

# IMPACT OF THE AGRARIAN STRUCTURE ON FARM PRODUCTIVITY / EFFICIENCY AND FARM INCOME IN THE PROVINCE OF KHYBER PAKHTUNKHWA

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## ABSTRACT

*Generally the, farm productivity/efficiency and farm income of any region depends on the agrarian structure (considering only two main factors viz. farm size and tenure status). This article investigates the impact of agrarian structure on the farm efficiency and farm income in the province of Khyber Pakhtunkhwa. The main objective of the study is to probe into the influence of agrarian structure on the farm productivity and intern on the farm income.*

*For the collection of primary data through interview schedule directly from farmers, the whole province has been divided into four different agro-climatic zones known as strata. One district from each zone has been selected randomly and the sample size of 120 farmers has been equally distributed among sample districts. The averages and percentages for different agrarian structure have been presented in an appropriate tables. It is concluded that the data on production of the major crops has revealed that yield per acre of almost all the crops is higher on the large farms, however, the labor intensive crops have indicated higher yield on the small farms. The trend of yield per acre is nearly similar on all the tenures. But the pure owners have shown more efficiency in the crops of wheat, sugarcane and rabi vegetables, while the pure tenants have produced maize, rice, grams and kharif vegetable more efficiently.*

**Key Words:** Agrarian Structure, Farm Productivity / Efficiency and Farm Income.

## INTRODUCTION

Every rational producer tries to enhance the efficiency of his farm by producing maximum possible farm output with given inputs. This study quantitatively examines the impact of the agrarian structure specifically the impact of two selected factors, farm size and tenure status on the farm efficiency (productivity and income). In fact the agrarian structure may include a number of factors related to the farming, but the uneconomic distribution of a farm holdings creates the problem of uneven productivity of the land. Different views have been observed among different research reports about the efficiency of small and large farms. Certain researchers claim that small farms are more productive than the large ones, while the others claim otherwise. Thus the farm size is one of the main factors of agrarian structure to affect the farm efficiency. Similarly, the land tenure system may also very well influence on the farm efficiency. A number of researchers declared that owner farmers utilizes their land efficiently, because they produce for themselves, using their own resources. Contrarily tenants do not take

interest in the increase of productivity, because think that they are producing for others. But some believe otherwise. This study highlights the analysis crop yields, farm productivity / efficiency of key inputs, overall level of farm income.

### OBJECTIVE

This research paper focuses on the achievement of one main objective that is “to identify the impact of agrarian structure on the farm productivity / efficiency and farm income in the province of Khyber Pakhtunkhwa.

### LITERATURE REVIEW

Michael R. C and K.D. Weibe (1990). In the article “ The Non Neutrality of Agrarian Structure: U-Shaped Farm Size-Productivity Relationship in Kenya” they observed that agrarian structure today is variegated with units ranging from a single acre to hundreds of acres in size, which has significant impact on farm efficiency. They further stated that Blarel et al. analyze data on 109 small and large farms in the Njoro region of Kenya. Two patterns they observe are of particular interest. First productivity varies strikingly with farm size and tenure status. Second productivity is affected by the allocation of land to various activities (cropping pattern).

Economists have long been debating the question whether small or large farms are more productive. The answer to such a question has very crucial policy implications. Singh (1981) has argued that there are commonly held view about peasant agriculture, especially in Asian conditions, but small farms are more productive than large.

Singh (1979) held that small farmers have higher land productivity (total output per acre) under traditional technologies. He based such argument on the basis of analysis of data of farm management study (FMS) from over 3000 owner farms in 6 states of India. He observed a consistent pattern of negative relationship between farm size owned and productivity in all sample states. A large number of studies have confirmed the above finding.

*Mahmood and Haq (1981)* have tested negative relationship for Pakistan and concluded that the observed negative or positive correlations between land productivity and the farm size in Pakistan are the result of over-aggregation. They argued that the productivity is high on small farms due to intensive labour and irrigation use and on large farms due to capital intensive input. They further observed that the middle level efficient entrepreneur farmer has so far failed to emerge.

*Babi (1983)* conducted a study to empirically analyze the relationship between farm size, productivity, demand for inputs of production in India. He observed that the per hectare production is about 14 percent higher on the small irrigated farms than that on the large irrigated farms. Furthermore, he argued that the irrigated small farms are able to allocate their resources relatively more efficiently as compared to irrigated large farms.

*Singh (1981)* described that small farmers are more efficient in the use of their resources than larger and better endowed farmers. This efficient utilization of resources also explains higher land productivity. A large number of studies have confirmed this argument and these are reviewed here.

*Shultz (1964)* explained that Indian peasant farmers are poor but efficient.

*Hopper (1965)* showed from a small (43 farms) sample in an Uttar Pradesh village that farming in traditional Indian agriculture is efficient. He did not test for relative efficiency by size as most of his sample consisted of ownership holdings of less than 5 acres.

*Sahota (1968)* explicitly tested differences in efficiency under traditional technologies using the farm management data from the 50's of various states and regions and he found no significant differences in efficiency by farm size. *Saini (1969)* also confirmed the same findings. *Lau and Yotopoulos (1971)* used somewhat improved methodology and concluded that small farms are relatively more efficient than large farms.

(*Johnson, 1968; Sahota, 1968; Yotopoulos, 1968; Lin et al., 1974*). However, within their technical and institutional constraints, small farmers behave as profit maximizers, even in the most remote area.

