CHAPTER II
REVIEW OF LITERATURE

In this chapter it has been attempted to review the earlier work done in the area of market integration. Studies on market integration of agricultural commodities and allied activities were taken into consideration. For simplicity and clarity, the order of presentation is as follows:

(a) Studies related to International level.
(b) National level studies.

International Level Studies

Fafchamps (1972) examined reasons behind the wealthier farmers in growing cash crops. The first part of the paper presents a simple theoretical model of crop portfolio choice, the second part on effects of consumption preference on output choices and the third part the possible effect of market integration on optimal crop choice is simulated for various types of producers. Simulation are based on Taylor approximation. Parameters used for simulation are chosen to represent a typical third world farming household. The author argues that the correlation between individual and aggregate output is also likely to decrease with market integration, thereby reducing the price and revenue correlation. A glimpse of the strong pleading for market integration can be obtained through – ‘food’ market integration via reduced trade
restriction, better roads and transportation, and/or government food shops can be a powerful tool to boost cash crop production and to increase responsiveness of small farmers to price incentives.

Hays and McCoy (1978) examined spatial and temporal aspects of marketing efficiency for the traditional marketing system for millet and sorghum in Northern part of Nigeria. Analysis of pricing efficiency of the marketing system was accomplished by examining movement between prices at fifteen selected locations in Nigeria's four Northern States during 1969-71. Spatial price relationship were analysed by examining inter-market price differentials in relation to transport and other transfer costs. Temporal price relationship were analysed by examining significance of storage costs as a factor in explaining seasonal price rises. The analysis revealed that positive price spreads is due to an erratic nature of supply, an inadequate dissemination of information on prices and supply in the various markets and lack of specialisation in trade by traders. Storage operations were considered to be the reason for intertemporal price increases. The author points out that lack of market integration among the fifteen urban locations studied resulted in spatial price differentials that in some cases exceeded transfer costs.

Harris (1979) made a detailed survey of studies on market performance and market integration. The survey encompasses studies undertaken in India, United Kingdom, Africa, Nigeria etc. Until then almost all studies have used correlation coefficient as a measure of market integration and competitiveness.
Citing several studies Harris maintains that high correlation coefficient may characterize a situation of physical disconnection and low coefficients characterise regions with complex trading pattern. The author indicated that correlation coefficient analysis fails to explain market integration due to secularly rising prices and it is caused by increased population growth and effective demand, widening range of crop varieties, trading relationship of a joint destination market, monopoly procurement at fixed prices, inflationary trend etc.

Lundahl and Petersson (1982) gave some more evidence of problems regarding the use of price series correlation as a tool of market integration. Besides, an attempt is made to calculate correlation coefficient in the same manner as carried out by Blyn with Cumming’s data for Haitian market for the period 1969-1974. Rice, grain, millet, grain corn, ground corn and red beans are the products chosen for the analysis. The average correlation coefficients for the raw series, after grouping and detrending were obtained. The average coefficients for each of the products is approximately in the same range as the one calculated by Blyn (1973). The lower correlation coefficient is cited probably for trade which is not uni-directional. The scholar argues that the specific nature of Haitian marketing system also nullifies the use of price series correlation for market integration.

Analysing market integration of international trade in cotton was the subject matter to Monke and Petzel (1984). The data for the estimation of the
pair wise price relationship included twenty series of monthly prices. Monthly prices were averaged to produce annual series for the period 1962-79. The prices are deflated by the world bank index of CIF prices to generate stable time series and reduce the possibility of spurious correlation. Thirteen international price series are included and the data are organised by staple length. Bivariate price regression and hedonic index estimation are the methods used to identify whether differentiated products are amenable to treatment as homogenous commodity. The analysis reveals that the international cotton market is integrated across the shorter staple lengths; and short, medium and long staple cotton may be treated as a homogeneous commodity. The authors were of the opinion that consumption rather than production adjustments are the constraints for price movements of exports of alternative countries.

