Review of literature provides information to the researchers regarding the previous work done in the their area of research and thereby helps them in identifying the theoretical framework and methodological issues related to the study and in comparison of research findings with the empirical evidence that already exists. It provides the researchers a proper direction to carry out their research work and enables them to arrive at meaningful results.

Fonseka (1963) studied the guaranteed price scheme in Sri Lanka using secondary data. The study describes the price setting, procurement and distribution of rice. The purpose of the guaranteed price for rice was not only as an incentive to production but also as a form of income support to the bulk of the rural population. The relationship between guaranteed price (GP) of paddy (rough rice) and imported price of rice was examined and found that GP remained always higher than imported price and increased whenever imported price increased but not reduced when imported price decreased during the period 1948-1961. Government purchased paddy from farmers through co-operative societies located at village level and in 1962 their purchase amounted to be a 56 per cent of the production. The success of the programme was easy access to producers and availability of storage facilities adequately. Paddy purchased under the guaranteed price scheme was milled into rice and passed to the food control authorities for issue to consumers on the ration. The study concluded that the guaranteed price scheme for paddy in Sri Lanka had been successful in achieving twin objectives i.e. enhancing farm income and increasing overall production.

Abeysekara (1976) has analyzed the production function of paddy farming in Sri Lanka by using the Cobb-Douglas type production function in which total output was regressed with land, labour, fertilizer, agro-chemicals, tractor services, buffalo services and seed. All variables were valued in monetary terms except for land (acre) and labour (man days). The study was based on farm records maintained by 107 paddy farmers for the 1972/73 Maha season in five selected districts of Sri Lanka. Study found that land, labour, fertilizer and seed had significant and positive impact on paddy production. In this study, return to scale was found to be 1.186. Allocative efficiency analysis revealed that paddy farmers in Sri Lanka had been concerned with achieving efficient uses of land and buffalo services while labour and fertilizer allocation was inadequate. The reasons given for under use in fertilizer were cash shortages and high degree of risk associated with output. The major recommendations
made in the study were expansion of farm credit facilities and investment in farmer education.

**Mats and Erling (1982)** studied the market integration in Haiti using monthly wholesale prices of rice and other selected grains. The data covered the period 1965-74. This study applied two methods: correlation of original data (raw) and correlation of residuals obtained from the trend line. Results indicated average correlation coefficients for the raw series were lower than those obtained from residual series. The study revealed that correlation values were lower in the harvest months when most of the deliveries are made as against expectation of high correlation.

**Anderson and Ahn (1984)** examined the protection policy and changing comparative advantage in Korean agriculture from the mid-1960s to 1980s. The domestic resource cost (DRC) methodology was used to measure the foreign exchange earnings foregone by keeping resources in rice production. The study concluded that agricultural production was unlikely to continue to achieve its objective of slowing the decline in food self-sufficiency and helping farmers keep pace with urban incomes unless it was increased continuously.

**Ravallion (1986)** developed a model to test market integration of rice markets in Bangladesh. The study used the spatial price differentials and identified the central market that market price influences on other markets. In his study Dhaka market was selected as the central market. Monthly prices from July 1972 to June 1975 were used for testing the model. The study results indicated that there was no market integration among the markets selected both in short and long run due to government intervention in distribution.

**Chahal and Chahal (1989)** worked out the economics of irrigated crops in Punjab. They observed that the per acre variable costs incurred were highest for paddy followed by maize, sugarcane, wheat, cotton and groundnut while gross returns were maximum for sugarcane followed by wheat, paddy, cotton, groundnut and maize. Among the crop combination, the annual returns to fixed farm source were the highest for sugarcane followed by paddy-wheat, groundnut-wheat and maize-wheat systems. The returns per unit of irrigation were the lowest for paddy-wheat combination and highest for groundnut-wheat combination followed by cotton-wheat, sugarcane and maize-wheat. The study recommended that cotton groundnut system should be encouraged.

**Jayasuriya (1989)** studied the profitability of different cropping patterns in Mahaweli system C in Sri Lanka using a primary data obtained from 150 farmers in 1988. It was found that 53 per cent of farmers grew paddy – paddy (double cropping) and earned net income of Rs.10880 per hectare while farmers who grew paddy and non-paddy crops (chillie &
vegetables) in both seasons obtained the highest income of Rs.19012 per hectare. The net returns per hectare of onion, vegetables and green gram were Rs.18493, Rs.17979 and Rs.12084, respectively. The major cropping patterns identified in the study area were, paddy – paddy; paddy – paddy & non-paddy crops and paddy in both seasons along with perennial crops in part of the low land. The study suggested diversification rice fields during the *Yala* season to increase farm income.

**Gulati, James and Garr (1990)** worked out the National Protection Coefficient (NPC) and Effective Protection Coefficient (EPC) for rice growing states in India, namely, Andhra Pradesh, Bihar, Madhya Pradesh, Orissa, Punjab and Uttar Pradesh under the exportable and importable hypothesis during 1978 –1986. The values of NPC under importable hypothesis for the six districts were less than unity and under exportable hypothesis only Punjab was considered and it had NPC of 0.97. The EPC for all the states under reference was less than one under importable hypothesis and for Punjab under exportable hypothesis it was 0.87. These results showed that rice cultivators were more taxed on the pricing front under import competitive hypothesis.

**Gunawardana and Quilkey (1993)** conducted a quantitative analysis to identify the major determinants of the farmers’ supply of paddy to the official market in Sri Lanka in the period 1953 to 1989. In their analysis, the farmers’ supply of paddy to the official market is hypothesized to be a function of the guaranteed price of paddy, the open market price of paddy, paddy production and the quantity of rice purchased by the consumers in concession market. The specified model was estimated employing ordinary least squares (OLS) using annual aggregate time-series data for the period 1953 to 1989. The regression estimates indicated that higher guaranteed price, larger quantities of domestic paddy output and higher levels of purchases of rice by the consumers in concession market resulted in larger quantities of paddy sold by the farmers to the government, while higher open market prices resulted in lower quantities of paddy sold to the government. The study concluded that the guaranteed price of paddy and the sales of rice in the concession market are key policy variables that can be manipulated to influence the farmers’ supply of paddy in the official market.

