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by

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**No. S-15**

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# Organisation and Efficiency of Agricultural Enterprises in Transformation: An Empirical Analysis of the Gorzów Voivodeship

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## 1. Introduction

The economy in Poland has changed tremendously in recent years. Agricultural enterprises can defend their market share only if they are able to adjust quickly and efficiently to new circumstances. The most effective strategy to cope with changing operating conditions is a strategy of permanent development of human resources. This strategy must embrace a constant improvement of professional entrepreneurial skills and of management structures within organizations. Only such a strategy will allow businesses to hold on to or to increase their market standing despite strong competition. It will also allow them to meet, for instance, the newly introduced standardisation procedures for goods produced and supplied. This challenge holds especially true for agricultural enterprises that operate in highly competitive markets; markets which are currently characterised by a permanent surplus of supply over demand and a great number of businesses, mainly of small or medium size. Demand in the agricultural market is exerted by millions of consumers, all of different consumption habits with idiosyncratic consumption preferences.

Agricultural producers as a group are extremely sensitive to any kind of change in their environment. This is especially true in the current transition period when a worsening of economic conditions can be observed: an economic downturn caused by the price of inputs increasing at a faster rate than agricultural product prices and an ineffective agricultural policy.

One of the agricultural production factors which allows for quick adjustment to change and which can thus be used to improve one's market position is the human factor. It is a well-known fact that a good level of professional skills in combination with ongoing means of furthering and updating professional qualifications of workers can help to facilitate coping with market challenges.

The aim of this study is first to determine specific quality and quantity features of human resources in agricultural production, looking, *inter alia,* at changes in employment, specific employment structures and the number of recruitments and dismissals in a given period. A further aim was to undertake an efficiency analysis of limited partnerships which leased their agricultural real estate from the Agricultural Property Agency (APA) in the Voivodeship of Gorzów between 1995 and 1997.

The first analysis was carried out using data which were collected from surveys amongst the owners of 36 privately owned farms and the managers of 14 limited partnerships. The data cover the period between 1994 and 1997.

The incentive to conduct research on large farms in the Gorzów Voivodeship using the Data Envelopment Analysis method (DEA) lay in the outcome of various earlier studies on the financial standing of limited partnerships leasing real estate from APA in the Gorzów Voivodeship in 1996 and 1997. Apart from general adjustment processes, these inquiries proved that, in 1997, the economic condition of the farms analysed was worse when compared to the situation in 1996; the following ratios worsened: the financial support ratio, the liquidity ratio, the turnover ratio, the profitability ratio and the cost level ratio (see Świtłyk, 1998, 1999).

These results determined the focus of our research, namely input efficiency in particular limited partnerships. The base of our calculations was a research model which consisted of efficiency measures focusing on firms' inputs The analysis was carried out on a sample of 90 firms in the years between 1995 and 1997 (30 firms every year). Other data material was collected from national statistical office reports on incomes, costs and financial results (F-O1) and statistics about land usage, crop area and yields (R-O5).

In the next section we briefly discuss privatisation in agriculture. Sections 3 and 4 present results from our survey. Section 5 concludes.

## 2. Privatisation

Because of the decreasing financial standing and lack of further development perspectives of the state farms in Poland after 1989 the decision was made to change their ownership structure. State farms were subordinated to the Ministry of Agriculture and Food as well as to the local before the transition period.

A first step in restructuring ownership was the creation of an owners' representative institution. This role was assigned to the Agency of Agricultural Property (APA) of the State Treasury established in 1991 which is in charge of all the former state farms, lands and real estate coming from State Land Fund (SLF).[1] APA prepared the legal and organisational conditions for privatisation of state agricultural real estates. APA can sell the land as well as lease it, put it as a capital to the partnerships, transfer to new owners free of charge, or arrange land use by managerial contracts.

First, APA took over the assets of well operated enterprises. At the same time the remaining state farms encountered increasing debts and a quick deterioration of assets. The most important APA task is the privatisation and restructuring of the assets coming from former state farms. Usually restructuring preceeds privatisation. This has led to the creation of great scale private farms on the base of former units of large state farms. Some part of the land was transfered to enlarge existing or new-created family farms. Untill the end of 1998 APA overtook 4646 000 ha of agricultural land and 3815 000 ha have been leased (see Table 1).

*Table 1: Land taken over by APA in 1992 – 1998 in Poland (state in December of each year)*

| Years | Overtaken land (in 1000 ha) | Leased land by APA (in 1000 ha) |
|---|---|---|
| 1992 | 1425 | |
| 1993 | 3300 | |
| 1994 | 4233 | 2107[a)] |
| 1995 | 4414 | 3023 |
| 1996 | 4506 | 3434 |
| 1997 | 4592 | 3633 |
| 1998 | 4646 | 3815 |

a) total for 1992 – 94

Source: APA materials.

Leasing occurred to be the most popular way to arrange a productive land use. Although selling is commonly regarded as the best way of restructuring agriculture it was not a significant way of privatisation so far. In 1994 only 2,6% of land was sold and in 1995 5,2%, in 1996 9,6% and till the end of 1997 13% (see Table 2).

Only a marginal fraction of land was assigned to the partnerships (in the period of 1994-1997 only 0,2% of land each year). The part of land left under the managerial contracts decreased each year from 10,0% in 1994 to 8,9% in 1995, to 7.2% in 1996 and to 6,6% in 1997. The

1 Official Legal Act of State Treasury Land Administration, 19 October 1991 (Official Journal No. 107, Pos. 464 with next changes).

same trend can be observed for the temporary management (1994: 37,7%; 1995: 14,5%; 1996-1997: 6,8%).

