Labour productivity as a factor of sustainable economic development of the CR agriculture

Produktivita práce jako faktor trvale udržitelného ekonomického rozvoje zemědělství ČR

L. BERVIDOVÁ

Czech University of Agriculture, Prague, Czech Republic

Abstract: A basic presumption of sustainable economic development of every branch is an efficient use of production factors. As a decisive production factor, it is possible to consider labour which actives other production. In such a way, labour creates sources for reproduction and improvement of other production factors; i.e. it creates sources for sustainable economic development. Efficiency of labour use as a production factor is generally evaluated by the level of labour productivity. To express its level, various indicators are used. Using the indicator of gross agricultural production per one worker, labour productivity grows, even with the decrease of production. The growth factor is there the decreasing number of workers. Using the indicator of value added per one worker, resp. per 1 CZK of labour costs, labour productivity decreases. Market factor lowers labour productivity on both input and output sides.
The contribution issues from solving of the institutional research intention CEZ: J03/98: 411100013 "Efficient integration of Czech agrarian sector into the frame of European structures – presumption of sustainable development".

Key words: labour, production, value added, labour productivity, sustainable development

Abstrakt: Základním předpokladem trvale udržitelného ekonomického rozvoje každého odvětví je efektivní využití výrobních faktorů. Za rozhodující výrobní faktor přitom lze označit práci, která uvádí do pohybu další výrobní faktory. Tím práce vytváří zdroje pro reprodukci a zdokonalování ostatních výrobních faktorů, tj. vytváří zdroje pro trvale udržitelný ekonomický rozvoj. Efektivnost využití práce jako výrobního faktoru je obecně hodnocena úrovní produktivity práce. K vyjádření její úrovně je použito různých ukazatelů.Při použití ukazatele hrubé zemědělské produkce na jednoho pracovníka produktivita práce roste, a to přes pokles produkce. Faktorem růstu je klesající počet pracovníků. Při použití ukazatele přidané hodnoty na jednoho pracovníka, resp. na 1 Kč nákladů na pracovní sílu, produktivita práce klesá. Faktor trhu produktivitu práce snižuje jak na straně výstupů, tak na straně vstupů.
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Klíčová slova: práce, produkce, přidaná hodnota, produktivita práce, trvale udržitelný rozvoj

INTRODUCTION

The basic presumption of sustainable economic development of every branch of national economy and also of agriculture is an efficient use of basic production factors, i.e. labour, land and capital. As a decisive production factor, we can mark labour. Labour as a purposeful activity, the bearer of which is man, actives other production factors and transforms natural objects into such shape which serves people to meet their needs and is a presumption of their existence. In this way, it creates conditions for its own reproduction as a factor at a still higher level and at the same time it creates sources for reproduction and improvement of other production factors.

Efficiency of labour use as a production factor is generally expressed by the level of labour productivity. Labour productivity is defined as the efficiency of human work utilised in creation of useful goods. It is expressed by the amount of these goods per unit of the labour input. Growth of labour productivity is considered as a key factor for maintaining the economic growth in the conditions of low inflation. The reason of economic growth in the USA during the last years is probably the growth of labour productivity linked to the development of information technologies. The low level of labour productivity in the CR is one of causes of the low competitiveness of the economy as a whole.

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AIM AND METHODS

The aim of the presented contribution

The aim of the presented contribution is to acknowledge the scientific public with partial knowledge resulting from the solution of the research intention CEZ: J03/98:411100013 "Efficient integration of the Czech agrarian sector into the frame of European structures – presumption of sustainable development". Concretely, it deals with the evaluation of labour productivity importance for sustainable economic development of Czech agriculture (Bervidová 2001).

In the evaluation of labour productivity level, it was necessary to solve some methodological questions which resulted from the fact that, up to now, the most wide-spread way for expressing labour productivity in agriculture was the use of natural production results which were compared with the utilised labour expressed also in physical units. So it was necessary to give theoretical reasons for using the indicators which would respect the influence of market environment in evaluation of labour productivity and which are used currently in the developed market economies.

METHODICAL APPROACH

Result quantification of the utilised labour in agriculture as a branch of national economy

The amount of goods created by human labour in concurrence with other production factors can be in principle expressed in physical or financial units. Advantages and disadvantages of both ways are generally known.

At the level of the branch as a whole, the production of which is very heterogeneous, it is necessary to use financial units. The basic question is whether we want to evaluate the efficiency of this branch only from the viewpoint of efficiency of utilised factors, or whether we include into research also the influence of market mechanism. In the first case, we use gross production in fixed prices to express results of utilised labour; in the second case, we use final agricultural production in market prices. While gross agricultural production expresses the amount of production in a given time period without respect to its use, final agricultural production represents the value of production sales outside the agricultural branch and own consumption. Gross production is the result of the utilised labour and other production factors efficiency in the branch; in case of final production, this efficiency is evaluated by the market where its value could be increased, or, in the worse case which often occurs in agriculture, decreased.