**Santha (1993)** worked out the cost of cultivation and profitability of paddy crop in Kerala using a primary data collected from three cultivation seasons. The results showed that the cost of cultivation per hectare was minimum for Viruppa season, which was found to be Rs.3726.16 while there was not much difference between the cost of cultivation during Mundakan and Punja, which was Rs.4641.51 and Rs.4625.50, respectively. The input-wise split up revealed that the major share of the total cost was on hired human labour, which
accounted for 22.62 per cent for Virappa and 25.57 per cent for Mundakan and 27.22 per cent for Punja. The next important input was the imputed value of rent on land. The cost A, which forms the paid out cost accounted only for 62.54 per cent in Viruppa, 65.04 per cent in Mundakan and 67.74 per cent in Punja. The profitability analysis revealed that return per rupee invested was the highest for Viruppa (1.4) followed by Mandaka (1.33) and Punja (1.24).

Karwasra and Arora (1995) has used the time series data of prices from 1965-66 to 1987-88 to analyzed the farm level price spread and shares of farmers, wholesalers and retailers and variations in the shares of each of them in retail price of wheat and rice over the space and time in selected markets in India. The farm–retail price spread and shares of farmers and middlemen in retail price of wheat and rice were calculated for each year based on the mean values of price spread and shares were presented for whole study period. The variation in price spread and farmer’s, wholesaler’s and retailer’s shares in retail price were studied by calculating the coefficient of variation. The study found that the average price spread of paddy varied from 16.26 per cent in Andhra Pradesh to 34.40 per cent in Madhya Pradesh. This was due to differences in availability of marketing facilities and government procurement operation. It was further found that farmer’s share of consumer price varied from 90.67 per cent in Andhra to 56.15 per cent in Punjab. An analysis of variation indicated that variation in retailer’s and wholesaler’s share was more as compared to farmer’s share in paddy due to speculative activities of the trading community. As compared to farm price there is a large fluctuation in the wholesale and retail prices. Similarly, the higher variation in wholesaler’s and retailer’s share in rice was also due to time lag in paddy supplied by the producer and the rice purchased by the consumer. The study concluded that farmer’s share in the retail price had shown an increasing trend as against decreasing wholesaler’s and retailer’s share. This was mainly due to the implementation of government price support, procurement and distribution policy along with development of infrastructure marketing facilities. Above stated policies proved very much helpful to stabilize the price variations as indicated by the study.

Radam and Latiff (1995) analyzed the technical efficiency for paddy cultivation using a cross section data of North West Selengor in Malaysia. The data used in this study consisted of information on production and input used for a sample of 317 paddy farmers in Northern selangor in the main season of 1990. The output produced was in physical unit (kg). The inputs for production included land (ha), fertilizer, herbicide, insecticide and fungicide, which are in physical units and labour in man-days. Results of the production function analysis
revealed that the production of these farms was technically inefficient and the farms could have produced 74 per cent more output than what they have actually produced if they operated with overall technical efficiency. It was further found that the output could have doubled if optimal efficiency was achieved. Another source of inefficiency is due to non-optimal scale of production. About 38.8 per cent of farmers were operating at increasing returns to scale and 56.8 per cent of farmers at decreasing return to scale. If the farmers had been operating at optimal scale the output could have been increased by 22 per cent as indicated by the study.

Datta (1996) calculated Nominal Protection Co-efficient (NPC), Effective Protection Co-efficient (EPC) and Domestic Resource Cost (DRC) for Indian Basmati and non-basmati rice. The results revealed that India has very slender competitive strength in export of basmati rice. However, DRC analysis showed that Indian exporter has some amount of buffer, because India required spending of only Rs 0.89 on non-tradable expenditure in order to earn one rupee of foreign exchange. In case of non-basmati rice these ratios were below one indicating moderately competitiveness of the product.

Gopalappa (1996) analyzed the effect of agricultural diversification on the income and standard of living of the farmers over time in a village Gopalpur in Elakathurthi Mandal of Karimnagar district of Andhra Pradesh. The study found that the annual growth rate of paddy area declined at the rate of 3.01 per cent on the marginal farms and 5.44 per cent on the small farms. Paddy yielded an annual real income of Rs.696 per acre as compared to Rs.5391 for sericulture in 1993-94. It was further found that net return from paddy cultivation was declining over time whereas it was increasing for sericulture. Analysis of impact on consumption expenditure indicated that people had consumed more nutritious food such as fish, meat, vegetables etc., as well as spent more on entertainment. The study concluded a significant change in the income levels and standard of living of the marginal and small farmers due to diversification of the farm activities.

Kumara, Pramod and Singh (1996) studied the growth rates of area, production and productivity of rice in Bihar state of India using time series data from 1959 to 1990 by dividing them into, 1959-68 (period I), 1969-79 (period II) and 1980-90 (period III). The study found that the growth rate of yield was positive during green revolution period and negative before green revolution period in all the zones of the region. The growth rate of area was negative in both periods in all the zones.

Maji (1996) estimated Nominal Protection Co-efficient (NPC), Effective Protection Coefficient (EPC) and Domestic Resource Cost (DRC) for Indian rice. It was found that NPC
was less than one indicated that rice products were not protected through policy incentives. Similarly, DRC of less than one implied that a low domestic resource cost could earn a much higher value in foreign exchange through export.

**Mohandas and Thomas (1997)** studied the economics of rice production for different size holders such as small, medium and large farmers in Kuttanad areas of Kerala. The analysis showed that the percentage increase in gross income per hectare from rice cultivation was highest among marginal farmers followed by large and small farmers. The results of the study showed that cost escalation is the most important factor, which makes rice cultivation a relatively less remunerative enterprise. The study suggested that mechanization should be followed wherever possible and thus reduces the cost of human labour.

**Sundaravaradarajan, Selvaraj and Krishnamoorty (1997)** conducted a study on decision making of farmers in relation to marketing of paddy at various centers. In this study, stability of market arrivals of paddy and its price was used to examine performance of regulated markets. Coefficient of variation was applied to test price stability. Time series data on arrivals and prices of paddy were collected from Pondicherry regulated market from 1978/79 – 1995/96 for the study. The study found that the extent of instability of market arrivals was relatively low as compared to price in all paddy varieties. The coefficient of variation around trend line showed that the variation in arrivals was relatively higher than the price of paddy. The study pointed out that standard weight, competitive bidding, better price, immediate payment and direct sale were major factors influencing the producers to opt for the regulated market.