Heytens (1986) employed Ravallion model to examine the validity of market integration hypothesis with reference to Gari (processed cassava) price and Yam prices. The results indicate that gari market comprised a fairly well integrated system after the first five years. Yam prices from a subset of Eastern Nigerian cities result showed a dismal integration. Local seasonality was identified as the source of poor integration. Besides, the author points out that as a matter of fact the Ravallion model gives a much broader range of results than earlier bivariate correlations.
Ravallion (1986) throws light on the inferential dangers in using bivariate correlation or regression coefficients as a measure of spatial market integration in agriculture. He suggests that the main dangers of the simple bivariate model can be avoided if the static bivariate model is extended into a dynamic model of spatial price differentials with the same data. By accepting short run dynamic adjustment process, Ravallion offers an approach to test long run market integration. The analysis was done by using data on the interregional price differentials for rice in Bangladesh during the turbulent post-independence period (1972-75). Ravallion posits an autoregressive distributed lag relationship among each local price of a commodity and an appropriate reference price level. The analysis revealed that market segmentation performs poorly as a restricted form of the general model for all districts and short run integration continues to be weak when long run integration is imposed.

Delgado (1986) developed a variance component method to test food grain market integration in Nigeria. The approach is to decompose the variance of food grain prices into components. The model was applied to eighteen months of weekly grain prices for twenty two villages in Northern Nigeria for the period August 1976 to March 1978. Empirical result reveal that markets are not well integrated in the six months covering the harvest period.

Dahlgran and Blank (1992) investigated the integration of a system of discontinuous and continuous markets. The discontinuous markets are those in
which transactions do not occur during same time period. They observe that when a discontinuous market is part of a spatial system, the degree of integration of the continuous markets may depend on operation of discontinuous markets. For empirical test of integration, data from six western U.S. alfalfa markets from April 1, 1984 to March 29, 1987 were used. The analysis revealed that continuous markets are less integrated during discontinuous market operation and long run market integration differ by season.

Sorensen (1993) attempted to study the impact of product market integration on welfare of an economy. Usually there are welfare gains from integration either due to increasing returns to scale or to firms' or unions' loss of market power. The author's main purpose was to show that in an economy with centralised wage setting, integration of product market may give rise to lower welfare. The experiment was made with a general equilibrium model. It is shown that highly centralised as well as completely decentralised economies in general, have better employment performance than economies with a degree of centralisation in between. Utility function is applied to illustrate how integration of product market may give rise to a decline in welfare. The analysis concluded that the real wage is higher and employment, real income and profits are lower when product markets are integrated.
Kallfass (1993) examined the impact of long term contracts and vertical integration between farm and the food industry would reduce costs and improve the competitive situation of German agriculture. The author’s analysis revealed that the choice among spot market sales, long-term contracts and vertical integration depends on key factors such as specific physical assets, specific location and difficulty in monitoring quality as suggested in theoretical analysis. Kallfass’ findings do not confirm the hypothesis that greater vertical integration is necessarily cost saving. Hence, he argues that government policy should not distort competition between different distribution system by favouring a particular type of co-ordination.

Zanias (1993) investigated the degree of spatial market integration in European community of agricultural product markets. Failure to observe a single price throughout the community could be attributed to one or more of the following: (i) lack of linkage by arbitrage between agricultural markets between member states (ii) impediments to efficient arbitrage and (iii) imperfect competition in one or more of the markets. Zanias with the help of co-integration analysis investigated the impact of the above reasons to nullify the force of the law of one price in the European community agricultural product market. Law of one price is tested for four European community agricultural products which differ both in terms of product characteristics and policy framework namely, soft wheat, cow’s milk, potatoes and pig carcasses. Test result reveals an existence of a single price in the soft wheat market; and
it may be due to the operation of minimum intervention prices rather than the different markets being truly integrated in a spatial sense. Zanias observes that market integration fails in the European community milk markets due to non-tariff barriers to intra – community trade or imperfect competition. In the case of pig carcasses and potatoes, cointegration is established in three out of six cases.

The intention of Gardner and Brooks (1994) was to examine the extent to which economic reforms in Russia constituted genuine price liberalisation, i.e., food prices that respond to supply and demand conditions. Both linear and non-linear equations were worked out to test market integration. Test result showed that for every commodity, the hypothesis that $\beta_1 = 1$ in all cites can be rejected at one per cent level of significance and hence, there is little consistency across commodities in which city is most closely integrated with the Moscow price. The results of city market prices also indicated a similar trend. From OLS estimates strong evidences for lack of consistent relationship between the distance and income variable and the city price difference were also obtained. They have observed that the behaviour of these price series is dominated by oblast - level (formal or informal) regulation of enterprises and markets. Hence, there is a need for local political reform for effective market integration.

