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IMPACT OF GLOBALIZATION ON THE AREA, PRODUCTION AND YIELD OF THE FOODGRAINS IN INDIA

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ABSTRACT

With the help of time series data pertaining to the period of 1970-71 to 2013-14, the paper attempts to assess the impact of globalization on the area, production and yield of the Foodgrains in India. To achieve the objectives of the study analytical tools like compound annual growth rate, coefficient of variation and paired sample t test have been utilized in the study. The results revealed that the reform process had significant adverse impact on the growth rate of total area under Foodgrains during post reform period. While the decline in the growth rate of production and improvement in the growth rate of yield was not found significant in the study. The improvement in production technology, land development initiatives, irrigation facilities and reduced dependence on monsoon have played vital role in the improvement of the Foodgrains yield in India during post reform period. Not only the growth rate of the yield has improved, the volatility in the growth has also reduced. The study concludes with the remarks that by improving the yield and transformation of uncultivated land into the cultivated land may bring significant improvement in the overall foodgrain scenario in India. The same should be accompanied with the efforts related to the betterment of finance, irrigation, electricity facilities and the timely and competitively priced availability of fertilizers and seeds.

Keywords: *Area, Coefficient of Variation, Compound Annual Growth Rate, Globalization, Foodgrains, Paired Sample T –Test, Production, Yield.*

I. INTRODUCTION

At the time of independence the Indian economy was characterized by huge agricultural sector which provided livelihood to almost two third of the population and accounted for nearly half of the GDP. Though the Indian economy was dominated by agricultural sector, the sector was failed to ensure self reliance in terms of food production. It was the green revolution which has taken place in Indian agriculture during the late 1960's which transformed the condition of Indian agriculture from food shortage to self sufficiency and further with the passage of time it has converted into surplus generating agriculture. The government played a major role to promote and support the farmers during the period of green revolution, almost every major input like seeds (high yielding varieties seeds – HYVS), Fertilizers, insecticides, pesticides, irrigation and electricity was government supported.

During the late 1980's and in particular in 1990-91 the Indian economy has experienced major financial crisis, which left the economy with insufficient foreign currency reserve, accompanied with huge inflation and fiscal

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deficit. In such a condition India decided to follow a new economic model known as Liberalization, Privatization and Globalization. Accordingly an array of reforms were initiated in India, leading to major changes in the economy which included devaluation of Indian currency, disinvestment and privatization of public sector units, promotion for foreign capital and technology etc. Hence the era of 1990's has been marked as an era of policy shift from the controlled economic system to the open and liberalized economic system under the structural adjustment programme. It is believed that the reforms initiated by India during 1990's were the major step of India towards the process of Globalization.

Globalization is a process of integration among nations particularly through across the nation movements of commodities, capital and technology. International Monetary Fund (2008) defines the term globalization as "globalization is a historical process, the result of human innovation and technological progress. It refers to the increasing integration of economies around the world, particularly through the movement of goods, services, and capital across borders. The term sometimes also refers to the movement of people (labor) and knowledge (technology) across international borders. There are also broader cultural, political, and environmental dimensions of globalization".

How to grow, how to improve the living standards, how to sustain in the long run are some of the basic and critical challenges which are of perennial nature for any country. Based on the distinctive nature of socio-economic-political and cultural set up, the path every country will follow would be different. However it has been well perceived all over the world that whatever the path a country chose to achieve growth, welfare and sustainability there are some basic precondition that should exist in the economy. Besides sound macroeconomic policies, these conditions include availability of capital, attractive investment environment, skilled human resource and sound technological knowhow. The same could be ascertained with greater integration with global economy. In the economic literature, this kind of integration with global economy is called "Globalization".

As a step towards the integration with global economy i.e. globalization, and the introduction of World Trade Organization in 1995, has resulted in to several structural and policy related changes in India. The need for financial strengthening has motivated the government to cut in the subsidies and price support to the agricultural sector; on the other hand the introduction of WTO has opened the doors to the more competitive global market. Almost every segment of the economic activities whether it is industrial, financial, social, external or agricultural sector all has been impacted by the same. Hence, it has been decided in this study to assess the impact of globalization on the Indian agriculture, particularly on the area, production and yield of the Foodgrains.

The study is structured into five sections. The section 1 introduces the background and central problem of the study. Objectives and methodology of the research have been discussed in section2 and 3 respectively. The analysis has been presented in the section 4 and section 5 comprises the conclusions and suggestions.

II. OBJECTIVES OF THE STUDY

There are two major objectives of the study:

1. To explore the changing pattern of the area, production and yield of the Foodgrains in India.
2. To assess the impact of globalization on the area, production and yield of the Foodgrains in India.