*Table 2: Forms of land administration of former state farms by APA in 1000 ha and in % (December of each year)*

| Forms administration | 1994 | | 1995 | | 1996 | | 1997 | |
|---|---|---|---|---|---|---|---|---|
| | 1000 ha | % | 1000 ha | % | 1000 ha | % | 1000 ha | % |
| Sale | 96,7 | 2,6 | 193,0 | 5,2 | 359,6 | 9,6 | 486,7 | 13,0 |
| Lease | 1834,0 | 49,2 | 2614,7 | 69,9 | 2804,2 | 74,8 | 2693,6 | 71,8 |
| Partnerships put | 6,5 | 0,2 | 8,2 | 0,2 | 8,9 | 0,2 | 9,3 | 0,2 |
| Managerial contract | 373,5 | 10,0 | 332,9 | 8,9 | 268,0 | 7,2 | 248,5 | 6,6 |
| Free giving | 12,5 | 0,3 | 47,8 | 1,3 | 53,4 | 1,4 | 58,0 | 1,6 |
| Temporary management | 1404,8 | 37,7 | 544,0 | 14,5 | 256,0 | 6,8 | 255,4 | 6,8 |
| Total | 3728,0 | 100,0 | 3740,6 | 100,0 | 3750,1 | 100,0 | 3751,5 | 100,0 |

Source: APA Reports of central office.

The land area overseen by APA in Gorzów voivodeship at the end of 1997 was 226 264 ha. The land came from former state farms (189 710 ha), State Land Fund (21 373 ha) and other sources (15 178 ha). In Gorzów voivodeship untill the end of 1997 APA sold 14 400 ha of land, transfered 3 100 ha for free and gave 100 ha to the partnerships. The remaining agricultural land of 208 700 ha has been administered in the following ways:

- lease: 154 200 ha
- administration: 12 700 ha
- managerial contract or perpetual usage: 5 200 ha
- land in the process of administration: 36 600 ha.

## 3. Research results: quality and quantity features of human resources

### 3.1. Changes in Employment

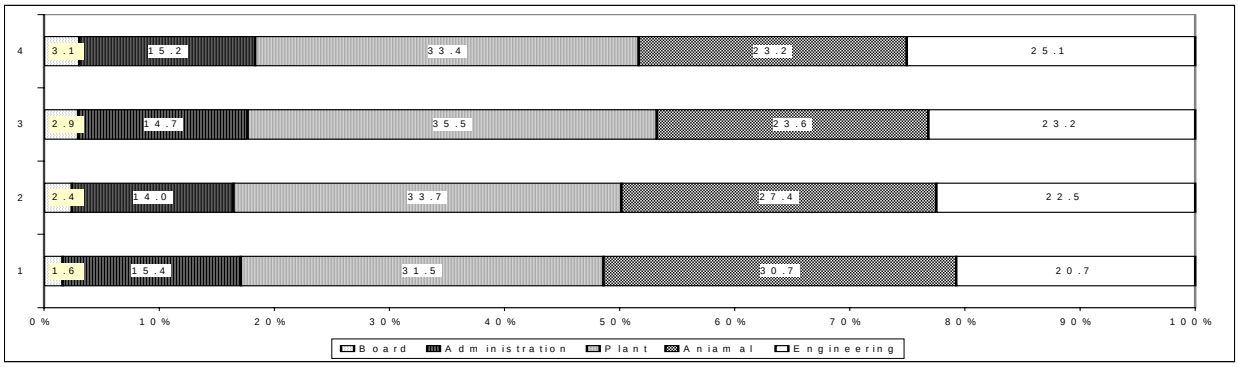
Compared with 1994, in 1997 individual farms were characterised by an increase in the number of administration employees, workers in crop and animal production and the machinery related ("engineering") branches of the farms; on the other hand, there was no significant change in the number of those employees with supervisory duties ("the boards") (see Graph 1). In the limited partnerships, however, we observed an increase of employment in boards, administration, crop production and the engineering branches but a decrease in number of those involved in animal production (see Graph 2). Thus, if one compares the development of individual farms and limited partnerships, one can conclude that significant differences exist in employment related to supervisory duties and engineering, whereas no

significant differences exist in the administration and crop and animal production branches. Graphs 3 and 4 present changes with regard to specific branches of employment in individual farms and limited partnerships in the period between 1994 and 1997.

In the group of individual farms we observed a decrease in the number of supervisory employees (from 39.7% to 29.8%) but an increase in the number of crop production workers (from 20.5% to 26.9%) and administration personnel (from 5.1% to 6.7%).

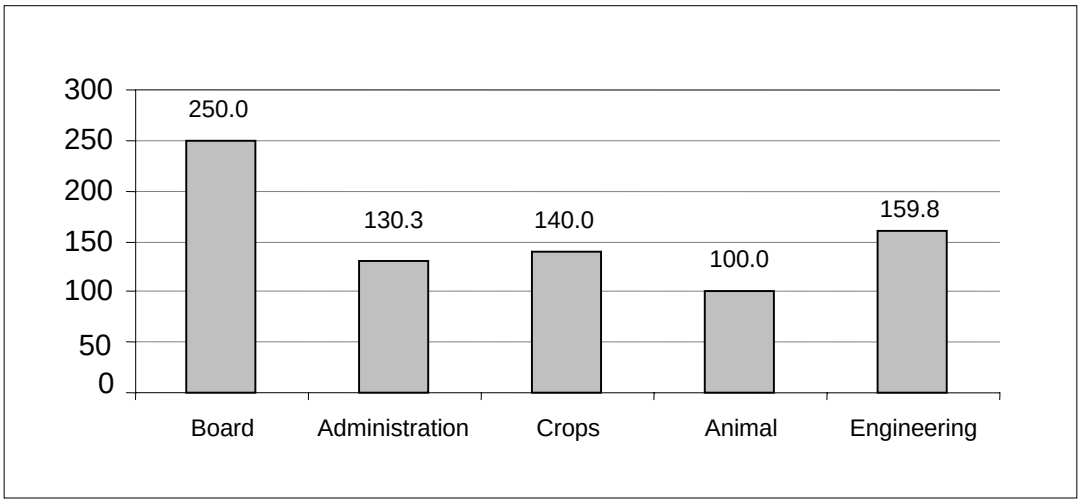
Only small changes are visible elsewhere. As far as limited partnerships are concerned, there was a decrease in the percentage of animal production workers (from 30.7% to 23.2%) and an increase of employees in other branches: the percentage of production workers went up to 33.4%, engineers to 25.1% and boards' personnel to 3.1%.

