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## ABSTRACT

Technical efficiency estimates for grain, corn for grain, sunflowers, sugar beets, and vegetables are estimated for collective and state farms in the Stavropol Region, Russia, for the period 1986-88. The technical efficiency estimates then are related to the farm organizational structures, management characteristics, and labor payment methods of the farms.

## THE RELATIONSHIP BETWEEN TECHNICAL EFFICIENCY AND FARM CHARACTERISTICS IN THE STAVROPOL REGION

Recent measures of technical efficiency in the Soviet Union have been incongruous with the presumption that bureaucratic obstacles in the command-economy system inherently foster waste in resource utilization and in production.[1] Relatively high estimates of technical efficiency suggest that Soviet industries cannot increase output appreciably by eliminating inefficiencies in production. Rather, increases in output will require the removal of institutional barriers, the need for technological infusion and improvements in the resource base. Consequently, the level of technical efficiency has direct implications on the reforms and restructuring ongoing in the economy of the Soviet Union.

This paper presents further evidence on the level of technical efficiency in Soviet agriculture by analyzing farm-level crop production in the Stavropol Region of the former USSR. And perhaps of more policy relevance, explanations for differences in technical efficiency among the sample farms are given. The Stavropol Region is located in the North Caucasus region of the Russian Republic, between the Black and Caspian Seas.

Technical efficiency is measured using the stochastic frontier methodology developed by Aigner, Lovell, and Schmidt (1977) and Meeusen and van der Broeck (1977). Frontier production functions are estimated for grain, corn for grain, sunflowers, and vegetables using data from 71 farms during 1986 and 1987. Individual farm-level technical efficiency estimates are obtained by the methods devised by Jondrow, Lovell, Materov, and Schmidt (1982). The individual farm-level technical efficiency is then related to the organization structures, labor-payment methods, and management characteristics of the farms.

[1]Koopman (1989) estimated the average level of technical efficiency in the agricultural sectors of the Soviet Republics to be equal to almost 94 percent. Danilin, Materov, Rosefielde, and Lovell (1982) found an average level of technical efficiency of nearly 93 percent in Soviet cotton refining plants. In both studies there is little dispersion of sample technical efficiency estimates.

## Technical Efficiency Computation Methods and Estimates

The stochastic production function provides a firm-specific standard to judge the technical efficiency of firms in the sample. The stochastic frontier production function, as developed by Aigner et al., is

$$Y_i = G(X_i\beta) + \epsilon_i \quad and\ \epsilon_i = v_i + u_i, \quad i = 1,2,...,N; \tag{1}$$

where N is the number of firms, $Y_i$ is the level of production, and $X_i$ is a input vector, and ß is vector of parameters to be estimated. The composite disturbance term $\epsilon_i$, is divided into two components. The first, $v_i$, is a symmetric disturbance (iid N(0, $\delta^2_v$)) that is independent of $u_i$. It represents uncontrollable random factors that include the weather, pest outbreaks, and possibly just luck. Also included in $v_i$ is measurement error in the dependent variable. The second, $u_i$, is a nonsymmetric, nonpositive disturbance that is assumed to be distributed as N(0, $\delta^2_u$), truncated from above at zero. It represents the technical inefficiency of the firm that is revealed as production shortfalls from the firm's stochastic frontier, $[X_{it}\beta + v_{it}]$. It can be thought that included in $u_i$ are all factors the limit the firm from reaching its output potential. These controllable factors include the ill-timed application of inputs, slack labor practices, and poor management.

An estimate of the average level of technical efficiency in the population, $TE_m$, is given by (Lee and Tyler 1978, p. 387)

$$TE_m - E(e^u) = 2[\ 1 - F(\sigma_u)\ ]\ exp(\sigma^2/2), \tag{2}$$

where F is the standard normal distribution function. The conditional estimates $u_i$ are given by (Jondrow et al. 1982)

$$E(u_i|\epsilon) = (\sigma_u\sigma_v/\sigma)\ [(\ f(\epsilon_i\delta/\sigma)\ /\ 1-F(\epsilon_i\delta/\sigma)\ ) - (\epsilon_i\delta/\sigma)\ ], \tag{3}$$

where f is the standard normal density function and F is the standard normal distribution function, $\sigma^2 = \sigma^2_u + \sigma^2_v$, and $\delta = \sigma^2_u/\sigma^2_v$ . The expected value for the $i^{th}$ firm can be obtained by substituting the residual from the estimation of (1) into (3). The measure of technical efficiency for the $i^{th}$ firm, $TE_i$, is then by obtained by substituting (3) into $\exp(u_i)$. This is approximately equivalent to the ratio of the production level for the $i^{th}$ firm to the level of production if the technical efficiency is zero ($u_i = 0$).

