CHAPTER-I
INTRODUCTION AND RESEARCH DESIGN

I.I) CONTEXT:

Rice is the second largest produced cereal in the world. Rice is one of the most important food-grain in the world, accounting for more than 20 per cent of global calories consumed. The share of calories is even higher for developing countries at 26.2 per cent; for low income countries it is 29.2 per cent; and 27.9 per cent for low income food deficit countries. The thinness of trade for rice is primarily a result of the variety of protectionist mechanisms based on consuming countries to achieve desired domestic food security and prices, and incomes for producers.

India is the second largest rice producer, exporter and consumer after China. Rice is the main food for 56 per cent of the Indian population [AGRO, 2000]. In 45 years Indian rice production has increased by more than double. Total export also has increased substantially for the period. The main importers for Indian rice are Middle East, Europe Union (EU) and the United States of America (U.S.A).

During the 1990 s by contrast, significant changes happened in the pattern of food consumption. There was a significant increase in the spending of fats, whereas as increase was witnessed in the consumption of vegetable products on one hand, on the other hand there was increase in the consumption of wheat, starchy roots, and cereals declined. This evidence of structural break is related to the previous decade. The 1990 s was associated with the consumption of significantly larger amounts of energy – dense foods in the form of fats, oils and starchy roots. The decline in the consumption of rice and pulses and the increase in the consumption of wheat are particularly significant. It is important to note that the use of wheat in the diet is changing as well, since there is a more western diet in the early stages of diet transformation. The effect of the decline in total rice consumption gives negative income elastic of demand for rice.
India is a major supplier of low quality long grain rice and also fragrant basmati-rice. Compared with China, rice in India is viewed as a strategic commodity with regard to food security. Consequently, the government actively intervenes in the market through grain procurement, price supports and export subsidies. In recent years, the government has procured approximately 25 per cent of the annual harvested crop to replenish government stocks. Since April 2001 the government has actively subsidized rice exports at a rate of 50 per cent of procurement prices, underselling Vietnam, Thailand, and Pakistan in low quality long grain markets by $15 to $20 per ton. Major markets for India’s low quality parboiled and regular long grain rice include: Indonesia, Philippines, Bangladesh, Nigeria, Coted’Ivoire and South Africa. Major markets for basmati-rice include Saudi Arabia, European Union, Kuwait, United Arab Emirates, and Iran.

According to the Food and Agriculture Organization [FAO] of the UN 80 per cent of the world rice production comes from 7 countries. However, if we observe world rice production from 2009-2010 the figures below show the world wide rice production by Countries—in fact, the top ten countries of world listed for their rice production are China (32.7) per cent, India (26.0) per cent, Indonesia (10.2) per cent, Bangladesh (7.5) per cent, Vietnam (6.8) per cent, Thailand (5.3) per cent, Myanmar (4.8) per cent, Philippines (2.8) per cent, Brazil (2.0) per cent, Japan (1.9) per cent etc with considerable production. Major Rice importers and import shares are Nigeria (3.6) per cent, Iran (3.6), Brazil (4.1) percent, Philippines (4.9) per cent, Bangladesh (6.3) per cent, Indonesia (15.9) per cent in million tons.

Global trade in rice expanded on an average by 7 per cent a year to about 25 mt during the 1990 s. Despite such dynamic growth, the international rice market remains thin, accounting for only 5 to 6 per cent of global output. Unlike for other bulk commodities, the international rice market is segmented into a large number of varieties and qualities, which are not easily interchangeable because of strong consumer preference. According to USDA, PS&D (2002), over the period, 1997-2002, global rice trade accounted for only 6.5 per cent of world consumption
compared to wheat trade at 18.3 per cent, Corn at 11.9 percent, and soybeans at 34.5 per cent. Ordinary Indica rice is the most commercialized (some 80 per cent of international trade by the end of the 1990s) followed by aromatic (Basmati and Fragrant) rice at 10 percent, medium rice at 9 per cent and glutinous rice at 1 per cent [FAO-2002].