*Barnum and Squire (1978)* observed that small and large farmers are equally economically efficient. They further analysed that tenants and owners are also equally economically efficient.

The above discussion provides a clear insight of the relative superior productivity and efficiency of the small farms under traditional technologies.

*Grosskopf (1986)* showed that the extent of overall efficiency can be greatly influenced by assumptions about the functional forms. Restrictive functional forms, e.g., Cobb-Douglas, yield a relative low overall inefficiency. *Russel and Young (1983)* pointed out that economic environment is an important determining factor of economic efficiency analysis. Monopolistic influence of the government on prices does not reflect relative scarcity. Under these circumstances an individual enterpriser may maximize profit and this may not be an inefficient from society's point of view.

There are several other empirical studies which have tried to measure the extent of technical inefficiency. *Shapiror and Muler (1977)* observed that there is a technical inefficiency of 34 percent for cotton crop in Tanzania. They used a probabilistic linear programming model to estimate the technical inefficiency. *Kalirajan and Flinn (1981)* reported technical inefficiency to the tune of 53 percent for rice crop in India. *Lingard et al. (1981)*, in a research study on rice crop in Philippines, observed that there was technical inefficiency of 50 percent. They used analysis of co-variance with firm specific dummies. *Mijindadi and Norman (1984)* have studied technical efficiency for the whole farm with a sample of 340 in Nigeria. They used probabilistic linear programming model to measure technical inefficiency. They found inefficiency of 8 percent.

*T.W. Schultz* has advanced the hypothesis that “the agricultural sector in a large class of poor countries is relatively efficient in using factors of production at its disposal.” “Given the land at the disposal of farmers and the state of their knowledge, they are not under utilizing the land by the way they farm. Nor are they misallocating the reproducible material capital at their disposal... they are not misallocating their own labour nor other labour that is available to them....”

Schultz's hypothesis is based on a particular definition of traditional agriculture. He discards the description of traditional agriculture based on difference in “cultural” values and argues that a simple economic explanation will suffice. He treats traditional agriculture “as a particular type of economic equilibrium”. Viewed *ex-post*, it is an equilibrium at which agriculture gradually arrives over a long period, provided particular condition prevails....

### RESEARCH METHODOLOGY

The nature of study and objective reveal that the analysis of article is based on the primary data secured through a comprehensive interview schedule addressed to the farmers. All the farmers in the province constitute the universe of the study. Because of infinitely large number of farmers in the study area, it has been difficult to prepare a complete and proper sampling frame; therefore the stratified random sampling technique has been used. The province has been divided into four strata on the basis of four agro-climatic zones that is Northern Hilly Region/Wet Mountains, Western Dry Mountains, the Suleiman pied Mountains/ Barani Lands and Northern Irrigated Plains. One district has been selected from each stratum, applying the lottery method. It has been assumed that the basic characteristics of the farmers within each zone is homogeneous, hence the proposed sample size of 120 farmers has been equally distributed among the four strata. The sample farmers have been selected purely on basis of probability sampling/ simple random sampling technique.

### DATA ANALYSIS

This section of the article has been subdivided into four subsections as follows:

#### (i) Crop Yields:

The data in table 1 reveals that yield per acre of almost all the crops has been higher on the large farms than on the small farms. However, the labor intensive crops like vegetables indicated higher yield on the small farms. Regarding the impact of tenure status on the crop yield, a mixed trend has been observed with per acre yield of wheat lower on the tenant than on the owners' farms, and the reverse of this for the maize.

Table 1: Per Acre Yield of Major Crops on Sample Farms by Tenure and Farm Size

| Tenure/Farm Size               | Wheat | Maize | ugarcane | Rice  | Grams | (In maunds)<br>Rabi Vegetable | (In maunds)<br>Kharif Vegetable |
|--------------------------------|-------|-------|----------|-------|-------|-------------------------------|---------------------------------|
| <b>(A) OWNERS</b>              |       |       |          |       |       |                               |                                 |
| Small Farms                    | 19.05 | 16.70 | 375.00   | 32.18 | 1.54  | 329.13                        | 65.11                           |
| Large Farms                    | 23.95 | 17.92 | 455.00   | 42.76 | 1.75  | 300.49                        | 57.88                           |
| Total-A                        | 21.43 | 17.29 | 418.00   | 37.45 | 1.68  | 315.01                        | 61.53                           |
| <b>(B) OWNER-CUM-TENANTS</b>   |       |       |          |       |       |                               |                                 |
| Small Farms                    | 2.050 | 17.59 | 360.00   | 34.45 | 1.81  | 321.50                        | 71.08                           |
| Large Farms                    | 22.78 | 18.97 | 450.00   | 38.95 | 1.94  | 310.00                        | 62.14                           |
| Total-B                        | 21.65 | 18.25 | 410.00   | 36.65 | 1.86  | 315.64                        | 66.06                           |
| <b>(C) TENANTS</b>             |       |       |          |       |       |                               |                                 |
| Small Farms                    | 21.75 | 18.84 | 325.00   | 39.16 | 2.00  | 309.99                        | 73.65                           |
| Large Farms                    | 20.14 | 21.32 | 445.00   | 36.98 | 2.66  | 315.04                        | 64.37                           |
| Total-C                        | 20.98 | 20.04 | 380.00   | 38.15 | 2.32  | 312.72                        | 68.98                           |
| <b>(D) ALL TENURES (A+B+C)</b> |       |       |          |       |       |                               |                                 |
| Small Farms                    | 20.26 | 17.40 | 350.00   | 35.21 | 1.83  | 320.51                        | 17.00                           |
| Large Farms                    | 22.29 | 19.37 | 450.00   | 39.50 | 2.08  | 308.49                        | 61.50                           |
| Total-D                        | 21.12 | 18.14 | 409.00   | 38.41 | 1.99  | 313.02                        | 65.20                           |