The stochastic frontier production function model (1) was applied to 1986 and 1987 crop production data from collective and state farms in the Stavropol Region. The sample farms are representatives of a total of 461 state and collective farms in the Stavropol Krai. The 71 sample farms are the farms that answered a mailed questionnaire that was sent to all of the farms in the Stavropol Krai. The mailed questionnaire sought information about the organizational structures, labor payment methods, personnel characteristics, and input use of the farms in the region. The sample size for each crop and year depends on cropping patterns, production plans, rotational practices, and data omissions.

The basic model is the following four input model

$$Y = F(ITPCT, A, K, L, M), \quad i = 1, \ldots, N \tag{4}$$

where N is the number of observations (farms) and Y = output (centers); ITPCT = percent of sown area in the intensive technology program; A = sown area (hectares); K = capital (number of grain combines for grain production and the number of tractors for the other crops); L = direct labor applied (man-hours); M = mineral fertilizer nutrients (N, P, and K) applied (centers).

The stochastic frontier production functions were estimated separately for each of the four field crops. The Cobb-Douglas functional form was used. All values are in logarithms except ITPCT because it is zero for some farms. The intensive technology (IT) program in the Stavropol Krai sought to improve the allocation and timing of resource use, particularly fertilizer and pesticide use. The OLS and maximum likelihood frontier estimation results for each crop are given in Table 1. In Table 2, population average and firm-level estimates of technical efficiency estimates for each crop are summarized.

During the two crop years of the sample (1986 and 1987), favorable weather prevailed in the Stavropol Region. The level of moisture was above average and crop conditions were considered good. Nevertheless, the presence of shifts in the frontier production functions due to periodicity was examined. The initial model was expanded to include intercept shift dummy for 1987 (YR). The validity of direct intercepts was tested with the likelihood ratio test. Only with the grain stochastic frontier did the log-likelihood test indicate a significant shift between the sample periods.[2]

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[2]The negative of twice the log-likelihood ratio is asymptotically distributed as a Chi-square statistic with a parameter equal to one, the number of restrictions. The test statistics for the inclusion of an intercept shift in 1987 equal 44.78 (grain), 8.16 (corn for grain), 1.07 (sunflowers), and 0.514 (vegetables).

The percentage of sown area in the IT program surprisingly proved to be a statistically insignificant factor in determining total production in the OLS and frontier production functions. It is surprising because of the reported success of the IT program in raising yields and resource productivity. For example, 1987 winter wheat yields under the IT program in the Stavropol Krai were 63 percent higher than "usual" technological practices. Table 3 gives an indication of the scope of the IT program in the survey sample farms. IT participation by the sample farms follow regional trends; the bulk of the IT program is concentrated in grain production, which is primarily winter wheat.

The estimation results suggest that the IT program can be captured in the production function by increased resource use. In the Stavropol Krai, this would be increased mineral fertilizer application. Consequently, the reported elements of the IT program, improved cultural practices, and resource application timing, appear to be only marginal factors in increasing yields.

The results suggest, depending on the crop, considerable increases in output could be obtained without expanding the resources base. Grain production is the most technically efficient crop of those analyzed and shows the least dispersion in the sample. This corresponds with conventional wisdom. In the Stavropol Krai, grain production typically is a profitable crop with less variability in returns than the other more specialized and labor-intensive crops. Corn, sunflowers, and vegetables require more careful production, harvesting, and handling practices, and thus are more suspectable to losses. Consequently, farms may put less emphasis on the production and harvesting of these crops, and use their scarce resources on grain crops.

## The Role of Farm Characteristic on Technical Efficiency

Of more importance than the level and dispersion of technical efficiency is delineating the reasons for variation in efficiency across farms. Some of the controllable factors of farms and their management are related to the firm-level estimates of technical efficiency. The characteristics of the farms examined are the organizational structure and their labor payment method. Also, the farm directors' years of management experience, previous position, and whether the directors were born and raised on a farm are examined as potential factors that may influence efficiency.

In Table 4, the mailed questionnaire results used in the current analysis are given for the 71 sample farms. Other information obtained from the 71 sample farms also are provided in supplementary tables. Of the 71 sample farms, 43 are collective farms and 28 are state farms. In 1987, of the total 461 farms in the region, 171 were collective and 290 were state farms.

Consequently, the proportion of collective farms in the sample is much higher than in the entire Stavropol Krai.

The four types of farm organizational structures found in the Stavropol Krai are the departmental, brigade, shop, and combination. With the departmental structure (Figure 1), different regions of a farm's territory work as separate, diversified entities. These productive units, called departments, may produce a diverse mixture of crops and livestock. Typically, the number of departments in a farm correspond to the number of villages encompassed by the farm's territory. The head of each department has considerable autonomy in the day-to-day operating and planning decisions. The department head also has influence over the villages social and cultural life. The department form of organization is the oldest form in the krai. However, this form currently is the least common form of organization in the region and in the sample.