In addition to the thinness of rice trade, another structural characteristic important for understanding the global rice market is the geographic concentration of production and consumption in Asia. Over 90 per cent of production and consumption occurs in Asia and nearly two-thirds in just three countries—China, India, and Indonesia. Rice is a major food staple and a mainstay for the rural population and for their food security in India. It is mainly cultivated by small farmers with holdings of less than 1 ha. Rice is also a “wage” product for human resources in India.

During the 1990s, global rice production expanded at a rate of 1.8 per cent per year—marginally above the population growth rate. By the end of the decade, it reached 400 million tonnes (mt). Developing countries account for 95 per cent of the total, with China and India alone accounting for over half of the world output. Most of the increase in the 1990s was sustained through productivity gains rather than land expansion. With as much as 40 per cent of Asian rice cultivated under rain-fed systems, the monsoon, weather effects produce substantial effect on rice output and trade. In recent years the tendency for yield growth to slacken has been cause for concern. Furthermore, competition for basic resources (in particular, land and water) from other agricultural and non-agricultural sectors, as well as the negative environmental impacts associated with rice cultivation are expected to pose a serious challenge to the future development of the sector.

After Independence till the 1970s, Indian agriculture was characterized by intensive agriculture practices in favourable ecologies through an integrated use of HYVs, irrigation, fertilizer, pesticide use and technologies with mining of natural resources to meet the food security needs. Since the 1980s, the adverse effects and
limitations of the green revolution technologies were realized and the emphasis shifted to appropriate/alternative and sustainable land use systems and to improving the efficiency of resources and inputs. The agricultural innovation system, as designed and put in place during this period – 1950s to 1970s – must be seen in the context of the national concern for food security. By the early to mid-1960s the state had invested heavily in public sector organizations and mandates to address food security (Raina 2011).

The long term compound growth rate of production of food-grains between 1973 and 2011 is 2.1 per cent, which is below the national average of 2.7 per cent. The last four decades can be divided into four sub-periods: the Green Revolution period during 1973-83 the post-green revolution period between 1983-91, early reforms period of 1991-2001 and the latest-reforms decade (2001-11) to understand the temporal dimension of growth in the production of food grains. In these sub-periods, the compound growth rate of food-grain output was placed at 2.86 per cent, 0.53 per cent, 3.55 per cent and 3.08 per cent, respectively. In the two sub-periods in post-reform decades, food-grains recorded impressive rates of growth of above 3 per cent (Ramana Murthy and Rekha Misra).

Paddy coverage was 41.85 million hectares in the country and rice production was 133.70 million tonnes. China ranked number one in the world with production of 196 million tonnes. Area under paddy increased marginally from 40.15 million hectares in 1980-81 to 42.56 million hectares in 2010-11. Area under paddy in Karnataka State was 1.44 million hectares. The cost of production of paddy per quintal was Rs. 639 in Andhra Pradesh, Rs. 783 in Madhya Pradesh and Rs. 435 in Bihar. The Minimum Support for Price for paddy has been fixed at Rs. 1,280 per quintal for 2012-13. Delayed planting, pest attack and diseases, poor water management practices, increase in cost of cultivation; inadequate mechanization and depletion of soil fertility were major reasons for decline in the profitability in the cultivation of paddy.

Rice output increased from about 20 million tonnes roughly in 1950 to 90 million tonnes at the turn of the century, first doubling to more at the turn of the century, first doubling to more than 40 million tonnes by 1970-71. Wheat production
increased tremendously from more than 6 million tonnes circa in 1950 to 24 million tonnes in 1970, and then to the region of 70 million tonnes at the end of the century, a level that has been maintained since then. Output of sugarcane increased from 57 million tonnes in 1950 to 126 million tonnes in 1970 and then reached nearly 300 million tonnes at the end of the century. It has declined sharply in 2003-04 though, production of rice during this long period of 22 years has largely stagnated between a minimum of 39.46 million tonnes in 2010-11 and a maximum of 44.35 million tonnes is 1991-92. However, there has been a sudden spurt in production of rice to 70.31 million tonnes in 2011-12. Recently, has rice production has increased to a maximum of 105 million tonnes in 2012-13.

During the 1980s, growth in area under rice was marginal at 0.41 per cent; however, growth in production and yield was above 3 per cent. During 2000-01 to 2011-12 the situation changed, whereas growth in area is 0.04 per cent, the growth in production and yield was at 1.72 per cent and 1.68 per cent respectively.