Source: Field Survey

### (I) Farm Efficiency in Terms of Productivity of Key Inputs:

How far the relationship between the farm size and output productivity is positive or negative is important to be resolved. Different views are being held on this issue. Many observe an inverse relationship between them; on the other hand a significant number of applied economists believe that large farms are more productive than the small ones. However, different outcomes could be expected in different situations on this polemic. The negative or positive correlation between land productivity and the farm size could even be over aggregated. The productivity may be high on the small farms due to intensive use of labor and good irrigation use, while it may be equally high on the large farms for intense use of capital and other inputs. This section empirically examines the land, labor, capital and overall productivities of different farm sizes and different tenancy arrangements.

#### a) Land Productivity:

The productivity of land is studied from two purviews: yield per acre of crops, which has been computed in terms of maunds (40 kgs) and in terms of money. While the yield per acre has been enumerated in table 5.1i, and their monetary values are presented in table 2. The land productivity has been Rupees 4863 per acre. The data has revealed a direct relationship between the land productivity and farm size. The value of output per acre has been Rs. 5004 on the large farms and Rs. 4713 on small farms. The corresponding monetary values of the farms operated by the owners, owner-cum-tenants and tenants have been computed at Rs. 5,039, Rs. 4,787 and Rs. 4,780 respectively, with average of Rs. 4,863.

Table 2: Land Productivity of the Sample Farms by Tenure and Size

| Tenure            | Productivity (in rupees / acres) |             |           |
|-------------------|----------------------------------|-------------|-----------|
|                   | Small Farms                      | Large Farms | All Farms |
| Owners            | 4593                             | 5685        | 5039      |
| Owner-cum-Tenants | 4759                             | 4840        | 4787      |
| Tenants           | 4874                             | 4675        | 4780      |
| All Tenures       | 4713                             | 5004        | 4863      |

Source: Field Survey

**a) Labor Productivity:**

It is generally assumed that the supply of labor is comparatively greater than demand for labor in the rural areas. Consequently, the labor productivity is low. This subsection describes the situation in the sample area with regard to labor productivity.

The labor productivity of the major crops has been obtained by dividing their production (in kgs) per cultivated acre by labor input (in man-months) per cultivated acre. It is pointed out that the measurement of time span spent by the labor, on the farm is fairly a complicated procedure, resulting from seasonality of farm production and inter farms variation in labor requirements. In this context, the time spent by permanent, hired, casual, family and female labors have been converted into their working man-months. One female working month has been assumed to be equal to 3/4th of man-months. The converted labor input provided by females into man-months and the per cultivated acre production with corresponding per cultivated acre labor productivity for major crops by farm size are enumerated in table. 3.

Table 3: Labor Productivity of the Sample Farms by Farms by Farm Size

| Farm size/crop | Production per cultivated acre (kgs.) | Labor per cultivated acre (Man-Months) | Labor Productivity col.2 ÷ col.3 |
|----------------|---------------------------------------|--|----------------------------------|
| (1)            | (2)                                   | (3)                                    | (4)                              |

**A) Small Farms**

|             |        |       |     |
|-------------|--------|-------|-----|
| Wheat       | 180.0  | 810   | 4.5 |
| Maize       | 178.0  | 696   | 4.5 |
| Sugarcane   | 3255.8 | 14000 | 3.9 |
| Rice        | 260.7  | 1408  | 5.4 |
| Grams       | 60.8   | 73    | 1.2 |
| Other crops | 33.62  | 19840 | 5.9 |
| All crops   | 1427.4 | 6138  | 4.3 |

(...contd)

**B) Large Farms**

|             |        |       |     |
|-------------|--------|-------|-----|
| Wheat       | 343.1  | 892   | 2.6 |
| Maize       | 267.2  | 775   | 2.9 |
| Sugarcane   | 4390.2 | 18000 | 4.1 |
| Rice        | 322.5  | 1580  | 4.9 |
| Grams       | 92.2   | 83    | 0.9 |
| Other crops | 4377.7 | 22764 | 5.2 |
| All crops   | 2100.0 | 7350  | 3.5 |

**C) All Farms (A+B)**

|             |        |       |        |
|-------------|--------|-------|--------|
| Wheat       | 234.7  | 845   | 3.6    |
| Maize       | 220.0  | 726   | 3.3    |
| Sugarcane   | 3895.2 | 16360 | 4.2    |
| Rice        | 295.4  | 1536  | 5.2    |
| Grams       | 72.7   | 80    | 1.1    |
| Other crops | 3848.9 | 21554 | 5.6    |
| All crops   | 6851   | 3.8   | 1802.9 |