*Graph 1: Dynamic of employment changes in specific branches of individual farms*



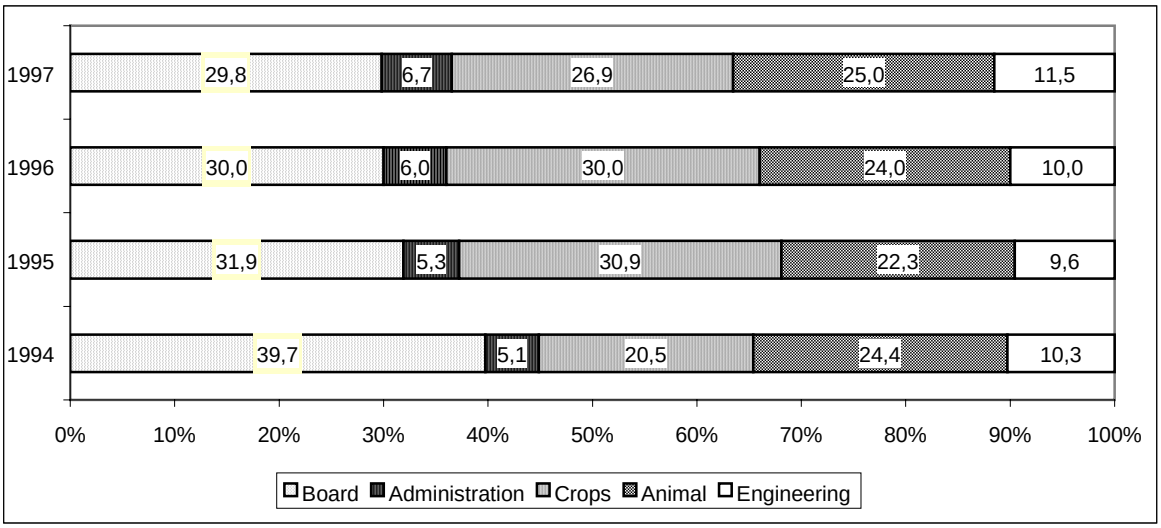

Source: Own calculation.

*Graph 2: Dynamic of employment changes in specific branches of limited partnerships (1994-1997)*

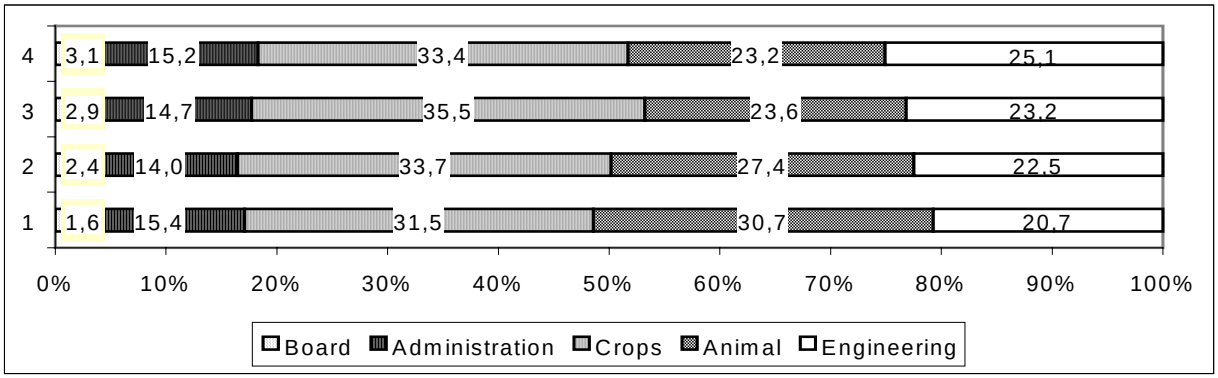



Source: Own calculation.

*Graph 3: Percentage share of employment in specific branches of individual farms (1994 – 1997)*




*Graph 4: Percentage share of employment in specific branches of limited partnerships (1994 - 1997)*

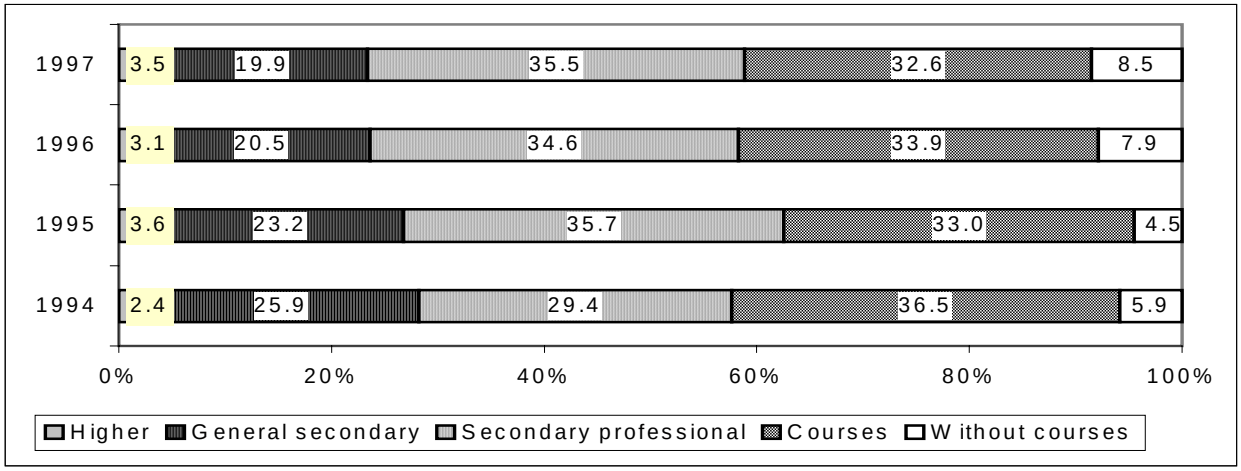



Source: Own calculation.

