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Level of agricultural performance in Ahmednagar District: A geographical analysis

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Abstract

Agricultural productivity is closely linked with technological change in farming. This study examines the relationship between agricultural technology and agricultural performance in Ahmednagar district using primary and secondary information. The analysis considers the role of improved farm practices, irrigation technologies, inputs and other technological facilities in shaping agricultural performance. The findings indicate a positive association between agricultural technology and agricultural performance in the study region.

Keywords: Agricultural performance, agricultural technological

Introduction

Agricultural productivity provides an important measure of the overall agricultural condition of a region and is useful for rural-development planning. Agriculture continues to occupy a major position in the Indian economy, while pressure on cultivated land makes improvement in productivity increasingly important. Productivity is shaped by physical, socio-economic, technological and organizational factors. Weather conditions, economic limitations and conventional farming practices may restrict the adoption of improved technology and thereby influence production. Such differences contribute to spatial inequalities in agricultural productivity (Singh and Dhillon, 2000). Agricultural productivity can therefore be understood as the extent to which the physical, social, cultural, economic, technical and organizational characteristics of a region are utilized for agricultural production (Singh S., 2012)).

Singh, Jasbir, *et al.* (1990) proposed a weighted composite approach for assessing agricultural performance. The present study applies this method to Ahmednagar district and examines differences among the tahsils for the selected period.

Study Area

The present study Ahmednagar district has been selected as a study area. It extends between 18° 20' and 19° 59' north latitudes and 73° 40' to 75° 43' east longitudes located in part in the upper Godavari basin. The district is very dense in shape and length of 200 km. a width of 210 km. This study region is divided into there are three physical divisions namely, first Sahyadri moutons ranges i.e. Kalsubai, Adula, Baleshwar and Harishchandragad, second Plateau third plains area. The Godavari, Bhima River is the main rivers in this district with the major tributaries are Paravara, Mula, Sina, Dhora, Kukdi ect. And the recharge (water available) of rivers is mainly depending on rainfall in western ghat. Ahmednagar district occupies 17,048 square km geographical area. The administratively there are divided into 14 tahsils. The average annual rainfalls is 578.8 mm. (22.79") and mean daily maximum temperatures is 39 °C and mean daily minimum temperature is 11.7° C. In study region 71.10 percent area under cultivation area out of them 32.40 percent is irrigated and 67.60 percent rain fed or rain shadow area. According to 2011 census population is 45, 43,083 in which male and female are 2,348,802 and 2,194,281 correspondingly. The density of population was 266 persons per square kilometers.

