An evaluation of the types of technical development in agriculture in the years 1995–2000

Hodnocení typu technického rozvoje v zemědělství v letech 1995–2000

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Abstract: This article is divided into four parts; the first is concerned with the methodology of evaluation of the type of technical development and its objectives. Another part will evaluate the type of technical development in the national economy as a whole in the period 1995–1999. The main indicators are fund efficiency, productivity of labour and the technical specifications of work. The third part of the contribution will deal with an evaluation of these indicators in the selected sector of the economy, namely in the farms which are obliged to make public their income statements in the business bulletin. The last part, considered from the perspective of the type of technical development will be a farm sample, divided according to size into two groups - production and marginal area. This sample will be considered for the years 1997–2000. Finally a total evaluation of the present development of single monitored groups and an inter group comparison will be carried out.

Keywords: marginal areas, production areas, fund efficiency, productivity of labour, average registration number of labourers, operation, average state of tangible assets, technical specifications of work

Abstrakt: Příspěvek je rozdělen do čtyř částí, z nichž první část se zabývá metodikou hodnocení typu technického rozvoje a jeho cíly. V další části je hodnocen typ technického rozvoje v národním hospodářství jako celku a to v období 1995–1999. Hlavními sledovanými ukazateli jsou fondová účinnost, produktivita práce a technické vybavení práce. Třetí část příspěvku se zabývá hodnocením těchto ukazatelů ve vybraných odvětvích národního hospodářství a to u podniků, které jsou povinny zveřejňovat výsledovku v Obchodním věstníku. Jako poslední je posuzován z hlediska typu technického rozvoje výběrový soubor zemědělských podniků, který je rozdělen podle nadmořské výšky do dvou skupin, na produkční a marginální oblast. Tento soubor je posuzován v letech 1997–2000. Na závěr je provedeno celkové zhodnocení dosavadního vývoje jednotlivých sledovaných skupin a jejich vzájemné porovnání.

Klíčová slova: marginální oblasti, produkční oblasti, fondová účinnost, produktivita práce, průměrný evidenční počet pracovníků, výkony, průměrný stav investičního majetku, technické vybavení práce

Macro-economic conditions and the entrepreneurial environment for agricultural undertakings have been improving year after year. The gross domestic product has increased, the unemployment rate has decreased, and higher real wages have led to an improvement in the actual demand for agricultural raw materials and food. Higher demand has been influenced by the growth of agrarian exports and a decrease in the deficit balance of agricultural foreign trade. Lower interest rates have produced a resumption of interest in investing. The economic situation of farms was affected adversely by natural conditions with an extremely dry spring in the year 2000 and extremely rainy weather during harvest. The strengthening economy of farms was also affected by internal conditions consisting of the virtual termination of restitution claims and progress in the process of state farm privatisation. The unfinished problem of transformation shares still remains to be resolved. The great economic problem for farms has been their long-term low profitability.

Permanent pressure on production profitability on the one hand and a still adverse economic situation in the farms on the other hand has also evoked a series of important measures, the most marked being: the lowering of the number of agricultural workers, restrictions on investments, the related rationalisation of the acquisition of tangible assets and a drop in gross agricultural production.

The number of farm workers at the end the period in question was 168 000, which represents an annual decrease of agricultural labourers of 8.2%. The volume of investment in agriculture decreased 2.4% and its value was 9 897 million CZK in the year 2000. The reason seemed to be the adverse financial situation in agricultural enterprises and restrictions on investments from SGAFF. The volume of gross agricultural production in constant prices for the year 1999 decreased to 95.5% of the previous years total and thus changed the current trend of slow growth. The hoped for diversification of production in agricultural enterprises has not occurred.

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It is evident, that these changes will not only have a substantial influence on total net income of agricultural enterprises, but also on the main efficiency factors of the manufacturing process, that is; on the productivity of labour, fund efficiency and agricultural technical development. Therefore let us try to describe the global influence of economic conditions on these indicators in the last years according to a farm sample prepared with the cooperation of the Chamber of Agriculture CR.

METHODOLOGY OF VALUATION OF TECHNICAL DEVELOPMENT

Satisfactory attention to valuation of technical development, i. e. the relation between tangible assets and firm revenues, has not been paid either in economic theory or in practice. An investment efficiency check will generally be carried out before realization of the investment goals, and for several years after investment. The aim of this check is the evaluation of existing investment. The aim of an evaluation of technical development is a check of the proportional development between the development of tangible assets volume, average registration number of labourers and the volume of farm operations.

The relation between production volume and tangible assets we generally name fund efficiency and express as the formula

$$Fu = V : HIM$$

where:
Fu = fund efficiency,
V = annual operation volume,
HIM = average tangible assets state.

Output and tangible assets on the right side of the formula divided the average number of labourers, fund efficiency can be expressed as

$$Fu = v : T(vp)$$

where:
v = productivity of labour,
T(vp) = technical work equipment

The type of technical development can be expressed by means of an index of fund efficiency (Fu). Should the index of fund efficiency be equal to one ((Fu) = 1), then we talk about the *neutral type of technical development*. If the operation index is growing as fast as the index of tangible assets, and fund efficiency stays unchanged, it is *extensive development*. If the index of fund efficiency is greater than one ((Fu) > 1), it is a *fund- saving type of technical development*. The tangible assets volume is growing with regard to output volume underproportionally. Consequently the relative saving of tangible assets and other relative savings resulting from it are realized. If

Table 1. Types of technical development and derived development of separated characteristics

Version	Relation	Characteristic
1	iFu = iv = 1	Fund neutral type of technical development, unchangeable fund efficiency. Unchangeable productivity of labour. Unchangeable technical equipment of work.
2	iv > iFu = 1	Fund neutral type of technical development, unchangeable fund efficiency. Growing productivity of labour. Growing technical equipment of work.
3	iv < iFu = 1	Fund neutral type of technical development, unchangeable fund efficiency. Decreasing productivity of labour. Decreasing technical equipment of work.
4	iFu < 1 < iv	Fund-saving type of technical development, decreasing fund efficiency. Growing productivity of labour. Growing technical equipment of work.
5	iFu < 1 = iv	Fund-saving type of technical development, decreasing fund efficiency. Constant productivity of labour. Growing technical equipment of work.
6	iFu < iv < 1	Fund-saving type of technical development, decreasing fund efficiency. Decreasing productivity of labour. Growing technical equipment of work.
7	iFu = iv < 1	Fund-saving type of technical development, decreasing fund efficiency. Decreasing productivity of labour. Constant technical equipment of work.
8	iv < iFu < 1	Fund-saving type of technical development, decreasing fund efficiency. Decreasing productivity of labour. Decreasing technical equipment of work.
9	iv < 1 < iFu	Fund-saving type of technical development, growing fund efficiency. Decreasing productivity of labour. Decreasing technical equipment of work.
10	iv < 1 < iFu	Fund-saving type of technical development, growing fund efficiency. Constant productivity of labour. Decreasing technical equipment of work.
11	1 < iv < iFu	Fund-saving type of technical development, growing fund efficiency. Growing productivity of labour. Decreasing technical equipment of work.
12	1 < iv = iFu	Fund-saving type of technical development, growing fund efficiency. Growing productivity of labour. Constant technical equipment of work.
13	1 < iFu < iv	Fund-saving type of technical development, growing fund efficiency. Growing productivity of labour. Growing technical equipment of work.

the index of fund efficiency is less than one ((Fu) < 1), a fund-saving type of technical development is realized, which leads to the relative overfulfilment of tangible assets and other consequential indicators. It is possible to combine the type of technical development with different dynamics of productivity of labour. Thirteen qualitatively different variations of the type of technical development will arise. Their identification together with resulting consequences are shown in Table 1.

EVALUATION OF TECHNICAL PROGRESS IN THE ECONOMY AS WHOLE

An evaluation of the type of technical development in the various sectors of the national economy has been set up by the very dynamic combination of gross investment and an economically active population in the national economy in the Czech Republic.