An empirical testing of spatial market integration of Philippines rice market was made by Silvapulle and Jayasuriya (1994). The analysis was based
on the monthly average price of rice of five selected markets for the period January 1975 to December 1989. Johansen's multiple cointegration technique was applied to test market integration. The result of the Johansen's multiple co-integration technique indicates that Philippines rice markets are generally well integrated in the long run with Manila as the central market.

Baharumushah and Habibullah (1994) made an attempt to determine whether prices of black and white pepper in a market are in parity with prices in a reference market. The cointegration method developed by Engle and Granger (1987) was employed to analyse the long run relationship between prices in different markets. The period of observation spans from the first week of January 1986 to the last week of December 1991. The test results shows that regional pepper markets in Malaysia are spatially linked. The authors concluded that due to low transportation cost and risk, the degree of cointegration is unaffected by distance and hence, price changes are fully and immediately passed on to the other markets.

Carvalho, et. al. (1994) examined the agro-industrial vertical integration process in Brazil's sugar cane and alcohol sector in the period 1970-92. The analysis revealed that the Brazilian sugar sector already has vertical integration and it was due to well established relaxation of restriction, seasonality of the raw material, emphasis on profit, and administrative price practices.
Alexander and Wyeth (1994) employed Granger method of cointegration and Johansen’s maximum likelihood procedure to test market integration and employed data on monthly prices from January 1979 to December 1990. The method was illustrated with data on prices in different parts of the Indonesian market. The authors observed that the consumer price Index (CPI) is consistently cointegrated with all the rice price series, which means an existence of apparent market integration. Besides, this analysis also revealed that supply sources are more important than demand sources in driving prices.

Zhao (1995) in an article seeks to draw general trends for the development of the integration of agricultural production, processing and marketing in China. He concluded that there is a high degree of integration of agricultural production, processing and marketing. Besides, he pointed out that integration of agricultural production, processing and marketing and the close links between agricultural production supply and sales result from the development of market economy.

Angulo and Gil (1996) analysed the impact of vertical integration on price transmission in the Spanish poultry sector by employing error correction model. Feed price, producer’s price and consumer prices are considered for the analysis. Monthly data from January 1981 to December 1992 were considered for an empirical analysis. Angulo and Gil’s computation of impulse response functions and decomposition of the forecast errors variance
shows that producer and consumer prices immediately rise after shock. They further pointed out that these response endure is for approximately two years, indicating that poultry firm tend to price according to long term goals, thereby showing the price adjustment process.

Fafchamps and Gavian (1996) studied spatial integration of livestock market in Niger by using co-integration approach. The study shows that livestock markets are poorly integrated. Prices are seldom co-integrated, suggesting that large price differentials occasionally persist between adjacent areas for long periods of time. Parity bound approach indicates that one has to assume high transportation costs and large quality variation to reconcile the data with efficient spatial arbitrage. Besides, the analysis confirms descriptive studies that have emphasised regional segmentation in West-African livestock trade.

Bijman (1996) examined the link of biotechnology and vertical integration in the Dutch potato chain. In general studies on the impact of biotechnology have stated that development and introduction of this technology may lead to vertical integration on the agrofood chain, making farmers more dependent on the input supply industries and the food industry. It is pointed out that even without biotechnology the agrofood sector experiences structural changes leading towards more horizontal and vertical integration. Further, the analysis revealed that biotechnology will reinforce the trend only if consumers accept products made with the new technology.
Rozelle, et. al. (1997) examined the impact of liberalisation on rural market integration in China. The impact of market integration on pushing producers to more effectively utilise their comparative advantage was also analysed. Price and market liberalisation were taken as a way of raising the efficiency of China's food economy and to increase rural income. A unique and comprehensive set of data on provincial prices of major food commodities between 1988 and 1995 were considered for the analysis. The analysis revealed a falling coefficients of variation for provincial rice and maize and it implies a sign of increasing integration. The number of pair of province that became integrated went up by more than four times for rice markets and more than doubled for maize markets during 1988-89 and 1991-93. This is an indication of an expanding geographic range of spatial market integration. Increase in rank correlation coefficient results reveals that liberalisation policies appear to have been successful in encouraging farmers to move into crops in which they have a comparative advantage.