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III. METHODOLOGY OF THE RESEARCH

The study is based on secondary data, pertaining to the period of 1970-71 to 2013-14, collected from the Directorate of Economics and Statistics, Ministry of Agriculture. To achieve the objectives of the study the entire period has been divided into the two sub periods: Pre reform period (1970-71 to 1990-91) and Post reform period (1991-92 to 2013-14). To come up with unbiased and trustworthy results, statistical and mathematical tools of analysis like averages, compound annual growth rates, Coefficient of Variation and Paired Sample t test have been applied. Charts and graphs have also been utilized to present the information in a convenient manner. For the purpose of the study, 28 states were chosen initially. The criteria for selection of these states were the availability of data for entire study period. However, 4 states/UTs namely Andaman & Nicobar, Daman & Diu, Mizoram and Pondicherry have been dropped during the hypotheses testing to remove any extreme outliers in the study. Hence, 24 states namely Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Dadra & Nagar Haveli, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal have been selected for the hypotheses testing. Thus it has been assured that there were no extreme outlier and the distribution of differences is normal.

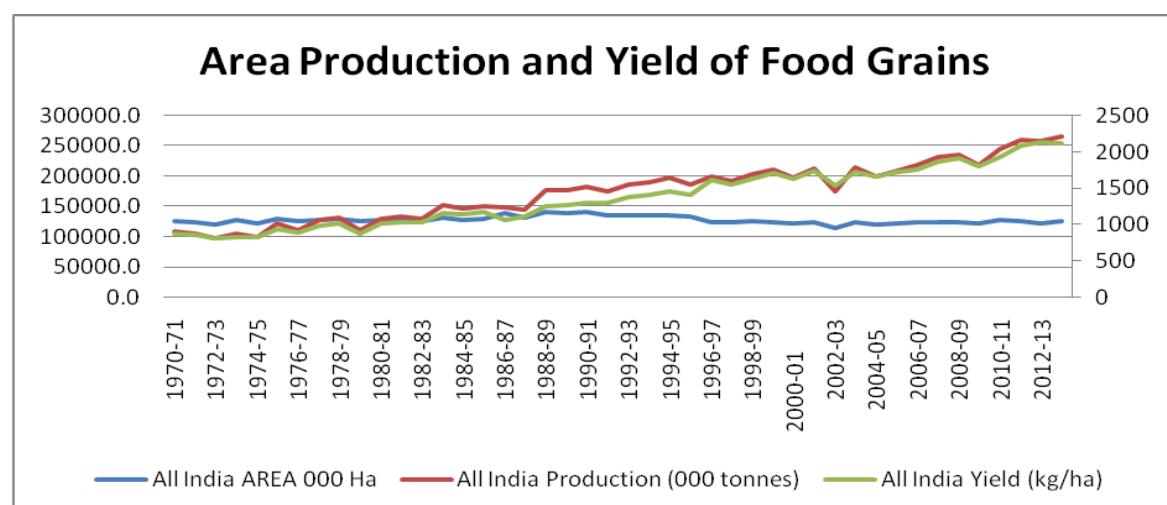
The analysis has been conducted with the help of Microsoft Excel and SPSS 20.

IV. ANALYSIS

4.1 Area Under Foodgrains

The changing pattern of area, production and yield has been illustrated with the help of chart1. One could observe that during the pre reform period the area under foodgrain production was increased from the level of 124 million hectare in 1970-71 to the 134 million tonnes in 1991-92. However, the total area under foodgrain production was found to be around 120 million hectares in 2012-13 and 125 million hectares in 2013-14 which was remarkably low as compared to the level of 134 million hectare in 1991-92, showing a decline in the area under Foodgrains during the post reform period.

Chart 1: Area, Production and Yield of Foodgrains



Author's Illustration, Data Source: Directorate of Economics and Statistics

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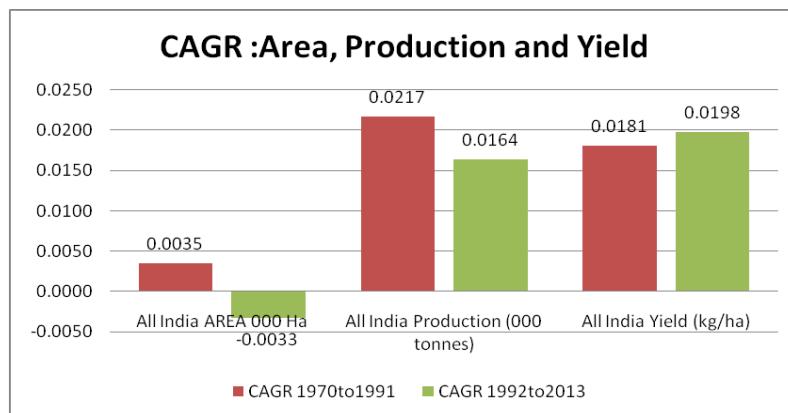
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As illustrated in the figure 1, the Compound Annual Growth Rate (CAGR) of area under Foodgrains production has declined during the post reform period. The CAGR of area was declined from the 0.35 % during the pre reform period to the -0.33 % during the post reform period, resulting into the stagnant growth in the area during the study period. Ahmed et al (2012) also observed in their study that during the post reform period the area under foodgrain production has registered a negative growth in terms of average annual growth rate. The causes can be attributed to the rapid industrialization and urbanization which has transformed a larger portion of agriculture land into the non agricultural land. With the growing population and rapid urbanization it is not possible to make unconstrained growth in the cultivated land. The efforts have been done by government to bring uncultivated land under cultivation with the help of several land development programmes. However, the same were not enough to compensate the decline in the growth are of area during post reform period.