On the whole, though, the green revolution of 1968-88 at 2.3 per cent per annum of GDP originating in agriculture was not very impressive in the international perspective, when compared with (rice and Paddy) growth rates in other Asian countries. It then moved on to non-crop agriculture, which showed great promise. However, it excluded vast tracts of mainland India that we later describe as ‘rainfed’ agro-ecological system, along with their sub-zones in the form of semi-arid tropics and arid regions. Those vast areas and the people in them have not benefitted from this scheme of development and the crops they grow have also not seen much yield.

In 1965, when the Jha committee on food-grain prices gave its report, that a cohesive and systematic thinking fixation of support/procurement price started (GOI, 1965). The setting up of the Agricultural Prices Commission in 1965 was an offshoot of the recommendation of Jha committee. Today these recommendations cover 20 commodities which account for over 88 per cent of total agricultural output in term of value, and over 80 per cent of area. In 1980 the terms of commission were revised to include study of terms of trade between agricultural sector and non-
agricultural sector, and in 1985 the commission was renamed as ‘Commission for Agricultural Costs and Prices (CACP)’ (Gulati and Sharma, 2011).

The MSP has been increasing year after year. For paddy the MSP increased from Rs. 105 quintal in 1980-1981 to Rs. 530 quintal in 2001-2002, and for wheat the MSP increased from Rs. 130 quintal in 1980-81 to Rs. 580 quintal in 2001-02. The rise in the MSP since the mid-1990 has been sharper than the rise in consumer and wholesale price indices. Another factor in the escalating MSP is that government announces the support prices at a premium on the prices recommended by the designated Commission on Agricultural Costs and Prices (CACP) under pressure from the powerful farmer’s lobby. The excessive rise in the MSP has led to accumulation of stock and contributed to rise in market prices of wheat and rice. These are among the staple crops in India and the resultant price increase affects the purchasing power of agricultural labourers, small farmers, and cash crop growers who depend on market purchases, besides that of urban consumers. These can significantly affect poverty levels among low income earners who are not fully covered by the PDS, which provides subsidized food-grains to the identified poor (Ray, 2009).

This has been due to a steep rise in the cost of cultivation not matched by commensurate increase in the paddy prices. The predicament faced by the farmers was rendered more acute during the year of bumper harvest of 2010-11 when the market prices of paddy ruled at a level below the minimum support price (MSP). Moreover, this problem is further compounded in a scenario which prevailed in the State during 2010-11 when the market prices were below the MSP and the actual procurement by the millers was also at prices which were lower than the MSP. The present situation has risen largely due to the existing structure of procurement in the State which has an overwhelming procurement of rice through the millers and only an insignificant amount of paddy is procured from the farmers.

Rice is grown on an area of about 43 mha accounting for about 20 per cent of the total cropped area in India. The production of rice in 2007 was 93 mt. It is
projected that India needs to produce 115 mt of rice, 225 mt of food-grains and agriculture GDP growth 4 per cent by the year 2020 to maintain the present level of self-sufficiency. The future increase in rice production requires improvement in productivity and efficiency. To maintain national food security there is a need not only to increase rice production but also the efficiency to sustain self-sufficiency. (Paroda. 2000).

On the one hand, the cost of cultivation has risen in the recent times and on the other market price of rice has ruled at a level below the cost of cultivation as well as the minimum support price (MSP). Procurement operations by the State have also not provided much succour to the farmers as majority of them did not receive MSP for their produce. In the year of bumper harvest of 2010-11, the gap between the cost of cultivation and the market prices widened further. The unavailability of paddy cultivation in the State is a peculiar phenomenon as the market and institutional support which is supposed to exist for paddy much more than any other crop, except may be for wheat, is not to the desired extent.

Weak growth in food grain production and consumption, and pronounced recent market cycles, have created pressure for reform of India’s longstanding food grain policies. There has been a considerable public debate in India on the need for changes in agricultural and food grain policy, but political consensus on major reform has proved difficult to achieve.