Source: Field Survey

For a given piece of one acre of farm land with other required ingredients, the average production for all crops per unit of labor input has been estimated at 1802.9 kgs. This is 1427.4 kgs for small and 2100.0 kgs for large farms. The labor productivity of sugarcane, rice, wheat and maize for all sample farms has been calculated at 3895.2 kgs, 295.4 kgs, 234.7 kgs and 220.0 kgs respectively. Almost the same pattern is found on large and small farms. The data reveal that the labor productivity of various crops on large farms is significantly higher than on the small farms, which is attributed either to the small quantity of labor input applied or the use of machinery on the large farms. It is pointed out that the difference in the productivity of various crops is due to the difference in the crop nature and their monetary values and weights, especially vegetables, sugarcane, grams and conversion of fodder into kilograms. The production of one crop per unit of labor appears higher than the other, but its income and importance is less than that of the later crop. For example the productivity of fodders is approximately sixteen times higher than wheat, while the productivity of sugarcane stands seventeen times higher to that of wheat, but in terms of their selling prices or income values such differences in productivities are vanished, which is an indication of the efficiency of labor.

The productivity of labor in major crops by land tenure is shown in table 4, which indicates that it is high in almost all crops of the owners and owner-cum-tenant farms, but lower in the rented farms. The difference in productivity is described towards the adoption of mechanization by the land owners.

Table 4: Labor Productivity of Major Crops by Tenure

| Tenure/crop                   | Production per cultivated acre (kgs.) | Labor per cultivated acre (Man-Months) | Labor Productivity col.2 ÷ col.3 |
|-------------------------------|---------------------------------------|--|----------------------------------|
| (1)                           | (2)                                   | (3)                                    | (4)                              |
| <b>A) Owners</b>              |                                       |  |                                  |
| Wheat                         | 857                                   | 3.2                                    | 267.8                            |
| Maize                         | 692                                   | 2.9                                    | 238.6                            |
| Sugarcane                     | 16720                                 | 3.6                                    | 4644.4                           |
| Rice                          | 1498                                  | 4.9                                    | 305.7                            |
| Grams                         | 67                                    | 1.0                                    | 67.0                             |
| Other crops                   | 19964                                 | 5.4                                    | 3697.0                           |
| All crops                     | 6637                                  | 3.5                                    | 1896.3                           |
| <b>B) Owner-cum-tenants</b>   |                                       |  |                                  |
| Wheat                         | 866                                   | 3.4                                    | 254.7                            |
| Maize                         | 730                                   | 3.2                                    | 228.1                            |
| Sugarcane                     | 16400                                 | 4.0                                    | 4100.0                           |
| Rice                          | 1467                                  | 5.1                                    | 287.6                            |
| Grams                         | 74                                    | 1.2                                    | 61.7                             |
| Other crops                   | 21807                                 | 5.5                                    | 3964.9                           |
| All crops                     | 6879                                  | 3.7                                    | 1859.2                           |
| <b>C) Tenants</b>             |                                       |  |                                  |
| Wheat                         | 839                                   | 4.2                                    | 199.8                            |
| Maize                         | 802                                   | 3.7                                    | 216.8                            |
| Sugarcane                     | 15200                                 | 4.8                                    | 3166.7                           |
| Rice                          | 1526                                  | 5.6                                    | 272.5                            |
| Grams                         | 93                                    | 1.2                                    | 77.5                             |
| Other crops                   | 22890                                 | 5.9                                    | 3879.7                           |
| All crops                     | 6894                                  | 4.2                                    | 1641.4                           |
| <b>D) All Tenures (A+B+C)</b> |                                       |  |                                  |
| Wheat                         | 845                                   | 3.6                                    | 234.7                            |
| Maize                         | 726                                   | 3.3                                    | 220.0                            |
| Sugarcane                     | 16360                                 | 4.2                                    | 3895.2                           |
| Rice                          | 1536                                  | 5.2                                    | 295.4                            |
| Grams                         | 80                                    | 1.1                                    | 72.7                             |
| Other crops                   | 21554                                 | 5.6                                    | 3848.9                           |
| All crops                     | 6851                                  | 3.8                                    | 1802.9                           |

Source: Field Survey



**a) Capital Productivity:**

The capital productivity is the ratio of output to capital, which is an important indicator of farm efficiency. For the computation of output-capital ratio, rent as a reward of land and wage, as a reward of labor have been excluded while the costs of all other inputs such as seeds, fertilizers, use of farm machinery, insecticides and pesticides etc. have been included in the capital, while holding constant the values of land and labor. The total value of farm output comprising of major crops is thus added and divided by the total amount of capital. Output-capital-ratio is the ratio contribution of the capital (excluding the values of land and labor) to aggregate output of the sample farms. Output-capital ratios of the major crops of the major crops of the sample farms by farm size and tenure are presented in the following table 5:

Table 5: Capital Productivity of Major Crops by Farm size and Tenure:

Value of Crop Output /Total Capital in Rupees.