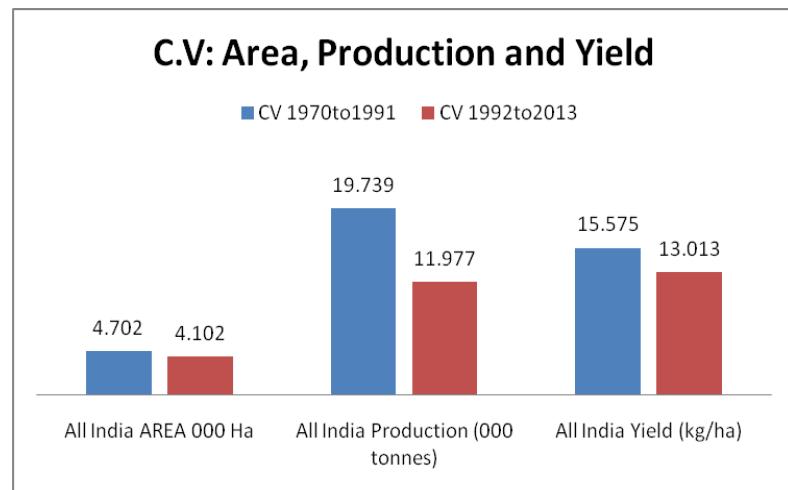
However, one thing is to be noted that the volatility in the area under Foodgrains was higher during the pre reform period as compared to the post reform period. The same has been illustrated in the figure 2. The Coefficient of Variation (C.V.) of area during pre reform period was calculated to be 4.7 % as compared to the 4.1 % during the post reform period. Hence we can say that although the area under Foodgrains has declined during the post reform period, it has been accompanied with the reduction in volatility also.

Figure1: Compound Annual Growth Rates: Area, Production and Yield



Author's Illustration, Data Source: Directorate of Economics and Statistics

Figure 2: Coefficient of Variation: Area, Production and Yield



Author's Illustration, Data Source: Directorate of Economics and Statistics

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In such a situation one could speculate that the reforms have resulted into the significant decrease in the area under Foodgrains. Being a study of economics the study is interested in the significance of the difference between CAGR of area during pre and post reform period. Accordingly null and alternative hypothesis have been stated below:

H0: There is no significant difference between the CAGR of area during pre and post reform period.

H1: There is significant difference between the CAGR of area during pre and post reform period.

After being assured that all the assumptions have been met, the study utilized paired sample t test to test the hypotheses stated above. As stated in the section 3 the test is based on CAGR values of 24 selected states. The results revealed that at 5 % level of significance and 23 degree of freedom the probability value of p was calculated to be 0.006. Hence the null hypothesis cannot be accepted, indicating that there is significant difference between the CAGR of area during pre and post reform period. In other words the pace of growth of area under foodgrain production has significantly decreased during the post reform period. The study revealed that significant adverse impact of globalization has been experienced in terms of area under foodgrain production.

4.2 Production of Foodgrains

It could be easily observed from the chart 1 that the foodgrain production has registered a remarkable growth from the beginning. The total foodgrain production has grown from 108.4 million tonnes in 1970-71 to the level of 173.8 million tonnes in 1991-92 and further to 265 million tonnes in 2013-14. However, in terms of CAGR the growth in the production of Foodgrains during the post reform period was just 1.64 % as compared to the CAGR of 2.17% during pre reform period. A similar study by Ahmad et al (2012) has also observed that new economic policies have resulted into the deceleration of growth in Foodgrains production. After 1991, the cost of fertilizers, seeds, irrigation and electricity etc. has increased and it becomes difficult for the small farmers to purchase it and consequently total Foodgrains production declined Ahmad et al (2012). The shift of cultivated land from the Foodgrains to the more remunerative cash crops has also been instrumental in this process. The decline in the growth rate of foodgrain production may also be caused by relatively low prices of Foodgrains in the international market.