Farms have adopted more specialized forms of organization. The brigade structure (Figure 2) follows this trend by segmenting the farm into branches by production specialty (e.g., crop, horticulture, livestock). Work brigades are assigned to each of these branches. Brigade chiefs are responsible for the day-to-day operations of these production branches. The brigade chiefs are subordinate to the farm director and receive technical advice from the farm specialists (e.g., agronomist, animal scientist). The brigade form of organization is the second most prevalent form in the krai and in the sample.

The shop form (Figure 3) of organization forces the chief specialist into a dual role, one of a manager and a technical advisor. Productive branches are specialized like the brigade form of organization, but each branch is managed by a chief specialist, not a separate brigade chief. It is thought that the shop structure is an improvement over the brigade structure because the lines of authority are simplified. With the brigade structure, brigade chiefs essentially are subordinate to both the farm director and the farm specialists. This situation often leads to conflicting orders and advice. The shop structure has become the most common form of organization in the region. Also, in the sample over half of the farms have this form of organization.

The combination organizational structure incorporates the features of the departmental and shop structures. Most of a farm's organization would follow the shop structure and one branch may act as an autonomous unit.

The average length of managerial experience of the farm directors was 4.9 years in 1986 and 5.9 years in 1987. The distribution of years of management experience for the 1986 and 1987 time period is found in Table 5. Nearly three-fourths of the directors held their previous positions on farms and were born and raised on farms. Also of interest, but not included in the analysis, were the education levels and professions of the directors. All 71 directors were college graduates. Their professions are given in Table 6. As indicated, nearly half of the farm directors of the sample farms were agronomists.

There are two main types of labor payment used in the Stavropol Krai: "povryemennaya" or time payment and "sdelhaya" or task payment. The time payment method simply pays farm workers for their time spent on the job, irrespective of the results. The task system attempts to link salaries of workers with the production results or profitability levels. Also, combinations of these forms are used. A base salary is given which unrelated to the results of labor and bonuses are given that correspond to production targets or profitability levels. Using only the time payment method is less prevalent in the sample and in the region. Various forms of the task method are used. The most common form is called the "tarif" method. With this method each job (e.g., plowing a hectare of land) has an associated wage. Bonuses (demerits) are paid (deducted) for above (below) standard quality work.

In Table 7, readers familiar with the alternative "sdelhaya" or task methods of labor payment may find useful the distribution of these forms used in the sample farms. These forms were grouped together in the current analysis. The average monthly pay under the alternative labor payment methods during the sample period is provided in Table 8. Also of note, no farms in the sample used the "areynda" or rental contract form of labor payment.

## Farm Characteristic-Technical Efficiency Relationships

The firm-level technical efficiency estimates by crop were regressed on explanatory variables that represented the farm characteristics depicted in Table 4. The basic model is

$$TE_{it} = F(\text{Type, Department, Brigade, Shop, Experience, Previous, Raised, Time Percent}),$$

where $TE_{it}$ = technical efficiency estimate of farm i in year t (percent); Type = 1 if collective farm, equals 0 otherwise; Department = 1 if departmental organizational structure, equals 0 otherwise; Brigade = 1 if brigade organizational structure, equals 0 otherwise; Shop = 1 if shop organizational structure, equals 0 otherwise; Experience = management experience of farm director (years); Previous = 1 if farm director's previous position was on a state or collective farm, equals 0 otherwise; Raised = 1 if farm director born and raised on a state or collective farm, equals 0 otherwise; Time Percent = percent of farm workers paid with the "povryemennaya" (time) system of payment (percent).

The regression results for each crop of the technical efficiency estimates on these variables for the 1986 and 1987 period are given in Table 9. The parameter estimates were obtained with ordinary least squares (OLS).

The results suggest that collective farms were significantly more efficient than state farms in grain and sunflower production. In corn and vegetable production, collective farms were not significantly more efficient. Collective farms tend to be more efficient because collective farms that fail tend to be rescued by the state and then become state farms. Therefore, the efficiency gains in moving to a collective farm structure would probably be minimal.

The shop and departmental forms of organization tended to be linked to higher levels of technical efficiency than the combination or brigade structures. The shop and departmental structure have a positive and significant relationship with technical efficiency in grain and sunflower production. In the other crops, there is no statistical difference among the alternative forms of organization. Grain production is the major crop in the region. Then perhaps, moving to the autonomous department structure or the shop structure with its simplified lines of authority may improve agricultural production in the Stavropol Krai.

Years of management experience only had significant impact on technical efficiency in vegetable production. However, this positive relationship was minor. In the rest of the crops no relationship between years of management experience and technical efficiency was found.