**Singh and Naresh (1998)** studied the technical efficiency in rice cultivation in Punjab. The analysis of technical efficiency in rice cultivation showed that there was considerable variation in efficiency across regions and size categories of farmers in Hoshiarpur district and Sangrur district. The main reason for high technical efficiency was observed to be timely transplanting and application of irrigation, fertilizers and pesticides in appropriate dosages.

**Umashankara (1998)** studied production efficiency of rice farming in hilly zone of Karnataka state of India by using Cobb-Douglas production function and frontier production function approach. Independent variables used were area, farmyard manure, fertilizer, human labour and seeds. Resource use productivity analysis indicated that in lowland paddy cultivation, land, fertilizer and seed had a significant contribution to output while human labour component was found to contribute negatively to the output. In upland situation, only land contributed most significantly to the output while seed and human labour contributed negatively to the output. The technical efficiency in paddy production was observed to be
high, as more than 70 per cent of efficiency was achieved by 90 per cent of the farmers. However, less than five per cent of the farmers were found to have achieved the allocative efficiency of more than 70 per cent. The study stressed the importance of investment in paddy cultivation on the basis of returns realized from each of the factors of production.

**Vinu (1998)** examined the export competitiveness of rice grown in Karnataka. National Protection Coefficient (NPC) was calculated taking the ratio of domestic wholesale price of rice prevailing in the selected market of the state to world reference price of rice (Bangkok). Results indicated that values of NPC of both fine and medium quality rice during *kharif* season under irrigated condition were below unity in all the zones under study during 1994 – 1997 under importable hypothesis. This means that domestic prices were less than the international prices. The study stressed that export competitiveness should be enhanced through improved productivity and quality, better technologies, better marketing arrangements, improving standards to meet international quality specification and improved transport structure.

**Shaik, Ramorao, Katyal and Reddy (1998)** analyzed costs and returns of major crops grown Andhra Pradesh. The overview of the study revealed that human factor constituted the kingpin of total cost of all the crops including paddy in all the zones of Andhra Pradesh while the adoption of plant protection measures was abysmally low in almost all the crops except in cotton. The analysis of profitability in case of cereals indicated that paddy claimed a lion’s share of higher profitability in high potential irrigated zone of Krisna-Godavari compared to other zones. Similar situation was observed in case of maize in Krishna-Godavari zone, which was due to wider acceptance of the farmers in case of technology.

**Umashankara (1998)** worked out costs and returns in paddy farming in hilly zone of Karnataka. The cost of cultivation per acre in low land situation (transplanted) was higher (Rs. 4931) than upland situation under drill sown (Rs. 4716). This was due to increased usage of labour, fertilizers, pesticide and improved varieties of seeds in anticipation of higher yield. The share of variable cost was 96 per cent of total cost in both situations. Among the variable costs, the cost on human labour was the single largest item. The average yield was found to be 15.1 quintal per acre for lowland situation as compared to 13.1 quintal for upland districts. The net return was Rs. 3498 per acre in lowland and Rs. 2442 per acre in upland situation.

**Vyas (1999)** reviewed Indian trade policy by grouping the study period into three periods, e.g. (1) till 1960s; (2) mid 1960s till 1991 and (3) after 1991. The agricultural trade till mid 1960s was subject to a regime of quantitative controls and other state interventions to conserve foreign exchange. The trade policy in agriculture was designed to pursue twin
objectives of food self-sufficiency and promotion of exports of commercial crops. In the second phase, inward looking imports substituting policy frame was implemented more rigorously and food self-sufficiency became the corner stone of the development strategy in agriculture. In the third stage, continuation of strategy of food self-sufficiency was challenged with the economic liberalization policies. Those who were against self-sufficiency argued that distortion in agricultural trade would be removed with WTO agreement, cheap imports could be made if a country could earn foreign exchange and wide-spread distribution of food would result instead of being controlled by a few countries as in the past. However, this study stressed the need of continuation of self-sufficiency in principal cereals, i.e., wheat and rice because expenditure on food grains accounts for 40 per cent of the expenditure of the bottom one-third of India’s population. International prices are more volatile than the domestic prices and bulk of the poor living in rural areas depends on the growth on agriculture. The study concluded that food self-sufficiency is not a matter of faith and it could be reviewed when expenditure on food becomes a minor part of the consumer’s budget, when food production does not remain the main source of livelihood for the small and marginal farmers, when nonfood export becomes sufficiently buoyant to generate enough foreign exchange, when country has enough buffer stocks to ward off any significant price fluctuations of imports and when there are numerous and assured sources of supply to cope with any sizeable shortfall in domestic production.

Acharya (2000) reviewed the subsidies in Indian agriculture and presented an assessment of as to who benefited from the subsidy. In the study various types of subsidy programmes such as input, output and food subsidy are discussed. It was reported that benefit of the subsidies had been shared by all the sections of the society including farmers, landless labourers, urban consumers and the industry. The study concluded that price support policy would need to be in place even in a liberalized environment in all the areas of the country, an agency would be needed to undertake price support purchases, maintain food grain buffer stock and undertake public distribution of food grains at least for the families below the poverty line.

Ananthi (2000) carried out a study on Indian rice exports using time series data from 1980/81 to 1997/98. In this study, instability analysis was performed to examine variation of export quantity of basmati rice and non-basmati rice. The variation around the trend rather than the variation around the mean were used as an index of instability. The study found that the coefficient of variation with respect to export quantity of basmati rice was 31.37 per cent and 183.58 per cent for non-basmati rice during the period 1980/81 to 1997/98 period. A steady mounting demand from importing countries and stable domestic production might
have led to stable exports of basmati rice from India while high variation of non-basmati rice was due to fluctuation in demand that has led to unstable exports.

