non-competitive (NPC > 1) in Saudi Arabia, Singapore and Bahamas.

Chand et al. (2004) studied the trade competitiveness of selected oilseeds i.e., rapeseed / mustard, soyabean and sunflower. The results for rapeseed indicated a high level of protection. For sunflower too, the NPC and DRC values favour imports over domestic production. International prices for soyabean oil consistently remained lower than domestic prices and oil import had always been attractive. Seed prices, however, had hovered around international prices and the NPC values under importable hypothesis did not indicate protection. Under exportable hypothesis, the DRC value suggested marginal gains only. Import substitution was clearly a more relevant strategy for soyabean seed.

Raghavendra (2004) studied the impact of price distortions on important crops of Karnataka state and their consequences on incomes of producers, consumers and government revenues. The results showed that welfare gain to producers was high and consumers incur substantial loss due to rise in prices. The net effect to the economy of the state due to the liberalization was substantial amounting to Rs. 48542 lakhs for rice, Rs.8101.63 lakhs for maize and Rs.32684.75 lakhs for red gram during the year 2001-02.

Ramesh Chand et al. (2004) attempted to study, if edible oil import tariffs under the WTO may leave India with less scope to provide protection to its domestic oil seeds industry in the future. Besides, in such a situation, India’s already high level of imports will make it particularly vulnerable to global price volatility. The country needs to urgently boost its domestic competitiveness in the sector.

Kumar, L.R., Srinivas, K and Singh, S.R.K. (2005) in their joint paper “Technical Efficiency of Rice Farms under Irrigated Conditions of North West Himalayan Region. A Non-Parametric Approach”, used farm level data to analyze the
various efficiency measures of rice under irrigated conditions in North Western Himalayan region. The overall technical efficiency in the case of improved rice growing farms is higher than that in the case of local rice growing farms. The scale inefficiency contributes more to the overall technical inefficiency. From the policy point of view, increasing the share of rice cultivation under irrigated situation in the total farm areas can bring about improvement in the overall technical efficiency. With regard to farms growing improved rice varieties, pure technical inefficiency makes the greatest contribution to the overall inefficiency.

Rama Rao and Raju (2005) studied the patterns of growth and magnitude of instability in area, production and productivity and relationship between the production and the explanatory variables affecting area and productivity of groundnut in Andhra Pradesh. The time series data for the period 1980-81 to 2001-02 regarding area, production and productivity of groundnut was collected from various sources published by the Bureau of Economics and Statistics, Government of Andhra Pradesh. Compound growth rate was employed to know the growth trends. Results revealed that growth performance of groundnut production was stagnant. Besides recording high degree of instability in production, the results of decomposition and path analysis revealed that contribution of area has higher effect on production.

Kumar et al. (2006) used Markov chain analysis to estimate market share of onion exports to different countries for the period 2009. It was estimated that Bangladesh would account for the highest share of onion fresh exports followed by Malaysia, UAE, Singapore etc. With reinforcement of Free Trade Agreement with Srilanka the declining trend in exports to Srilanka is expected to be reversed. The study concluded that there is need to have long term and stable policy towards exports of onion.

Manitra and Gulati (2006) used Nominal Protection Coefficient to determine the level and change in competitiveness of dairy products between 1975 - 2001. Results showed that India’s dairy products lack export competitiveness.
Mohammad et al. (2006) used PAM to study the economics of sugarcane production in Pakistan. The results showed that DRC was less than one at import parity price showing that Pakistan will have comparative advantage in sugarcane production as an import substitution crop. DRC was more than one at export parity price indicating no comparative advantage in sugarcane production in future. It is concluded that Pakistan should grow sugarcane only to maintain self sufficiency level as it will be cheaper in domestic market than to invest on import of sugarcane. It will not be feasible to grow for export purposes.

Rajesh et al. (2006) conducted co-integration tests and spatial integration of Indian major pepper and cardamom markets during pre and post liberalization era by using maximum likelihood method of co-integration. The results suggested that liberalization has improved the transmission of price signals among various pepper markets within the country as well as between the domestic and the international markets. The price of Indian cardamom is poorly integrated with the international prices, indicating its non-decisive role in influencing the trade at international level.

Roy (2006) studied the impact of liberalization on exports and imports of India. The results revealed that in the case of exports there has been a significant difference in growth rates between pre and post liberalization era. Growth has increased in the latter. No significant change in overall stability of growth patterns has been observed in both the periods. The rate of growth of imports was increasing in pre liberalization era where as, it is decreasing in post liberalization era which is indeed a good sign for the economy.