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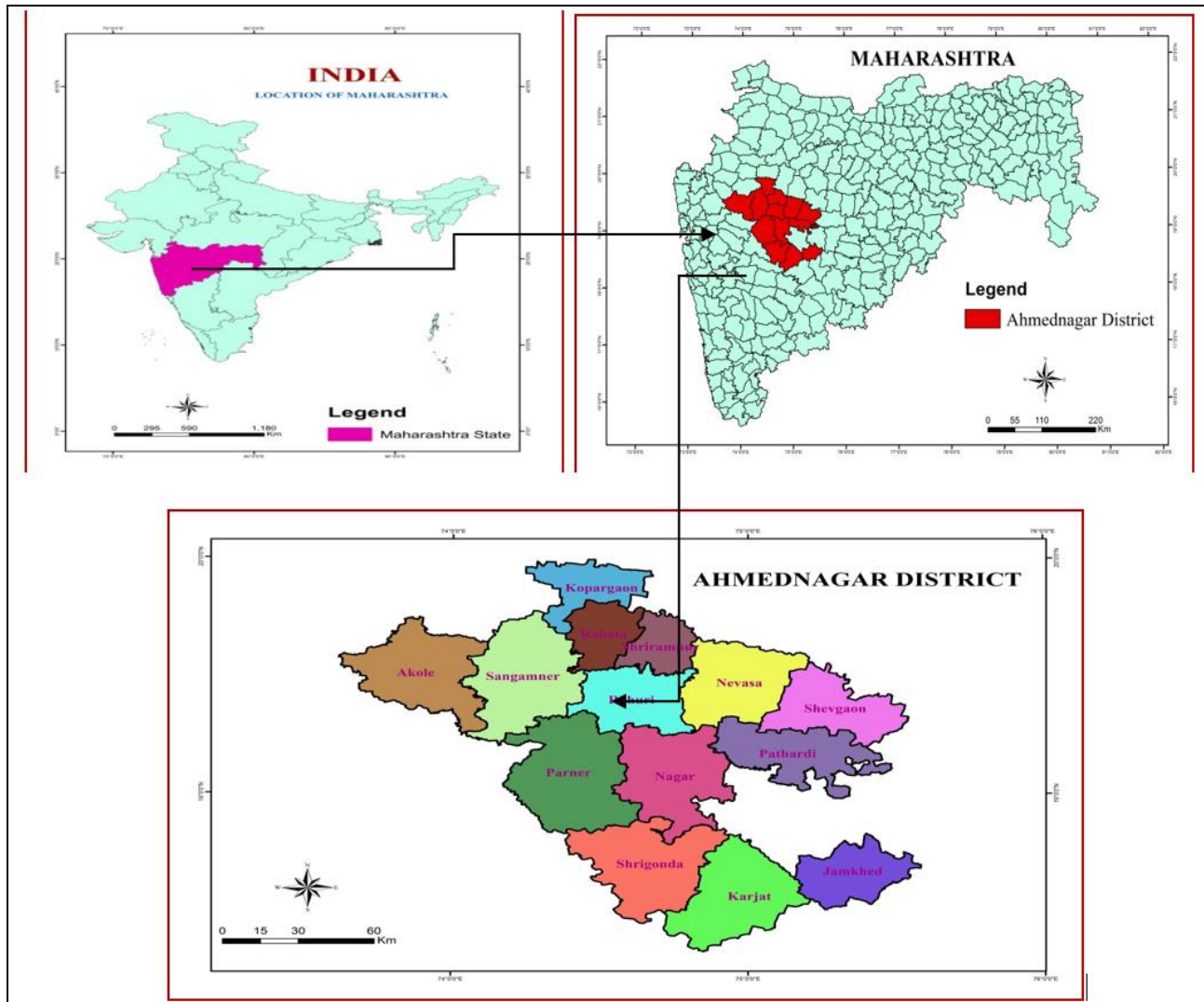


Fig 1: Location Map of Ahmednagar District, Maharashtra, India

Objectives

1. To Study the Spatio-Temporal Pattern of Level of Agricultural Performance in Study area
2. To Analysis the Absolute Change in Level of Agricultural Performance in Study area
3. To Find out the Impact of Agricultural Technology on Agricultural Performance in Study area

Database: The research is based on primary and secondary information covering 1991-2015. District Gazetteers were consulted for background and historical data. Information on farm implements, fertilizers, pesticides, polyhouses, farm ponds, drip and sprinkler irrigation and Jalyukt Shivar was obtained from the District Superintendent Agricultural Office and the Agricultural Department of Zilla Parishad, Ahmednagar. Data on cold-storage facilities came from the

District Industry Office. Information concerning modern farm machinery and agricultural technology was compiled from the Directorate of Agriculture, Ahmednagar, Socio-Economic Reviews and Zilla Parishad records. Primary information was collected through stratified random sampling. Published and unpublished research studies were also used. The collected material was organized through tables and maps and interpreted using appropriate analytical procedures.

Methodology

The regionalization of agricultural performance follows the quantitative procedure developed by Jasbir Singh *et al.* (1990). The weighted composite level of agricultural performance is used to compare the position of each talhsil with the district as a whole.

$$V_w = \frac{Y_{ae}}{Y_{ar}} \times \frac{P_{ae}}{P_{ar}} + \frac{Y_{be}}{Y_{br}} \times \frac{P_{be}}{P_{br}} + \frac{Y_{ce}}{Y_{cr}} \times \frac{P_{ce}}{P_{cr}} + \dots + \frac{Y_{ne}}{Y_{nr}} \times \frac{P_{ne}}{P_{nr}} = \sum LQs$$

Where, V_w denotes weighted composite index of regional inequality in agricultural performance; Y means crop-yield of crop 'a' in kilograms per hectare; P implies cropland occupancy of crop 'a' in percentage of gross cropped area; a, b, c subscripts denote crops considered; e and r subscripts denote enumeration unit (talhsil) and entire region (district)

respectively.