**Madhusudan (2000)** examined whether intra-state and inter-state regional markets are integrated and linked together into a single economic market using the maximum likelihood method of co-integration, with the help of monthly wholesale prices of rice during March 1984 to April 1997. The selected market centers are: Dumka, Gaya, Jamshedpur and Patna from Bihar; Balasore, Cuttack, Jeypore and Sambalpur from Orissa; Allahabad, Azamgarh, Gorakhpur and Nowgarh from Uttar Pradesh; and Contai, Sainthia and Siliguri from West Bengal. The results indicated that the regional rice markets within and across the states are spatially linked in the long run. On the basis of findings of regional market integration, the study indicated the success of price policy and market liberalization programmes undertaken in India. The major policy suggested was withdrawing or reducing of government intervention in pricing from these markets.

**Jain and Karam (2000)** analyzed the effect of price policy on farm income of the paddy farmers over time in Punjab. Data on area, yield, production and cost per quintal for 200 holdings scattered over twenty clusters of villages in three zones of Punjab were obtained. Operational holdings having higher cost of production than the Minimum Support Price (MSP) were treated as affected holdings. The study found that traditional paddy producing area of zone I was the most sufferer where about 64 per cent of farmers incurred higher cost of production than the MSP announced by the government in 1981-82. Between size classes of the holdings in the state, small farmers (1-2 hectare) were the most sufferers where 62 per cent of farmers had produced paddy at a higher cost of production than MSP. In 1990-91 among the size classes, except a majority of large farmers (above 6 hectares), each size category of farmers had higher cost of production than the MSP. On the whole, at the state level, it was observed that 58 per cent of the paddy farmers in 1980-81 had covered their cost of production by the MSP but it declined to 45 per cent in 1990-91 thereby showing that Punjab had become a high cost producer of paddy in India. Similarly, price policy proved less beneficial over time as the area benefited declined from 65 to 63 per cent during the period concerned.

**Badal and Singh (2000)** made an attempt to examine resource use efficiency in maze and its competing crops of wheat and rice in Bihar. Due to problems of multicollinearity, the production responses were estimated on per capita basis. The regression coefficients were less than unity for all the inputs. This implied that each input was depicting diminishing marginal productivity. The elasticity of human labour was positive and significant for all the
selected crops indicating that it was the most important factor increasing farm returns from
cultivation of these crops. Return to scale was less than one except in the case of HYVs of
Rabi maize which was unity. This indicated that these farms were better managed than those
of HYV Rabi maize and there was a scope to increase maize production in Rabi through
judicious use of resources and better management. Analysis of marginal values, which
measure the allocative efficiency, showed that human labour was over used in the production
of local varieties of Kharif and Rabi maize and in the production of HYVs of paddy because
their MVP/price ratio was less than one.

Kamal and Meenu (2000) worked out the compound growth rate for paddy in Punjab using
data on area, production, and yield for the three periods viz., period I (1970-71 to 1983-84),
period II (1984-85 to 1997-98) and overall (1970-71 to 1997-98). Chow-test was applied to
test the difference in the growth rate between two time periods. The null hypothesis of no
difference between the growth rates was tested against the alternative hypothesis that the
growth rates for the two periods were significantly different. Results indicate that the annual
compound growth of the area, production and yield of paddy was 6.90, 8.82 and 1.79 per
cent, respectively for the whole period. Results of the Chow-test showed that there was a
marked difference in the growth rates of area, production and yield between the two periods
showing a significant decline in area, production and yield during the second period.

Singh and Singh (2000) estimated the cost and return of rice in different ecosystems viz.,
Rain-fed upland (RU), Rain-fed lowland (RL), Irrigated with high yielding varieties (IHYV),
Deep water rice (DR) and Boro - rice (BR) in India. The cost of cultivation (Cost C) per
hectare was highest on IHYV farms (Rs.12111), which was slightly higher than BR farms
(Rs.12104) with lowest on DWR farms (Rs.5165). When total cost was divided into factors
of production, it was found that hired human labour along with imputed value of land jointly
contributed to more than 50 per cent of the factor cost under all the rice ecosystems. The
study also revealed that net profit was much higher on BR farms (Rs.13615 per ha.) than
IHYV farms (Rs.3329 per ha.) owing mainly to significantly higher yields on BR farms
(6.43t/ha) compared to IHYV (3.9 t/ha). In conclusion, the study reported that future food
needs of the eastern India could be successfully met by extending the area under boro rice
wherever possible.

Mythili and Shanmugam (2000) measured the technical efficiency in paddy cultivation in
Tamil Nadu using an unbalanced panel data of 234 farms for the period 1990-91 to 1992-93.
The study used the stochastic frontier production function approach and the Cobb-Douglas
functional from. Output was expressed as a function of human manpower (man-hours), area
(hectares), fertilizer (kilograms) and capital expenditure incurred on bullock labour, machinery and pesticides (rupees). The maximum likelihood method was used to estimate frontier function. The study found that the technical efficiency varied from 46.5 per cent to 96.7 per cent with a mean value of 82 per cent. The mean technical efficiency indicated that on average, the realized output could be increased by 18 per cent without any additional resources. The study recommended the need for improving farmers’ practices through extension services and training programmes.

Gyanendra and Chandra (2001) estimated growth rates of area, yield, production, cost and profit of paddy in India by fitting different functional forms on time series data from 1975 to 1998. The compound growth analysis showed that overall growth rate in area under paddy was small (0.47 per cent per annum) during the period concerned. The maximum growth rate in area was 1.57 per cent per annum, which was recorded during 1986-87 to 1990-91 period. Linear trend analysis on yield revealed a growth rate of 2.58 per cent per annum with a maximum rate of 5.24 per cent per annum for the period 1986-87 to 1990-91. The results indicated that the overall growth rate in paddy production was 3.06 per cent per annum. The maximum growth rate was observed during 1986-87 to 1990-91 (6.89 per cent per annum). Growth trend in cost of production showed 8.09 per cent increase per annum during the period 1975-76 to 1996-97. The growth rate in minimum support price, which was worked out using the similar functional form, was 8.27 for the whole period. It was found that the best function for estimation of growth rate in profit was cubic function. It was found that margin of profit had tendency to get reduced in due course of time. This may discourage farmers’ investment in increasing productivity. The study concluded that higher growth rate of paddy yield had been the major factor to increased production and increase in net profit was very low due to higher rate of increase in cost.