Sujatha (2006) studied price integration of major spices in India, the results of which showed that the number of co-integration vectors increased from two in pre-WTO period to three in post-WTO period in the case of pepper, turmeric and ginger implying that WTO has increased the strength and stability of price linkages and also the transmission of price signal among various markets within the country as well as between domestic and international markets. The presence of two co-integrating vectors in the case of Cardamom during both pre and post-WTO periods indicated that the prices were not pair-wise co-integrated, whereas the presence of three co
integrating vectors during both the periods in the case of chillies indicated that the prices of chillies were pair-wise co-integrated.

**Tejaswi et al. (2006)** applied Markov chain analysis to study the direction of trade and changing pattern of Indian coffee exports to eight major importing countries (Italy, Russian Federation, Germany, Belgium, Spain, Slovenia, U.S.A and others). The results showed that USA was the most reliable and loyal importing country with the probability of 80 per cent retention than any other importing countries, followed by ‘other’ countries (51 per cent) and Russian Federation (36 per cent). Analyzing the losses and gains in market share proportions, other countries was a major net gainer, which was borne by the fact that 100 per cent of Slovenia’s market share of imports from India, 47 per cent of Germany’s share, 34 per cent of Italy’s market share and 4 per cent of Russian Federation market share were diverted to other countries.

**Manoj et al. (2007)** studied the trends in Indian Agriculture before and after the introduction of the economic reforms, and advent of WTO regime. They used employing the Cobb-Douglas production function using the OLS specification to investigate the determinates of agricultural gross domestic product for the period 1970-71 to 2002-03, during pre and post economic reforms to document the impact of policy change (post-1992) and India’s membership of the WTO (post-1995). Their findings reveal that Indian agriculture sector has witnessed decreasing return to scale after the introduction of economic reforms. These observations point to the trends in food grains production of major crops for pre and post economic reform period. Compound Annual Growth Rate of production of rice crop declined from 2.42 between the eighties and further declined to -0.08 per cent in the nineties. Production of wheat also declined from 4.36 to 1.37 during the period 1970-71 to 2000-03. Consequently, total food grain production growth declined from 3.00 per cent in the 1980-90 decade to 0.67 per cent during the post-reform period. If this declining trend continues, food security would be a great challenge in the near future for India.

**Munish Alagh (2007)** studied the trends of food grains (Rice, Wheat, Coarse Cereals, Jowar, Bajra, Maize, Pulses and Gram) and non-food grains (Groundnut, Mustard, Cotton, Jute Mesta, Sugarcane and Potato) in India, by using compound
growth rates for the period 1950-51 to 2003-04. He divided the study period into three periods, viz., period I (1950-51 to 1974-75), period II (1975-76 to 2003-04) and over all period III (1950-51 to 2003-04). Growth rate of production went up since the eighties for the agricultural sector as a whole. Output was rising at an annual compound rate of 3.04 per cent compared to 2.18 per cent earlier. There was no contribution of area in the second phase, yield being the only source of growth. The results revealed that from the early fifties to the mid seventies, food grains growth was 2.69 per cent annually and went down to 2.25 per cent annually in the second phase. Area growth, which was 0.86 per cent in the first phase went down to a negative figure of -2.15 per cent in second phase. Area allocation for non-food grains was the same as for food grains in the first phase, but in the second phase, area under food grains had fallen and that under non food grains was rising.

Ramesh Chand and S.S. Raju, (2008), estimated instability in three major crops before (1981-93) and after (1993-04), the initiation of economic reforms at the state and district levels in Andhra Pradesh. It has revealed that in a large state like Andhra Pradesh, and which is the case for most states of India, the instability status as perceived through the state level data may be vastly different from that experienced at the disaggregate level. They concluded that the state level analysis does not reflect complete picture of shocks in agriculture production, and, further, shocks in production underestimates shocks in farm income.

Bhalla, G.S, and Gurmail Singh (2009) studied the performance of agriculture at the state level in India during the post-reform period (1990-93 to 2003-06) and the immediate pre-reform period (1980-83 to 1990-93). Their study showed that the post-reform period has been characterized by deceleration in the growth rate of crop yields as well as total agricultural output in most of the states. By ending discrimination against tradable agriculture, economic reforms were expected to improve the terms of trade in favour of agriculture and promote its growth. They also discussed the changes in cropping pattern that have taken place in the allocation of the area as well as in terms of value of output.
Praduman Kumar et al., (2009) studied “Demand Projections for Food grains in India”. The authors estimated that the demand for food grains for India for the years 2011-12, 2016-17 and 2021-22, by accounting for the factors like urbanization, regional variations in consumption pattern, shifts in dietary pattern and income distribution, limit on energy requirement and changes in tastes and preferences of consumers for food varieties.