Baulch (1997) developed an alternative methodology known as Parity Bound Model (PBM) to test Philippine rice market integration. The author argued that all the conventional tests (price correlation, causality, error correction and co-integration) rely on price data alone and fail to recognize the pivotal role played by transfer costs. Transfer costs (comprising transportation, loading and unloading costs and traders' normal profit) determine the parity bounds within which the prices of a homogeneous
commodity in two geographically distinct markets can vary independently. Violations of the spatial arbitrage conditions indicates that there are impediments to trade between markets and to be viewed as evidence of lack of market integration. The parity bound model developed in this paper assess the extent of market integration by distinguishing among three possible trade regimes. They are: (i) the parity bound (spatial price differential equals transfer cost) (ii) inside the parity bound (price differentials are less than transfer costs) and (iii) price differentials exceed transfer costs. To assess the statistical reliability of the parity bound model, a series of Monte Carlo experiments were performed. Three alternative trading scenarios for the spatial price equilibrium model integrated, partially integrated and independent markets are considered in the Monte Carlo simulations. The analysis revealed that the sum of the probabilities of trade (i) and (ii) are interpreted as the probability of market integration of Philippine rice markets.

Munir, et. al. (1997) analysed market integration of Indonesian vegetable market. Four selected vegetables (chilli, shallot, potato and cabbage) in nine consumer and three producer markets in Indonesia are considered for the analysis. The results revealed that none of the markets are segmented. Further, short run and long run market integration tests revealed that transportation and product perishability are the important factors in explaining the speed of price transmission.
Khedhiri (1999) empirically analysed agricultural market integration in Tunisia. Cointegration technique was employed to examine the objective. The empirical result shows that the degree of market integration is low for wholesale market, particularly for the storage products. Besides, the analysis revealed that the distance between markets and the volume of transaction cannot explain the lack of linkage between the markets.

Ismet, et. al. (1999) evaluated the long run spatial price relationship in Indonesian rice markets and factors affecting the degree of market integration. By relying on the weekly price data for the period 1982-1993, they employed multivariate co-integration test for verifying market integration. Besides, they classified their evaluation into pre-self sufficiency and post-self sufficiency period. The co-integration tests revealed a smaller degree of market integration in Indonesian rice market. Further, the analysis revealed that government intervention in terms of rice procurement significantly influenced market integration during the period of post-self sufficiency (1985-93) and the pooled period (1982-93).

Asche, et. al (1999) by using the Johansen procedure analysed world salmon market integration to test the law of one price and to evaluate the possibility of product aggregation. Their empirical investigation also include (a) a co-integration analysis of world Salmon export prices during 1986-1996, (b) an analysis of the dynamic relationship between the price series and (c) an error correction model which assess short run responsiveness of the prices to
one another. For empirical analysis five species of salmon were considered. Since multivariate cointegration test indicates four cointegration vectors (hence one common stochastic trend in the system) the scholars conclude that there is one market for all salmons. Parameter stability test indicates that the salmon market is well integrated during the study period.

National Level Studies

Lele (1967) examined market integration of Sorghum prices in Western India. Five primary markets in Sholapur district and two terminal markets are selected for the analysis. The analysis is based on weekly wholesale prices for the period 1958 to 1963. The two hypotheses tested in this article are: (i) markets of agricultural commodities in underdeveloped countries are closely interrelated (ii) Price differences between markets do not tend to be greater than transport costs because of the competitive nature of wholesale trade. Correlation coefficient is used to test the degree of market integration. Lele obtained high correlation coefficient between prices and maintains that it support the hypothesis that agricultural markets are fairly competitive and that price movements in a single market are influenced by prices in other markets.

Lele (1971) made an extensive study of market integration of Indian grain markets. Comparable varieties price data for the year 1954-1965 of rice, wheat and Jowar in the four major states of West Bengal, Tamil Nadu, Punjab and Maharashtra were considered for the analysis. Correlation coefficient is used to test market integration. The analysis revealed the following
conclusions: (i) By and large collusion, either tacit or overt is uncommon in the Indian grain trade. High profits earned by few traders are not monopolistic returns but can be attributed to the large volume of operations resulting from their command of capital. (ii) Examination of regional price disparities suggests that grain markets are closely related to each other. (iii) The study of market integration suggests that a reasonably well organised competitive system of private trade exists in India and (iv) Existence of price difference between regions, are mainly due to lack of adequate transportation facilities and hindrance to perfect mobility imposed from outside the trade sector such as transport bottlenecks and official restrictions.