| Farm size/crop            | Owners | Owner-cum-Tenants | Tenants | All Farms |
|---------------------------|--------|-------------------|---------|-----------|
| <b>A) Small Farms</b>     |        |                   |         |           |
| Wheat                     | 1.99   | 2.00              | 2.05    | 2.01      |
| Maize                     | 2.29   | 2.31              | 2.41    | 2.34      |
| Sugarcane                 | 2.23   | 2.09              | 2.02    | 2.12      |
| Rice                      | 2.24   | 2.17              | 2.16    | 2.19      |
| Grams                     | 2.79   | 2.14              | 0.98    | 1.97      |
| Other crops               | 2.23   | 2.28              | 2.86    | 2.45      |
| All crops                 | 2.28   | 2.16              | 2.09    | 2.17      |
| <b>B) Large Farms</b>     |        |                   |         |           |
| Wheat                     | 2.63   | 2.64              | 2.75    | 2.67      |
| Maize                     | 2.09   | 2.07              | 2.17    | 2.11      |
| Sugarcane                 | 2.71   | 2.38              | 2.38    | 2.49      |
| Rice                      | 2.80   | 2.43              | 2.39    | 2.54      |
| Grams                     | 1.69   | 1.64              | 1.58    | 1.64      |
| Other crops               | 1.92   | 1.97              | 2.37    | 2.08      |
| All crops                 | 2.31   | 2.20              | 2.28    | 2.28      |
| <b>C) All Farms (A+B)</b> |        |                   |         |           |
| Wheat                     | 2.31   | 2.32              | 2.41    | 2.35      |
| Maize                     | 2.19   | 2.20              | 2.29    | 2.21      |
| Sugarcane                 | 2.46   | 2.24              | 2.20    | 2.30      |
| Rice                      | 2.51   | 2.30              | 2.27    | 2.37      |
| Grams                     | 2.25   | 1.88              | 1.28    | 1.81      |
| Other crops               | 2.07   | 2.13              | 2.62    | 2.27      |
| All crops                 | 2.31   | 2.19              | 2.18    | 2.23      |

Source: Field Survey

On average, the productivity of capital for all crops on all the farms has been computed as 2.23, which is statistically significant. It shows that for every one rupee invested (cost) the output has been at the value of Rs. 2.23. This output-capital ratio has been 2.28 on the large farms, which stands higher to the corresponding ratio of 2.17 on the small farms. The capital productivities of rice, wheat, sugarcane and maize have been 2.37, 2.35, 2.30 and 2.21 respectively on all farms. The capital productivities of all crops except maize, grams and other crops are significantly higher on large farms as compared to the corresponding productivities of small farms. The value difference may be attributed to the adoption of recommended farm practices and availability of sufficient amounts of inputs by the large farmers. The higher productivity of other crops on small farms could be due to the production of cash crops like vegetables and fodder. In terms of the impact of tenure status on the efficiency of capital, the owners have been on the top, followed by owner-cum-tenants and tenants. The output-capital ratios on these farms have been 2.31, 2.19 and 2.18 respectively. The same trend has been found on the large and small farms. In almost all crops, owners and owner-cum-tenants attained relatively higher productivities, but in case of labor intensive crops (other crops and maize) the tenants remained better.

**(i) Overall/Aggregate Productivity OR Undiscounted Benefit-Cost Ratio:**

The decision whether or not to remain in the farm business depends primarily on the overall/aggregate productivity of the farm. The farm productivity of the individual factors of production may suggest a positive response, but in aggregate the business may be at a loss. This subsection focuses on the overall aggregate productivity of the sample farms. The individual productivities of land, labour and capital examined in the preceding subsections have portrayed general idea of the efficiency of each factor of production. For computing the aggregate productivity of the sample farms, an attempt has been made to calculate the monetary value (in rupees) of the total farm output and cost. The total farm cost is the sum of the imputed and actual costs. The imputed cost includes those for which no cash expenditure have incurred, instead they are met by using the available resources and includes rental value of land, estimated wage of family labor and depreciation/interest of farm machinery and implements etc. The actual costs are those which have been met from “own pockets”, and involves real cash outflows (in certain cases in kind) from farm household, including costs incurred on seeds, fertilizers, insecticides, pesticides, water charges, wages of hired labor, farm yard manure and payments made for the services of hired farm machinery.

The aggregate farm productivity or the undiscounted benefit-cost ratio is obtained by dividing the total value of the farm output by its total costs. The macro level farm productivity of the major crops by farm size and tenure is enumerated in table 6.

Table 6: Aggregate Productivity of Major Crops by Farm Size and Tenure:  
Value of Farm Output /Total Cost in Rupees.

| Farm size/crop        | Owners | Owner-cum-Tenants | Tenants | All Farms |
|-----------------------|--------|-------------------|---------|-----------|
| <b>A) Small Farms</b> |        |                   |         |           |
| Wheat                 | 1.26   | 1.21              | 1.16    | 1.22      |
| Maize                 | 1.18   | 1.14              | 1.20    | 1.17      |
| Sugarcane             | 1.29   | 1.22              | 1.18    | 1.23      |
| Rice                  | 1.04   | 1.05              | 1.02    | 1.04      |
| Grams                 | 1.06   | 1.04              | 1.04    | 1.05      |
| Other crops           | 1.33   | 1.29              | 1.31    | 1.31      |
| All crops             | 1.20   | 1.16              | 1.15    | 1.18      |
| <b>B) Large Farms</b> |        |                   |         |           |
| Wheat                 | 1.53   | 1.48              | 1.47    | 1.49      |
| Maize                 | 1.11   | 1.11              | 1.13    | 1.12      |
| Sugarcane             | 1.61   | 1.55              | 1.50    | 1.55      |
| Rice                  | 1.40   | 1.38              | 1.32    | 1.37      |
| Grams                 | 1.17   | 1.12              | 1.07    | 1.12      |
| Other crops           | 1.16   | 1.18              | 1.23    | 1.19      |
| All crops             | 1.34   | 1.30              | 1.28    | 1.31      |
| <b>C) All Farms</b>   |        |                   |         |           |
| Wheat                 | 1.40   | 1.34              | 1.31    | 1.35      |
| Maize                 | 1.15   | 1.13              | 1.16    | 1.15      |
| Sugarcane             | 1.45   | 1.38              | 1.34    | 1.39      |
| Rice                  | 1.22   | 1.22              | 1.17    | 1.20      |
| Grams                 | 1.11   | 1.08              | 1.05    | 1.08      |
| Other crops           | 1.24   | 1.23              | 1.27    | 1.25      |
| All crops             | 1.27   | 1.23              | 1.21    | 1.24      |