## 3.2. Employment structure - education

The education level of the workers is one of the most important human resource factors if a farm is to operate in a constantly changing environment. In this respect, there were no differences evident between the individual farms and the limited partnerships which we observed. In 1994, 2.4% of individual farmers had completed tertiary education, and this figure increased to 3.5% in 1997 (see Graph 5). Similarly, we observed an increase in the number of farmers attaining secondary professional qualifications (from 29.4% to 35.5%); but then again, there was also an increase in the number of farmers without any kind of schooling (from 5.9% to 8.5%). Moreover, the percentage of farmers with a general secondary education dropped from 25.9% in 1994 to 19.9% in 1997, as did the share of farmers who had undertaken professional courses (36.5% in 1994 to 32.6% in 1997).

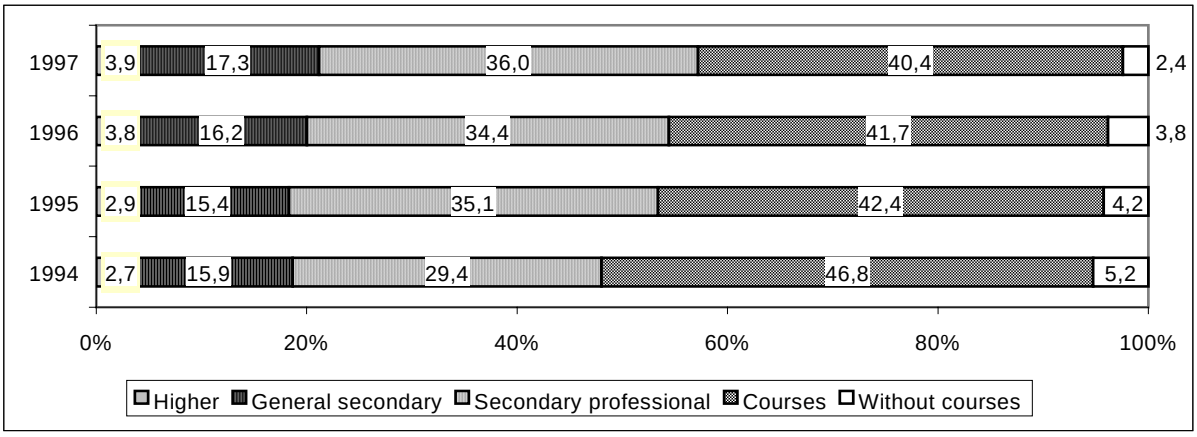
*Graph 5: Employee education on individual farms (1994 – 1997)*




Source: Own calculation.

As far as limited partnerships are concerned, we saw an increase in the number of workers with a tertiary education (from 2.7% to 3.9%), secondary education (from 15.9% to 17.3%) and secondary professional education (from 29.4% to 36.0%); at the same time, we observed a decrease in the percentage of workers having undertaken professional courses (from 46.8% to 40.4%) and an increase in the number of workers, who by the time of the period analysed, had not completed any course of formal education (from 5.2% to 2.4%) (see Graph 6).

*Graph 6: Employee education in limited partnerships (1994 – 1997)*



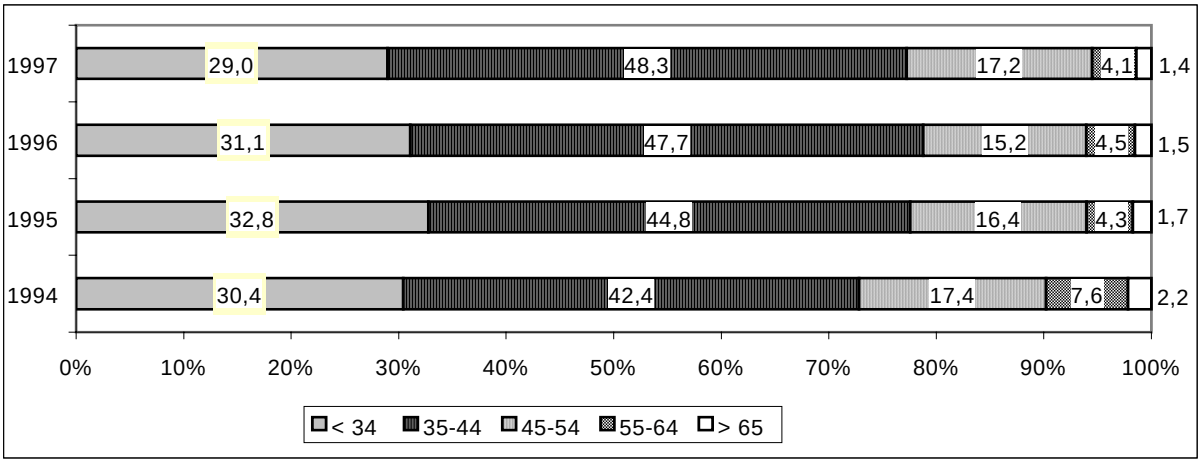

Source: Own calculation.