In Karnataka the area under paddy was 13, 95,000 hectare with the production of 53, 22,000 tonnes of paddy during 2007-08. A major cause of concern is the growth rate of productivity of food grains has declined from 2.02 to 1.01 per cent in post-reform period (1991-92 onwards). Further, during pre-reform period the growth in production was positive for rice, wheat and cotton.

Traders exploit both the producers and consumers by paying unreasonable low prices to the farmers and by charging exorbitantly high prices from the consumers. The present study focuses on subsidies and tariff, cost-return structure paddy
processing and its market changes, which will have significant influence on domestic price of rice which in turn will produce its impact on production and trade of rice.

I.II) NEED FOR THE STUDY:

There has been a structural change in production and consumption parameters of rice at global and national level in relation to other cereals like wheat. A shift in consumption to animal food has further added to these changes the subsequent impact, on trade and price dimensions and a shift in favour of non-rice production has brought in demand-supply disequilibrium of rice. This problem has assumed greater significance in view of the fast growing population in the country. Rice economy in India is facing the constraints of slackening yield growth of rice and rapid depletion in the area under rice cultivation.

Decline in productivity along with high input costs has affected the supply economy of rice. Millions of paddy is regulated across the value chain. With a spurt in demand price escalation of rice with reduced supply has brought in new dimensions of the rice economy of the country. Hence, this diagnostic study of rice economy of India’s production, trade and price has been undertaken for an in-depth analysis.

I.III) STATEMENT OF THE PROBLEM:

This study examines the performance of rice economy of India in terms of production, trade and prices. Rice is the most premier, staple and extensively cultivated food crop of the world. In India, price of rice has increased by manifolds. Though, there is huge increase in domestic demand for rice, production has not increased in the same proportion to match the demand. The higher cost of raw materials has increased the total cost of processing indicating the need for increasing efficiency in procurement system. The problem of rice cultivation in the rainfed areas is accentuated due to lack of the alternative option’s i., e. technology or other policy incentives to the farmer’s to choose the better one with this back ground the study proposes to examine the trends and patterns in Indian rice in terms of production, trade and prices.
I.IV) RESEARCH ISSUES:

India’s food grain economy is one of the world’s largest one, the path India ultimately takes on food grain policy is likely to contain important implications for global markets for rice. Because, weak growth in food grain (rice and wheat) production, consumption, and pronounced recent promote cycles, have created pressure for reform of India’s longstanding food grain policies. This study examines recent developments in India’s production, trade and consumption policies for rice of prices, and analyzes the impacts of several policy changes already underway or under consideration to rebalance producer and consumer interests. India’s cereal imports trended downward between the 1970s and the late 1990s when, aided in some years by export subsidies meant at reducing surpluses, India became a major exporter of rice which is a significant aspect. India’s low average wheat and rice yields compared with other major world producers suggest that there is significant scope to further make better yields and output. Recently between 2000 and 2010 when trends in rice trade where determined not only by changes in yield growth and consumer demand, but, perhaps more importantly, by changes made in policies affecting producers and consumers. Another issue is concern about decentralized procurement, including elimination of the rice levy, indicates that decentralization will have negligible impacts on rice supply, demand, and prices. (i) What is happening to area, production and yield? (ii) Is the trend in area under paddy same across the states? Impacts on the rice market would be somewhat larger than for wheat, mostly because of the increase in rice prices. With this background and the lacunas the study proposed to examine the trend and pattern in Indian rice in terms of production, procurement, trade and prices.

I.V) OBJECTIVES OF THE STUDY:

The study envisages the following objectives:

- To study the present scenario of rice production, area expansion and productivity in India and comparing it with other major rice producing countries of the world.
To identify the factors responsible for stagnation in rice area expansion and productivity in India.

To examine the impact of trade liberalization on rice sector in relation to export, import and prices.

To assess the impact of green revolution on rice economy in India relating to production, innovation and cost of cultivation of rice.

To study the impact of policy of food security on procurement and price of rice with Indian perspective.

To examine the government policies towards rice economy of India.

To suggest policy measures the on basis of findings of the study.

I.VI) HYPOTHESIS:

- The rice production in all the countries except China is found to be statistically significant at 5% level of significance.

- There is stability in compound annual growth rate of rice exports from major exporting countries in world exports during 1991-00 and during 2001-09.