The average number of workers in the national economy has recorded three different development waves since the year 1990 (Table 2).

The first wave, which is characterized by a drop in the average number of workers, covers the period 1990–1993. At the beginning of the period, the average number of workers was 5.351 million and the economically active population share of the total number of inhabitants was 52.8%. A steady drop in that period reduced the number of workers to about 5.03 million and to 4.848 million in the year 1993.

In contrast, the second period, 1994–1996, shows growth. The year 1996 produced the second highest number of workers at 5.044 million persons and the average increase is 65.3 thousand workers in that period.

The third period, 1997–1999, represents again a steady drop. The number of workers was 4.693 in the year 1999 and in comparison with the year 1990 it had decreased by 658 thousand persons.

By comparing the index of average number of workers in years 1990–1999 its value is $i_{99/90}$ = 87.70% and average annual drop rate of number of workers is 98.69%.

Gross investments in the national economy in current prices were increased steadily in the period 1990–1997. Since that time they have decreased. In 1990, gross investments represented 134.3 millliard CZK, in 1997, 638.8 milliard CZK and in 1999 523.3 milliard CZK. The index (1999/1990) was 388.49% and the average growth rate 114.53% (Table 2).

It is true that part of these increases in investments has been connected with the reclassification of the national economy, but it is necessary to constantly monitor the interdependence between the volume of tangible assets and operation, and thereby evaluate the adequacy and effect of these parameters.

The gross investments share in fixed assets had a tendency to grow in the years 1995–1997 (index 1997/1995 = 116.1%) and since that time it has been decreasing (index 1999/1997 = 63.2%). The second period decrease had been influenced by a total decrease since 1995 (index 1999/1995 = 73.4%).

The gross investments share in GDP also has its culmination point in 1997. Until 1997 the gross investments share of GDP had been increasing steadily (index 1997/1995 = 115.15%) but since that time has been decreasing steadily (index 1999/1997 = 73.69%). Gross investments in relation to GDP has been growing underproportionately. The rate of investment has slowed down.

Development of the fixed assets share of GDP in current price has not been steady but has oscillated around the value of 267%.

The productivity of labour was 117.3 thousand CZK in the year 1990. It shows a steady growth during the whole monitored period and in the year 1999 it was 391 285 CZK. (The basic index (1999/1990) is 334.36% and the average growth rate is 112.83%.) The growth of productivity of labour was achieved both by the highly dynamic growth in the gross domestic product and also by a fall in the economically active population. During the period the economically active population decreased by 658 thousand persons (Table 2).

The lower average growth rate of productivity of labour than that of technical equipment entailed implementation

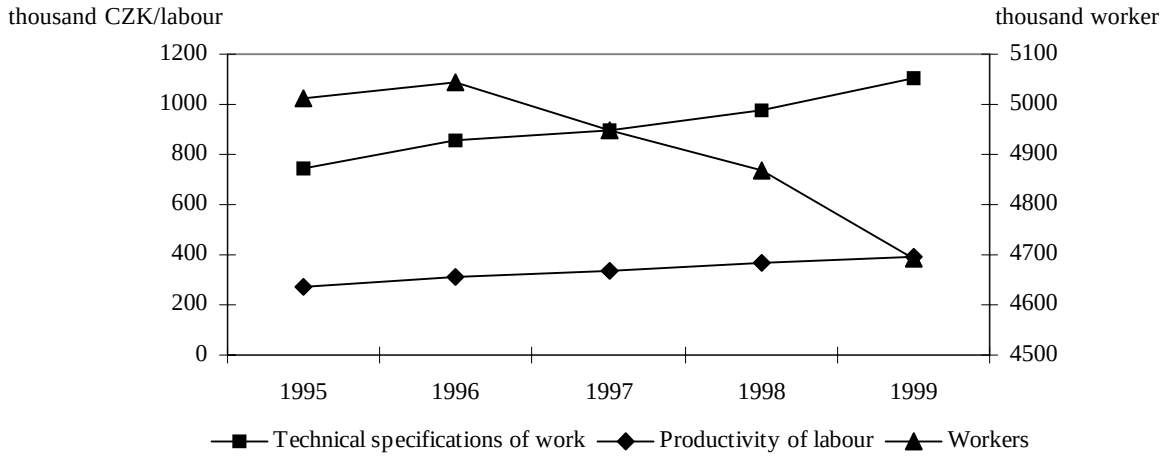

Figure 1. The development of productivity of labour in the Czech Republic

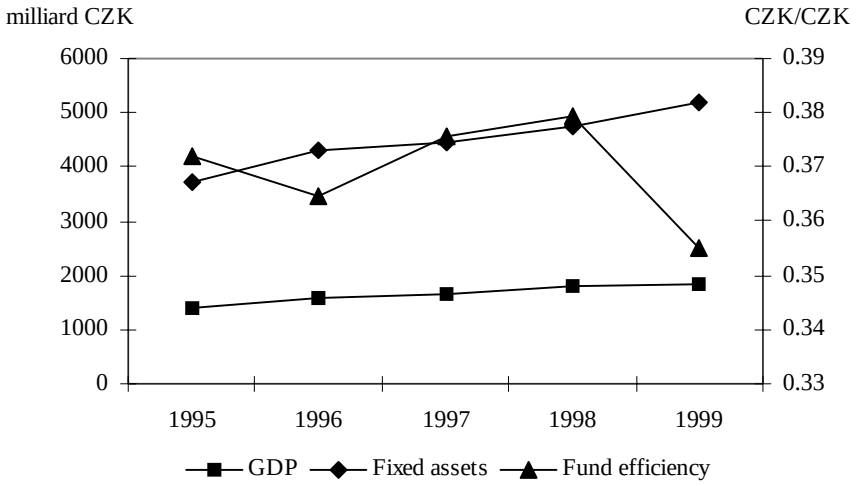

Figure 2. The development of fund efficiency in the Czech Republic

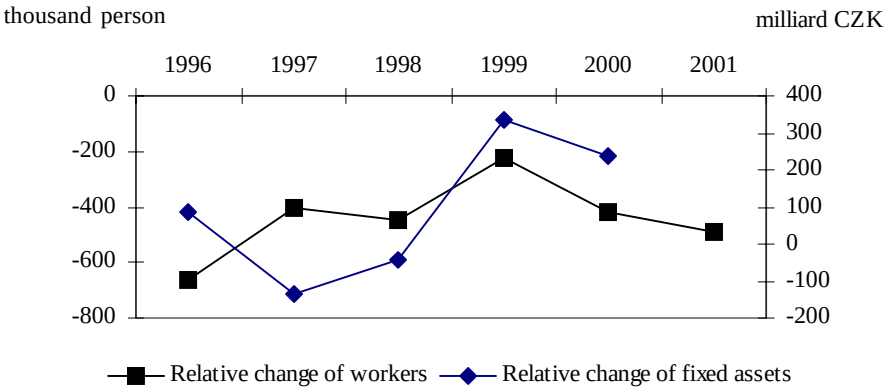

Figure 3. Relative change of workers and fixed assents in the Czech Republic caused by change in productivity of labour and fund efficiency

Table 2. Evaluation of the type of technical development in the national economy

Indicator	Specific unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Employment rate**	%	99.3	95.9	97.4	95.7	95.7	96	96.1	95.2	93.5	91
Average number of workers	1 000 pers.	5 351	5 059	4 927	4 848	4 885	5 012	5 044	4 947	4 869	4 693
Gross domestic product	mld. CZK b.c.*	626.2	753.8	842.6	1020	1183	1 381	1572.3	1668.9	1798.3	1836.3
Gross investments	mld. CZK b.c.*	134.7	154.4	200.9	256.1	332.6	461.3	585.2	638.8	596.1	523.3
Fixed assets	mld. CZK b.c.*						3713.1	4311.5	4440.8	4740.3	5173.1
Fixed assets/GDP	CZK b.c.*						2.689	2.742	2.661	2.636	2.817
Gross investments per GDP	CZK/CZK	0.2151	0.2048	0.2384	0.2511	0.2812	0.3340	0.3722	0.3828	0.3315	0.2850
Gross investment per fixed assets	CZK/CZK						0.1242	0.1357	0.1438	0.1258	0.1012
Productivity of labour***	1 000 CZK/ labour.	117.03	149.00	171.02	210.46	242.13	275.54	311.717	337.356	369.337	391.285