In expressing the amount of goods created by the utilised labour, it is, however, necessary to consider the reality that these goods are the result of the connection of human labour with other production factors (machines, tools, material, energy) which increase the efficiency of the utilised labour. The higher the level of these factors, the higher is the efficiency of the utilised labour. That is why, for purposes of expressing the utilised work efficiency, it is necessary, on behalf of objectivity, to eliminate the influence of these factors. It means that their consumption in value has to be taken from the reckoned results. For this reason, there appears, as a very suitable category for expressing results of the utilised labour, the value added. Because it rises from the monetary evaluation of the utilised labour results and from the monetary evaluation of consumed inputs, it is a suitable category for the evaluation of labour productivity from the viewpoint of application of the created goods in the market, so it appears as a suitable category for judging competitiveness of labour inputs by workers of the relevant company or branch. Value added is the part of value created in the company which is left after the deduction of material inputs. Then it is the result of labour inputs only by the company workers or agriculture as a branch of the national economy. At the same time, it is the source for their wages payment, taxes into the state budget and other payments. It also creates resources for purchase of more perfect and more efficient other production factors, thereby a base for further increase of labour productivity and strengthening of efficiency of agriculture as a whole is created and through it also its competitiveness in the international comparison is increased.

Quantification of the amount of labour utilised in agriculture as a branch of national economy

If labour represents a purposeful human activity, then the most exact indicator of the utilised labour amount would be the spent energy of muscles (in physical work) and brain (in psychical work). To measure the spent amount of energy in common work activity is, however, practically non-productive. That is why substitute ways of the utilised human labour quantification are used, which show a higher or lower level of inaccuracy.

Most often, human labour consumption is expressed in time units. The advantage is simplicity and comparability. At the level of agriculture as a branch of national economy, it is, however, more suitable to express the amount of consumed work by the number of workers. Nevertheless, it is necessary to consider the fact that there exist various obstacles in work (e.g. sickness leave), holidays, differing efficiency of particular workers and so on.

The results of the utilised labour as well as the amount of labour can be expressed in monetary units by means of the total labour costs. The total labour costs represent the price of labour as a production factor, considering also its complexity, demands, responsibility or scarcity. It is then suitable to use this way of measurement of the utilised labour for evaluation of its productivity from the viewpoint of the application of created production in the market.

It can be concluded that in expressing the amount of the utilised labour for the purposes of labour productivity evaluation from the technological point of view, it is possible to use physical units, and in judging of the uti-

lise labour efficiency from the viewpoint of its results application in the market, monetary units are more suitable.

Indicators used to evaluate labour productivity

For the reasons mentioned in the theoretical part of the methodological approach, the following indicators can be used to express the productivity of labour in Czech agriculture:

a) regardless of the influence of market mechanism

– gross agricultural production per 1 worker

Gross agricultural work is expressed in stable prices of the year 1989. Labour consumption is expressed as the average registration number of workers, i.e. arithmetical average of daily registration states, i.e. the numbers of permanent workers, seasonal workers and helping workers during the year.

b) considering the influence of market mechanism

– final agricultural production per 1 worker in agricultural activity
– net value added in factor costs per 1 worker in agricultural activity
– net agricultural value in factor costs per 1 CZK of labour costs in agricultural activity

Net value added in factor costs is reached from gross agricultural production by deduction of the total intermediate consumption (= gross added value in market prices as a contribution of agriculture to the creation of gross domestic product); by adding subsidies linked to production; by deduction of taxes linked to production (= gross value added in factor costs); and by deduction of depreciation. Gross agricultural production represents the sale value of production outside the branch agriculture and own consumption; the intermediate consumption then represents the value of material inputs and services from other branches of national economy consumed in agricultural production process.

The source of data basis are the Statistical Yearbooks of the CR 1994–2000 and the Report on the State of Czech Agriculture in 1999. On the availability of these data, also the time series of the relevant labour productivity indicators is depend.

RESEARCH RESULTS

Labour productivity development regardless the market mechanism influence

As was already mentioned, for that purpose, it is suitable to use the indicators of gross agricultural production per 1 worker. From the Table 1, it is clear that labour productivity in the monitored period constantly grew except the year 1997; in 1999, it was higher by 100.1% in comparison with 1989. The growth factor is a permanent decrease of the number of workers (by 64.2%) which was faster than the decrease of gross agricultural production (in 1999, it was lower than in 1989 by 28.4%). A temporary decrease of labour productivity in 1997 was caused by the fact that production exceptionally fell faster between years (by 5.1%) than the number of workers (by 1.6%).