The calculated coefficient of variation reveals that although the production of Foodgrains has declined, it was more moderate during the post reform period. The calculated C.V. of foodgrain production has been improved from the pre reform level of 19.7% to the post reform level of 11.9%.

It is obvious to think that reforms have resulted into the significant adverse impact on the foodgrain production. To test the preposition stated above a null and alternative hypothesis have been formed below:

H0: There is no significant difference between the CAGR of Production during pre and post reform period.

H1: There is significant difference between the CAGR of Production during pre and post reform period.

The results revealed that at 5 % level of significance and 23 degree of freedom the probability value of p was 0.061. Hence the null hypothesis cannot be rejected, indicating that there is no significant difference between the CAGR of production during pre and post reform period. In other words although during the post reform period the growth of production has been decreased as compared to pre reform period, it was not significant. Hence it

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could be reported that reforms do not have any significant impact on the growth of foodgrain's production in India.

4.3 Yield of Foodgrains

As discussed earlier, despite the decline in area and production of Foodgrains, the yield of Foodgrains has shown remarkable improvement during the post reform period. The yield was improved from the level of 872Kg/Ha in 1970-71 to the level of 1295 Kg/Ha in 1991-92. It has reached the level of 2120 kg/ha in 2013-14, making it remarkably high as compared to yield achieved during the post reform period. The calculated compound annual growth rate (CAGR) of yield has revealed that during the post reform period India has experienced slightly better growth in yields as compared to pre reform period. The CAGR of yield during post reform period was calculated to be 1.98%, while the same during the pre reform period was 1.81%. The improvement in production technology, land development initiatives, irrigation facilities and reduced dependence on monsoon have played vital role in the improvement of the Foodgrains yield in India during post reform period. Not only the growth rate of the yield has improved, the volatility in the growth has also reduced. The coefficient of variation during the post reform period remained remarkably low at 13% as compared to the pre reform period when the C.V. was calculated to be 15.5%.

It is clear now that at least in terms of yield, India has experienced positive impact of reforms in foodgrain's production. The study however, is interested to know the significance of this impact. For this very purpose a null and alternative hypothesis have been formed below:

H0: There is no significant difference between the CAGR of Yield during pre and post reform period.

H1: There is significant difference between the CAGR of Yield during pre and post reform period.

To test the hypothesis stated above, paired sample t test has been applied in this paper. The results revealed that at 5% level of significance and 23 degrees of freedom the probability value of p was 0.136. With the p value of 0.136, the null hypothesis cannot be rejected. Indicating that, there is no significant difference between the CAGR of Yield during pre and post reform period. Hence, it could be reported that although the growth rate of yield and volatility in the same has improved remarkably, reforms do not have any significant impact on the yield of Foodgrains in India.

V. CONCLUSIONS AND SUGGESTIONS

With the help of time series data pertaining to the period of 1970-71 to 2013-14, the paper has examined the impact of globalization on the area, production and yield of the Foodgrains in India. To achieve the objectives of the study analytical tools like compound annual growth rate, coefficient of variation and paired sample t test have been utilized. The study observed that during the study period 1970-71 to 2013-14, all the three parameters area, production and yield have increased in absolute figure. However the rate of growth during the pre and post reform period was different. Area and Production have experienced the decline in the compound annual growth rate during the post reform period. This decline was accompanied with decline in volatility also, as revealed by relatively small value of coefficient of variation during the post reform period.

The yield of Foodgrains has shown remarkable improvement during the post reform period. The calculated compound annual growth rate (CAGR) of yield has revealed that during the post reform period India has

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experienced slightly better growth in yields as compared to pre reform period. India has experienced relatively less fluctuations in the yield during the post reform period. The improvement in production technology, land development initiatives, irrigation facilities and reduced dependence on monsoon have played vital role in the improvement in the yield of Foodgrains during post reform period. Not only the growth rate of the yield has improved, the volatility in the growth has also reduced.

The results of paired sample t test have revealed that the reform process has significantly adversely affected the growth rate of total area under Foodgrains during post reform period. While the decline in the growth rate of production and improvement in the growth rate of yield were not found significant in the study. On the basis of findings, the study concludes with the remarks that although reforms have led to the remarkable improvement in the Foodgrains yield, it was the significant decline in the area under Foodgrains which resulted in to the decline of growth rate of Foodgrains production during the post reform period. By improving the yield and transformation of uncultivated land into the cultivated land may bring significant improvement in the overall foodgrain scenario in India. The same should be accompanied with the efforts related to the betterment of finance, irrigation, electricity facilities and the timely and competitively priced availability of fertilizers and seeds.

VI. ACKNOWLEDGEMENT

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