Source: CSU

* b.c. – current price

** calculation in accordance to data CSU about general rate of unemployment in separated years

*** calculation in accordance to data CSU

Table 3. Ratio of gross investment to GDP in current prices

Country	1995	1996	1997	1998	1999	2000
Belgium	18.1	18.2	18.8	19.0	19.1	19.3
Denmark	16.9	16.8	17.9	18.9	18.6	19.9
Germany	20.2	19.6	19.5	19.6	19.6	19.8
Greece	15.4	16.3	17.6	18.5	18.9	19.8
Spain	18.3	18.5	18.8	19.5	20.8	22.1
France	15.5	15.3	15.0	15.5	16.1	16.7
Ireland	14.9	16.4	17.9	19.4	20.4	19.8
Italy	16.2	16.1	15.9	16.0	16.2	17.2
Luxemburg	17.2	16.6	18.0	16.7	19.6	16.9
The Netherlands	17.3	17.9	18.6	18.6	19.5	19.5
Austria	20.2	20.5	21.5	21.7	21.9	22.0
Portugal	19.1	19.3	21.3	22.9	23.2	24.8
Finland	13.5	14.2	14.8	15.8	16.1	16.7
Sweden	12.1	12.7	12.5	13.3	14.3	14.8
Great Britain	14.2	15.0	15.3	16.0	16.4	16.4
EU	17.2	17.1	17.1	17.5	17.9	18.3
Czech Republic	33.4	37.2	38.2	33.1	28.4	

of the fund-intensive type of technical development in the given period which was characterized by decreasing dynamics of fund efficiency. The fund-intensive type of technical development was accompanied by high dynamics of productivity of labour connected with the relative reduction in the number of workers. That relative saving of the number of workers was 662.3 thousand persons (in 1996) to 226.2 thousand persons (in 1999). The average annual reduction in the number of workers was 441.5 thousand persons in the years 1996–2001 (Figure 1).

The fund-intensive type of technical development leads to the permanent overrun of fixed assets except in the years 1997 and 1998. The highest overrun was reached in the year 1999 (332.6 milliard CZK) and in the year 2000 (238.7 milliard CZK) (Figure 2).

The average relative overrun of fixed assets is 95.0 milliard CZK in the years 1996–2000 (Figure 3).

One of the significant reasons is there is no relationship between gross investments share and the creation of gross domestic product. A comparison between our data and Eurostat data shows a difference in both the level and dynamics in our gross investments share (Table 3). The gross investments share has been increasing or decreasing in 60% of EU states, unchangeable only in 40% EU states in the monitored period. From this point of view, a positive evaluation of our economy performance is impossible.

TYPE OF TECHNICAL DEVELOPMENT IN SELECTED SECTORS OF ECONOMY

The farm sample for the evaluation of fund efficiency and the type of technical development in separate sectors of the economy was chosen from farms that are obliged to make public their statement of income in the business bulletin. Four sectors of the national economy were compared – the building industry , the engineering, agriculture and food-processing industries. An average of 364 firms was monitored every year and the sector distribution ratio was: the building industry 18.74 %, engineering 17.68 %, agriculture 41.88 % and the food-processing industry 21.70%.

The performance development in the monitored sectors of the national economy except agriculture is similar

Table 4. Fund efficiency and the type of technical development in selected sectors of the national economy

Indicator	Sector	1993	1994	1995	1996	1997	1998	1999	Average
Performance	Food-processing	526 788	554 084	949 111	636 810	581 219	382 578	558 808	598 485.5
(1 000 CZK)	Building indust.	325 995	345 444	759 032	488 735	926 907	321 864	460 653	518 375.7
	Engineering	506 127	478 126	600 789	438 838	600 927	369 958	547 624	506 055.5
	Agriculture	162 204	166 994	148 730	111 371	117 968	326 371	81 560	159 314.1
Long-term	Food-processing	323 401	190 696	342 631	274 706	242 214	127 083	338 300	262 718.9
property	Building indust.	145 747	240 590	421 699	169 074	252 929	148 262	144 596	217 557.0
(1 000 CZK)	Engineering	343 311	500 518	393 388	216 091	310 040	535 707	244 180	363 319.2
	Agriculture	120 540	126 559	100 787	78 306	84 120	114 222	78 277	100 401.4
Fund	Food-processing	1.629	2.906	2.770	2.318	2.400	3.010	1.652	2.3835
efficiency	Building indust.	2.237	1.436	1.800	2.891	3.665	2.171	3.186	2.4835
(CZK/CZK)	Engineering	1.474	0.955	1.527	2.031	1.938	0.691	2.243	1.5513
	Agriculture	1.346	1.319	1.476	1.422	1.402	2.857	1.042	1.5521
Index of	Food-processing	100	178.39	95.32	83.68	103.54	125.42	54.88	105.9
the fund	Building indust.	100	64.19	125.35	160.61	126.77	59.27	146.75	111.8
efficiency	Engineering	100	64.79	159.90	133.01	95.42	35.66	324.60	130.5
	Agriculture	100	97.99	111.90	96.34	98.59	203.78	36.41	106.4

with two culmination years – 1995, when performance in three monitored sectors (foodstuff, building industry and engineering) was, in comparison with the two previous years the biggest, and 1997 with the maximum production in the engineering and building industries. There is a downtrend in the food-processing industry performance from 1995 to 1998 and there is growth only in 1999. Performance in agriculture was falling until 1997. The year 1998 is from the performance aspect extremely successful and the smallest performance volume from the monitored period seems to be in the year 1999.

Current assets development in the building industry and food-processing industry achieved its maximum in the year 1995 and then mainly decreased up to the end of the period. There is a revival in foodstuffs only in the year 1999. In engineering current assets development achieves two maxima: in the year 1994 and in the year 1998. There exists an inexpressive downtrend in agriculture. From the charts, the clear dependence between production volume and investment rate is marked.

The data in the business bulletin does not contain the number of workers and that is why we must put up with a evaluation of the type of technical development in each sector without the productivity of labour relationship.

For comparability, all the primary and secondary (derivative) characteristics are set according to an average firm in the given sector. The average firm characteristics were calculated by the simple average (Table 4).

Engineering has the lowest fund efficiency in the branches compared. The average fund efficiency in the monitored period was 1.551. In this branch, the fund-saving type of technical development was realized in 1995 and in 1999. The fund-intensive type of technical development was realized in the next four years. However, also in this branch, performance volume does not determine the type of technical development, but mainly the tangible assets volume. However, a high tangible fixed assets volume in 1994 and in 1998 in an average engineering firm increased production with a year's delay. Performance increase was oscillating around 600 000 thousand CZK (Figure 5). The dominate type of technical development is shown by a regression line in parameters $y = 0.197x - 391.82$ and the correlative coefficient $r_{yx} = 0.4482$.