Table 1. Development of number of workers, gross agricultural production and labour productivity in the CR

Year	Number of workers	Gross agricultural production	Labour productivity
	persons	mil. CZK fixed prices 1989	CZK per 1 worker
1989	533 057	108 633	203 792
1990	513 552	106 143	206 684
1991	410 911	96 683	235 289
1992	312 097	85 008	272 377
1993	270 849	83 059	306 662
1994	246 549	78 090	316 732
1995	221 620	82 031	370 143
1996	217 208	80 916	372 528
1997	213 738	76 803	359 332
1998	204 189	77 351	378 821
1999	190 800[1)]	77 798	407 746
Index 1999/89	0.358	0.716	2.001

Source: Statistical yearbooks 1994–2000; Report on the State of Czech Agriculture 1999

1) preliminary estimation

DEVELOPMENT OF LABOUR PRODUCTIVITY REGARDING THE INFLUENCE OF MARKET MECHANISM

Development of the categories serving to the calculation of labour productivity is shown in the Table 2; the relevant indicators of labour productivity in the Table 3. Regarding the available data basis, the time series are shorter than in the previous case.

From data in the Table 2, it is obvious that categories expressing the results of utilise labour in current prices show a decreasing tendency in the monitored period. Net value added shows a higher average decrease than final agricultural production. The cause lies mainly in the growth of intermediate consumption (growth of agricultural input prices). As regards the amount of utilised labour, the number of workers linked to agricultural activity decreased but labour costs, expressing the price of labour, grew.

From the development of labour productivity indicators (Table 3), it is obvious that labour productivity expressed by final agricultural production per one worker in agricultural activity fluctuates in the monitored period , however, in average it shows a growing trend. Considering the influence of consumed production factors from other branches, i.e. in its expression by the net value added per one worker, respectively per 1 CZK of labour costs, it decreases. As especially alarming from the viewpoint of further development of agriculture, it is necessary to consider the fact that 1 CZK of labour input

Table 2. Development of the results and amount of utilised labour

Year	FAP	NAV in f.c.	Number of workers	LC[1)]
	mil. CZK	mil. CZK	persons[1)]	mil. CZK
1995	99 454	30 304	195 934	18 930
1996	114 149	33 149	179 848	19 798
1997	111 407	27 269	191 937	23 131
1998	112 269	28 456	177 644	23 538
1999[2)]	94 728	21 640	165 996	22 249
Average	106 401.4	28 163.6	182 271.8	21 529.0
Average yearly change	–1 133.2	–2 202.1	–5 043.2	1 166.7

Source: Report on the State of Czech Agriculture 1999

1) in agricultural activity; 2) preliminary estimation
FAP = Final Agricultural Production; NAV in f.c. = Net Value Added in factor costs; LC = Labour Costs

Table 3. Development of work productivity indicators in CZK

Year	FAP per 1 worker[1)]	NAV per 1 worker[1)]	AV per 1 CZK of LC[1)]
1995	507 589	154 664	1.60
1996	634 697	184 317	1.67
1997	580 435	142 073	1.18
1998	631 989	160 186	1.21
1999[2)]	570 664	130 365	0.97
Average	585 074.8	154 321	1.326
Average yearly change	12 344.2	–7 272.9	–0.148

1) in agricultural activity; 2) from preliminary data basis
FAP = Final Agricultural Production; NAV = Net Value Added in factor costs; LC = Labour Costs

creates a very low added value which is not only a source of reproduction of the labour itself but also a source of the extended reproduction of other production factors. Then it is a presumption of sustainable economic development of the branch of agriculture as such.

From the Table 3 , it is furthermore clear that in 1999, labour was not able to create sources neither for the simple reproduction –1 CZK of work created only 0.97 CZK of net value added. It issues only from the preliminary data, nevertheless, the total decreasing trend of this indicator is alarming.

FACTORS INFLUENCING THE DEVELOPMENT OF LABOUR PRODUCTIVITY IN AGRICULTURE IN THE CR

From the indicators by which it is possible to express the level of labour productivity in the CR, it results that labour productivity is basically influenced partly by the value of production and partly by the amount of consumed production factors, namely of the own labour but also of the factors which support substitute labour and which enter agriculture from other branches of the national economy.