Hazar (2001) documented a series of programmes on rice implemented by both Central and State governments in India. State level training programme on rice production technology started in 1975-76 aimed at dissemination the latest rice production technologies to the extension officers of the state governments. In 1985-86, special rice production programme partially funded by the union government, focused on increase in the productivity of low productivity areas. With a view of achieve the minimum food production of 166 million tonnes during 1988-89 and 175 million tonnes, in 1989-90, a special food production programme was implemented during the 7th Five Year Plan period. Under this programme, 106 potential districts in 13 states were identified for the development of rice production. This programme was fully funded by government of India. Integrated programme for rice
development was initiated in 1990-91 to develop rice production on district basis. The government of India financed 75 per cent of the total cost. In order to introduce hybrid technology developed in China, promotion of hybrid rice programme was commenced in early 1990s. For the first time in India four rice hybrids had been released for commercial cultivation during 1994 by the state government of Andhra Pradesh, Tamil Nadu and Karnataka. As regards the price policy, the government of India announced the MSP for rice at the start of the season. The prices were fixed on the basis of the recommendations of the CACP. Promotion of a cropping system approach rather than a single crop development approach and promotion of hybrid rice production technology were among the recommendations given in the study.

Krishna (2001) worked out the costs and returns of paddy cultivation in Kerala through a sample of 100 farmers for the year 2000-2001. The total cost of cultivation per hectare was found to be Rs.31043.75. Of this the lion’s share was attributed to human labour, which amounted for 61.46 per cent of total cost. Total returns from per hectare cultivation were Rs.27023.68. Since it was below the total cost incurred, the net income was found negative with a loss of Rs.4020.08 per hectare and the benefit-cost ratio of 0.87, indicating unprofitable situation. However, rice and prawn cultivation together earned profit making B-C ratio to be 1.27. The study concluded that there was an increased trend towards double crop of prawn due to higher profitability of the prawn farming and loss incurred in rice crop. One of the major recommendations made in the study was mechanization of rice farming operations due to higher wage rate prevailing and scarcity of labour at proper time.

Visva (2001) estimated the producer’s share for paddy (rough rice) in West Bengal for three selected markets using time series data. Producer’s share in consumer rupee was expressed as a percentage of the retail price. The study found that variation in producer’s share was more pronounced in Sainthia market than that in Bolpur and Rampurhat. In case of month wise variation, the study revealed an abrupt up and down in producer’s share throughout the study period. In December 1995 producer’s share was 76.56 per cent, which suddenly fell to 66.2 per cent in the next year.

Deshpande and Gopalappa (2003) made an attempt to study agricultural marketing policies in India. In this analysis, policies were reviewed under policy intervention, market regulations, institutions in agricultural marketing sector, market infrastructure, agricultural marketing under the WTO regime and suggestions for new policy regime. Market regulations were grouped into two, viz., regulations governing functioning of primary agricultural produce markets and a series of legal instruments. Institutions involved in marketing were
documented under public, cooperative and farm sector. As regard to market infrastructure, study pointed out that some states like Punjab, Haryana, Tamil Nadu, Kerala and Gujarat have better infrastructure facilities whereas in the states like Madhya Pradesh, Rajasthan, Bihar, Assam and West Bengal a lot needs to be done. It was pointed out that private sector investment in this area was totally lacking. To face the WTO regime there are three challenges i.e., clearing the existing inefficiencies, connecting the domestic market with international trade and creating proper safety nets in the system.

Hegde, Tiwari and Rai (2003) reported in their study that double or triple cropping with rice, though possible, but needs not be encouraged very much because with the same irrigation water, one could produce other crops more efficiently. Rice is treated as very inefficient user of water. The study found that though in Asia the rice-wheat system has been practiced for over 1000 years, its sustainability has declined due to a number of causes such as labour shortage and delayed and excessive tillage operation resulting in the late plating of wheat crop. According to the study, in India approximately 15 million hectares of area is under fallows ecosystems, which can be favourably exploited for the successful cultivation of pulses and oilseeds. Three major challenges in Indian agriculture found in this study are increase in productivity, move the green revolution to ecological systems and couple food production efforts with sustainable environment quality. The study stated that crop diversification is one of the ways towards meeting these challenges and achieving sustainable agricultural development.

Parmod Kumar and Sharma (2003) analyzed market integration among four wholesale paddy markets in Haryana with the help of co-integration and error-correlation mechanism. The study period was divided into pre-liberalization period (October 1978 to September 1989) and post-liberalization period (October 1989 to September 2001). Results indicated that markets were integrated in the long run although price transmission was found to be lacking in the short run. Price adjustment among the markets was taking around 2-3 weeks’ time period and adjustment process was found to be quicker in the post-liberalization period compared to pre-liberalization period.

Rama Rao, Chowdry, Reddy and Krishna Rao (2003) examined the levels of technical efficiency in the production of rice in Andhra Pradesh through application of stochastic frontier production function. Yield responded significantly to all the inputs namely, labour, seed, farmyard manure, plant protection chemicals, except fertilizer. Analysis of frontier production function indicates the presence of significant inefficiency in the production of rice. The average level of technical efficiency was estimated to be about 0.85 indicating that
it was possible to improve yield by 15 per cent by following the efficient crop management practices. The differences in technical levels were significantly influenced by age and education of the farmers and the area under rice to total cropped area. The negatively significant coefficients for age and education suggest that as the age and the education of the farmer improve, the efficiency decreases. However, farm size was not found to have any significant relationship with technical efficiency. The study pointed out that increasing technical efficiency by following the best farmers’ practices could increase profitability from rice farming.

Rafeek and Samaratunge (2003) examined the market integration at farm and retail level in rice trading in Hambantota and Kandy market in Sri Lanka with the help of the model developed by Ravallion. Monthly producer, wholesale and retail prices of different quality rice (Samba and Nadu) during the period 1997 – 2000 was used for the analysis. In this study, two models were developed: (1) farm price was regressed with lag farm price, wholesale price in Colombo and its lag price, and (2) wholesale price was regressed with lag wholesale price, retail price and lag retail price. The Model I was used to ascertain the market integration between farm and wholesale level while the Model II was used to test market integration between wholesale and retail level. The results showed a low degree of market integration between farm and wholesale markets while the wholesale and retail markets exhibit a greater degree of market connection. The study pointed out that changes in wholesale prices poorly transmitted to farm gate prices consequently leading to widening of the farm-wholesale margin.