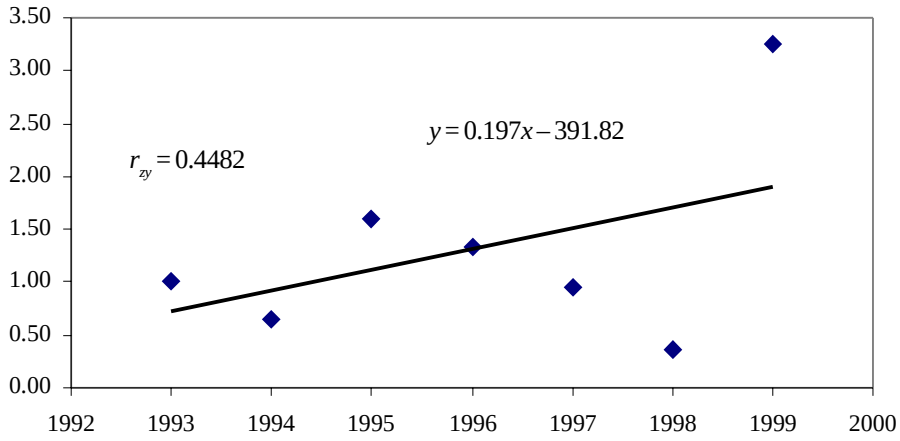

Figure 4. Development of the fund efficiency indexes in engineering (type of technical development)

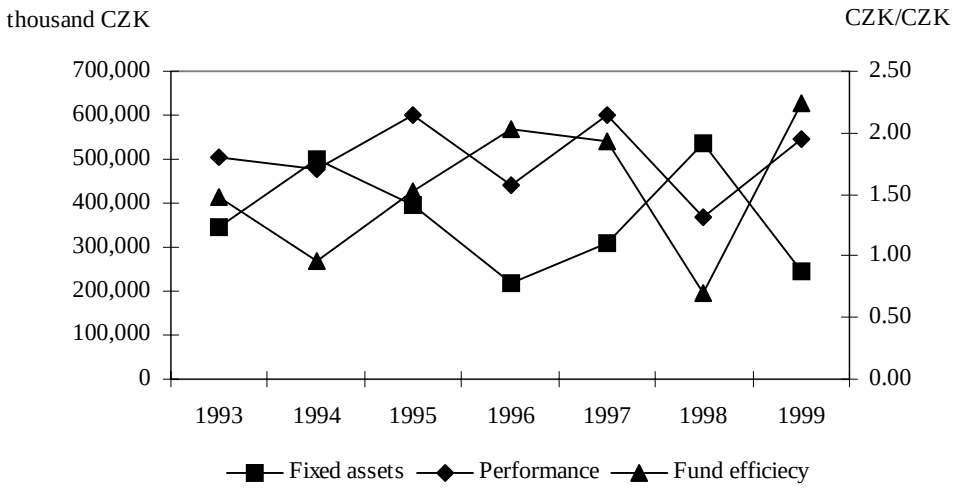

Figure 5. Performance development, current assets and fund efficiency dynamics in engineering

According to the development of the fund efficiency indexes (Figure 4), in the years 1995–1998 the fund-intensive type of technical development was predominating. Its disaffirmation from the fund-saving type of technical development was first of all affected by a high growth of the fund efficiency index in the year 1999.That growth had been so radical, that it evoked trend change from the fund-intensive type of technical development (in years 1995–1998) to the fund-saving type of technical development during the whole monitored period and evoked an average relative saving of long-term property of 53 392 thousand CZK: 15.6% share of the long-term property from the year 1993 (Table 5).

The building industry is characterized by high performance dynamics especially in the period 1993–1995 and 1996–1997. The current assets volume oscillates around the value of 183 533 thousand CZK except in the year 1995, when the current assets volume reached 421 699 thousand CZK. In the four years, 1995–1997, 1999 the fund-saving type of technical development was implemented and also the fund-intensive type of technical development but only in two years, 1994 and 1998. The performance volume growth and current assets decrease share the fund-saving type of technical development markedly (Figure 7).

During the whole analysed period the equation of the regression line shows $y = 0.0471x - 92.804$ (Figure 6) the predominating fund-saving type of technical development, which led to a relative saving of long-term property in the average annual amount of 33 015 thousand CZK and represents 22.7% long-term property share from the year 1993 (Table 5).

Agriculture in 1993–1999 was characterized by a decrease in both current assets and production. It is the only sector with four years of the fund-intensive type of technical development and only two years – 1995 and 1998 – of the fund-saving type of technical development (Figure 8).

The regression line formula is given by figure $y = 0.0027x - 4.3158$ and according to it the trend of the fund efficiency indexes stays almost unchangeable (Figure 9).

The average fund efficiency is low and together with engineering belongs among the worst of the monitored branches. Nevertheless the average relative annual saving of long-term property in the amount of 12 372 thousand CZK – which is 10.3% long-term property share in 1993 – appeared in the whole period (Table 5).

Performance volume in the food-processing industry has been growing from 1993 to 1995, when the most considerable growth can be seen and the index (1995/1993) is 180.17%. From this year until 1998 it decreased and achieved minimum 382.78 million CZK: the basic index (1998/1993) is 61.10%. In 1999 the performance volume achieved again approximately a slightly higher level than in 1993. The basic index (1999/1993) = 106.08%.

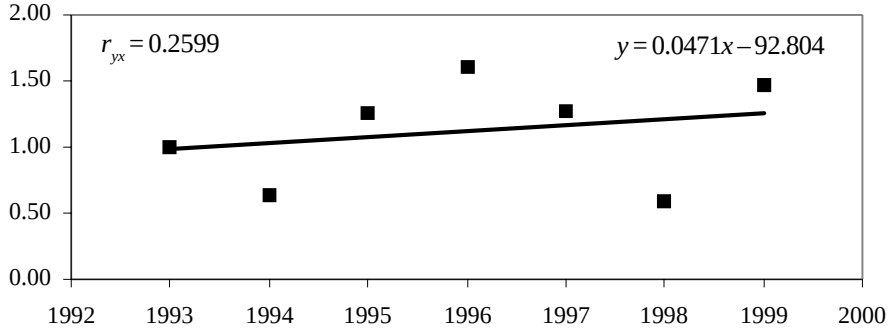

Figure 6. Development of the fund efficiency indexes in building industry (type of technical development)

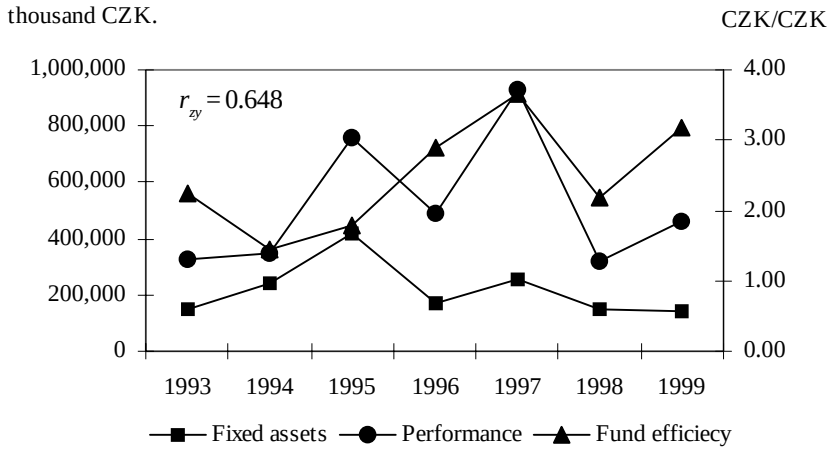

Figure 7. Performance development, current assets and fund efficiency dynamics in building industry

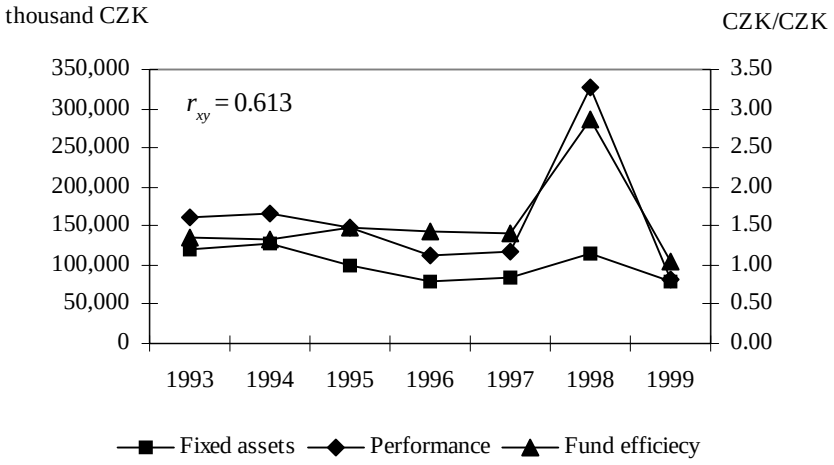

Figure 8. Performance development, current assets and fund efficiency dynamics in agriculture