The summed up location quotients (LQs) were divided by the number of crops considered in the enumeration unit and multiplied by 100 to obtain the Weighted Composite Level of Agricultural Performance. The abridged equation is:

$$\text{Weighted Composite Level of Agricultural Performance} = \frac{\sum LQs}{N} \times 100$$

Results and Discussion

A) Spatio-Temporal Pattern of Agricultural Performance

Table 1.1 shows considerable spatial variation in agricultural performance. The composite index ranges from 41.43 to 221.81 in 1991 and from 50.14 to 173.29 in 2011. For both years, tahsils are grouped into high, moderate, low and very-low categories using the mean and standard

deviation.

In 1991, Shrirampur and Rahuri occupied the high-performance category, with values above 159.52. Fertile soils, surface irrigation and agro-based activities are identified as factors supporting farm investment and the use of improved seeds and implements. Sangamner, Rahata, Shevgaon and Jamkhed fell in the moderate group, between 113.01 and 159.52.

Table 1.1: Composite Index of Agricultural Performance in Ahmednagar District, 1991 and 2011 (Based on Jasbir Singh's Method)

Sr. No.	Name of Tahsils	1991	2011	Absolute Change in Composite Index of Agricultural Performance in 1991 and 2011
1	Akole	41.43	70.97	29.54
2	Sangamner	133.21	144.95	11.74
3	Kopargaon	110.87	171.07	60.20
4	Rahata	142.23	173.29	31.06
5	Shrirampur	185.09	132.27	-52.82
6	Newasa	109.89	125.30	15.41
7	Shevgaon	123.48	136.15	12.67
8	Pathardi	83.39	101.55	18.16
9	Nagar	90.61	50.14	-40.47
10	Rahuri	221.81	153.38	-68.43
11	Parner	86.49	91.09	4.60
12	Shrigaonda	75.36	87.24	11.88
13	Karjat	56.72	52.50	-4.22
14	Jamkhed	121.60	122.54	0.94
Mean		113.01	115.18	2.16
SD		46.51	39.09	-7.42

Source: Compiled by the researcher on basis of Z.P. Agricultural Department, 2012 and Socio-Economic Abstract of Ahmednagar District, 1991 and 2013.

Kopargaon, Newasa, Pathardi, Nagar, Parner and Shrigonda were placed in the low category, with index values from 66.50 to 113.01. Akole and Karjat formed the very-low group. The study relates their lower performance to hilly

and uneven terrain, shallow soils, limited surface irrigation, lower fertilizer consumption, restricted HYV coverage and inadequate modern farm equipment.