Raj Singh (2003) made an attempt to examine interrelationship among globalization, agrarian situation and sustainability in Haryana state of India. This study reported that area under wheat and rice had increased considerably during the post-liberalized period and area under other crops such as gram, sugarcane, groundnut, fruits and vegetables had decreased. This is against the manifest objectives of economic liberalization because the wheat-rice monoculture pattern leads to biological problems besides reduced soil fertility. The study highlighted that wheat-rice mono cultivation system required the application of considerable amount of chemical fertilizers, pesticides and excessive application of both surface and ground water. Consequently, consumption of chemical fertilizers pesticides and use of tractors have increased considerably since 1990-91, which almost destroyed bio-diversity, ecosystem and soil health. Since fertilizer use of rice and wheat is now close to optimal level and application of additional doses of fertilizers is often unprofitable, the study stressed the necessity of diversifying some areas from wheat and rice to other crops and it is a serious
challenge for the researchers to develop some cropping alternatives, which the farmers would accept.

**Rajeswar Rao (2003)** pointed out that monoculture and continuous cropping of rice wheat system have resulted in various disadvantage in India besides deteriorating soil fertility. It was further reported that the physical condition of soil like aeration has deteriorated. Pulses, when included in the cropping system, offer a unique opportunity in sustaining soil fertility by virtue of converting atmospheric nitrogen into assimilable form of ammonia, i.e., Biological Nitrogen Fixation (BNF). The study reported that the inclusion of pulses in cereal-cereal system economizes the nitrogen to the tune of 30-40 kg/ha for succeeding cereal crops. The study concluded that diversification of pulses into cereal based cropping system will not only replenish the soil health but also economize input use lowering the cost of production.

**Singh and Chandra (2003)** tested various functional forms and found that exponential function was the most appropriate to examine the growth trends of area, production and yield of paddy in India. They studied the growth performance for different periods and used ‘t’ test to test the significant difference between growth rates of any two periods of aggregate. The study found that as a result of increase in area under cultivation and yield, the overall growth rate in paddy production had been very significant (2.96) during the 1975/76 –1990/00 period. Yield increased by 2.42 per cent whereas acreage increased by 0.52 per cent.

**Velayutham and Palaniappan (2003)** studied the crop diversification in India and found that more than 250 cropping systems are being followed in the country of which 30 cropping systems are predominant. These 30 systems include rice-wheat, rice-rice, rice-grain, rice-mustard, rice-groundnut, rice-sorghum, groundnut-rice and sorghum-rice. Crop diversification had been studied by analyzing change in area under major crops during the period 1970-71 to 1998-99. It was found that the area under total cereals remained static at about 102 million hectares while there had been a significant increase in non-grain crops such as cotton, sugarcane, fruit and vegetables during that period. The economic return was one of the major considerations for adoption of major cropping systems at farm as well as regional level.

**Alka, Vasisht, Atteri and Daroga (2004)** applied the market integration model given by the Ravallion to explore the relation between wholesale prices of rice in the local markets and the central market in Orissa. The monthly wholesale prices of four markets namely, Sambalpur, Jeypore, Balasore and Cuttack were analyzed with respect to the central markets of Bankura in West Bengal and Kakinada in Andhra Pradesh. The study period referred to November 1995 to October 2000. To eliminate the effect of inflation, prices were deflated by
consumer’s Price Index for agricultural labour. Results showed the importance of Bankura market for price formation of rice in local market of Orissa as compared to Kakinada market of Andhra Pradesh. The Index of market connectedness showed low degree of short run market integration as evidenced by values more than unity. Analysis also revealed that in all the integrated markets, the degree of integration declined with the increase in distance between local market and reference market, which indicated inadequacy and poor quality of transportation facilities.

Elsamma and Nandamohan (2004) analyzed the trends in rice production in Kerala using exponential function both in linear and quadratic form. The study referred to the period 1975 –2000. The results of the exponential linear model (compound growth) showed a negative growth in area (-3.15 percent) and production (-1.80 percent) while productivity was positive but not statistically significant. The findings of the growth rates estimated using log quadratic equation revealed that area and production of rice showed significant deceleration with significant acceleration in productivity during the period under reference. The conclusion made in the study was declining trend in area under rice with positive trend in yield. The said reasons for declining area were unprofitable price situation and difficulties in cultivation with high cost of labour and other inputs. Study recommended need of attention on increasing yield by reducing yield gap through eliminating constraints to potential productivity.

Dorosh (2004) studied trade, food aid and food security in Bangladesh using secondary data. One of the objectives was to examine the positive contribution of trade liberalization and private sector imports to short-run food security. Rice imports increased considerably from India after the liberalization of international rice trade in 1994. In 1998 the Bangladesh government removed a 2.5 per cent tariff on rice to encourage private sector imports of rice to stabilize domestic market as a result of scarcity of domestic production resulting from floods. The study pointed out that price stabilization through private imports was successful in 1998 as compared with public sector imports made to stabilize market during 1974 and 1988-89 food crisis situations. Similarly, in 2001 the government raised the tariff on rice from 5 per cent to 37.5 per cent to protect the producers whereby imports ceased and producer prices increased. Finally, it is possible for a small country with access to international markets to avoid a major food crisis and stabilize prices even without large government stocks. The study stresses the need of intra-regional trade to increase food security and finally all countries in the region get benefits.

Gulati and Landes (2004) examined the performance of agricultural policy since the 1991-92 reforms and identified key areas where achievement of consensus on reform could have
positive impacts. During 1995-96 – 2001-02 period the government set Minimum Support Price (MSP) above the recommendation made by the Commission of Agricultural Costs and Prices (CACP) in four out of seven years for rice. As against the historical trend, real price of rice in India has an increasing trend since 1990s despite declining per capita consumption, accumulating huge public stocks and falling world market rice prices in real terms. This study stressed that the failure of price policy to successfully adapt to the new environment has created a number of impacts. First, high prices of rice due to higher MSP reduced consumption. Second, public expenditure on storage and transport increased. Third, MSP policy has not been made an effective tool for stabilizing producer prices for other crops and supporting the diversification of agriculture. Fourth, subsidy outlays are crowding out new investment needed to boost productivity and marketing efficiency. Finally, the strong price incentives for rice are contributing to the rapid deterioration of ground water resources and rising concern with deteriorating soil fertility. The major conclusion was that as long as producer price policy attempts to meet both income and price stabilization goals, it would be difficult to serve the efficient allocation of resources in the sector.