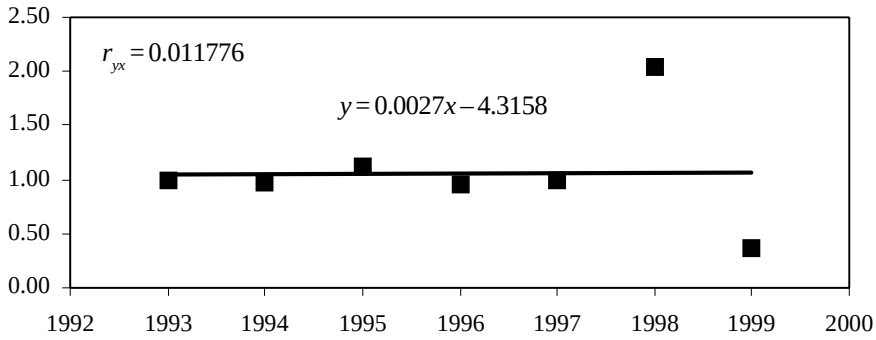

Figure 9. Development of the fund efficiency indexes in agriculture

Current assets follow a similar tendency; the highest – in the year 1995 – 342 631 thousand CZK, the basic index (1995/1993) was 105.95%. Since that year the current assets have been decreasing to the minimum value in the year 1998 – 127 083 thousand CZK and the basic index 30.29%. In the year 1999, again a mild growth to the value 338 300 thousand CZK, the basic index 104.60%.

Fund efficiency has differed significantly – from 1.629 to the 3.01. On average food-stuffs show the second biggest fund efficiency. Each 1 000 CZK of current assets entailed 2 383 CZK of performance. This is the second highest fund efficiency after the building industry. A fund-saving type of technical development was realized in the three years (1994, 1997, 1998) (Figure 10).

It is interesting that the fund-saving type of technical development was realized during performance decrease (years 1997 and 1998), or during the mild performance growth (year 1994) (Figure 11). Investment decreasing

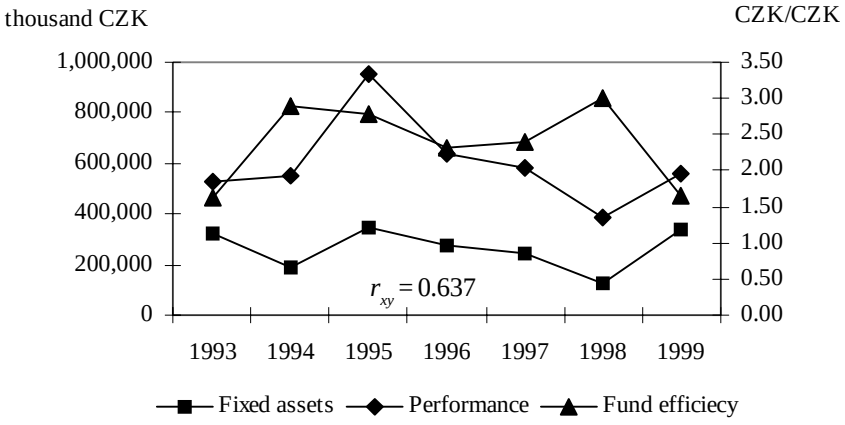

Figure 10. Performance development, current assets and fund efficiency dynamics in food – processing industry

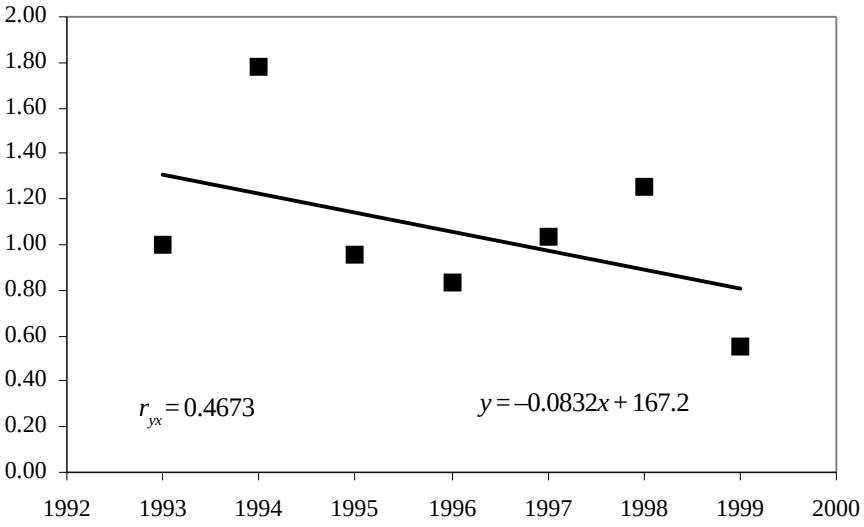

Figure 11. Development of the fund efficiency indexes in food-processing industry

Table 5. Relative change of long - term tangible property due to fund efficiency

Branch	1994	1995	1996	1997	1998	1999	Average
Food-processing	–149 468.55	16 035.43	44 828.59	–8 567.00	–32 305.17	152 611.00	3 855.72
Building industry	86 137.00	–106 889.37	–102 465.48	–67 710.35	60 435.09	–67 598.08	–33 015.20
Engineering	176 282.36	–235 654.42	–71 315.81	14 198.45	344 498.28	–548 361.39	–53 392.09
Agriculture	2 539.66	–11 994.08	2 865.36	1 183.44	–118 554.02	49 725.13	–12 372.42

was always the main source of the fund-saving type of technical development. Performance growth, mainly in the year 1995 and in the year 1999 was connected with fund-intensive type of technical development and always meant a relative overrun of current assets. The average annual relative overrun of long-term property is 3 855.7 thousand CZK and it is 1.2% share of the long-term property in the year 1993 (Table 5).

FUND EFFICIENCY IN FARMS IN PRODUCTION AREAS

Production areas were specified by the Economic Committee of the Agrarian Chamber as areas up to 450 metres above sea level. The farms mentioned specialise mainly in maize and sugar beet crops. The average soil price in these firm is 5.9 CZK/m^2. It was necessary to get records at each farm for the whole analysed period for evaluation of the type of technical development. Exact comparability considerably limited the number of monitored farms to 40 farms for both areas (Table 6).

The 1997–2000 period is characterized in the production area farms by a decrease in the average number of labourers. If in the year 1997 there were 69.5 labourers in an average farm, then in the year 2000 there were 59.3 labourers in the same farm. Index (2000/1997) is 85.4%. For these years a steady drop of labourers in a farm is a common feature. From the aspect of country development it is almost adverse, because the number of job opportunities in the country is decreasing. On the other hand, the reduction of the number of labourers in farms increases their economic prosperity, which positive expresses the positive variation of technical development of the farm.

The average state of tangible assets has been increasing. If tangible assets in an average farm was 40 426 thousand CZK in the year 1997, then in the year 2000 tangible assets had increased to 41 060 thousand CZK. Basic index (2000/1997) was 101%. The rate of growth of tangible assets (100.58%) has insufficiently covered simple reproduction of these assets. The evidence is the increase in the relative age of these assets. In 1998 the average relative age was 41.81% and in 2000 43.20%. This differentiation can be even bigger in natural expression because of the growth of the purchase prices of tangible assets.

Increasing average tangible assets together with the drop in the number of workers are leading to a growth in the use of technical equipment in an average farm. In the monitored period the value of technical equipment increased from 581.67 thousand CZK to 692.06 thousand CZK. An increase in technical equipment characterized by the basic index ($i_{2000/1997}$ = 118.98%) can be taken as adequate because this rate growth it was possible to realize the fund-saving type of technical development in farms.