- There is no considerable variation in the rice imports in the major importing countries of rice during the period from 1991 to 2009.

- Public Distribution System in respect of rice is inadequate to meet the total consumption needs of rice of people.

- There is a trend of severe fluctuation in the share of procurement of rice for the control pool by states.

- The margin of MSP over cost of rice production is not substantial during 1999-00 to 2009-10.

I.VII) METHODOLOGY AND DATABASE:

The study is based only on secondary data collected from various sources.
Secondary Data:

The present study is based on secondary data. Time series data is used for the entire period from 1950-2013. The period covered is after liberalisation policy of 1991 to 2010 and sub-periods 1970-80, 1990-2000 and 2001-10. To examine the rice exports and imports response in major rice exporting countries under FAO and WTO regime like, India, China, Indonesia, Bangladesh, Viet-Nam, Thailand, Myanmar, Brazil, USA, and Pakistan. Major importing Countries Sri Lanka, Benin, Saudi Arabia, Oman, Kuwait, Malaysia, UAE, Canada, Cote d’Ivore, and Syrian Arab Republic.

Pre-green revolution of 1950-51 to 1965-66, and after-green-revolution of 1966-67 to 1989-90 and reform period of 1990-91 to 2011-12 are also considered. The factors like demand, supply, production, trade, prices, direction, export and import are studied. To see the rice procurement, consumption and prices response in major rice producing states under green revolution regime like, Andhra Pradesh, Haryana, Karnataka, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal, Orissa, Chhattisgarh, Bihar, Assam and on the whole all-India is considered. The trade sector is a function of domestic production, consumption, and CIF (cost, insurance, and freight) or FOB (free on board) prices. For a farm, price is model as a function of the retail price. Retail price is a function of the deflated FOB price and a time trend that captures the improvements in marketing efficiency domestic prices like, producer price, consumer price, price, minimum support price, wholesale price and world price are to be taken into consideration.

I.VII.I) Source of Data:

Data has been collected from reports of Government of India, Karnataka at A Glance, Central Statistical Organization (CSO), Economic Survey (2013-14 GOK, GOI), Ministry of Agriculture and Co-operation (Agricoop), Food Corporation of India (FCI), Commission for Agricultural Costs and Prices (CACP), International Monetary Fund (IMF), Food and Agricultural Organization (FAO), World Trade Organization (WTO), United Nations Conference on Trade Development
(UNCATD), Reserve Bank of India Hand Book of Statistics (RBI), International Food and Policy Research Institute (IFPRI), International Rice Research Institute (IRRI), Rice Board of India, Planning Commission reports, National Sample Survey Organization (NSSO), Centre for Monitoring Indian Economy (CMIE), Ministry of Commerce and Industry, Ministry of Food, and studies on different government sector reports are used for the study.

I.VII.II) Statistical Tools:

To examine the rice economy of India and its performance, Statistical tools like, Revealed Comparative Advantage (RCA) are used to measure the price competitiveness of rice. Compound annual growth rate (CAGR) for volatility and consistency co-efficient of Variation (CV) is applied, percentage, ratios, average, multiple regression are used to analyze the data. To examine the determinants of Rice Production, Producer Price, Consumer Price, Trade, multiple regression technique is applied.

I.VII.III) Period of Study:


Revealed Comparative Advantage: (RCA)

As theoretical reference, competitiveness is mainly linked to comparative advantage, which is connected to the Ricardian (classical) theory of comparative advantage and Heckscher-Ohlin (neo-classical) theory explains international trade within a two-country and two commodity world. This simple analysis becomes very difficult and even impossible when trade takes place among many countries on many commodities. To overcome this restriction Balassa (1965 and 1977) developed an index of “Revealed Comparative Advantage”. Jebuni et al. (1988) have used the
Balassa Revealed Comparative Advantage (RCA) index to analyze the comparative advantage in exports for twelve countries. Yeats (1997) studies the possible distortions in trade patterns on account of discriminatory trade barriers that are characteristic of the regional trade agreements (RTAs). He uses the index of revealed comparative advantage in conjunction with the changes in the orientation of exports to identify any apparent inefficiency in trade patterns for the Mercusor group of countries.