**Hathurusinghe and Ravichandran (2004)** analyzed the price of rice in Sri Lanka for the period 1985 to 2002 using percentages, averages and ratios. This analysis showed declining trend in real prices, lower absolute margins in lean supply period due to availability of imported rice at cheaper rates, higher margins during the harvest time and declined farmer’s share due to increase in marketing cost. The study also found that rice markets were well integrated and inter-dependent. The study suggested the need of changing traditional inward looking policy of achieving self-sufficiency in major food commodities towards the strategy of competitive production for the domestic market and for the export market in the context of open economy.

**Basanta, Peter and Gilbert (2004)** studied the efficiency of rice farming in Nepal as a means of exploring the reasons that hinder productivity growth in rice farming. This study used a two-step methodology. In the first step, data envelopment analysis (DEA) was used to model efficiencies as an explicit function of discretionary variables. In the second step, farm specific variables such as a farmer’s risk attitude, age, education, gender and family labour endowment are used in a Tobit regression framework to explain variations in measured inefficiencies. The results found that Farrell’s overall economic efficiency was 66 per cent meaning that the sample farms can potentially reduce their overall cost of rice production by 34 per cent and still achieve the existing level of output. The results of the Tobit regression method showed that younger farmers are more likely to be inefficient than their older
counterparts and more educated farmers are more likely to be efficient as compared to their less educated counterparts.

**Debnarayan and Sudpita (2004)** examined the extent of technical efficiency of paddy under different types of tenure and different farm sizes in West Bengal using a Data Envelopment Analysis (DEA). Two types of villages – technologically advanced villages having high incidence of irrigational and HYV facilities and technologically backward villages having no irrigational and HYV facilities were selected. The use of high technological inputs in agriculture is not so important in improving the efficiency level of the farms. Similarly, the proportion of efficient farms increases with increase of farm size except the lowest farm size where all the farms are efficient.

**Ilukpitiya and Yanagida (2004)** studied the technical efficiencies of small-scale rice farmers in Sri Lanka and the factors contributing to technical inefficiencies in rice farming by using the stochastic frontier production function methodology. In this analysis two models were developed. One is relationship production and inputs and the other is relationship between inefficiency and factors contributing to it. In the first model, production is a function of area, inorganic fertilizer, organic fertilizer, labour, seed (dummy: 1 for certified seeds and 0 for otherwise) and method for plating (dummy: 1 for transplanting and 0 for broadcasting). In the second model, technical inefficiency is a function of the age, education, experience and the hours of extension advice obtained. Data were collected from 46 households selected from the Badulla district of Sri Lanka in the 1998-99 seasons. Results showed that area, inorganic fertilizer and transplanting had positive impact on production while labour and seed has no significant contribution to the production indicating overuse. It was further found that the overall mean technical efficiency of the paddy farms was 0.74 and factors affecting technical efficiency were experience in farming, education, age, and extension contacts. Overall results implied that there is potential for improving the efficiency of paddy farming and thereby increasing farm revenues. In paddy production, technical efficiency can increase if farmers are given the proper motivation and necessary facilities for improvement.

**Jeevika (2004)** analyzed the income from rice farming in Sri Lanka under different scenarios. This analysis showed a number of important findings. First, tariff protection is not good solution for augmenting paddy farm income even disregarding the impact on consumers. Second, if fertilizer is provided free of charge with higher import tariff rice farming does not generate a sufficient income or provide a reasonable income for living. Third, the income of a rice farmer with one acre is 20 per cent of the average income of the country in 1980/81 and it declined to 10 per cent in 1990/91 and further dropped to five per cent in 2000/01. The
study concluded that paddy farming when it is practiced, as mono crop cultivation on a small scale cannot provide a sufficient income for farmers.

**Reddy and Sen (2004)** studied the technical inefficiency in rice production in Bihar and investigated the influence of farm specific socio-economic characteristics on inefficiency. Technical inefficiency of the individual farm was estimated through stochastic frontier production function analysis. To study the effect of socio-economic factors on inefficiency, the sample farmers were grouped into various categories based on each factor and then the average inefficiency of each group worked out and compared. Analysis of variance was carried out to know whether various groups differ significantly in their inefficiency level or not. Besides this correlation, analysis was also carried out to know the relationship. The study revealed the existence of technical inefficiency in the production of rice in the study area. It was also found that technical inefficiency in the production of rice is negatively related with farm size, education of the farmer, experience, extension contacts and percentage of good land and positively related with age and fragmentation of the land. To reduce the inefficiency in the rice production encouraging co-operative type of farming, land consolidation, improving literacy rate, strengthening extension services and providing alternative employment opportunities were among the recommendations.

**Ravi Kumar, Bapuji Raw and Lakshmi (2004)** studied the most profitable cropping pattern of small and medium farmers in North Coastal Zone of Andhra Pradesh using primary data. A farmer with a land holding less than or equal to 2 acres was categorized as small farmer and the farmer with holding ranging between 2.1 acres to 5 acres was categorized as a medium farmer in the study. Benefit-cost (B-C) ratios of major crops, namely paddy, sugarcane, maize and paddy fallow black gram, were worked out to study the profitability. It was found that for both in small and medium farmers, the B-C ratios were higher for paddy and paddy fallow black gram crops respectively. The study therefore concluded paddy followed by black gram was the most profitable cropping pattern. Another conclusion was cultivation of two crops per year more profitable than adopting monoculture with sugarcane.