Table 6. Dynamics of the selected indicators in an average farm in the years 1997–2000 in an production area

Indicator	Specific unit	Compared time **1998**	Basic time **1997**	Index	Difference	Relative change index	Relative change
Average evidence number of labour	labourer	68.00	69.50	0.98	–1.50	–5.94	–0.09
Average state of fixed assets	1 000 CZK	41 612.00	40 426.00	1.03	1 186.00	–1 399.20	–0.03
Performance	1 000 CZK	40 199.50	37 783.30	1.06	2 416.20		
Personal cost	1 000 CZK	10 618.50	10 090.00	1.05	528.50	–928.25	–0.09
Fixed assets depreciation	1 000 CZK	4 304.83	3 981.17	1.08	323.66	–144.75	–0.04
Interest rate	%	4.00	4.00	1.00	0.00		
Productivity of labour	1 000 CZK/lab.	591.17	543.64	1.09	47.53		
Technical equip. of work	1 000 CZK/lab.	611.94	581.67	1.05	30.27		
Fund efficiency	CZK/CZK	0.97	0.93	1.03	0.03		
Personal cost of a workers	1 000 CZK/lab.	156.15	145.18	1.08	10.97		
FA depreciation/average TA state	CZK/CZK	0.103	0.098	1.05	0.005		

Indicator	Specific unit	Compared time **1999**	Basic time **1998**	Index	Difference	Relative change index	Relative change
Average evidence number of labour	labourer	63.50	68.00	0.93	–4.50	3.17	0.05
Aver. state of fixed assets	1 000 CZK	43 302.08	41 612.00	1.04	1 690.08	6 384.63	0.15
Performance	1 000 CZK	35 664.30	40 199.50	0.89	–4 535.20		
Personal cost	1 000 CZK	9 617.67	10 618.50	0.91	–1 000.83	480.37	0.05
Fixed assets depreciation	1 000 CZK	5 150.50	4 304.83	1.20	845.67	759.41	0.18
Interest rate	%	4.00	4.00	1.00	0.00		
Productivity of labour	1 000 CZK/lab.	561.64	591.17	0.95	–29.53		
Technical equip. of work	1 000 CZK/lab.	681.92	611.94	1.11	69.98		
Fund efficiency	CZK/CZK	0.82	0.97	0.85	–0.14		
Personal cost of a workers	1 000 CZK/lab.	151.46	156.15	0.97	–4.69		
FA depreciation/average TA state	CZK/CZK	0.119	0.103	1.15	0.015		

Indicator	Specific unit	Compared time **2000**	Basic time **1999**	Index	Difference	Relative change index	Relative change
Average evidence number of labour	labourer	59.33	63.50	0.93	–4.17	–12.91	–0.20
Aver. state of fixed assets	1 000 CZK	41 060.00	43 302.08	0.95	–2 242.08	–8 201.81	–0.19
Performance	1 000 CZK	40 572.83	35 664.30	1.14	4 908.53		
Personal cost	1 000 CZK	9 791.50	9 617.67	1.02	173.83	–2 130.53	–0.22
Fixed assets depreciation	1 000 CZK	5 263.50	5 150.50	1.02	113.00	–1 051.39	–0.20
Interest rate	%	4.00	4.00	1.00	0.00		
Productivity of labour	1 000 CZK/lab.	683.85	561.64	1.22	122.21		
Technical equip. of work	1 000 CZK/lab.	692.06	681.92	1.01	10.14		
Fund efficiency	CZK/CZK	0.99	0.82	1.20	0.16		
Personal cost of a workers	1 000 CZK/lab.	165.03	151.46	1.09	13.57		
FA depreciation/average TA state	CZK/CZK	0.128	0.119	1.08	0.009		

Positive performance in the whole analysed period on the one hand could have realized the fixed assets growth and consequently on the other hand no fund efficiency differentiating in farms and together with a drop in the average number of workers the growth of productivity of labour was accelerating. In 1997 the performance volume

in an average farm was 37.783 million CZK, in 1998 it was 40.199 million CZK and in the year 1999 this dynamic growth had increased to 35.664 million CZK; the basic index of performance (2000/1997 was 107.4% and the average growth rate of performance was 102.45%.

Fund efficiency in the period analysed slightly increased. If in 1997 an average farm was able to produce with 1 000 CZK of current assets 930 CZK of performance, then in the year 2000 fund efficiency was 0.99(Figure 12). In 1997 the average productivity of labour in a farm was 543.4 thousand CZK per worker and in 2000 the average productivity of labour was 683.85 thousand CZK per worker. Basic index (2000/1997) is 125.8% and the average growth rate 108.1% (Figure 14).

In the years 1998/1997 and 2000/1999 the fund-saving type of technical development accompanied by fund efficiency and productivity of labour growth was realized in these farms; in the years 1999/1998, a fund-intensive type of technical development accompanied by fund efficiency and a fall in the productivity of labour was realized (Figure 13).

The effects of the fund-saving type of technical development in the years 1998/1997 and 2000/1999 can be seen in following points:

In comparison with the previous periods, fund efficiency growth follows the fund-saving type of technical development in both periods.

In 1998/1997, fund efficiency increased from 0.93 to 0.97, fund efficiency index was 103%. Due to increasing fund efficiency, there was an underproportional fixed assets development considering performance volume and as a result there were relative savings. These savings in an average farm were 1 399.2 thousand CZK, (3.36% of fixed assets in the year 1998). Relative savings of fixed assets evoked relative depreciation savings of 144.75 thousand CZK, (3.36% of the depreciation cost of the year 1998).

Productivity of labour was increased from 543.64 thousand CZK to 591.17 thousand CZK (9 points). In relation to performance, the number of workers was developing underproportionally and that produced relative savings in the number of workers. These savings were 5.94 workers in an average farm: 8.7% of workers in the year 1998. Because of relative savings in the number of workers personal costs were reduced by about 928.25 thousand CZK.

A fund-saving type of technical development in the period 1999–2000 was connected with the growth of the fund efficiency index and productivity of labour index. The dynamics of that growth were overtaking the rate of growth in the years 1997–1998.

A fund efficiency increase from 0.82 in the year 1999 to 0.99 in the year 2000 was due to farm performance growth and fixed assets drop (index 2000/1999 = 1995%). Accord-

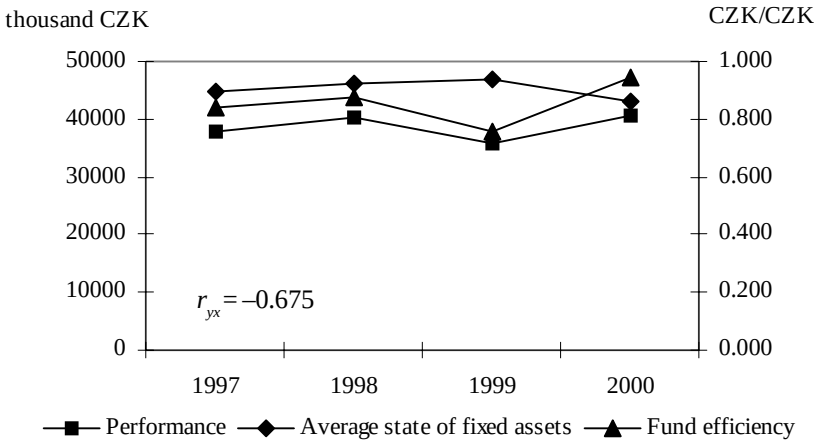

Figure 12. Performance development, current assets and fund efficiency dynamics in an average farm in production areas

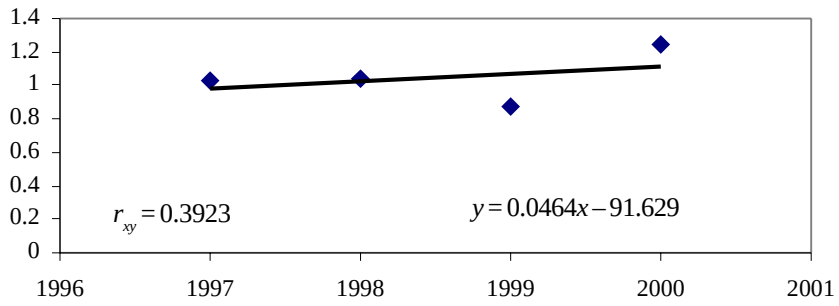

Figure 13. Development of the fund efficiency indexes in an average farm in production areas

ing to the fund-saving type of technical development, relative fixed assets savings of 8 201.81 thousand CZK and relative depreciation savings rose to the amount of 1 051.39 thousand CZK.