The previous position of the farm director had mixed results on technical efficiency. In grain and corn production no significant relationship was obtained. Previous experience on a farm tended to be associated with lower levels of technical efficiency in sunflower production and higher levels in vegetable production.

Being born and raised on a farm only had a statistically significant relationship with technical efficiency in vegetable production. Surprisingly, farm directors that were born and raised on the farm were associated with significantly lower levels of technical efficiency in vegetable production.

Of perhaps the most significance in the results is the lack of relationship between the form of payment and technical efficiency. The percentage of workers paid under the time method of payment proved to be statistically insignificant for all crops. In the Stavropol Krai, considerable effort has been made to link the results of labor with compensation. However, as depicted in Table 8, all forms of labor payment tend to give similar salary levels. Consequently, the alternative labor payment methods are not motivating factors in increasing labor productivity and more efficient use of resources.

## Summary

Technical efficiency in the Stavropol Region is lower and more variable than previous results based on aggregate republic data would suggest (e.g., Koopman 1989). The level of technical efficiency for corn for grain, sunflowers, and vegetables shows considerable dispersion variability in the samples. Improved use of existing resources could greatly improve the output of corn, sunflowers, and especially vegetable production.

More efficient use in resources could be attained by moving farms to the collective structure. The department or shop organizational structures appear to be the most favorable forms. The characteristics of the farm directors gave mixed results. The alternative labor payment methods had no effect on the technical efficiency of the farms. The results show that significant gains in output and resource efficiency could be attained, possibly by making some selective farm structure and possible personnel changes. These options are currently available and do not require institutional change.