**Raisunddin (2004)** made an assessment of comparative advantage of rice in comparison with other agricultural products in Bangladesh. In this study a number of indicators such as net financial return, net economic return and domestic resource cost, were worked out for the period 1996/97 – 1998/99. Net financial return is calculated by valuing output and input at actual market price. Net economic return was calculated with output and tradable input valued at world prices. Rice grown in Boro season had comparative advantage as opposed to what which is a competing crop. It was also found that Bangladesh had a fabulous
comparative advantage in cultivation of vegetables as indicated by low values of DRC, which was in the range of 0.05-0.11 for many vegetables. The study advocated need of public research investment in non-cereal crops as the country strives for diversification.

Sikander and Sandeep (2004) examined the profitability of paddy, maize and wheat crops grown in Himachal Pradesh for the year 2001-2002. In this study, different cost concepts of Cost A1, Cost A2, Cost B and Cost C were calculated. As regard to Cost C, paddy was the highest cost (Rs.20835) followed by maize (Rs.18709) and wheat (Rs.17102) per hectare. For all the crops, the lion’s share of cost was incurred by labour. In respect of gross returns per hectare, it was highest on paddy crop followed by wheat and maize. The study further found that net returns were positive on paddy crop as compared to the wheat and maize crop where net return was negative. The negative return was due to low yield. However, net profit per quintal was negative for all three crops.

Kumar, Srinivas and Singh (2005) estimated the efficiency levels of individual rice farms applying Data envelopment Analysis (DEA) approach, which is based on linear programming technique. A linear Tobit regression equation was used to identify the factors associated with efficiency. Data were collected from a sample of 50 farmers selected in Bageswer district in Uttaranchal. The study found that the overall technical efficiency in the case of improved rice growing farms was higher than that of rice farms growing local varieties. The study also suggests that efficiency initially increases and eventually declines with age. Moreover, higher education was found to be associated with higher efficiency level.

Weerahewa (2006) examined the economy-wide impacts of various policy packages on rice and related markets, which consist of liberal as well as protectionist elements. A general equilibrium model developed for the Sri Lankan economy using the input-output table for 2000 was used for the analysis. The model consists of 5 sectors, 2 factors of production and households in 8 representative provinces. The key results of the analysis indicate that removal of the import tariff on rice along with removals of the import tariff on fertilizer and/or subsidy payments on other agricultural sectors could improve economic efficiency and household welfare across provinces. Contrary to the general belief that protectionism is pro-poor, an import ban on rice reduces household income and welfare even in agricultural provinces, including Uva and Sabaragamuwa. Further analysis indicates that broad-brush approaches may not yield expected outcomes, as the policy packages generate second best outcomes due to existence of other distortions in the economy. The key channel of transmission of trade shock to households appears to be through government transfer payments that are influenced by changes in government expenditures on subsidy payments.
Rupasena and Vijayakumar (2006) examined the structural changes in rice marketing after economic liberalization in 1977 to compare the performance between pre and post liberalization period. Since marketing links with the production, efficiency in rice cultivation and profitability via competing crops were also studied during post liberalization era. Major policy changes on marketing during post liberalization period were closing down of Paddy Marketing Board along with guaranteed price scheme, replacement of rice rationing scheme into the food stamp scheme, liberalization of rice imports, price stabilization through variable tariff and establishment of a food supply monitoring system. The growth analysis showed that area under rice showed a positive growth before liberalization and no growth after liberalization. Nevertheless, yield registered a positive growth in both periods but the growth rate lowered in the post liberalization period. Production function analysis depicted that rice farming was technically and allocatively inefficient in post period; labour and fertilizer were over used and seed was under used. The B-C ratios were less than one for rice in all the districts studied indicating un-profitability in production but over unity for all alternative crops studied. Producer and retail price of rice increased in real terms during pre-liberalization era and declined in post liberalization period. Seasonal price fluctuation reduced during post liberalization regime over pre liberalization regime due to deregulation of rice trade. Rice wholesale markets were well integrated during the post liberalization period indicating a positive role played by market liberalization policies. The value of Nominal Protection coefficient suggests that Sri Lankan rice is uncompetitive in the international trade. The study stressed the need for a paradise shift towards increasing farm income rather than increasing production to sustain rice farming in the open economy. The policies governing rice economy should focus on developing forward and backward linkages with private sector.

Akhtar, Sharif and Akmal (2007) examined the level of economic efficiency and competitiveness in the production of rice crops and also assessed the effect of policy intervention on the production of Basmati and IRRI rice crops in Pakistan’s Punjab by employing the Policy Analysis Matrix (PAM). The results show that an expansion of the production of Basmati rice can lead to an increase in exports and the production of IRRI in Pakistan’s Punjab is characterized by a lack of economic efficiency implying inefficient use of resources to produce the commodity. The study further indicates a lack of competitiveness at the farm level in the production of both Basmati and IRRI rice and the prevailing incentive structure affected farmers negatively. A negative divergence between private and social profits implies that the net effect of policy intervention is to reduce the farm level
profitability of both rice production systems in Pakistan’s Punjab. The results highlight the need for removing existing policy distortions in the structure of economic incentives to increase economic efficiency and to attain farm level competitiveness in rice production.

Prasanna, Bulankulama and Kuruppuge (2012) examined and identified the likelihood factors affecting on farmers’ higher gain from paddy marketing in the North Central Province of Sri Lanka, where the main paddy cultivation area of the country. The required data was drawn from the field survey carried out in three irrigation systems covering 257 farmers during July to August 2010. The empirical logit model was used to assess factors. The study found that imperfections of existing paddy marketing system in the area due to concentrated market power among few oligopolistic buyers. Furthermore, land size, land ownership, poor accessibility in formal sector credit market and farmers involvement in informal sector credit sources are critical to farmers’ decisions to gain higher returns from paddy marketing. The results further showed the need of reviewing the roles and functions of government extension services and farmer organizations with regard to the paddy marketing.

Sharma (2013) examined India’s commitment related to domestic support under the AoA and agricultural modalities in context of Doha ministerial negotiations. The study found that India does not have any commitment to reduce domestic support under AoA because Aggregate Measure of Support (AMS) is below *deminius* level. Further, the study examined the revised draft of Doha negotiations and concluded there is no reduction commitment related to OTDS and final bound AMS. Therefore, in total, the study concluded that India has more flexibility to provide Blue Box and Green Box subsidies to its agricultural sector.

References


