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## Using Kendall's Co-Efficient Index Method for Agricultural Development in Ahmednagar District, M.S, India

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### Abstract

This research paper is based on secondary data sources, the statistical data taken primarily from Statistical Bulletin of Ahmednagar district. Thirteen factors have been considered for making Agriculture Development of Ahmednagar District according to the tehsils. Using Kendall's ranking co-efficient index with the composite score is the method adopted. Using Composite Score method for agriculture development, based on 10 parameters as well as the level, spans three types: high, medium and low. Geographical, socio-economic, political and technological factors affect the development of agriculture, preventing it in a particular geographical region completely or in a geographical region as a whole.

**Keywords:** Cropping intensity, Kendall's ranking co-efficient index, Composite Score, Agricultural development, Ahmednagar District.

**Contribution/Originality:** This study focuses on using Kendall's Co-Efficient Index Method for Agricultural Development in Ahmednagar District, M.S, India

### Introduction

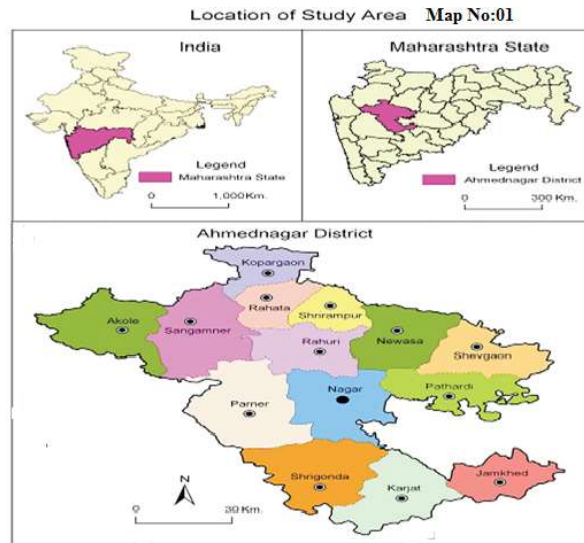
The physical, economic, social, economic and political factors affecting the agricultural progression and geography, considered as important factors in countries like India is known as gambling. This is because if the weather is the right factor, then the agricultural production and farming are done properly, and if the weather is not right, or if the geographical factors do not support it, then agriculture cannot develop. More the input, more the output. Although these

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inputs and outputs are important, weather is a factor. Maharashtra is basically an agricultural state. Indian economy is centered on agriculture. About 58.2 percentage of Indian population is directly and indirectly dependent on agricultural sectors. The most important reason for the increasing population pressure on the agricultural sector is the growing population and the declining proportion of agriculture (Deepak, 2021). The agro- sectors contribute nearly 14.4 percentage of Gross Domestic Product of India (2012). Agricultural development improves social and cultural development due to an increase in per capita income (Kazma Khan & Lubna Khalil, 2003). In addition to the geographical factors for agricultural development, economic factors, technology, social and political factors are also required. It is necessary to provide input to all the factors, mainly, agriculture, irrigation, fertilizer center, labor supply, various machinery. Human Resources are considered to be an important factor for the development of agriculture as they are directed by literacy and knowledge. At the same time, the chemicals used in agriculture contribute to the pollution, which mainly includes soil pollution and water pollution, and these pollutants have adverse effects on the environment and human health. Therefore, it has been decided to conduct research on agriculture development in Ahmednagar district. For this, the above mentioned factors have been considered. The agricultural development in Ahmednagar district depends on these factors.

### **Study Area**

Ahmednagar district is the largest district in Maharashtra. The geographical location of the area is 18° 20' and 19° 59' north latitudes and 73° 40' to 75° 43' east longitudes (Map.1). Ahmednagar district has a geographical extent of 17,048 square km and covers 14 taluks. The average rainfall of the district is 578 mm. The average temperature is 40 ° C and the minimum temperature is 11.7 ° C. As per 2011 census, the total population of Ahmednagar district is 45, 43,083 and the population density of this area is 266 per sq.km.



### Aims and Objectives

The main objective of this research is to calculate the extent of development of agriculture in Ahmednagar district using Kendall's ranking co-efficient method. The objective of the study is to find out what are the favorable factors for agriculture development and what is the situation in Ahmednagar district for agriculture development.

### Data and Methodology

The research paper is based on secondary data which has been obtained from the Socio-economic abstract, government publication Ahmednagar district. All the data was suitably converted into tables drawn for analysis of the agricultural development of the study area.