Blyn (1973) questions the validity of using correlation coefficients to test the presence of market integration. He maintains that even if markets are well integrated, correlation measures of their price series will not necessarily be high. Besides, he observes that time series correlation should be restricted to residuals remaining after the trend and seasonal components have been removed. An increase in population may affect all prices in a region, even if each market within the region was independent of others. Blyn reworked Cumming’s eight year collection of monthly wheat prices in eight Punjab markets and Delhi by eliminating trend and seasonal influences. The analysis revealed that even if markets are well integrated, correlation coefficients may not be high because these markets are not simply supply centres but also centres of importance for local consumption.
Ihakur (1974) examined pricing efficiency of the marketing system by analysing price trends, market integration and price spread in the marketing channel of Gujarat foodgrains. Foodgrains were pertained to bajra, jowar, paddy and wheat. Weekly wholesale prices from 1965-1971 were used for the statistical analysis. Correlation coefficient is used to test the degree of market integration. Test result shows correlation coefficient to be higher in certain markets and low and negative in the case of bajra. And for paddy and jowar coefficient seems to be high. In the case of wheat, correlation is relatively high since it is relatively a scarce commodity in Gujarat. Thus, the analysis revealed that the existing foodgrain marketing system on the whole is not efficient.

Rudra (1980) made a critical analysis of the concept of marketing efficiency as defined in several studies of Indian agriculture especially of Uma J. Lele and Z.Y. Jasdanwalla. He argued that without any scientific basis these authors are propagating the idea that markets for agricultural commodities work successfully in India. Uma J. Lele’s contention that product prices are equalised in foodgrains market is criticised by the author by saying that there is very little theoretical analysis of the concept of competition in its application to foodgrains. Competitiveness of the market is questioned on the basis of correlation coefficient that prices can frequently be uniform under monopoly or oligopoly, not even reflecting any difference due to transport costs or storage costs. The claim of single price for different parties entering
the grain market is also questioned. The concept of efficiency was cleared by Rudra by quoting A.K. Sen's words, "the mere attainment of Pareto optimality can be far from a thrilling achievement... Since pareto optimality is consistent with the most intolerable inequities of the distribution of income". Pareto optimality is possible only if both product market and factor markets are perfectly competitive. But in the case of food grain market only product market alone is claimed to be competitive.

Naik and Arora (1986) attempted to identify the marketing channel and the marketing function performed by Indian arecanut producers and market intermediaries and assess the pricing efficiency. Degree of pricing efficiency was assessed on the basis of measurement of market integration and price spread. Concurrent method is used to compute the price spread. Price series correlation was employed to measure market integration. The authors maintain that higher market integration and lower price spread compared to the amount of marketing services provided, indicate higher pricing efficiency in the system. Except in some cases moderately high correlations is observed, showing strong market integration. Besides, they pointed out that lower price spread and high degree of market integration between primary and Nagpur markets indicate higher efficiency in Nagpur channel than in Kanpur channel.

Patnaik (1988) examined the evidence of inter-market integration with regard to the major produce in which the particular market is specialized and to find out the price signals between primary market depend upon the
interest activities of the major participants of the system. The study was carried out by the monthly price data of groundnut pod, kernel, oil and cake of selected six markets of Rayalseema region of Andhra Pradesh for the period 1963-81. Trend of monthly average product prices, correlation coefficient, coefficient of variation and canonical correlation were employed to examine the objective. The trend analysis has shown inter-market integration. The correlation results confirm the proposition that there is inter-market association in product price movements. The coefficient of variation also showed a similar trend in all markets. The analysis revealed that market integrations is achieved by transmission of price signals with regard to pods.

From the data collected from a market survey, Palaskas and White (1993) tried to examine the dynamic relationship of market commodity prices of rice, potatoes and mustard in three locations of West Bengal. Cointegration technique was employed to test the hypothesis of market integration. Test results reveal that the prices of rice, potato and oil of the peripheral market and the central market are co-integrated; but there is a lower degree of integration of paddy and rice prices.

Padmanabhan (1993) tried to evaluate the performance efficiency of the market for jaggery in TamilNadu. He examined the cost price relationship in jaggery production and marketing, and also to analyze temporal variation in the price of jaggery. The degree of market integration was assessed by working correlation of prices between markets at Vellore and in each of
Madras city, Salem, Coimbatore, Madurai, Tirunelveli, Ernakulam and Kolhapur. The wholesale weekly price for the period 1982-83 were considered for the analysis. High correlation coefficient was obtained in all the markets. Hence, the analysis concluded that the market of jaggery are well integrated.