The decrease in the number of labourers on an average farm influenced the growth of productivity of labour. The average number of workers was 63.5 in the year 1999 and 59.33 in the year 2000. A decrease in the number of workers and performance growth have increased the productivity of labour to 122% and accordingly, relative savings of 12.91 workers,to a personal cost 2 of 130.53 thousand CZK. Technical equipment work increased to 692.06 thousand CZK.

Effects of fund-intensive type of technical development in the years 1999/1998

During 1999/1998, fund-intensive type of technical development accompanied by a fall in productivity of labour was implemented in an average farm. Fund efficiency decreased to 85 % in comparison with the year 1998 and was 0.82 in the year 1999. This is below the level for the year 1997. This fund efficiency drop entailed a relative overrun of fixed assets of 6 384.63 thousand CZK. A relative fixed assets overrun also resulted in a relative depreciation overrun of 759.41 thousand CZK.This situation was caused by rather considerable investment dynamics in the given year. Chain growth index of fixed assets was 104 %, while the performance index was only 89%. Productivity of labour at this time decreased. Index 1999/1998 was 95 %. In consequence of the decrease in the productivity of labour, a relative overrun of personal cost in the amount of 480.37 thousand CZK occurred (Figure 14).

Fund-intensive type of technical development entailed the growth of technical equipment of work, because fixed assets dynamics were higher than the average number in terms of dynamics as well as performance dynamics.

A fund-intensive type of technical development in the period 1999/1998 was connected with a general relative cost overrun of 1 239.78 thousand CZK. From the viewpoint of the period 1997–1999, the fund-intensive type of technical development had not affected the positive tendency of 1998 to any extent.

On the basis of the results of the evaluation of the type of technical development in the production areas in the years 1997–2000, the period will be evaluated positively. The development of productivity of labour was definitely positive, mainly because of the annual reduction in the number of labourers. That affected the total dynamics of productivity of labour to the extent of 117.14%. The change in performance volume did not share growth to the same extent as the productivity of labour. The share of total dynamics of productivity of labour was 107.38 %.

The fund-intensive type of technical development in the year 1999 had affected the total fund efficiency dynamics in the analysed period. From the aspect of particular factors fund efficiency was mainly influenced to the extent of 107.38% by performance increase. Fixed assets influence had been less important – its increase entailed a fund efficiency decrease of 98.45%. It follows from the above-mentioned facts that a change in the type of technical development is primarily affected by the dynamics of two factors – work and capital.

FUND EFFICIENCY IN FARMS IN MARGINAL AREAS

In marginal regions the type of technical development evaluation was divided into two different groups according to sea level. The first are farms 450–650 m above sea level, the second 650–850 m.

In marginal areas the fund-saving type of technical development accompanied by productivity of labour growth occurred in the period. The fund-intensive type of technical development connected with productivity of labour growth occurred in this period only once – in 1998 for the group of farms 650–850 m above sea level. On one occasion the fund-intensive type of technical development accompanied by constant productivity of labour occurred – namely in the year 1999 for the group of farms 450–650 m above sea level. From this point of view the

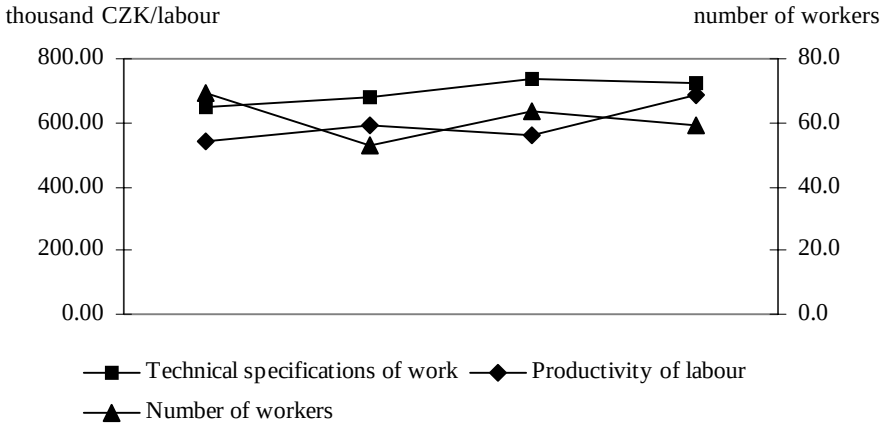

Figure 14. Productivity of labour development in an average farm in the production areas

Table 7. Development of fund efficiency and productivity of labour in an average farm in marginal areas

Group	1998	1999	2000
450–650	1 < i(Fu) < iv	i(Fu) < 1 = iv	1 < i(Fu) < Iv
	1< 1.02 <1.12	0.93 < 1 = 1	1 < 1.09 < 1.16
650–850	i(Fu) < 1 < iv	1 < i(Fu) < iv	1 < iv < i(Fu)
	0.95 < 1 < 1.03	1 < 1.03 < 1.09	1 < 1.11 < 1.19

year 1999 was a hard year endangering the positive development in the monitored period (Table 7).

We can make a detailed statement of the type of technical development in single zones of land above sea level.

In the zone 450–650 m above sea level the fund-saving type of technical development joined with productivity of labour growth in 1998. Performances in that period increased in comparison with the previous year to 102%. Decrease in the average number of workers (index 1998/1997 91%) had also positively influenced the type of technical development. Technical equipment work increased from 573.91 to 628.90 thousand CZK. A higher index of productivity of labour (112%) than technical equipment caused a growth in the fund efficiency index to 102%. Due to the positive development of the above-mentioned indicators, the farms realized fixed assets savings in the amount of 1 300.28 thousand CZK. The ratio of these savings to total fixed assets of the year 1998 was 2.27%. Relative fixed assets savings also entailed depreciation savings of 122.93 thousand CZK. These savings represent 2.27% depreciation cost in the analysed period. Productivity of labour growth produced relative savings of 10.99 workers and relative savings of 1 656.55 thousand CZK of personal cost.

Compared to this, in the year 1999, there was a fund-intensive type of technical development accompanied by fund efficiency decrease and constant productivity of labour. The performance volume in that year fell to 92% and was 40 763.57 thousand CZK. The average number of workers fell to 92% and was 83.97. Tangible assets fell to 98%. Technical equipment of work increased by seven points and stabilized at 671 960 CZK. The fund efficiency index fell to 93% and consequently tangible assets relatively overran by 3 876.59 thousand CZK and relative depreciation overran by 396.82 thousand CZK. Productivity of labour remained unchanged in comparison with the previous year. There was a relative overrun of personal costs of 65 230 CZK. The main reason was a performance decrease in that year.