The use of remote sensing and GIS methods is leading to a large collection of agricultural information (Deepak, 2021). The Kendall's ranking co-efficient index method (1939) is used to determine the level of agricultural development in the study area. Firstly, he calculated the percentage of all variables followed by marking the highest to the lowest values and then, remarking the numbers according to the ranks and lastly, summing the rank of all variables. Thus, the co-efficient index is calculated. The condition of agricultural development in Ahmednagar district also depends on ten factors which are mainly as follows.

X1=Percentage of Cross cropped area; X2=Percentage of Irrigated area; X3 =Percentage of Number of Tractors; X4=Percentage of Literacy; X5=Percentage of Iron Plough; X6= Use of

electricity for agriculture in Percentage; X7= Number of agricultural credit society in Percentage; X8= Use of fertilizers for agriculture in Percentage; X9 = Number of Electrical Pump used for irrigation in Percentage; X10= Percentage of Major cash crops (Grapes, Sugar cane, Onion and other Vegetables). The progressions made by Kendall's Co-efficient index method have been charted on the basis of the ten factors which have been considered for the development of agriculture in Ahmednagar district. In this study area, the level of agriculture development is also dependent on ten factors. In order to find out the level, there are basically three main types: high level, low level and moderate level.

$$\text{Kendall's Co-efficient Index} = \frac{\sum R}{N}$$

Where,

$\sum R$  = Sum of rank

N= Numbers of variable

### Results and Discussion

In this study session, the development of agriculture depends on ten factors. These entire variables are shown in the table no 01, 02 and 03. There are ten variables in agricultural sector: firstly, he calculated the percentage of variables followed by ranking and then, the calculation of the co-efficient index.

**Table No. 1: Spatial Distribution of Agricultural Development in %**

Tehsil%	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
Akole	8.1	1.9	3.768	6.85037	13.7	6.55	3.846	5	1.853	2.83
Jamkhed	6.4	2	1.955	6.68419	4.49	2.66	3.846	0.03	1.994	2.25
Karjat	8.7	1.8	4.277	6.81966	5.09	3.47	1.362	4.41	8.45	1.99
Kopargaon	5.3	4.7	20.89	7.34168	1.94	42.9	9.215	7.79	3.153	9.06
Nagar	10	21	2.661	7.92692	2.74	9.19	8.814	5.79	11.25	0.49
Nevasa	11	6.1	9.714	7.19627	9.78	4.31	10.66	15.1	14.31	21.7
Parner	1.3	5.8	5.383	6.9452	19.5	4.32	8.413	4.5	6.305	6.35
Pathardi	8.2	4.2	3.367	6.84404	7.32	2.52	6.731	4.24	6.994	3.67

Rahata	4.9	8.1	9.015	7.54669	3.86	3.25	6.01	7.03	6.621	6.94
Rahuri	5.8	6.4	4.059	7.27846	3.71	2.9	8.734	9.51	10.78	16.6
Sangamner	9.5	4.9	20.88	7.28478	3.34	5.18	10.82	10.8	10.03	17.4
Shevgaon	7.5	20	10.02	6.79708	16.9	6.12	5.849	7.92	3.217	1.35
Shrigonda	9.6	5.2	0.889	6.95242	5.87	2.6	10.18	7.73	7.528	5.51
Shrirampur	3.9	7.8	3.116	7.53224	1.8	4.03	5.529	7.54	7.515	3.85

Source: Compiled by the author

### Agricultural Development

The ten variables from the calculated level of agricultural development have been taken into account for measuring. Using the data above 10 indicators, the co-efficient index is calculated for each tehsil which are shown in the table no.02. Based on its evaluation, the agricultural development has been classified into three categories: high, medium, low. Table no.03 and map no.02 indicate the classes of agricultural development in each tehsil of the study area.

1. **High Level Development:** Only one of the tehsils come under this category in Nevasa. A lot of variables dominate in this tehsil. These tehsils achieved high agricultural development due to the agricultural infrastructure. It includes cross cropped area (X1), use of fertilizers for agriculture in Percentage(X8), number of electrical pump used for irrigation (X9), major cash crops(Grapes, Sugarcane, Onion and other Vegetables X10). These facilities stand first on availability in the Nevasa tehsil, followed by the agricultural credit society(X7). Agricultural infrastructure is well developed in this tehsil because they share 5 out of 10 variables, due to high level development of agriculture. These cash crops give a satisfactory profit to farmers.