## 3.3. Age structure

Another important factor in measuring the quality of human resources is employee age, as this factor determines the inclination of employees to risk new ventures and to accept inevitable change. In the group of individual farms observed, the number of farmers below the age of 35 decreased from 30.4% in 1994 to 29.0% in 1997 (see Graph 7). Amongst the limited

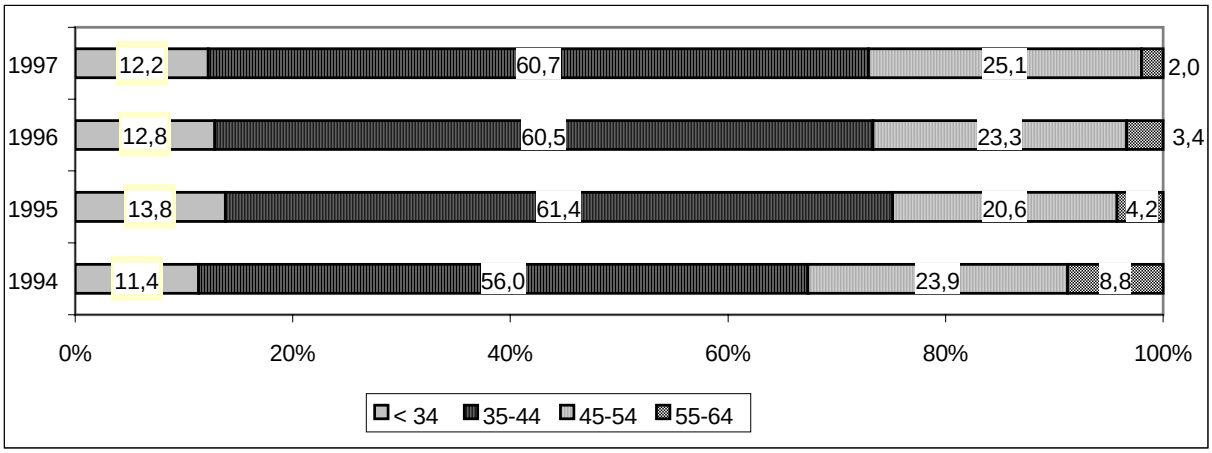
partnerships, however, the percentage of young workers was 11.4% in 1994 and 12.2% in 1997 (see Graph 8). The number of workers below the age of 44 dropped in individual farms but increased in limited partnership farms in the same period. Our findings also indicated that there are some persons older than 65 years on individual farms but no employees in this age group in limited partnerships.

*Graph 7: Age structure of employees on individual farms (1994 – 1997)*




Source: Own calculation.

*Graph 8: Age structure of employees in limited partnerships (1994 – 1997)*




Source: Own calculation.

## 3.4. Annual wages

The motivation of employees makes up another very important element of human resource management. Wage levels and payment structures are crucial factors in encouraging better work. Tables 1 and 2 show the annual wages of workers in the specific branches of employment. One thing which we would like to emphasise is the fact that, from amongst the group of farms analysed in 1997, a decrease in wages was only observed in the engineering

branch of the privately owned, individual farms (see Table 3) and the supervisory personnel of the board branch of limited partnerships (see Table 4). The other branches showed an increase in wages compared with 1996. In relation to the individual farms, and compared with 1996, in 1997 the wages of employees on the boards of individual farms had increased by 14.5%, in administration by 69.7%, in crop production by 7.8% and in animal production by 16.8%. The wages of workers on limited partnership farms in the same period grew in the following proportions: for administration staff by 19.3%, for crop production workers by 9.6%, for those responsible for animal production by 15.9% and by 9.7% for those engaged in the engineering side of agricultural production.

*Table 3: Annual wages of specific branches in individual farms (1994 – 1997) in Zloty*

| Specification | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|
| Board | 8375,0 | 10760,0 | 12371,4 | 14171,4 |
| Administration | 5400,0 | 3720,0 | 4500,0 | 7590,0 |
| Crop | 4925,0 | 5160,0 | 6604,6 | 7122,8 |
| Animal | 5726,6 | 6591,9 | 7903,8 | 9232,2 |
| Engineering | 5900,0 | 6335,0 | 7780,8 | 7455,2 |
| Other | 4200,0 | 5000,0 | 5125,0 | 5796,0 |

Source: Own calculation.

*Table 4: Annual wages of specific branches in limited partnerships (1994 – 1997) in Zloty*

| Specification | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|
| Board | 12596,5 | 18195,7 | 20787,9 | 18115,0 |
| Administration | 20173,6 | 7770,6 | 9016,0 | 10758,5 |
| Crop | 6566,2 | 7371,3 | 8271,6 | 9065,7 |
| Animal | 6593,6 | 7355,0 | 7721,8 | 8953,2 |
| Engineering | 6195,4 | 7440,2 | 10921,4 | 11983,6 |
| Other | 5700,0 | 4957,0 | 6755,0 | 7450,8 |

Source: Own calculation.

## 3.5. Payment Rules

The pay structure of those with supervisory duties on privately owned farms were usually based on the circumstances of the particular farm; supervisors on limited partnership farms, on the other hand, were largely (that is, in 92.9% of cases) paid according to the permanent salary rule. Administration staff on the individual farms were rewarded by fixed salary and by individual needs (50% and 50%) and in the limited partnerships by fixed salary (84.6%) or in two cases, according to labour time with additional result-based bonuses. Those working in crop production on individual farms were most often remunerated according to labour time and consumption needs (48.15% and 25.9%).

*Table 5: Payment structures on individual farms and limited partnerships in the period between 1994 – 1997*