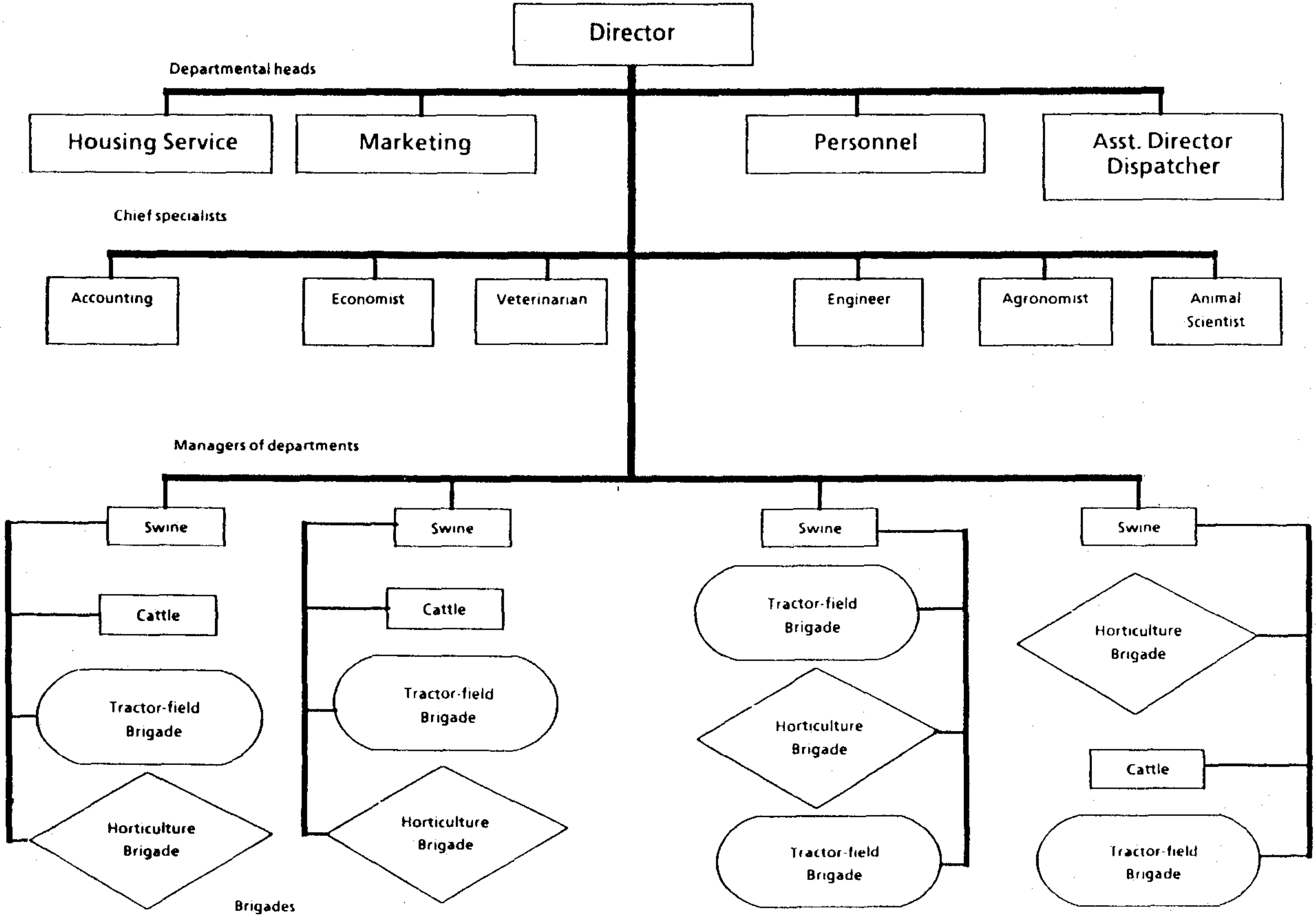


Figure 1. Departmental Management Organization

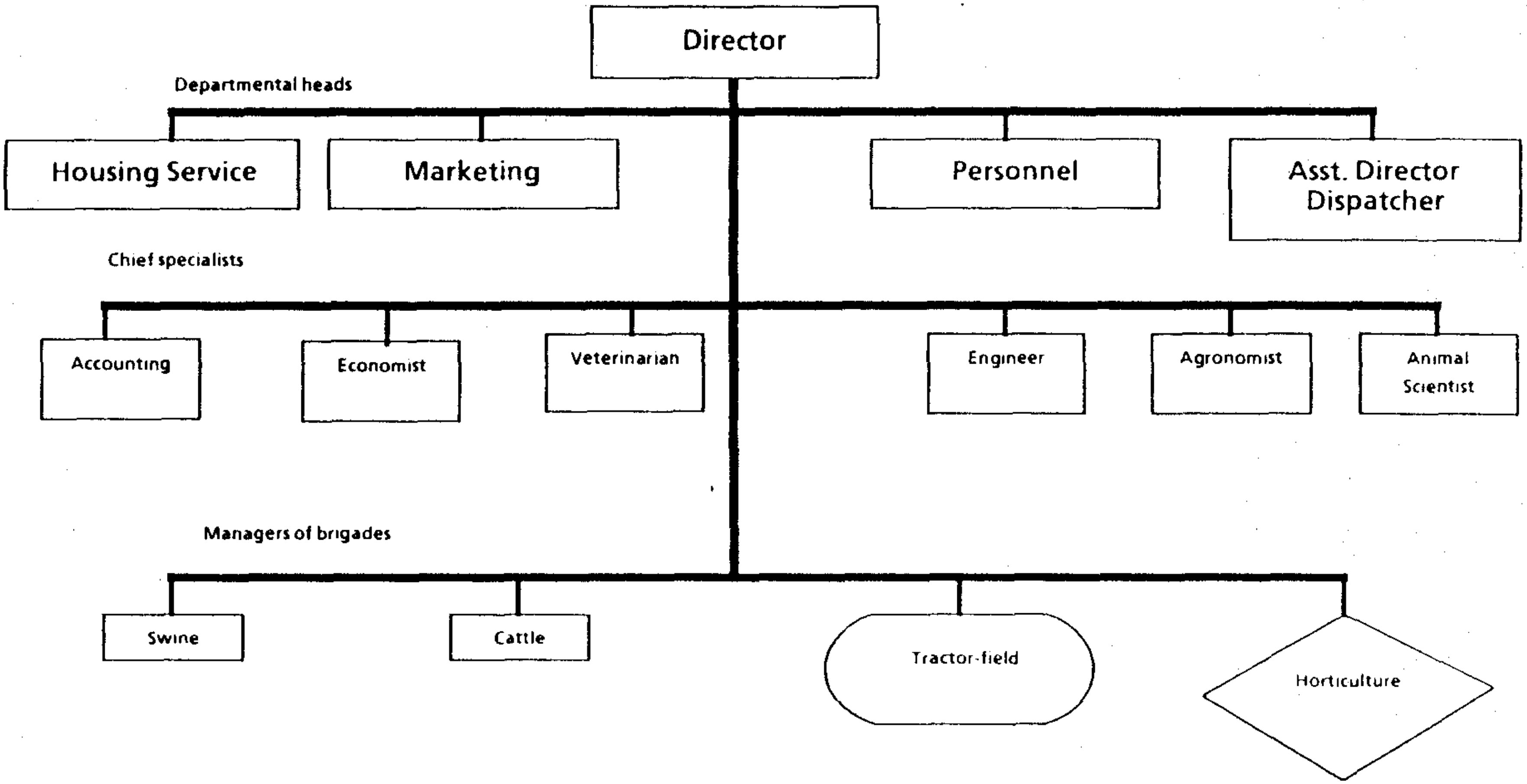


Figure 2. Brigade Management Organization

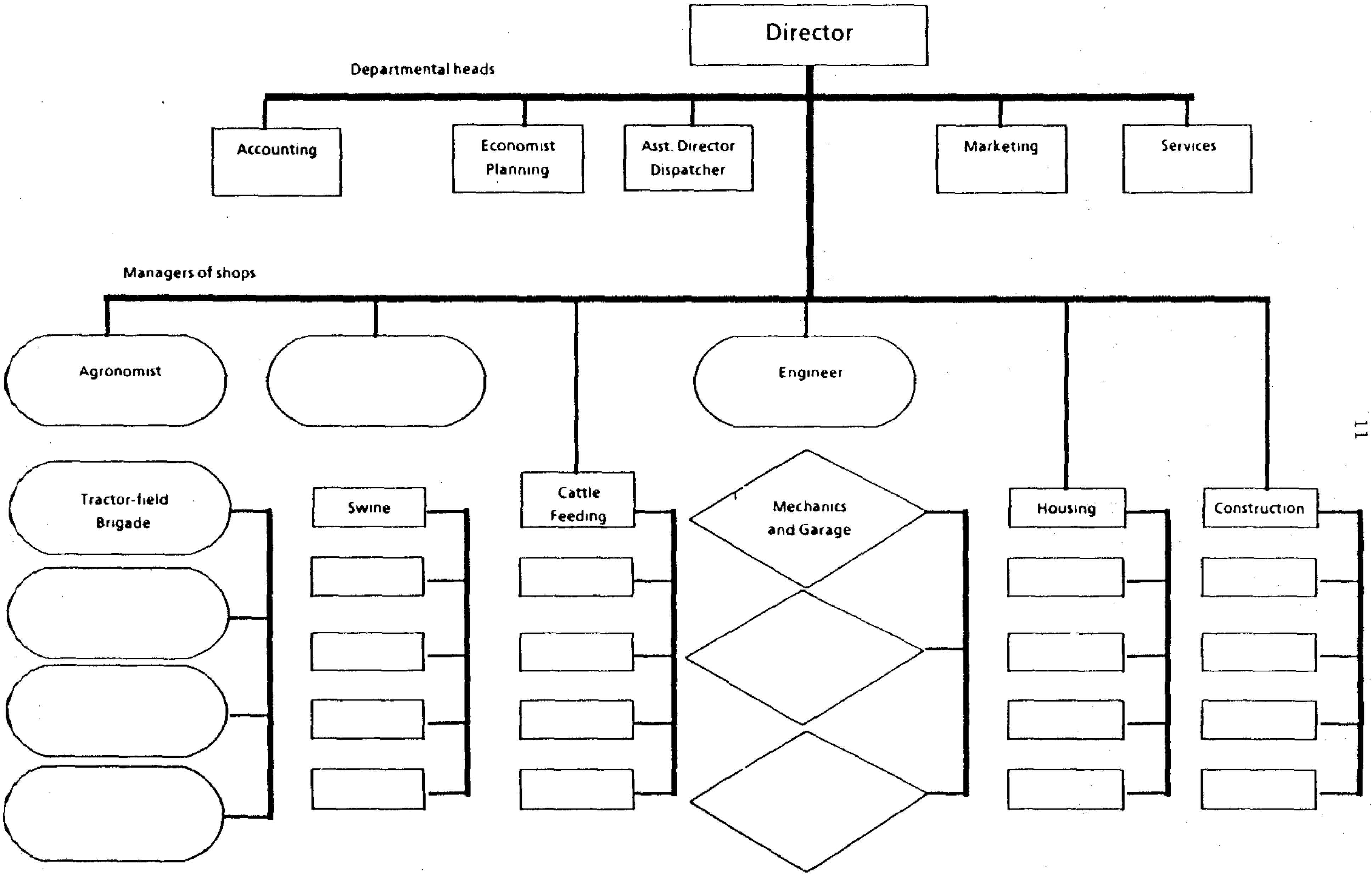


Figure 3. Shop Management Organization

Table 1. OLS and stochastic frontier production function results

| Dependent | Grain (N = 136) | | Corn (N = 77) | | Sunflowers (N = 87) | | Vegetables (N = 87) | |
|---|---|---|---|---|---|---|---|---|
| | OLS | Frontier | OLS | Frontier | OLS | Frontier | OLS | Frontier |
| Intercept | 3.942 (7.76) | 5.193 (7.45) | 1.568 (1.77) | 2.702 (6.10) | 0.254 (0.348) | 0.580 (0.73) | -1.061 (-0.87) | 0.470 (0.38) |
| YR | -0.363 (-7.10) | -0.338 (-5.81) | -- | -- | -- | -- | -- | -- |
| ITPCT | 0.000934 (0.99) | 0.00125 (1.34) | -0.000185 (-0.31) | -0.000068 (-0.77) | 0.00146 (1.70) | 0.0019 (1.18) | -- | -- |
| A | 0.454 (4.75) | 0.340 (3.91) | 0.808 (6.47) | 0.921 (7.01) | 0.689 (8.09) | 0.572 (10.4) | 0.801 (5.74) | 0.926 (6.16) |
| K | 0.405 (3.43) | 0.520 (4.95) | -0.073 (-0.40) | -0.087 (-0.55) | 0.017 (0.10) | 0.098 (0.50) | -0.128 (-0.48) | 0.237 (0.91) |
| L | 0.083 (1.82) | 0.058 (1.27) | 0.339 (4.13) | 0.216 (3.05) | 0.387 (5.17) | 0.426 (9.29) | 0.718 (7.78) | 0.648 (5.85) |