Narasimham (1994) examined the integration of groundnut markets of Rayalseema region of Andhra Pradesh. The study covered a period of six years from 1973 to 1979 with daily price data. Narasimham have considered Bombay as terminal market and Hyderabad and Madras as regional markets. Koyck’s distributed lag model was employed to examine the objective. The author observes that the results from the statistical analysis justify the hypothesis that the groundnut oil price in a given market is being influenced by the groundnut oil price in the immediately higher level market. Thus, the analysis proves that the oil price integrates the groundnut markets vertically.

Singharoy and Nair (1994) examined the movements in international prices of Indian pepper reflect the variations in such prices of other economies. Dickey – Fuller, Augmented Dickey – Fuller and co-integration technique was employed to examine the objective. Monthly spot prices of India, Indonesia and Brazil for the eighties are used for the analysis. Results show that the international prices of pepper for Indonesia and India have moved synchronously in the long run despite short run drifts and it is due to oligopolistic nature of the world market of pepper.
Nasarudeen and Subramanian (1995) examined the validity of (i) vertical integration of seed price to price of its oil and cake and (ii) horizontal integration of prices of different oils. Ten oil products were considered for the analysis of horizontal and vertical price integration. Koyck’s distributed lag model was employed to test the integration of oil prices. Horizontal integration test results revealed that the price of groundnut oil influenced the prices of all other oils except castor oil. Castor oil price was influenced only by linseed oil price since they are substitutes. Vertical integration results revealed that there exist some imperfection in seed price formation. It is also inferred that the price of industrial oil influenced the price of edible oils but not vice versa. The researchers concluded that vertical integration in oilseed price was much quicker as compared to horizontal integration in oil prices.

An attempt is made to study the long run behaviour of the farm prices of coconut in various markets of Kerala by Mathew, et. al. (1997). Average yearly farm price considered for the analysis is arrived by taking a simple average of monthly farm prices of 23 years data from 1970 to Dec. 1992 for 25 centers in Kerala. The co-integration method developed by Engle and Granger is employed in the study to test the coconut market integration. The test result indicated that the farm price of coconut in various markets of Kerala was integrated of order one. After establishing the order of integration of each variable, pairwise co-integration were carried out with the farm price of Trichur market as the independent variable and the respective farm price in
other markets as dependent variables. The study revealed that all the market except Calicut market were integrated with Trichur market.

Thakur (1998) made a detailed study of the concept of marketing efficiency. Correlation coefficient is employed as a statistical tool to measure the degree of market integration. Weekly wholesale prices of wheat market of Gujarat and apple in different terminal markets of India for the year 1985-86 to 1995-96 were empirically tested to examine the objective of the study. The analysis revealed that wheat and apple markets are integrated. Further, the analysis cautioned that high degree of integration may come simply as a result of collusion on the part of traders.

Behura and Pradhan (1998) made an attempt to identify marine fish markets in Orissa are integrated and efficient. The analysis relied on data pertaining to the weekend marine fish prices for the last week of twelve months for the period January 1984 to December 1992 from among 30 odd fish markets. Bivariate price correlation as well as the methodology developed by Engle and Granger (1987) has been employed to show whether marine fish markets are cointegrated or not. To test the univariate price series for stationarity, the Augmented Dickey Fuller test was also employed. The analysis revealed that the bivariate correlation coefficient ranged between 0.60 to 0.85. Augmented Dickey Fuller test revealed that the price series for marine fish in the selected markets in the state are stationary after first difference. The test statistic of cointegration test obtained for all the pairwise
markets are found to be less than the asymptotic critical value even at 10 per cent level except that of Cuttak-Paradip pairs. Hence, the analysis concluded that marine fish markets in the state are not integrated and it is mainly attributed to poor infrastructure facilities at landing centres as well as at terminal secondary markets.