**Table No 2: Ranking Co-efficient Index**

Name of the Tehsil	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	€Rank	Co-Efficient Index
Akole	7	13	9	10	3	3	12	10	14	10	91	9.1

Jamkhed	9	12	13	14	8	12	13	14	13	11	119	11.9
Karjat	5	14	7	12	7	9	14	12	5	12	97	9.7
Kopargaon	11	10	1	4	13	1	4	5	12	4	65	6.5
Nagar	2	1	12	1	12	2	5	9	2	14	60	6
Nevasa	1	6	4	7	4	7	2	1	1	1	34	3.4
Parner	14	7	6	9	1	6	7	11	10	6	77	7.7
Pathardi	6	11	10	11	5	14	8	13	8	9	95	9.5
Rahata	12	3	5	2	9	10	9	8	9	5	72	7.2
Rahuri	10	5	8	6	10	11	6	3	3	3	65	6.5
Sangamner	4	9	2	5	11	5	1	2	4	2	45	4.5
Shevgaon	8	2	3	13	2	4	10	4	11	13	70	7
Shrigonda	3	8	14	8	6	13	3	6	6	7	74	7.4
Shrirampur	13	4	11	3	14	8	11	7	7	8	86	8.6

Source: Compiled by the author

2. **Medium Level Development:** The medium level categories include the 8 tehsils: Shririgonda, Shevgaon, Sangamner, Rahata, Rahuri, Kopargaon, Nagar, Parner. These tehsils achieved medium agricultural development due to dominance of three to five variables of agricultural development. Main factors for medium agricultural development in these areas are the increasing area under cash crops and developing agricultural infrastructure.

3. **Low Level Development:** This category consists of five tehsils i.e. Shrirampur, Pathardi, Karjat, Jamkhed and Akole tehsil. Each tehsil holds different variables in position e.g. Shrirampur tehsil. In spite of the effects of Pravara lift canal on agricultural irrigation, other agricultural aspects are not well developed. In the Pathardi, Karjat and Jamkhed tehsils, all agricultural variables are not in a good position as all these regions in Ahmednagar district are drought prone and Akole tehsil is hilly with tribal settlements. This whole area has been characterized by adverse conditions like hilly, poor soil, less accessibility and low income of farmers with insufficient irrigation facilities. All these adversely affect the overall agricultural

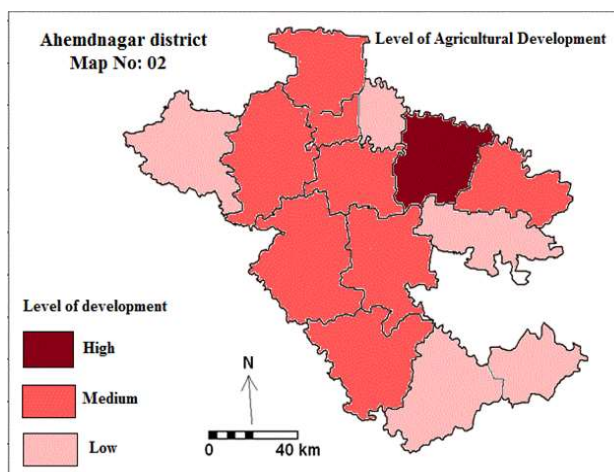
development.

**Table No 3: Type of Agricultural Development**

Co-efficient Index	Level	Name of Tehsils	Number of Tehsils
0-4	High	Nevasa	01
4-8	Medium	Shrirgonda, Shevgaon, Sangamner Rahata, Rahuri, Kopargaon, Nagar, Parnar	08
Above 8	Low	Shrirampur, Pathardi, Karjat, Jamkhed, Akole	05

Source: Compiled by the author

**Map No 02: Level of Agricultural Development**



**Conclusion**

The development in any region taken for the study here is influenced by five basic factors: First, the Physical resources; second lies the degree of technological advancement; the third being the Social structure; fourth is the Economic setup and finally, we have the Polity. The present study reveals that agricultural development is not well distributed in the region. Majority of tehsils come under medium agricultural development. It lies in the central, eastern and southern parts of the study area, where physical and environmental is unfavorable and agricultural infrastructure remains underdeveloped. The Nevasa, with many agricultural infrastructural facilities, is the highly developed tehsil. The low agricultural area is bound to focus on the betterment of irrigation, agro-based industries, agro-tourism etc. Akole is best

suited for tourism development, because of which many fundamental facilities are brought in to enhance tourism. Sufficient attention is necessary for market incentives especially in the medium development region. In the scarcely developed region, the agricultural facilities, animal husbandry and developed irrigation amenities should occupy the development stream in a collective format. In addition to the above mentioned aspects, post-harvest management and marketing linkages are important for overall development of agricultural region. For this purpose, creating awareness among the farmers is indeed a necessity in the underdeveloped regions (based on agro-development). Government should promote irrigation facilities and other agricultural infrastructure for sustainable development of agriculture in this region.

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