| M | 0.189 (4.40) | 0.173 (3.78) | -0.0129 (-0.19) | -0.010 (-0.18) | 0.095 (1.57) | 0.126 (1.95) | -0.102 (-1.49) | 0.098 (1.31) |
| $\sigma^2$ | 0.086 | 0.180 | 0.274 | 0.674 | 0.220 | 0.448 | 0.619 | 1.23 |
| $\delta$ | -- | 2.37 | -- | 6.15 | -- | 2.34 | -- | 2.50 |
| $R^2$ | 0.85 | 0.75 | 0.75 | 0.70 | 0.81 | 0.75 | 0.78 | 0.78 |

Note: T-statistics are in parentheses.

Table 2. Distribution and level of technical efficiency in crop production

| Efficiency Percent | Grain | | Corn | | Sunflowers | | Vegetables | |
|---|---|---|---|---|---|---|---|---|
| 0 - 10% | 0 | (0.0%) | 1 | (1.3%) | 0 | (0.0%) | 2 | (2.3%) |
| 10 - 20% | 0 | (0.0%) | 2 | (2.6%) | 1 | (1.1%) | 5 | (5.7%) |
| 20 - 30% | 1 | (0.7%) | 4 | (5.2%) | 3 | (3.4%) | 8 | (9.2%) |
| 30 - 40% | 1 | (0.7%) | 10 | (13.0%) | 5 | (5.7%) | 8 | (9.2%) |
| 40 - 50% | 3 | (2.2%) | 12 | (15.6%) | 8 | (9.2%) | 19 | (21.8%) |
| 50 - 60% | 9 | (6.6%) | 12 | (15.6%) | 13 | (14.9%) | 16 | (18.4%) |
| 60 - 70% | 30 | (22.1%) | 13 | (16.9%) | 21 | (24.1%) | 16 | (18.4%) |
| 70 - 80% | 29 | (21.3%) | 7 | (9.1%) | 20 | (23.0%) | 12 | (13.8%) |
| 80 - 90% | 53 | (39.0%) | 11 | (14.3%) | 16 | (18.4%) | 1 | (1.1%) |