Source: Field Survey

The aggregate productivity of all the crops on all the farms have been 1.24, which implies that the investment of one rupee correspondingly generated an income of Rs. 1.24, or in other words, with the cost of one rupee, the sample farmers earned a net benefit/profit of twenty-four paisa. The ratio of aggregate farm income to the aggregate farm cost is significantly higher on the large farms (1.31), as compared to that of the small farms (1.18). It infers that farm efficiency in aggregate has had a direct relationship with the farm size. Similarly, the productivity of sugarcane has been the highest one (1.39), with corresponding figures for large and small farms as 1.55 and 1.23 respectively. Except maize and other crops, the productivities of all crops remained higher on the large farms as compared to the small farms. However, the positive interaction between the farm productivity and size might be attributed to the use of farm machinery, practices and application of recommended doses of inputs on large farms

due to sufficient availability of resources.

The tenancy arrangements indicated exactly the same trend as is shown in the productivities of individual factors of production. From the points of view of undiscounted benefit-cost ratio, the corresponding productivities have been 1.27, 1.23 and 1.21 respectively for owners, owner-cum-tenants and tenants. The tenant's data reveal that aggregate productivity in case of all crops on the owners' large farms has been the highest (1.34) and the lowest (1.15) on the small farms operated by the tenants, implying that farm efficiency is positively/directly related to the farm size and ownership of land.

#### **iv) Level of Farm Income:**

The efficiency of a farm can be judged either by the productivities of individual factors of production or by the level of farm income. The farm productivities have been analyzed in the preceding sections of this chapter, while this part examines the farm income of the sample farms. There are various devices for measuring farm income and economic efficiency, such as net farm income, and net farm household income, etc. As a main objective of the study, net farm income and net farm household income are being examined in the following subsections, providing a true picture of the economic performance of the sample farms.

#### **a) Net Farm Income or Undiscounted Benefit:**

The most significant important measure of the efficiency of a farm is the “net farm income”, which is the net difference between the aggregate farm receipts and costs. The aggregate farm cost is the sum total of the imputed family labor cost, rent of land, cash costs and depreciation/interest on capital assets. The net farm incomes of all the sample farmers have been added in rupees and are classified at different levels of net farm incomes. The distribution of sample farmers by their net farm income and sizes are presented in table 7. A more than one fourth (that is 26.50 percent) of the sample farmers have reported negative net farm incomes on their farms with their proportions as 31.58 and 10.42 on the small and large farms respectively. The question arises, why do the farmers operate their farms with negative net farm income? To answer this question, a significant amount of rental value of land, imputed family labor cost and profit enter their pockets, which keep their survival within the farm business.

Table 7: Classification of the Sample Farms by Net Farm Income and Farm Size  
(In Rupees per annum)

| Level of Income | Small Farms |        | Large Farms |        | All Farms |        |
|-----------------|-------------|--------|-------------|--------|-----------|--------|
|                 | No          | % age  | No          | % age  | No        | % age  |
| Negative        | 48          | 31.58  | 5           | 10.42  | 53        | 26.50  |
| 0-6,000         | 66          | 43.42  | 16          | 33.33  | 2         | 41.00  |
| 6,000-12,000    | 23          | 15.13  | 12          | 25.00  | 35        | 17.50  |
| 12,000-18,000   | 8           | 5.26   | 5           | 10.42  | 13        | 6.50   |
| 18,000-24,000   | 5           | 3.29   | 4           | 8.33   | 9         | 4.50   |
| 24,000-30,000   | 1           | 0.66   | 3           | 6.25   | 4         | 2.00   |
| 30,000-36,000   | 1           | 0.66   | 2           | 4.17   | 3         | 1.50   |
| 36,000 & above  | --          | --     | 1           | 2.08   | 1         | 0.50   |
| Total           | 152         | 100.00 | 48          | 100.00 | 200       | 100.00 |

Source: Field Survey

In other words, they sold their labor and so earned livelihood by operating their farms even with negative net farm incomes. A highest percentage of 41.00 percent of the sample farmers fell in the income group of rupees less than six thousands per annum, followed by the corresponding income groups of Rs. 6,000 to Rs. 12,000 and Rs. 12,000 to Rs. 18,000 per annum, with 17.50 percent and 6.50 percent respectively. Only one group of farmers could earn net farm income of Rs. 36,000 and above per annum.