The year 2000 experienced the stabilization of single indicators in the given sea level zone. A continuing fall in the average number of workers to 93% of the original

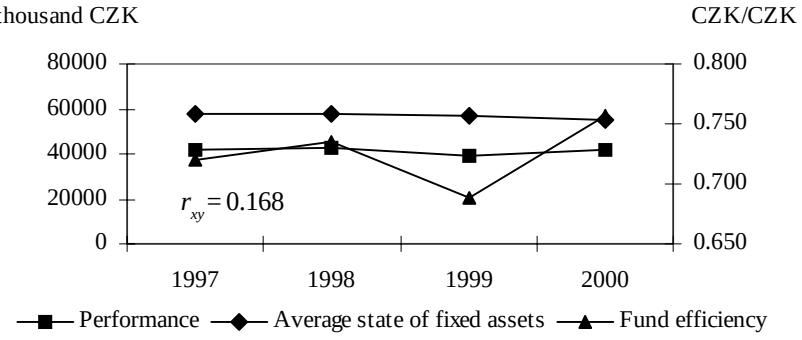

Figure 15. Revenues, fixed assets development and fund efficiency dynamics in an average farm in the marginal areas

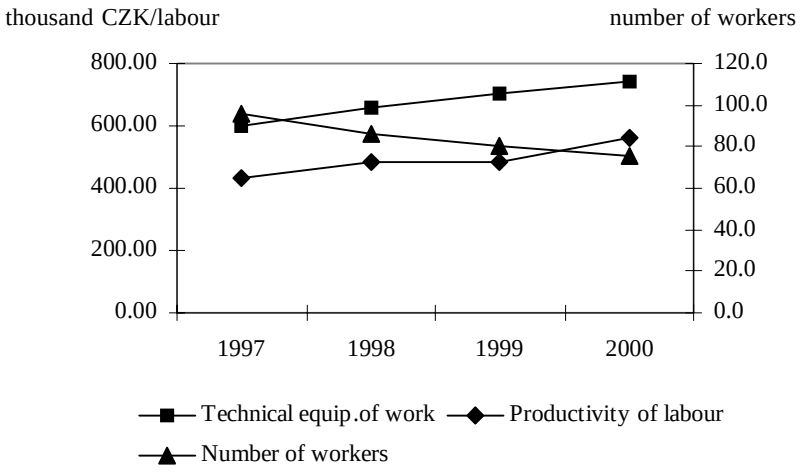

Figure 16. Productivity of labour development in an average farm in the marginal areas

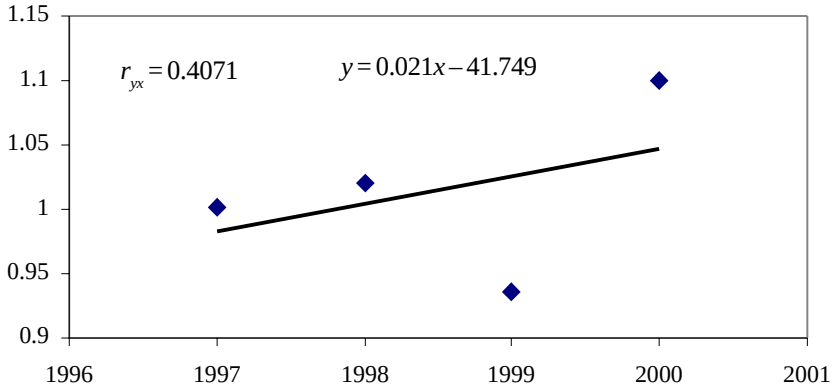

Figure 17. Development of the fund efficiency indexes in the average farm in marginal areas

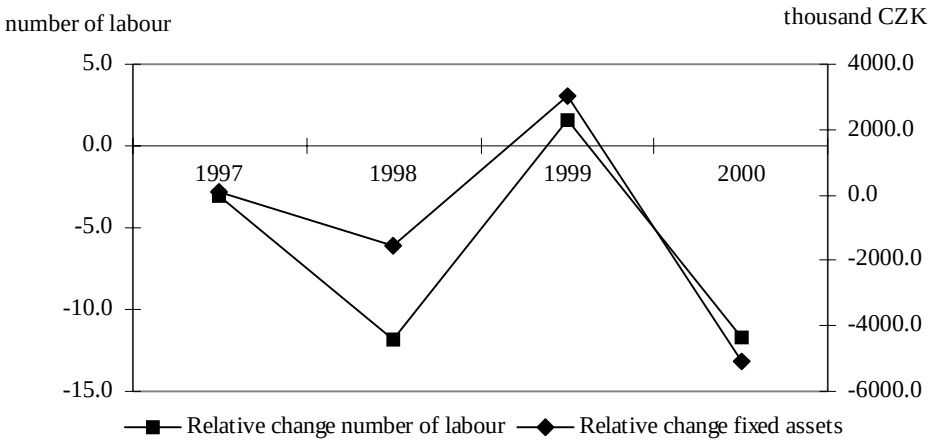

Figure 18. Relative labourer savings and relative long-term property savings in an average farm in the marginal areas

number was accompanied by a drop in tangible assets to 99%. Due to to the drop in the average number of labourers, technical equipment has increased 6 points (to 713.57 thousand CZK per one labourer). Growth of productivity of labour of 16 points has brought relative savings of 12.25 labourers and relative savings of personal costs of 2 072.89 thousand CZK. Fund efficiency has increased 9 points. On the basis of productivity of labour growth and an increase in fund efficiency we can evaluate development in this area very positively.

The development of the monitored indicators in the zone 650–850 m above the sea level can also be positively evaluated.

In the year 1998, the fund-intensive type of technical development joined with decreasing fund efficiency and produced increased productivity of labour. Performance continued unchanged in this period, however the average number of workers fell to 97% and productivity of labour increased 3 points. Tangible assets increased to 105%, and technical equipment of work to 108%. The fund efficiency index had fallen to 95%, which caused a relative overrun of fixed assets of 1251.82 thousand CZK and a relative depreciation overrun of 135.37 thousand CZK. Performance remained unchanged, however a decrease in the number of workers led to personal cost savings of 140.81 thousand CZK and growth in productivity of labour.

In the year 1999 the fund-saving type of technical development joined with increasing fund efficiency and produced an increased productivity of labour. The average number of workers fell to 90% and fixed assets to 95%. Due to the drop in the average number of workers, technical equipment of work increased by 6 points and was 771.37 thousand CZK per worker. A productivity of labour increase of 9 points brought relative personal cost savings of 469.63 thousand CZK. Fund efficiency increased 3 points. On the basis of productivity of labour growth and fund efficiency increase we can very positively evaluate development in this area.

The year 2000 brought to that area a more significant increase in performance than in previous years (113%) that is by a minor increase in the average number of workers (102%) and a decrease in fixed assets to 95% of the primary value, which meant an increase in the productivity of labour of 11 points and personal cost savings of 583.72 thousand CZK. A fall in fixed assets and low growth in the number of workers produced a decrease in the use of technical equipment to 93%. Fund efficiency

in that period increased by 19 points and development in respect the growth of productivity of labour in that period has been positive.

If we summarize the results of the evaluation of the type of technical development in all marginal areas in the years 1997–2000, the development can be evaluated as definitely positive. Except in the year 1999, there was a fund-saving type of technical development with increasing fund efficiency and productivity of labour. Not even in the year 1999 was there any drop in the productivity of labour. A typical feature of this area is a steady fall in the number of workers and fixed assets. Performance has increased very slightly (2000/1997 100.75%) however productivity of labour has increased to 128.86 and primarily because of a reduction in the number of workers to 78% of the original figure.

CONCLUSION

The aim of this evaluation of the type of technical development is an understanding of development proportionality between long-term tangible assets volume, the average number of labourers and performance volume. From this point of view the national economy is characterized by a slow investment rate, with tangible assets growing under proportionally according to gross domestic product. Productivity of labour growth has been achieved partly by gross domestic product growth, but also by a fall in the average number of labourers. However, this fall in the number of workers in the national economy in contrast to an average farm has not been steady; in the years 1995 and 1996 it was growing.

The monitored sectors of the national economy are characterized by average relative long-term tangible assets savings, mainly in engineering, the building industry and agriculture. In the whole monitored period in these industries the fund-saving type of technical development predominated. However in agriculture this trend was not much in evidence. In contrast, in the food-processing industry, fund efficiency decreased in the whole analysed period which led to average relative overrun of long-term tangible assets.

On an average farm in the production and marginal areas the type of technical development can be nominated for the whole period under analysis as the fund-saving type. Only the year 1999 represented the fund-intensive type of technical development caused first of all by a drop in performance. Both monitored areas produced an almost steady fall in the number of workers and a growth in productivity of labour. In production areas the growth of productivity of labour has been effected by performance growth, while in marginal areas performance growth has been very mild, so that growth of productivity of labour has been caused primarily by a reduction in the number of workers. From the viewpoint of the type of technical development we can evaluate development on an average farm as positive.

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