INTRODUCTION

Agriculture in India dates back to the time of Indus Valley Civilization. Ever since it has continued to be the leading occupation and the mainstay of the population of the country. About three fourth of the country's population lives in rural areas and carries out agricultural activities.

The present work is a study of the regional patterns of agricultural productivity, levels of regional development and their inter relationships as they obtain in the state of Bihar. The study examines regional patterns of agricultural productivity in the area under study and analyses their socio-economic and environmental correlates which are likely causes of spatial variations in agricultural productivity. Agricultural productivity is viewed as a measure of efficiency with which the agricultural system in the region works. As, such variations in the agricultural productivity reflects disparities in the use of agricultural resources in the area at the level of districts. Since agriculture is the mainstay of the economy of the region, where about 80 percent of the population is directly or indirectly engaged in agricultural activities, differences in the agricultural productivity may be taken as the differences in the economic progress of the region. In other words, if it is presumed that economic and social development go hand in hand, the agricultural productivity in the region can be taken as the major component of the regional development.

In the regional analysis of development one comes across regions
which are well developed and the people in such region enjoy reasonable standard of living while in others, resource utilization and development is low owing to historical circumstances or otherwise, resulting in the underdevelopment of the region whereby people have a poor standard of living. The problem of imbalance in regional development thus assumes a great significance. Regional development, therefore, is interpreted as intra-regional development designed to solve the problems of regions lagging behind. The first connotation of regional development is economic in which the differences in growth, in volume and structure of production, income, employment are taken as the measure of economic progress. However, recently it has been argued that merely economic criteria can not explain the level of development which is a multidimensional concept. Therefore, such variables or criteria should also be employed which indicate progress on technological, social and cultural fronts. Thus development means progress throughout the society. However, at the base of development process lies progress in different sectors of the economy.

Regional development in an overwhelmingly agricultural situation can only be achieved by developing agriculture and reducing gaps between regions with regard to the efficiency of the agricultural system. Progress in agriculture releases resources, labour as well as capital for use in industry and services. Progress in agriculture also leads to the modernization and social development and better level of living through education and generating propensity to consume other than agricultural goods.
Progress in agricultural productivity and levels of development may thus be hypothesized to interrelated. Testing of this hypothesis in the area under study is the crux of the research problem. Findings of this research may help to design plans and formulate policies for the development of the area in general and reducing regional disparities at micro level in particular.

The objective of the study as stated earlier is to delineate areas of high and low agricultural productivity, to delineate regions at varying levels of development and to examine the relationship between the agricultural productivity and the levels of development.

Agricultural productivity is calculated by using data on area and production of all the important crops grown in the region. The present study is based on secondary source of data for the year 1980-81 and 1990-91. The data for the calculation of productivity indices are obtained from Directorate of Statistics and Evaluation, Govt. of Bihar, Patna. A District has been taken as the unit of study. In order to analyse and measure levels of development a large number of variables relating to agricultural development, urbanization and industrialization, infrastructure and amenities and social development are also taken from Directorate of Statistics and Evaluation, Govt. of Bihar, Patna for the year 1980-81 and 1990-91. The area under study is a large region consisting of 31 districts in 1981 and 42 districts in the year 1991. This state has three distinct geographic regions, the North Bihar plains, the Central or South Bihar plains, and Southern Chotanagpur Plateau. The total geographical area of the state is 17.35 sq. km., with
a population of 86.3 million (Census 1991), and a high population density of 497 persons per sq.km.

Agriculture occupies an important place in the economy of India and more especially in the state like Bihar, where agriculture plays a dominant role as it not only provides food to 86.3 million persons but also supplies raw materials to numerous agro-based industries. About 80 percent of the total working population is directly or indirectly employed in agriculture. The increase in income levels and improvement in the quality of life of the majority of people in the rural areas is possible only by improvement of agricultural production and productivity, particularly small and marginal farmers. In Bihar agriculture is mainly of intensive subsistence type. Owing to great pressure of population, the average size of land holding is 0.93 hectares. There is an intense fragmentation of holdings and nearly 80 percent of land holdings are less than 2 hectares accounting for 30 percent of the total operational area.

In the present study two analytical concepts of agricultural productivity and level of regional development are used. So far as agricultural productivity is concern there is not a single universally accepted method of measuring agricultural productivity. Different scholars have used different numerical methods to measure levels of agricultural productivity, at small areal units. In this study two methods of measuring agricultural productivity have been used. These are agricultural output per hectare of cropland (price weighted) and the methodology as given by W.Y. Yang. Regional development in the
present study is measured on the basis of twenty variables. This is measured by factor analysis because loadings of variables on a factor (dimension) are their weights which are derived from their factual interrelationships. Factors are subjected to rotation to some theoretical criteria to make the factor structure more interpretable. The hypothesis of relationship between agricultural productivity and levels of development is tested by using coefficient of product moment correlation \((r)\) and coefficient of determination \((r^2)\).

Computation for these analysis was carried on Aligarh Muslim University's Vax-11 computing system which involves following steps:

1. Computation started with the transformation of original data matrix \(D\) for \(n\) observations on \(m\) variables into a standard score matrix \(z\) of \(n \times m\) order.

2. From \(Z\) matrix \(m \times m\) order correlation matrix \(R\) was calculated which contained product moment correlation co-efficients.

3. This correlation matrix was resolved into a factor matrix \(A\) of \(m \times r\) where \(r\) was number of fact extracted. The program employed can extract as many factors as the number of variables. Therefore, in the first instance all the factors were extracted. Histogram of the cumulative percentages of the variance explained by the successive factors and cumulative number of factors was constructed. By inspecting rate of change in the explanation of variation by factors. Number of factors
to be retained was determined.

4. Since original variables retained were not readily interpretable, the factor loading matrix $A$ was rotated according to normal varimax criterion to reproduce a new factor loading matrix. The criterion employed rotated the factor matrix to such a position where a minium possible number of variables loaded high on each factor. The factor structure, thus, became simpler and easily interpretable.

5. From the matrix multiplication standardized score matrix of $n \times m$ order and rotated factor matrix $A$ of $m \times r$ order, a factor score matrix $A$ of $m \times r$ order, a factor score matrix $F$ of $m \times r$ order was obtained. Factor scores were then standardized to zero mean and unit variance. These factors scores provided a measure of position of each district on the new factors.

The present work besides introduction and conclusion has been grouped into six chapters. Chapter one tries to sum up the geographical setting of Bihar, with reference to relief, drainage, climate and soil. In chapter two conceptual framework of agricultural productivity and the methodology of measurement of agricultural productivity is given. In the third chapter focus is onto regional development elucidating concepts of regional development and its measurements. The chapter four deals with the pattern of agricultural productivity. Dimensions of regional development are analysed in the fifth chapter. The sixth chapter
of the thesis is devoted to the analysis of relationship between agricultural productivity and regional development. In the conclusion suggestions have been made to minimize the regional disparities in the levels of agricultural productivity and regional development in the area under study.