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Methods of Determining Agricultural Efficiency & How to Sustainable: A Case Study of Jaipur District Special Reference Kotputli and Shahpura Tehsil

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Abstract

Though there are several methods used to measure the agricultural efficiency, the most suitable is adopted to measure the agricultural efficiency in Jaipur district of Rajasthan.

The methods of measuring agriculutral efficiency can be categoriesed into four groups[1]:

1. Output per unit of labour applied (man-hour).
2. Output in relation to input (input-output ratio).
3. Output expressed in terms of grain equivalent per head of population.
4. Output per unit of area.

As the data for the first two methods are not generally collected and are not available in India, it is not feasible to use these methods. The third method of output expresed in terms of grain equivalent was adopted first of all by Buck[2] in his work 'Land Utilization in China'. He considered all grains equally valuable and converted all other products such as potato and groundnut into grain equivalents according to the prevailing prices in the local market in China.

Keywords: Labour, Population, sapital distribution, Kotputli Tehsil, Shahpura Tehsil, Agriculture, Water Resource, Water and Distribution, Rainfall.

Introduction

This method was further developed by *De Vries*.[3] He obtained milled rice equivalents by converting different grains into rice equivalents based on local market prices and measured agricultural productivity in Asia. This device was also used by *Colin Clark*[4] and *Klaymen*,[5] who made a report on behalf of F.A.O. for preparing world index number for agricultural production. This method may be useful for making international comparisons in agricultural production, but it fails to measure the agricultural efficiency specially in Indian conditions where market prices are highly variable and oscillating. Besides, the price of one commodity rises while that of the other may not do so. The price variation of different articles may be at different rates. Thus, under such conditions calculations of grain equivalentsdo not serve the purpose.

Stamp has pointed out that higher output per unit denotes higher efficiency. He himself had taken wheat for mid latitutde cereals and calculated average yield from 1934 to 1938 and found that Denmark. Holland, Belgium and Britain were on the top of the list indicating the countries of very high efficiency. To base the judgement on one crop cannot be satisfactory and it is difficult to compare the efficiencies of wheat producing areas with those of the rice producing areas.

Kendall[6] adopted the statistical base for measuring the crop productivity. He found out the coefficients of correlation of wheat, barley, oats, beans, peas, potatoes, turnip, mangolds, hay (temporary grass) and hay crops (permanent grass) in forty eight counties of England for four years–1925, 1930, 1935 and 1936. After measuring the correlation of coefficients he got the productivity coefficient for four different years. He himself was not satisfied with this cumbersome method and the doubtful nature of its results and, therefore, adopted the method of ranking coefficients. He ranked the forty eight counties according to the yield of

each crop per unit area. He also added the rank of counties to obtain their arithmetic mean and called it the ranking coefficient and stated that a county with low ranking coefficient will have high efficiency and vice-versa.

Later on, *Stamp*[7] adopted Kendall's ranking coefficient method to measure the agricultural efficiency of twenty counties taking nine main crops. *Shafi*[8] also adopted the same procedure to measure agricultural efficiency in Uttar Pradesh.

Kendall's method neglects the areal strength of the crops. For example, if in a county certain crop has low yield but covers large area it would be counted as county of low agricultural efficiency. Contrarily in the same county if other crops occupy insignificant areas but give high yields it would make it a county of high agricultural efficiency. Thus it gives unsatisfactory results.

Sapre and Deshpande[9] calculated the coefficient for each district of Maharashtra. For this they took into account the yield per acre, cropwise rank of the district and percentage of land under eight selected crops to the total cultivated area. The used regression equations to ascertain the influence of three important factors, viz., rainfall, irrigation and soil fertility.

In this method weightage of ranks fails to overcome Kendall's weakness and this method gives only a broad productivity index for a region. Over and above all this, their method is not applicable for measuring the agricultural efficiency for a small area like a district where the cropping pattern is almost similar throughout.

Enyedi[10] worked out the following formula for determining an index of productivity:

$$\frac{Y}{Yn}:\frac{T}{Tn}$$

Where

Y = the total yield of the selected crop in the unit area.

Yn = the total yield of the crop on the national scale.