Table 4. Development of factors influencing the volume of value created by labour (mil. CZK)

Year	GAP	FAP	Intermediate consumption	GAV in f.c.
1995	82 031	99 454	60 846	40 855
1996	80 916	114 149	72 825	44 988
1997	76 803	111 407	79 159	37 429
1998	77 351	112 269	79 849	39 623
1999[1)]	77 798	94 728	70 775	32 806
Average	78 979.8	106 401.4	72 690.8	39 140.2
Average yearly change	–1 203.1	–1 133.2	2 688.2	–2 146.3

GAP = Gross Agricultural Production; FAP = Final Agricultural Production; GAV in f.c. = final agricultural production – intermediate consumption + subsidy linked to production – taxes linked to production
1) estimate

As it was already mentioned, the number of workers in agriculture decreases, it means there is a prerequisite of labour productivity growth. As it results from the data in Table 4, it is the only growth factor because production decreases and costs of the production factors increase (see intermediate consumption).

From the Table 4, it is obvious that in the monitored period, production in fixed prices fell in average. Final agricultural production which represents realisation of gross production in the market decreases more slowly, nevertheless, its evaluation is not significant. Intermediate consumption influenced by prices of inputs shows a growing tendency, while in 1999 there is shown a quite significant decrease, nevertheless, it is just preliminary data. The result of the falling production and growing intermediate consumption is a significant decrease of the gross value added which is the source of the simple reproduction of fixed capital and labour, but also the source of extended reproduction of all production factors. So it is a base of growth of agricultural efficiency. The fall of value added is moreover moderated by subsidies which were more than doubled during the monitored period (in 1995, they were 4 631 mil CZK; in 1999 then 10 418 mil CZK).

DISCUSSION

In the centrally planned economy, the emphasis was put on expression of labour productivity from natural production results. Both in expression of the utilised labour results and expression of labour consumption, a maximal effort was spend to clear all the results from price influence. It appeared logical because market mechanism did not work and competitiveness of the utilised labour not actual. Expression of intermediate consumption in physical units, resp. fixed prices, was very complicated

and practically impossible, mainly at the level of enterprise. In market economy, where the emphasis is put on as high competitiveness as possible not only inside the economy but also on the international level, the significance of categories influenced by market increases. That is why, from this point of view, as the most suitable indicator of labour productivity we can mark value added per 1 CZK of the total labour costs. In the value added, the influence of the efficiency of labour expounded by workers, efficiency of used inputs and efficiency of their use is reflected. At the same time, the added value is a source of enterprise development and welfare of workers, in connection also a source of growth of the economic level of the country and of international competitiveness. The total labour costs then reflect the price of the labour inputs. If the productivity is to be as high as possible, it is necessary that one monetary unit of the utilised labour creates as many monetary units of the value added as possible. This indicator then can be used also in the international comparison of labour productivity level. As less suitable, it is possible to consider the indicator of value added per one worker. In fact the discrepancy lays in the fact that the value added is a financial category whereas the number of workers represents physical units and the expression "worker" can be, and usually is, different.

Comparison of the labour productivity level in the CR agriculture with the labour productivity level in the EU countries is practically impossible. The main reason is especially the way of labour consumption monitoring (Boháčková 2001). A comparable indicator could be the net value added per unit of labour price. However, in private enterprises the price of owners' and family members' labour is not registered. It is possible to compare only the development trend which is similar – labour productivity expressed by the value added per one worker has a decreasing or stagnating tendency in the last years. The cause is the same as in the CR, decrease of the final production, especially as a result of the application of restrictive price policy. Also similarly as in the CR though in a milder form, there impacts increase of agricultural input prices. A positive factor of labour productivity growth is in the CR the falling number of workers. A significant role is played by the level of subsidies which are a part of the value added and, in the EU countries, they increase it significantly.

CONCLUSION

Labour productivity in the CR agriculture, expressed by the created production per one worker in average, is growing. It occurs notwithstanding the volume of gross and final production decreasing in the monitored period. The cause is a more significant decrease of the number of workers. However, market mechanism depreciates this trend in the sense that:

– falling demand leads to production decrease
– prices of agricultural products grow more slowly than input prices.

This state in general leads to the fact that in average the gross and net value added created per one worker decreases, it means that labour productivity expressed by categories which regard the influence of market mechanism decreases. Growth of the price of labour (though agriculture belongs still to the branches with the lowest average wage) then leads to the fact that 1 CZK of utilised labour creates low sources for financing of further agricultural development and it is possible that the created sources are not sufficient to cover simple reproduction.

In general, it is possible to state that despite the significant decrease of the number of workers, labour productivity in agriculture is still low for the above mentioned reasons and to this fact, also the possibilities of sustainable economic development of agriculture as a branch of the national economy respond.

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Contact address:

Doc. Ing. Ludmila Bervidová, CSc., Česká zemědělská univerzita Praha, PEF, Kamýcká 129, 165 21 Praha 6-Suchdol, Česká republika, tel. + 420 2 2438 2282, e-mail: bervido@pef.czu.cz