| Specification | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Individual (n = 36) | | | | | | | | | | | | | | | |
| Board | 5 | 29.41 | 12 | 70.59 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 17 |
| Administration | 2 | 50.00 | 2 | 50.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 4 |
| Crop | 3 | 11.11 | 7 | 25.93 | 13 | 48.15 | 2 | 7.41 | 0 | 0.00 | 2 | 7.41 | 0 | 0.00 | 27 |
| Animal | 3 | 15.00 | 6 | 30.00 | 6 | 30.00 | 3 | 15.00 | 0 | 0.00 | 2 | 10.00 | 0 | 0.00 | 20 |
| Engineering | 3 | 30.00 | 2 | 20.00 | 2 | 20.00 | 1 | 10.00 | 0 | 0.00 | 2 | 20.00 | 0 | 0.00 | 10 |
| Other | 1 | 33.33 | 0 | 0.00 | 0 | 33.33 | 0 | 0.00 | 0 | 0.00 | 1 | 33.33 | 0 | 0.00 | 3 |
| Limited partnerships (n = 14) | | | | | | | | | | | | | | | |
| Board | 13 | 92.86 | 0 | 0.00 | 0 | 0.00 | 1 | 7.14 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 14 |
| Administration | 11 | 84.62 | 0 | 0.00 | 0 | 0.00 | 2 | 15.38 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 13 |
| Crop | 1 | 5.88 | 1 | 5.88 | 5 | 29.41 | 4 | 23.53 | 0 | 0.00 | 5 | 29.41 | 1 | 5.88 | 17 |
| Animal | 2 | 11.76 | 1 | 5.88 | 4 | 23.53 | 3 | 17.65 | 0 | 0.00 | 6 | 35.29 | 1 | 5.88 | 17 |
| Engineering | 2 | 14.29 | 1 | 7.14 | 3 | 21.43 | 2 | 14.29 | 1 | 7.14 | 5 | 35.71 | 0 | 0.00 | 14 |
| Other | 2 | 22.22 | 0 | 0.00 | 2 | 22.22 | 2 | 22.22 | 1 | 11.11 | 2 | 22.22 | 0 | 0.00 | 9 |

1-Fixed salary
2-needs based payment (family farms)
3-Labour time system
4-Labour time plus result-based bonuses
5-Labour time plus quality-based bonuses
6-Labour time plus result- and quality-based bonuses
7-Other payment systems

Source: Own calculation.

Animal production workers on the individual farms were most often rewarded according to consumption needs (30%) and labour time (30%); on limited partnership farms, however, remuneration was mainly calculated on an hourly basis, but with bonuses for performance and work quality as well as bonuses related to labour time (23.5%). As far as the engineers (35.3%) on individual farms are concerned, a fixed salary system was usually used (30%); in the limited partnerships, on the other hand, engineers were remunerated by a mixed hourly rate and bonus (for both quality and results) system (35.7%). The rest of individual farm workers and partnership employees were rewarded according to various other payment systems (see Table 5).

## 3.6. Recruitment and termination

Between 1994 and 1997 the individual farms studied recruited 87 new employees (see Table 6). The labour split was as follows: most were hired into supervisory roles (21 people), for crop production (38 people), and for animal production (18 people). At the same time, 283 new workers were hired by the limited partnership farms; this included 65 new crop production employees, 38 new animal production employees and 128 personnel who were hired into general farm maintenance jobs.

*Table 6: Newly hired workers in the period between 1994 – 1997*

| Specification | Farms | |
|---|---|---|
| | Individual | Limited partnerships |
| Board | 21 | 7 |
| Administration | 3 | 31 |
| Crop production | 38 | 65 |
| Animal production | 18 | 38 |
| Engineering | 6 | 14 |
| Other | 1 | 128 |
| Total | 87 | 283 |

Source: Own calculation.

*Table 7: Reason for termination of employment on individual farms and limited partnership farms in the period between 1994 - 1997*

| Specification | Farms | |
|---|---|---|
| | Individual | Limited partnerships |
| New farm creation | 2 | 0 |
| Agribusiness | 7 | 5 |
| Industry | 3 | 15 |
| Service | 3 | 7 |
| Unemployed programs | 0 | 2 |
| Retired/pension | 13 | 73 |
| Unemployed | 0 | 31 |
| Other | 4 | 31 |
| Total | 32 | 163 |

Source: Own calculation.

Cessation of employment from individual farms (see Table 7) was most often as a result of retirement or the receipt of a pension (13 persons) but was also because the employee found alternate work in the wider agribusiness sector (7 persons). Those terminating employment from limited partnerships usually retired or became eligible for a pension (73 persons) or became unemployed (31 persons).

## 4. The results of Data Envelopment Analysis

For the purpose of the Data Envelopment Analysis (DEA)[2], the limited partnerships were divided into two main groups: the first grouping was according to arable land area; the second grouping was according to agricultural space quality as measured by a ratio of agricultural land production value[3].

2 See Czasch et al. (1999) for results concerning farms in Brandenburg, Germany.

3 This is a ratio developed by the Institute for Crop Cultivation and Soil Science in Pulawy. It takes into consideration soil quality, agriclimate, water conditions and the landscape.

Each grouping was further subdivided into 3 sub-categories. The partnerships grouped by agricultural space quality were subdivided on the basis of the ratio of agricultural land production value, where the values were:

- 55 - 65 pts (n = 10)
- 63 - 70 pts (n = 9)
- above 70 pts (n = 11).

In the group selected by arable land area the three sub-classes were established as follows:

- up to 1000 ha of arable land (n = 16)
- 1000 to 2000 ha of arable land (n = 7)
- more than 2000 ha of arable land (n = 7).

Calculations were carried out in each relevant year for both the general population and for the above-mentioned groups of limited partnerships.

The following variables were used:

Y = sale incomes (thousand zloties)

$x_1$ = arable land size (ha of arable land)