T = total crop area of the unit.

Tn = total crop area on the national scale.

It was applied by Shafi[11] in 1971 for measuring the productivity in India. But while measuring the agiricultural productivity of the Great Indian Plains[12] in 1972, the same auther found that in these conditions the formula did not hold good. So he modified the above formula in the following form.

$$\frac{\sum n_y}{t}:\frac{\sum n_y}{T}$$

In this model only major crops are considered in respect of the component unit of area and the nation as a whole. Here $\sum n_y$ is the total production of the unit which is divided by *t,* the total acreage under the crops. Similarly, $\sum n_y$ is the total national production divided by the total cultivated area under those crops in the country.

While considereing the application of Shafi's modified formula in the case of Jaipur district, it may be indicatd that the cropping pattern of Rajasthan is quite different and does not match with the national pattern. Bajra-moth, clusterbean, moth and chaunla, etc., which have a high rank in Jaipur, have no significance at the national level. These do not form a group of major crops in India. Wheat and rice which are high ranking at the national level are low ranking in Jaipur district. Besides, here the relative position of each tehsil with reference to agricultural efficiency has been investigated. Therefore this formula is not applicable in this case.

Cereals $\bar{C} = \frac{\sum Ci}{n}$

Pulses $\bar{P} = \frac{\sum Pi}{n}$

Oilseeds $\bar{O} = \frac{\sum Oi}{n}$

Where C = Cereals, P = Pulses and O = Oilseads.

The same means have been used to find out the standard deviation for each of the groups in the case of cereals:

$$\sigma C = \sqrt{\frac{\sum i^2}{n} - \bar{C}^2}$$

This standard score for each group is like zic = ci–c for cereals, and for the values of production, the zi values have been multiplied by the acreage figures, i.e., zic ×$^{aa-}$; zi^{p} ×A^{p}, zi$^{\circ}$ × A^{o} and zim×A^{m} which have given eight categories of efficiency for each group of crops. At the end he has determined the total aggregate efficiency of the component areal units like

$$\bar{Z} = \frac{(Zi^e \times A^e) + (zi^p \times A^p) + (zi^0 \times Ai^0) + (zi^m \times A^m)}{A^0 + A^p + A^0 + A^m}$$

The author has applied this method to Jaipur district and found the following discrepancies–

1. According to the actual per hectare yield of cereals Bassi, Amber, Viratnagar, Shahpura and Kotputli take the first five position respectively, but by applying Sinha's method the positions of these tehsils come: (1) Amber, (2) Bassi, (3) Viratnagar, (4) Shahpura, and (5) Sikrai, i.e., the postions of Bassi and Amber and also of Shahpura and Kotputli are inter-changed by the application of this formula.
2. When this formula was applied to measure the efficiency of oilseeds, then the Kotputli tehsil which is at the top in respect of both the per hectare yield and total production, reach the minus value of efficiency.

The above two exercises show that even this formula does not give correct results in the case of Jaipur district.

Another method, which is suitable for measuring the agricultural efficiency of a district is that of Bhatia.[13] By using this formula he measured the agricultural efficiency in U.P. for the period 1953-63. First, he calculated the index of yield efficiency for each of the nine crops.

(1) 1ya = $\frac{Yc}{Yr}.100$

where *1ya* = yield index of crop a

Yc = acre yield of crop a in the component unit.

Yr = average acre yield of crop a in the entire study area.

and (2) $Ei = \frac{1ya\,.ca + 1yb\,.cb + \cdots\ldots + 1yn\,.cn}{Ca + Cb + \cdots\ldots + Cn}$

where Ei = Agricultural efficiency index

1ya, 1yb, etc. = yield index of various crops

Ca, Cb, etc. = the proportion of crop land devoted to different crops.

The authors measured the agricultural efficiency of Jaipur district and grouped all the tehsils into five categories as given in the map according to this method.

The map shows that the area of very high agricultural efficiency (above 130) is found in the north-western part of the Jaipur district, in Amber and Viratnagar tehsils. The former has the maximum efficiency of all the tehsils of the district. It has the maximum irrigated area, maximum annual normal rainfall and also the maximum number of tube-wells in the whole of the district. The soil is loamy sand to sandy loam. The latter has complex hills and inter-montane valleys, causing more yield per hectare, so that its agricultural efficiency is also very high.