| 90 - 100% | 10 | (7.4%) | 5 | (6.5%) | 0 | (0.0%) | 0 | (0.0%) |
| Total | 136 | (100.0%) | 77 | (100.0%) | 87 | (100.0%) | 87 | (100.0%) |
| | | | Level of technical efficiency | | | | | |
| Average | 75.2% | | 57.7% | | 64.1% | | 50.2% | |
| Collective | 77.9% | | 56.5% | | 64.4% | | 59.9% | |
| State | 70.7% | | 60.7% | | 63.5% | | 51.4% | |
| Population | 75.5% | | 57.1% | | 64.2% | | 50.4% | |

Table 3. Sown and intensive technology area on survey sample farms, 1986-87

| | Average area (hectares) | | Percent of sown area | | Percent of sample farms | |
|---|---|---|---|---|---|---|
| | 1986 | 1987 | 1986 | 1987 | 1986 | 1987 |
| Total sown area | | | | | | |
| Grain | 5267 | 4881 | -- | -- | 100.0 | 98.6 |
| Corn for grain | 222 | 833 | -- | -- | 52.1 | 81.7 |
| Sugar beets | 133 | 127 | -- | -- | 19.7 | 19.7 |
| Sunflowers | 452 | 703 | -- | -- | 71.8 | 74.6 |
| Vegetables | 31 | 34 | -- | -- | 87.3 | 94.4 |
| Intensive technology | | | | | | |
| Grain | 2535 | 2546 | 42.6 | 45.6 | 84.7 | 83.3 |
| Corn | 202 | 258 | 38.3 | 22.3 | 36.1 | 37.5 |
| Sugar beets | 97 | 102 | 12.8 | 14.5 | 15.3 | 15.3 |
| Sunflowers | 234 | 252 | 32.0 | 27.8 | 36.1 | 38.9 |
| Vegetables | 4 | 4 | 8.2 | 7.6 | 8.3 | 8.3 |