Balasa (1965) was the first to coin the term Revealed comparative Advantage. His measures contained only export data and the relative export share measure of RCA which is defined as, \( \text{RCA}_{wm}^{i} \left( \frac{X_{Si}}{X_{Sm}} \right) / \left( \frac{X_{Sw}}{X_{Sw}} \right) \), where \( Xs \) refers to export supply, \( i \) to the home country, \( W \) to the world and \( a \) to any particular commodity and \( m \) to all commodities. This measure is based on the assumption that commodity pattern of exports reflect relative costs as well as differences in non-price factors, and that comparative advantage can be expected to determine the structure of exports.

Some earlier works like Krishna and Raychaudhuri [1980] tend to suggest that procurement prices simply follow the trend of wholesale prices." However, in their formulation they have included cost of production along-with past trends in wholesale prices of wheat and paddy (as derived by us) as determinants of procurement prices. While the cost of cultivation takes care of the trends in factor markets the lagged wholesale prices reflect the market demand and supply situation.

Minhas and Vaidyanathan (1965) analysis method has been applied by Siddayya (2002), for studying Decomposition analysis which was carried out to measure the contribution of area and yield in total production. The theory and methodology of decomposition analysis is given as follows: The observed increase in production of a crop could be decomposed into different components, i.e. (i) change in area, (ii) change in yield and (iii) the interaction between area and yield. Further, in order to measure the contribution of area, yield and their interaction effects in the change in production.
I.VIII) RESEARCH QUESTIONS:

- What are the factors responsible for stagnation in rice area expansion and productivity?
- What is the level of procurement of paddy at the national and across the major producing states in India?
- Has the MSP for paddy increased uniformly over the years?

I.IX) LIMITATIONS OF THE STUDY

The study is limited only to secondary data. In respect of international prices of rice statistics only up-to the period of 2010-2011 have been used. The study is restricted only to few major producing countries and also across the few major producing states of India.

I.X) ORGANISATION OF THE THESIS:

The Present study has been divided into the following seven chapters.

**The first chapter is an** introduction for the research study, Objectives of the Study, Data Source and Research Methodology, Revealed Comparative Advantage: (RCA), Need for the Study, Statement of the Problem, Hypothesis, Research Questions, and Organization of the Thesis.

**The second chapter** contains review of literature on the growth, demand, supply and price analysis of rice with global and national perspectives.

**The third chapter explains with the Introduction** of global rice economy, Analysis of the rice and global economy, Trend Analysis of Rice Producing Countries During 1991-2010, share of major rice produce countries, yield per hectare and area per hectare countries in world, combined influence of production and consumer price, producer price on consumption of rice, competitiveness of international domestic prices of rice, analysis of India’s rice exports, value of exports, analysis of rice export through growth rate and co-efficient of value in quantity and value, analysis of India’s rice imports: movement in value of imports, competitiveness of Indian rice
exports: directions of major producing countries to major exporting countries, impact of trade liberalization export and import prices of rice and its trade flows and conclusion.

**The fourth chapter is devoted to** the introduction issue of green revolution on rice in India, analysis of movement in production, yield and area of India’s rice, major rice producing states in rice production, yield and area, major producing states/season-wise production, yield and area, determinants of cost of cultivation in paddy, economics cost of rice, innovation and consumption fertilizers in paddy and conclusion.

**The fifth chapter is on factual details** of export, import and prices of rice economy of India. They include, trend analysis in agricultural export and import in India, consistency of India's export performance in rice, impact of wholesale prices on rice in India, trends in wholesale price of rice food grains index in India, share of percentage, monthly index wholesale price of rice in India and concluding remarks.

**The sixth chapter deals with introduction** of analysis of background of food security on procurement and prices of rice, determinants of procurement in rice, State-wise procurement of rice from major rice producing states in India, paddy procurement for central pool in India, impact of minimum support prices, food inflation and rice, determinants of food security, consumption of rice, stock of food-grain and share of rice in the central pool, impact on information communication technology system and future challenges.

**Seven chapter deals** with Summary and conclusion on rice economy, major findings of rice economy, major policy and suggestions, perspectives for useful rice policies, impact on production, trade and prices at international and national level.
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