Two points with respect to net farm income are important to note. First, the majority of the sample farmers have earned negative or lower levels of income, and second the corresponding percentages of the large farmers are higher in the high levels of income as compared to their percentages in the small farmers. The data confirm a direct relationship between the level of farm income and farm size.

The same pattern has been found in different tenure classes. However it is important to note that all tenants fell in income levels of less than Rs. 24,000 per annum. In the higher income levels, only owner farmers have been found alike. (See Table 8)

Table 8: Distribution of the Sample Farms by Net Farm Income and Tenure  
(In Rupees per annum)

| Level of Income | Owners |        | Owner-cum-Tenants |        | Tenures |        | All Tenures |        |
|-----------------|--------|--------|-------------------|--------|---------|--------|-------------|--------|
|                 | No     | % age  | No                | % age  | No      | % age  | No          | % age  |
| Negative        | 34     | 31.19  | 11                | 22.45  | 8       | 19.05  | 53          | 26.50  |
| 0-6,000         | 41     | 37.62  | 20                | 40.82  | 21      | 50.00  | 82          | 41.00  |
| 6,000-12,000    | 14     | 12.84  | 11                | 22.45  | 10      | 23.81  | 35          | 17.50  |
| 12,000-18,000   | 7      | 6.42   | 4                 | 8.16   | 2       | 4.76   | 13          | 6.50   |
| 18,000-24,000   | 6      | 5.51   | 2                 | 4.08   | 1       | 2.38   | 9           | 4.50   |
| 24,000-30,000   | 3      | 2.75   | 1                 | 2.04   | --      | --     | 4           | 2.00   |
| 30,000-36,000   | 3      | 2.75   | --                | --     | --      | --     | 3           | 1.50   |
| 36,000 & above  | 1      | 0.92   | --                | --     | --      | --     | 1           | 0.50   |
| Total           | 109    | 100.00 | 49                | 100.00 | 42      | 100.00 | 20          | 100.00 |

## CONCLUSION

Economic efficiency of the agrarian structure has been examined from two perspectives viz, the productivity of inputs and the levels of farm income.

The data on production of the major crops has revealed that yield per acre of almost all the crops is higher on the large farms, however, the labour intensive crops have indicated higher yield on the small farms. The trend of yield per acre is nearly similar on all the tenures. But the pure owners have shown more efficiency in the crops of wheat, sugarcane and rabi vegetables, while the pure tenants have produced maize, rice, grams and kharif vegetable more efficiently.

In momentary terms, the land productivity indicated an inverse relationship between the farm size and productivity. In aggregate the value of output per acre has been Rs. 4713 on the small farms and Rs. 5004 on the large farms, while it is Rs. 4780 in the farm operated by tenants and Rs. 5039 by the owner farms.

The labour productivity has been estimated at 1802.9 kgs on the small farms. The labor productivity of the large farms is significantly higher to the small farms. The positive relationship between the farms size and the labor productivity has been due to the use of farm machinery and small quantity of labor input on the large farms. The labor productivities of the owner, owner cum-tenant and tenant farms have been. In aggregate, the capital productivity or output-capital ratio has been estimated at 2.23 which is significant. The capital productivity of the large farms stands higher of the small farms. The positive relationship between the farm size and output-capital ratio is attributed to the adoption of recommended farm practices and doses of inputs on the large farms. The capital productivities have been show ideclining trend on the farms operated by owners, owner-cum-tenants and tenants respectively. The overall productivity or the undiscounted benefit-cost ratio of the sample farms has been calculated at Rs. 1.24. It implies that with a cost of Rs. 1, the sample farmers have earned paisas twenty-four only. The ratio of the total farms receipts to the total farm costs has been notably higher on the large farms than on the small farms. The direct relationship between the overall farm productivity and large farms is due to farm practices, and proper doses of inputs and sufficient owned resources.

The majority of the sample farmers has reported negative net farm income on their farms. The corresponding proportions on the large and small farms have been 10.42 and 31.58, respectively. The percentages of earning are 43.42 on the small farms and 33.33 on the large farms. Approximately 50% of the sample farmers have been in the income bracket of Rs. 0-12,000, which is lower than the subsistence income level. The percentages of the large famers are higher in the higher levels of income as compared to the corresponding percentages of the small farmers and vice versa. A positive relationship between the net farm income and the farm size has been ascertained. It concluded that from the productivity point of view, in case of capital intensive crop the large farms are relatively more productive, while in case of labour intensive crops the

productively has been higher on small farms. The positive relationship between farm size and level of income has been observed.

### RECOMMENDATIONS

The research paper proposes that the requirement of appropriate land reforms are recommended. The farms productivity and farms income may be increased by the economic farm holdings (farm size). It also recommends that the small farmers may be provided credit facilities, so that they may acquire the basic ingredient input.