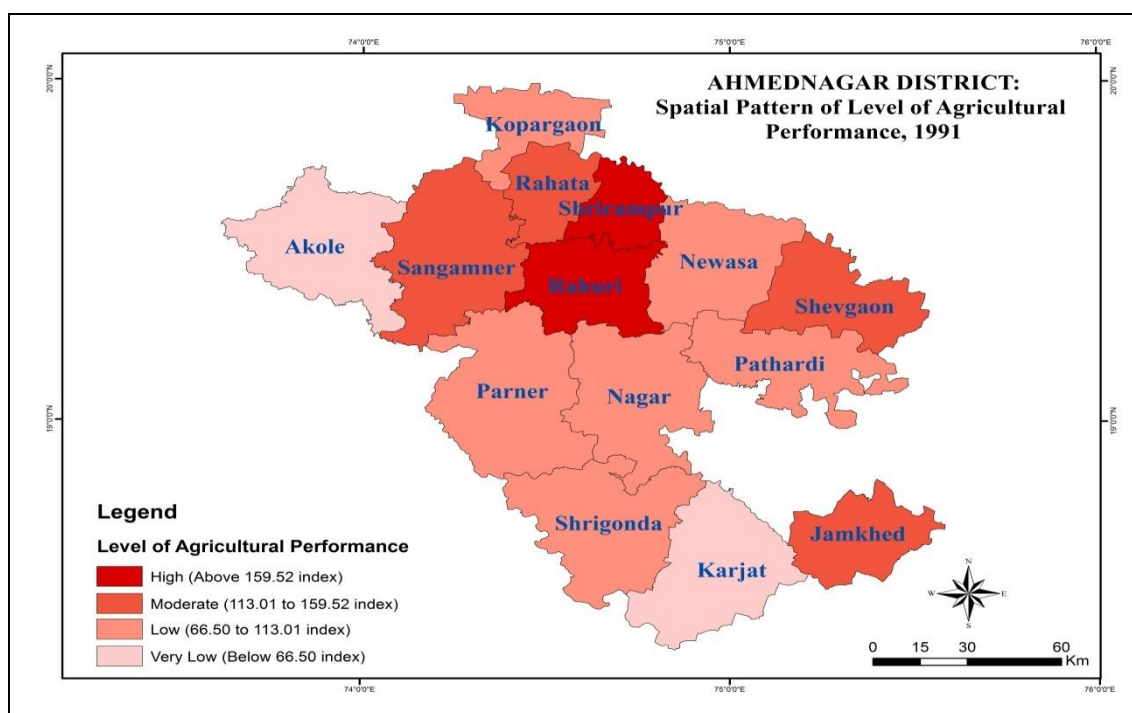


Fig 1.2: Spatial Pattern of Level of Agricultural Performance in Ahmednagar District, 1991

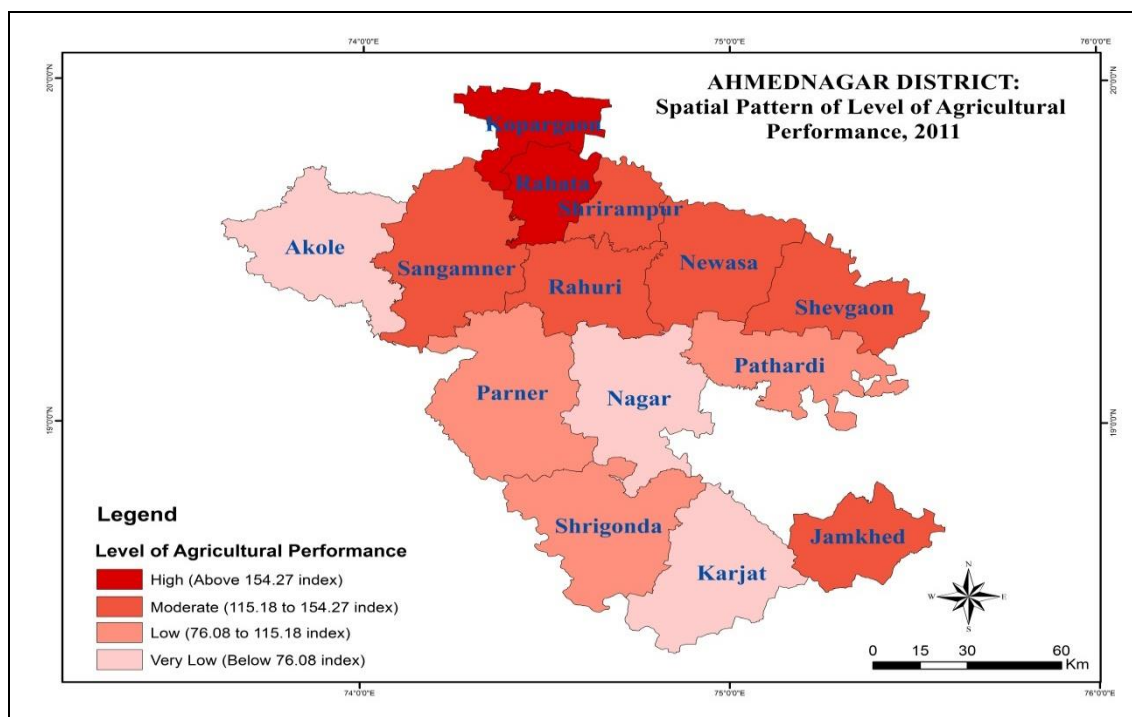


Fig.1.3: Spatial Pattern of Level of Agricultural Performance in Ahmednagar District, 2011

In 2011, the taluk-wise index continued to display marked spatial differences in agricultural performance across Ahmednagar district.