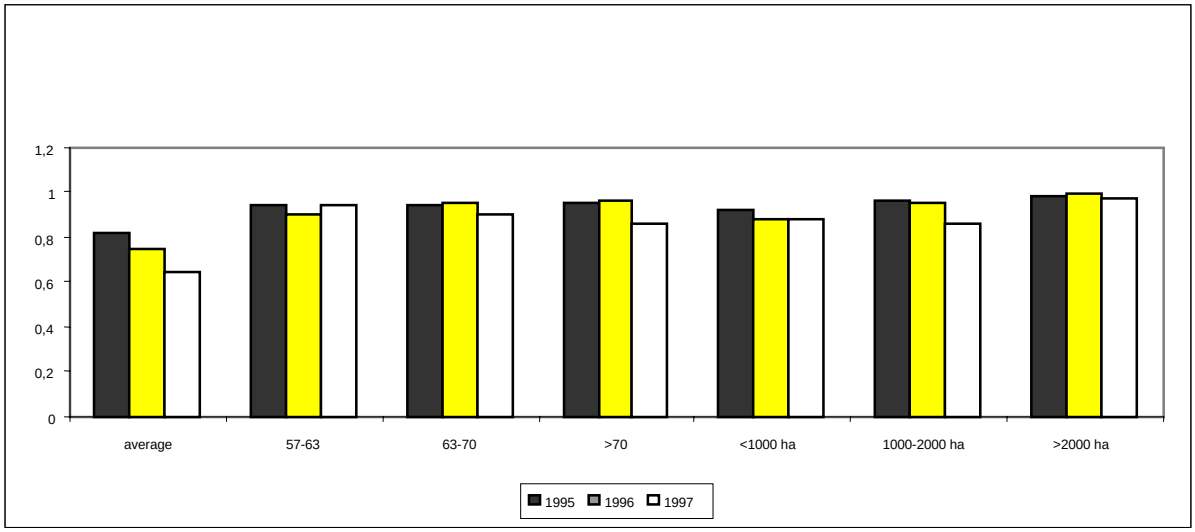
$x_2$ = materials and energy usage (th. zl)

$x_3$ = labour costs with additives (th. zl)

$x_4$ = amortization (Th. zl ).

In 1995, the average CRS (constant return to scale) ratio of technical efficiency for the entire investigated group was equal to 0.820, while the VRS (variable return to scale) efficiency ratio was equal to 0.894. Of the examined limited partnerships, 23.3% were 'effective partnerships' according to CRS and 43.3% according to the VRS ratio in the analysed year. The minimal CRS efficiency ratio was equal to 0.438 while the minimal VRS efficiency ratio was equal to 0.602. In 1996, the CRS technical efficiency ratio, as an average on the whole population, was equal to 0.746 and the VRS ratio 0.894. In 1996, 16.7% (5) of the partnerships were effective according to CRS and 43.3% (13) according to the VRS ratio. The minimal ratio of technical efficiency according to CRS was equal to 0.359; according to VRS, that ratio was equal to 0.620. In 1997, the average technical efficiency ratio in the examined population calculated by CRS was equal to 0.643 and by VRS equal to 0.808. The percentage of effective companies in that year decreased to 13.3% (4) according to CRS and to 26.7% (8) according to VRS.

*Graph 9: Average technical efficiency of limited partnerships, measured by CRS*




Source: Own calculation.

In 1995, proposals for the improvement of efficiency largely concerned decreasing the size of land used for farming (33.3% of firms), reducing material and energy costs (6.7% of firms), reducing labour and additional costs (6.7% of firms) and minimising amortization costs (40% of firms). In 1996, the main proposals considered were reducing arable land size (30% of firms), decreasing labour and additional costs (30% of firms) and decreasing amortization costs (20% of firms).

In 1997, efficiency improvement was proposed by way of agricultural land reduction in 53.3% of firms, labour costs decrease in 63.3% of firms, amortization costs reduction in 26.7% of firms and materials and energy costs reduction in 10% of firms.

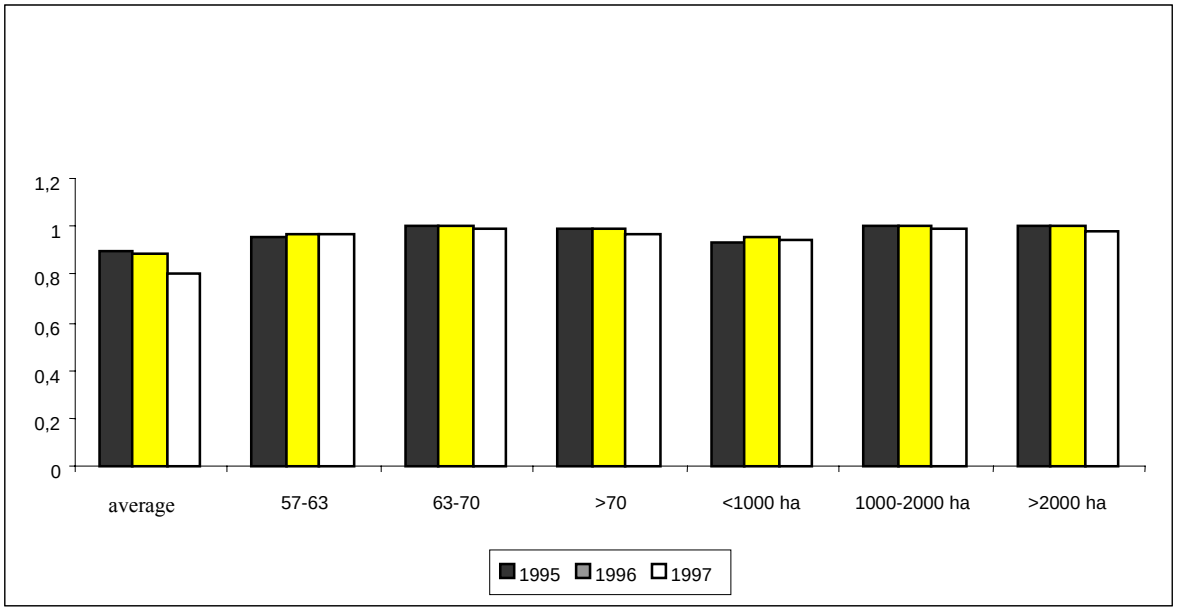
The partnerships in the land value group 55–63 points (of a 100 points scale) achieved efficiency ratios of 0.941, 0.900, and 0.941 under CRS. The VRS technical efficiency ratios were 0.956, 0.971, and 0.965. In the land value group 63–70 points the CRS technical efficiency ratios were 0.939, 0.950, and 0.905, while the VRS technical efficiency ratios were 1.0, 1.0, and 0.986. For the examined partnerships with land values of more than 70 points, the average technical efficiency ratios measured by CRS in the relevant years were 0.952, 0.968, and 0.857; while the VRS technical efficiency ratios were 0.996, 0.994, and 0.967.