Table 4. Characteristics of survey collective and state farms

| Year | 1986 | 1987 |
|---|---|---|
| Number of collective farms | 43.0 | 43.0 |
| Number of state farms | 28.0 | 28.0 |
| Organizational structure (percent of farms) | | |
| Shop | 62.5% | 62.5% |
| Departmental | 11.1% | 11.1% |
| Brigade | 15.3% | 15.3% |
| Combination | 11.1% | 11.1% |
| Characteristics of farm directors | | |
| Average management experience (years) | 4.9 | 5.9 |
| Previous position on farm (percent yes) | 74.6% | 74.6% |
| Raised on farm (percent yes) | 71.8% | 71.8% |
| Labor payment methods (percent of farms) | | |
| "Povryemennaya" (time) | 11.3% | 9.9% |
| "Sdyelnaya" (task) | 71.8% | 74.7% |
| Combination | 16.9% | 15.4% |
| Labor payment methods (percent of workers) | | |
| "Povryemennaya" (time) | 15.3% | 15.4% |
| "Sdyelnaya" (task) | 84.7% | 84.3% |

Table 5. Management experience of directors on survey sample farms, 1986-1987

| | Years | Percent |
|---|---|---|
| Management experience | 0 - 2 | 26.4 |
| | 3 - 5 | 20.8 |
| | 6 - 8 | 18.1 |
| | 9 - 11 | 11.1 |
| | 12 - 14 | 6.9 |
| | 15 - 17 | 12.5 |
| | > = 18 | 4.2 |

Table 6. Occupational background of directors on survey sample farms, 1986-1987

| Occupation | Percent |
|---|---|
| Agronomist | 47.2 |
| Engineer | 23.4 |
| Animal specialist | 13.6 |
| Veterinarian | 8.3 |
| Economist | 2.8 |
| Accountant | 1.4 |
| Electrician | 1.4 |
| Economist/Agronomist | 1.4 |

Table 7. Distribution of labor payment methods for the survey sample farms, 1986-1987

| Payment Method | 1986 | 1987 |
|---|---|---|
| Distribution of methods | (percent of farms) | |
| "Povryemennaya" (time) | 11.3 | 9.9 |
| "Sdyelnaya" (task) | 71.8 | 74.7 |
| Combination | 16.9 | 15.4 |
| Total | 100.0 | 100.0 |
| Distribution of "sdyelnaya" (task) methods | | |
| "Tarif" | 64.8 | 56.6 |
| "Akkordo-premialnaya" | 7.8 | 7.5 |
| "Valovog dohod" | 23.5 | 24.5 |
| "Edino istochneek fund" | 3.9 | 11.4 |
| Total | 100.0 | 100.0 |

Table 8. Average monthly salaries by labor payment method on survey sample farms

| | 1986 | 1987 |
|---|---|---|
| Average monthly salary | (rubles) | |
| "Povryemennaya" (time) | 201.8 | 205.8 |
| "Tarif" | 194.1 | 205.2 |
| "Akkordo-premialnaya" | 229.7 | 218.0 |
| "Valovoj dohod" | 207.5 | 222.0 |
| "Edino istochneek fund" | 183.3 | 202.8 |
| Combination | 201.9 | 215.0 |

Table 9. Estimation results of technical efficiency measures on collective and state farm characteristics

| Variable | Crop | | | |
|---|---|---|---|---|
| | Grain (N = 136) | Corn (N = 77) | Sunflowers (N = 87) | Vegetables (N = 87) |
| Intercept | 66.19 | 47.15 | 56.80 | 46.65 |
| | (17.4) | (4.61) | (8.97) | (7.37) |
| Type | 8.89 | -2.98 | 4.19 | -2.11 |
| | (3.49) | (-0.45) | (4.10) | (-0.47) |
| Shop | 5.96 | 8.88 | 10.51 | 4.83 |
| | (1.92) | (1.03) | (1.92) | (0.84) |
| Departmental | 8.84 | 3.61 | 20.34 | 9.16 |
| | (1.85) | (0.25) | (2.28) | (0.97) |
| Brigade | 3.63 | -0.70 | 3.06 | 7.80 |
| | (0.92) | (-0.66) | (0.44) | (1.09) |
| Experience | 0.10 | 0.21 | 0.35 | 0.71 |
| | (0.57) | (0.56) | (1.20) | (2.25) |
| Previous | 0.40 | 7.49 | -9.38 | 9.56 |
| | (0.13) | (1.15) | (-1.78) | (1.69) |
| Raised | -4.13 | 0.64 | 0.68 | -18.13 |
| | (-1.34) | (0.93) | (0.13) | (-3.39) |
| Time Percent | 0.031 | -0.034 | 0.0102 | 0.071 |
| | (0.88) | (-0.41) | (0.18) | (1.07) |
| $R^2$ | 0.12 | 0.09 | 0.12 | 0.18 |

Note: T-statistics are in parentheses.

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