Kopergaon and Rahata recorded high agricultural performance, exceeding 154.27. Their relatively level land, fertile soils and developed irrigation in the Godavari-Pravara basin are associated with greater fertilizer use, wider adoption of HYV seeds and modern farm technology. Sangamner, Shirampur, Newasa, Shevgaon, Rahuri and Jamkhed were in the moderate class, with index values of 115.18-154.27. Pathardi, Parner and Shrigonda showed low performance, with values between 76.08 and 115.18. Akole, Nagar and Karjat were below 76.08 and therefore belonged to the very-low category. The earlier factors remain relevant for Akole and Karjat, while adverse climatic conditions are identified for Nagar.

B) Absolute Change in Agricultural Performance

Comparison of 1991 and 2011 indicates substantial temporal and spatial variation in agricultural productivity. The overall position improved during the period, which is associated in the study with increased agricultural inputs and technological development.

Following Jasbir Singh *et al.* (1990), the change in the agricultural-performance index was assessed for 1991-2011. Most taluks showed positive change, while Shirampur, Nagar, Rahuri and Karjat recorded declines. Akole, Kopergaon and Rahata gained more than 20 index points, associated with greater HYV coverage and technologies such as drip irrigation. Sangamner, Newasa, Shevgaon, Pathardi and Shrigonda registered moderate gains of 10-20 points.

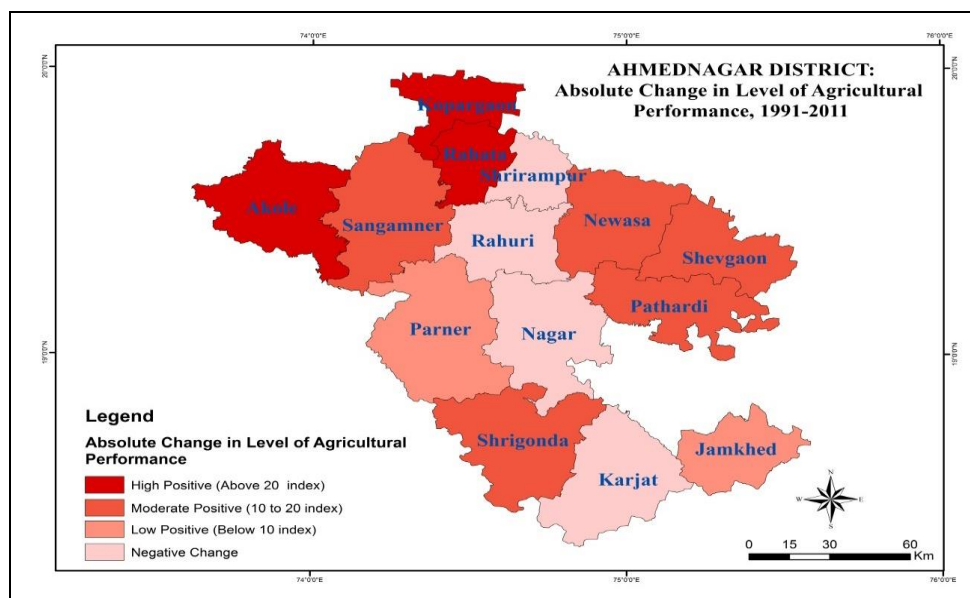


Fig.1.4: Absolute Change in the Level of Agricultural Performance in Ahmednagar District, 1991-2011

Parner and Jamkhed recorded increases of less than 10 points. Their dry and partly hilly conditions, together with limited irrigation, are linked with lower use of HYV seeds and chemical fertilizers. Declines occurred in Shrirampur, Nagar, Rahuri and Karjat. The study suggests that the first three had comparatively advanced conditions in the base year, reducing the scope for further gains, whereas Karjat remained constrained by drought-prone conditions, limited irrigation, lower HYV coverage and lower fertilizer use.

C) Impact of Agricultural Technology on Agricultural Performance

Table 1.2 examines the relationship between agricultural technology (X) and agricultural performance (Y). The calculated correlation coefficient is $r = 0.5909$, representing a moderate positive association between the two variables. The coefficient of determination is 0.3492. On this basis, the agricultural-technology index accounts for 34.92 percent of the variation in agricultural performance, while the remaining 65.08 percent is associated with other variables.