High and medium agricultural efficiency (90–130) is found in seven tehsils, whicha re scattered in different parts of the district. These tehsils are Bassi, Shahpura, Viratnagar, Kotputli, Sanganer, Phulera and Phagi. The Kotputli, Shahpura, Viratnagar and Bassi tehsils lie in the catchment area of the rivers Sota, Sabi, Banganga and Dhund respectively. The underground water table is high and the soils are fertile. The irrigated rabi crops give good yield. Almost all the categories of soils are found in this zone of medium and high agricultural efficiency. The tehsils of Phulera and Jaipur are adjacent to the Amber tehsil. Jaipur also has a high intensity of irrigation. However, Phulera has low rainfail and low irrigation.

Aim of the Study

1. Worked out the total yield of the crop in the unit area
2. Worked out the total yield of the crop in the study area

Conclusion and Suggestion

The low agricultural efficiency (70-90) is found only in three tehsils, viz., Jamwa Ramgarh, Shapura and Kotputli. In Jamwa Ramgarh the land is undulating with the lowest percentage of net area sown, while in Kotputli there are patches of saline soil. Besides there are the problems of the presence of brackish water in some patches and of irrigational difficulties. Thus the per hectare yield is low.

The tehsils of very low agricultural efficiency (under 70) are found in the southern part of the district excepting Chaksu tehsil. Dudu and Phagi tehsils normally get the least rainfall and have the least irrgated area of the total cropped area in the district, and so the per hectare yield is low. In sanganer tehsil the farmers grow more profitable crops like vegetables and flowers for the requirements of the capital twon of Jaipur. The area devoted to the main crops (foodgrains) is less as they give lower returns to the formers. The soil of these tehsils is medium textured and moderately deep.

The sapital distribution of efficiency and its analysis shows that much attention is needed for irrigational facilities in the tehsils of Dudu, Phagi and Chaksu to increase their productivity and improve the patches of saline soils. Shapura tehsil lies in the basin of the Banganga but due to lack of proper irrigation, fertilizers and improved seed, the yield per hectare is very low. The development of pump irrigation can go a long way to improve agricultural efficiency in this part.

References

1. *Sinha, B.N., 'Agricultural Efficiency in India', Agricultural Situation in India, Vol.XXV, No. 12, March 1971, p. 1237.*
2. *Buck, J. L., 'Land Utilisation in China', The Council of Economics and Cultural Affairs, Inc., New York, 1956.*
3. *Food Supplies and Population Growth by Royal Statistical Society, (London), 1963, p. 58.*
4. *Colin Clark and Haswel. The Economics of Subsistance Agriculture, London, 1964, pp. 51-52.*
5. *Food Supples and Population Growth; Rayal Statistical Society, (London), 1963, p. 79.*
6. *Kendall, M. G., The Geographical Crop Distribution and Crop Productivity in England, Journal of the Royal Statistical Society, London, Vol 12, 1939.*
7. *Stamp, L. Dudley, Our Develped World, (London), p. 90.*
8. *Shaffi, M, Measurement of Agricultural Efficiency in U.P., Economic Geography. Vol. XXXVI, No. 4, October 1960.*
9. *Sapre, S. G., and Deshpende, V. D., Inter-District Variation in Agricultural Efficiency in Maharashtra State, Indian Journal of Agricultural Economics, Vol. XIX, No. 1, 1964 p. 242.*
10. *Shafi, M. (ed.), Studies in Applied and Regional Geography, Aligarh, 1971, pp. 249-270.*
11. *Shafi, M., Measurement of Agricultural Productivity of the Great Indian Plains, The Geographer, Vol. XIX, No. 1, January 1972, p. 6.*
12. *Ibid., pp. 1237-42.*
13. *Bhatia, S.S., Sapital Variations, Changes and Trends in Agricultural Efficiency in U P, 1953-63, Indian Journal of Agricultural Economics, Vol. XXII, No. 1, January-March 1967.*