Kee, H.L., C. Neagu and A. Nicita (2010) constructed the overall trade restrictiveness indices for a wide range of countries using their tariff schedules in 2008 and 2009. The index summarizes the trade policy stance of a country, taking into account the share of each good in trade as well as its corresponding import demand elasticity. Results showed that there was no widespread increase in protectionism via tariff policies since the global financial crisis has unfolded. While many countries have adjusted tariffs upward on selected products, only a handful of countries, such as Malawi, Russia, Argentina, Turkey and China focus on products that have significant impacts on trade flows. The United States and the European Union, by contrast, rely mainly on anti-dumping duties to shield domestic industries. Overall, while the rise in tariffs and anti-dumping duties in these countries may have jointly caused global trade to drop by as much as US$43 billion during the crisis period, it explains less than 2 percent of the collapse in world trade.

The study of Dinesh Kumar, and Shivay, S. (2011) highlighted that demand and supply of food commodities as important factors in determining the prices. As the demand increases and supply does not match it, and as a result the prices of commodities increase leading to food crisis. They concluded that in the long run the rising prices of food products could be stabilized by increasing the food production in the country.

Elumalai Kannan and Sujata Sundaram, (2011), in their paper discussed about the trends and patterns in agricultural growth at the national and sub-national levels in India. There analysis revealed that cropping pattern in India has undergone significant changes over time. There is a marked shift from the cultivation of food grains to commercial crops. Among food grains, the area under coarse cereals
declined by 13.3 per cent between 1970-71 and 2007-08. Similarly, the performance of pulses in terms of area and output was not impressive during the study period.

**Suresh pal, and Girish Kumar Sha, (2011),** in their study concluded that the international prices rose sharply due to global shortfall in the food grain production mainly wheat in some major food producing countries because of unfavorable weather. Besides, a number or structural factors also played an important role in influencing the rise in food prices.

**Reddy G.P. et al. (2012)** have identified that in Andhra Pradesh, cotton and groundnut are the major cash crops. There are significant changes in the competitiveness of these two crops due to technological and policy environment. They examined the trends in area, production, and yield and competitiveness of these two crops in pre- and post-WTO period and their implications for producers, consumer surplus and social cost benefits at state level. Trade competitiveness of groundnut and cotton increased during post-WTO period as revealed from DRC and NPC. In the case of cotton, growth rate in area and production are consistently higher, but negative for groundnut. In the case of cotton, the state had clear competitive advantage and the adoption of Bt cotton varieties raised it further. The state is an efficient and competitive producer of groundnut, but its profitability is adversely affected by fluctuations in prices and yields. Welfare gain was higher in the case of cotton than groundnut due to free markets

**Vilas Khandare et al. (2012),** in their study highlighted that Agriculture has been a way of life and continues to be the single most important livelihood of the masses. India is the second largest economy in Asia after China, as measured in terms of its GDP. They examined the growth performance and trade patterns of Indian agriculture during 1990-91 to 2010-11. Agriculture including allied activities, accounted for 14.5 percent of GDP in 2010-11. On an average the percentage share of agricultural imports and exports to total national imports and exports was 4.76 percent and 14.79 percent respectively. The percentage share of principal agricultural products to total agricultural imports and exports was 88.19 percent and 66.09 percent respectively in 2010-11.
Evdokia Moise et al. (2013), considered that Agricultural trade as an important contributor to developing countries economic growth, poverty alleviation and food security. Their report identified and analyzed some of the most important supply-side constraints to developing countries exports of agricultural products. The report confirms that developing countries agricultural exports are highly responsive to the quality of transport and trade-related infrastructure, while tariffs still have a significant negative impact. The analysis also highlights the importance of complementary policies such as education and political stability on developing countries agricultural trade performance.

Parvathi.C, (2013), in her study concluded that India achieved impressive growth in food production after the adoption of green revolution technology which made the country self-sufficient in basic foods. Total demand for cereals is projected to grow to 218.9 million tonnes by the end of the eleventh plan and it would reach 261 million tonnes in the year 2020-21. Demand for pulses during the same period would grow to 16.1 and 19.1 million tonnes.