Table 1.2: Impact of Agricultural Technology on Agricultural Performance in Ahmednagar District, 2011

Sr. No	Name of Tahsil	Composite Index of Agricultural Technology (X)	Composite Index of Agricultural Performance (Y)
1	Akole	76.56	70.97
2	Sangamner	131.57	144.95
3	Kopargaon	155.23	171.07
4	Rahata	165.89	173.29
5	Shrirampur	213.47	132.27
6	Newasa	121.49	125.30
7	Shevgaon	110.95	136.15
8	Pathardi	144.38	101.55
9	Nagar	109.59	50.14
10	Rahuri	171.26	153.38
11	Parner	68.75	91.09
12	Shrigonda	89.12	87.24
13	Karjat	105.37	52.50
14	Jamkhed	70.20	122.54
$r =$		0.5909	
$r^2 =$		0.3492	

Source: Compiled by the researcher on basis of Z.P. Agricultural Department, 2012 and Socio-Economic Abstract of Ahmednagar District, 1991 and 2013.

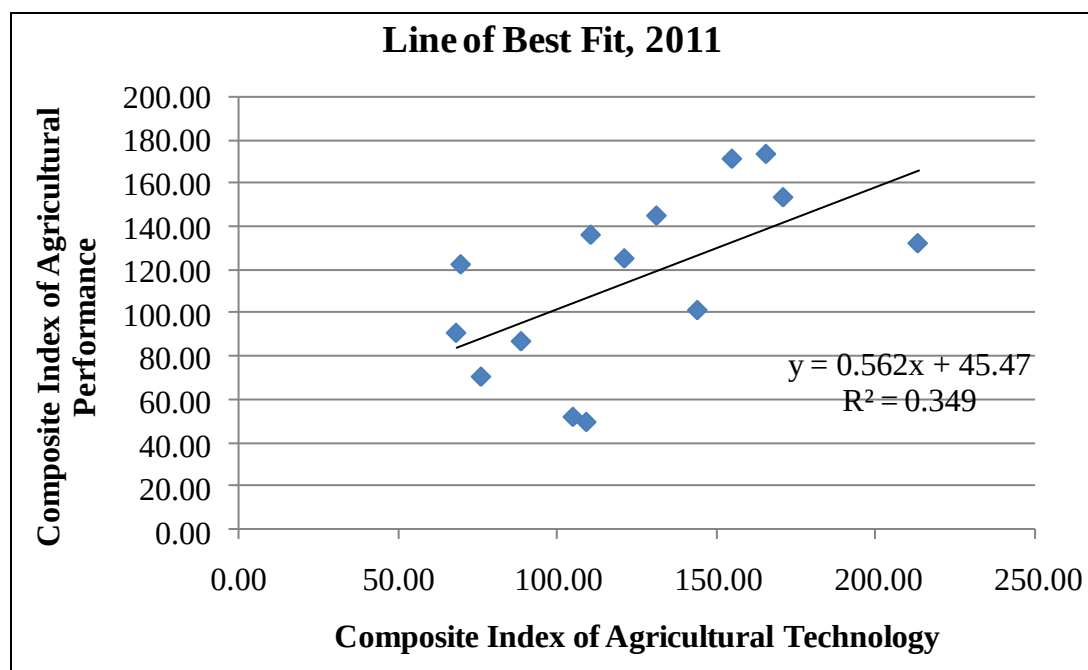


Fig.1.5

The fitted regression equation is $y = 0.5628x + 45.474$. The positive slope indicates that a one-unit rise in the agricultural-technology index corresponds to an estimated 0.5628-unit increase in the agricultural-performance index.

Conclusion

The results show that agricultural performance differs substantially among tahsils and between the two years.

Shrirampur and Rahuri were in the high category in 1991, while Kopargaon and Rahata occupied that position in 2011. Akole and Karjat were very low in 1991; Akole, Nagar and Karjat were very low in 2011. These differences are related in the study to terrain, soils, climate, irrigation, fertilizer use, HYV coverage and access to modern farm equipment. The technology-performance analysis produced $r = 0.5909$ and $r^2 = 0.3492$, indicating a moderate positive relationship.

Agricultural technology explains 34.92 percent of the variation in agricultural performance in this analysis, while 65.08 percent is associated with other influences. The fitted equation, $y = 0.5628x + 45.474$, confirms the positive direction of the relationship.

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