### REFERENCES

- Ali, F., Parikh, A. & Shah, M. K. (1994). Measurement of Economic Efficiency Using the Behavioural and Stochastic Frontier Approach. *Applied Economics*, 26:181-188.
- Ali, M. M. & Iqbal, M. (1984). Unachieved Productivity Potential: Some Results of Yield Constraints Research in Pakistan. A paper presented at National Seminar on Optimizing Crop Production through Management of Soil Resources, organized by NFDC-PAD&SC at Lahore.
- Bagi, F. S. (1983). Relationship Between Farm Size, Productivity, Input Demand and Production Cost. *Arthavijana*, Vol. XXV(3), 231-245.
- Bardham, P. K. (1973). Size, Productivity and Returns to Scale: An Analysis of Farm Level Data in Indian Agriculture. *Journal of Political Economy*, No. 81(13), 70-86.
- Barnum, H. N. & Squire, L. (1978). Technology and Relative Efficiency. unpublished paper, World Bank.
- Belbase, K. & Grabowski, R. (1985). Technical Efficiency in Nepalese Agriculture. *Journal of Development Areas*, 19(5), 15-26.
- Berry, R. A. & Cline, W.R. (1979). Farm Size, Factor Productivity and Technical Change in Developing Countries. Draft Prepared for the International Labour Organization and the World Bank.
- Bradford, L. A. & Johnson, G.L. (1963). *Farm Management Analysis*. John Wiley and Sons, New York.

- Byrelle, D., et al., (1986). Increasing Wheat productivity in the Context of Pakistan Irrigated Cropping System: A View from Farmer's Field. PARC/CIMMYT Research Report. Agricultural Economic Research Unit. Faisalabad.
- Chattopadhyaya, C. H. & Rudra, A. (1976). Farm Size and Yield per Acre. Economic and Political Weekly, Vol. III :26-28.
- Chaudhry, M. G., Gill, M. A. & Chaudhry, G. M. (1985). Size-Productivity Relationship in Paksitan's Agriculture in the Seventies. Paper presented in second annual General Meetings held in May 12-14, 1985, at Pakistan Institute of Development Economics, Islamabad.
- Chennareddy, V. (1967). Productivity Efficiency in South Indian Agriculture, Journal of Farm Economics ,49(4), 816-20.
- Desai, D. K. (1963). Increasing Income and Production in Indian Farming. Indian Society of Agricultural Economics, July-September.
- Dillon, J. L. & Anderson, J. R. (1971). Allocation Efficiency, Traditional Agriculture and Risk. American Journal of Agricultural Economics, February.
- Gangwar, A. C. & Ghakkar, R. K. (1975). Can Small-Scale Farming Yield more Income. Indian Journal of Agriculture Economics, Vol. XXX(3), 173-276.
- Hopper, D. W. (1965). Allocation Efficiency in Traditional Agriculture, Journal of Farm Economics, Vol,47(3), 611-24.
- Hussain, R. Z. (1981). "Efficiency of Resource Allocation on Pakistani Farms, Ph.D. Dissertation, Colorado State University, Fort Collins, Colorado.
- Hussain, S. S. (1989). Analysis of Economic Efficiency in Northern Pakistan: Estimation, Causes and Policy Implications. Unpublished Ph.D Thesis, University of Illinois at Urbana Champaign.
- Johnston, B. F. & Mellor, J. W. (1961). The Role of Agriculture in Economic Development. American Economic Division, September.
- Khan, M. H. (1979). Farm Size, and Land Productivity Relationship in Pakistan. The Pakistan Development Review, Vol. XXVII (1) Spring, 1979.



- Khusro, A. M. (1964). Returns to Scale in Indian Agriculture. *Indian Journal of Agriculture Economics*, July-December.
- Mahmood, M. & Haq, N. U. (1981). Farm Size and Productivity Revisited. *Pakistan Development Review*, Vol. XX(2), 151-190.
- Massell, B. F. & Johson, R. W.M. (1968). "Economics of Small Holder Farming in Rhodesia: A Cross-section Analysis of area, Food Research Institute Studies 8 (3 Supplement), 1-74.
- Mazumdar, D. (1965). "Size of Farm Productivity: A Problem of Indian Peasant Agriculture. *Economica*, May, 1965.
- Michael, R. C. & Webie, K. D. (1990). The Non Neutrality of Agrarian Structure: U-Shaped Farm Size Productivity Relationship in Kenea, *American Agricultural Association*.
- Mellor, J. W. (1963). The Use and Productivity of Farm Family Labour in Early Stages of Agricultural Development. *Journal of Farm Economics*.
- Mijindadai, N.B. & Norman, D.W. (1984). Efficiency Differentials in Traditional Agriculture of Northern Nigeria. *Agriculture Systems*, Vol,14(2). 13-28.
- Rudhra, A. (1968). More on Return to Scale in Indian Agriculture, *Economic and Political Weekly*. Vol. III (43), 33-38.
- Saini, G. R. (1969). Holding Size Productivity and some Related Aspects of Indian agriculture, *Economic and Political Weekly*, Vol. VI (26), A.79- A-85.
- Saini, G. R. (1971). Holding Size, Productivity and Some Related Aspects of Indian Agriculture. *Economic and Political Weekly Review of Agriculture*.
- Singh, I. (1979). Small Farmers and Landless in South Asia. *World Bank Working paper No. 320*.
- Singh, R. S. & Patel, R. K. (1975). Returns to Scale, Farm Size and Productivity in Meerut District. *Indian Journal of Agricultural Economics*, Vol. XXVII (2), 43-49.

Yotopoulos, P.A. (1968). On the Efficiency of Resource Utilization in Subsistence Agriculture. Food Research Institute Studies, 13(2), 125-35.

Yotopoulos, P. A., Lau, L.J. & Somel, K. (1970). Labour Intensity and Relative Efficiency in Indian Agriculture. Food Research Institute Studies in Agriculture Economics, Trade and Development, 91.



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