Between 1995 and 1997, and in the group of firms analysed by quality of agricultural land, our findings were that 80% of firms in the 55–63 point category were effective; in the 63–70 point

category, however, the percentage of effective firms dropped from 100% in 1995 /1996 to 77.7% in 1997.

When the value of agricultural land quality was above 70 points, the percentage of effective partnerships decreased from 72.7% in 1995/1996 to 63.6% in 1997.

*Graph 10: Average technical efficiency in studied limited partnerships, measured by VRS*




Source: Own calculation.

For those firms with an agricultural land quality value of 53–63 points, it appeared that the changes in input capacity most likely to be effective were a decrease in utilised farmed land and a reduction of labour and additional costs. In the group of partnerships with an agricultural land quality index of 63–70 points, a reduction of land area and amortization costs could increase efficiency. When the index of agricultural land quality was above the 70 point mark, input streamlining proposals related to decreasing land utilisation and reducing amortization costs would prove efficient.

In the analysis of partnerships based on agricultural land, the average CRS technical efficiency ratio for firms with up to 1000 ha of land was, between 1995 and 1997, approximately equal, the figures being 0.928, 0.881, and 0.883; similarly, the respective VRS technical efficiency ratios were approximately equal, with figures of 0.934, 0.954, and 0.859. In the group of partnerships with land size of 1000 to 2000 ha, the average CRS technical efficiency ratio in the analysed years was equal, at 0.968, 0.954, and 0.858; the VRS technical efficiency ratio for the same firms dropped from 1.0 in 1995 to 0.993 in 1997. A similar tendency can be observed in the group of companies with more than 2000 ha of arable land. The CRS technical

efficiency ratio for such firms was approximately equal, with the figures being 0.983, 0.999, and 0.971; the VRS technical efficiency ratio for the same firms dropped from 0.999 in 1995 to 0.982 in 1997.

In 1995, and from amongst the group of firms analysed according to agricultural land area, 50% of firms with arable land of up to 1000 ha were effective partnerships. This figure increased in 1996 to 68.8% but dropped to 62.5% in 1997. The percentage of firms with 1000 - 2000 ha of land and which were effectively operated was an even 100% in 1995 but dropped to 87.5% in 1996 and 1997. The percentage of effective firms with more than 2000 ha was 85.7% in 1995, 100% in 1996 and 71.4% in 1997.

Proposals for input reduction considered by the companies studied by area of agricultural land, and with less than 1000 ha, included decreasing the utilised land, reducing labour costs and additions as well as reducing amortization costs. The proposals for input streamlining by other farms in the grouping related mainly to particular cases of decreasing arable land, and minimising labour and amortization costs.

Optimal analysis techniques require the determination of an efficiency scale for each analysed partnership. This scale can be calculated with the use of two techniques (CRS and VRS). If there is a difference between the results of the CRS and VRS efficiency ratios, it is evidence of a non-effective scale of activity.

Data from the surveyed group indicated that 60% of partnerships in 1995 - 1996, and 50% in 1997 were expanding the scale of their operations. On the other hand, it also appeared that 16.6% of partnerships in 1995 and 33.3% in 1997 were undergoing a reduction in production activity. While the analysis was conducted according to an agricultural space and quality value and according to the size of arable land available, one can observe that farms were predominantly either falling in production activity and output, or remaining constant.

## 5. Conclusions:

1. Compared to 1994, by 1997, the size of the employee base on privately owned, or individual, farms had changed very little. At the same time, the number of supervisory personnel on limited partnership farms increased 2.5 times.
2. Investigating the proportions of employees across the various branches of employment on privately owned farms highlights the tendency for a reduction in supervisory staff and an increase in employment in other branches. One thing we should make clear, however, is

that the duties of the supervisory workers on individual farms, apart from general farm management activities, essentially also entail doing work typical for other branches. Analysis of the percentage structure of the various branches of employment in the limited partnerships did not indicate significant differences between the branches.

3. One can observe a growing number of highly educated employees on individual farms; there is an increasing number of workers on individual farms with tertiary education qualifications as well as an increasing number of employees completing general secondary education. Similarly, in the limited partnership farms we observed an increase in the number of employees who had completed tertiary education as well as an increase in those with either a general or professional secondary education.

4. Analysis of employee age structure on the various farms indicated a larger number of employees under the age of 44 years in individual farms (77,3% in 1997) than in limited partnership (72,9% in 1997).

5. Employees on privately owned farms are not remunerated as well as those working for limited partnership farms. Supervisory personnel in partnerships earned 27.8% more than their equivalents on individual farms. Administration workers in limited partnerships earned 41.7% more, crop workers 27.3% more, engineering employees 60.7% more and other workers 28.6% more than their colleagues on individual farms. Animal production workers on the individual farms, however, earned a little more than partnership employees of the same calling on limited partnership farms.

6. In the farms surveyed there was no unified or standard employee payment structure, but some of the farms connect wage level with work efficiency and quality (especially in animal or crop production).

7. During the period studied, the individual farms under examination hired 87 new employees; these new employees were mainly engaged to undertake supervisory duties (21 persons), crop production duties (38 persons), and animal production tasks (18 persons). Limited partnerships over the same period took in some 283 new workers, mainly for general farm work (128 persons), crop production (65 persons), and animal production (38 persons).

8. Of those terminating employment from individual farms, most went into retirement, began to receive a pension (13 persons) or found jobs elsewhere in the agribusiness sector (7 persons). In relation to the limited partnership farms, those who ceased to work mainly retired or became pensioners (73 persons) or gained unemployed status.

9. The investigations carried out by this study have not proved the original hypothesis that economic inefficiency is caused by inefficient use of production inputs. Lower than average efficiency ratios were observed in the firms with up to 1000 ha of arable land and of low quality agricultural land. This provides a foundation for the thesis that a more general reason for the economic inefficiency of the examined partnerships was the external economic conditions of the period.

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