Ghosh (2000) examined spatial integration of rice markets in India. The empirical analysis was carried out on the basis of data of monthly wholesale prices of rice for the period from March 1984 to April 1997. Price data relates to state-specific varieties of rice quoted in different market centres of four selected states viz. Bihar, Orissa, Uttar Pradesh and West Bengal. To examine whether intra-state and inter-state regional rice markets are integrated and linked together into a single economic market, the Maximum Likelihood (ML) method of co-integration developed by Johansen and extended by Johansen and Juselius was used. To examine the univariate time-series properties of the data and for non-stationarity, Augmented Dickey Fuller test was conducted. The finding of one common stochastic trend for Uttar Pradesh implies that all the prices are pair-wise co-integrated. On the other hand the presence of multiple common stochastic trends in Bihar, Orissa and West Bengal signifies that the prices are not pair wise co-integrated.

Basu and Dinda (2003) attempted to evaluate empirically spatial integration of potato market in Hooghly district of West Bengal. Bivariate price correlation as well as co-integration test and error-correction method
developed by Engle-Granger has been used to show whether potato markets are integrated or not. The study is based on time series data on wholesale and retail prices of potato in the selected three important market centres namely Champadanga, Tarakewshwar and Sheoraphully in the district of Hooghly for the period of January 1998 to December 2000. On the basis of high values of correlation coefficient, the analysis revealed that markets are strongly correlated and they are highly inter dependent in price formation.

Pramod Kumar and Sharma (2003) tried to evaluate price integration and pricing efficiency to the state of Haryana. Johansen’s multiple cointegration method was employed to test price integration. The integration tests were carried out with the monthly wholesale price of coarse paddy for four markets of Haryana. To know the impact of liberalisation the period was divided into pre-liberalisation (October 1978 to September 1989) and post-liberalisation period (October 1989 to September 2001). The multivariate cointegration tests results indicates the presence of three cointegrating vectors at one per cent level of significance for both pre and post – liberalisation periods. It implies that all the four paddy markets are cointegrated and hence exhibit a long run relationship.

However, results of error correction model reveals a very weak association among these markets. The authors observed that this weak association is because of paucity of availability of information and lack of quicker dissemination of available information. But the adjustment process
was found to be quicker in post-liberalisation period in comparison with pre-liberalisation period.

**Concluding Remarks**

From the earlier studies it can be observed that for the last four decades, a series of studies have undertaken to verify the validity of market integration hypothesis of various agricultural crops and products of allied activities. Immense studies were conducted at international level in comparison with national studies. Most of the studies have taken food crops for their analysis. Some experts have also attempted to evaluate marketing efficiency of certain non-food crops. Different statistical and econometric tools like Correlation coefficient, Coefficient of variation, Regression analysis, Ravallion model, Autoregressive model, Koyck's distributed lag model, Variance component approach, Engle-Granger's cointegration, Johansen's multiple cointegration and Parity Bound Model were employed to test the validity of market integration hypothesis.

Most of the studies have used monthly wholesale price to examine market integration hypothesis. Some of the studies have relied either on daily or weekly prices. Majority of the studies were able to identify the existence of strong form of market integration. Rejection of market integration is a rare phenomenon. However, the existing literature reveals the following lacunae:
(i) Most of the studies at national and international level have given much emphasis to food crops. Market integration analysis related to non-food crops or cash crops were almost neglected.

(ii) At the national level, studies are related to states such as Maharashtra, Tamil Nadu, West Bengal, Punjab, Gujarat, Andhra Pradesh, Orissa and Haryana. There is only a single study of coconut market pertaining to Kerala economy. But studies on pepper, which is a dominant crop of Kerala is lacking.

(iii) Some international studies have shown that economic liberalization had a positive effect on marketing efficiency. At the regional level, no serious attempt is made to know the effect of economic liberalization on marketing efficiency.

(iv) On methodological front also there are some drawbacks. Much of the earlier studies have relied on correlation, regression and Engle-Granger cointegration techniques. But these techniques have several limitations. Correlation simply shows the association between two variables. Regression technique gives an idea of the effect of one variable on the other. Engle-Granger method is used to know the nature of relation between bivariate markets. However, the studies employing Johansen’s multiple co-integration test to identify the existence of market integration across multiple markets are rare in the literature.
The above limitations related to market integration studies calls for more studies on regional cash crops. Even though only one-fourth of the Indian agricultural area is devoted for non-food crops, Kerala has earmarked more than three-fourth of its area for non-food crop cultivation. Among non-food crops of Kerala, pepper contributes to 97 per cent of Indian production. But no serious attention has been paid to the study of market integration of this crop. Hence, the present study is an attempt to fill this gap.