

**ECONOMIC EFFICIENCY OF INPUTS OF PRODUCTION
FACTORS IN COST MANAGEMENT CONTEXT**

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Abstract. The results of research concerning relations between cost structure in a given farm, productivity and efficiency of inputs utilization is presented in this paper. 49 farms from the Wielkopolska region were investigated. It was proved that inputs of current assets constitute the highest share in structure of inputs of production factors. Variability of intermediate consumption in total costs is mainly the reflection of relation between operational and investment activity. The analysis proved that farms with higher intermediate consumption, obtain higher productivity and profitability of land, labour and fixed assets. It can indirectly imply a dominant role of operational activity as far as improvement of inputs utilization efficiency is concerned.

Key words: farm, cost management, production profitability, inputs of production factors

INTRODUCTION

In food overproduction conditions Common Agricultural Policy imposes on rural community different non-economic functions, like cultural heritage and landscape protection. Their execution is possible only when economic aim of farm activity, which is profitability, is fulfilled. Farms constitute an important element which shapes local community and they are the factor that has influence on quality of natural environment and landscape. That is why the possibility of other aims within the framework of sustainable development of rural areas, understood as an integration of economic, environmental and social aims [Ryszkowski and Kędziora 2005], depends on economic situation of farms. Being aware of multifunctional character of farms we should treat them before all as enterprises that take part in market competition. Their managers are forced to lead the production in such a way to make it both profitable and competitive.

Requirement of competition is fulfilled when products meet legal and market standards and when they can be sold at the price accepted by the market. Profitability means that sum of receipts from production and possible subventions surpass overall costs. Thus economic conditions of farm activity are determined by the production quantity and level of market prices but also by the number of outlays and prices of production means [Poczta 2001].

The aim of this research was to describe influence of particular cost categories on efficiency of farming, understood especially as productivity and profitability of production [Poczta and Kołodziejczak 2004]. Productivity was determined as a relation between volume of production and outlay of particular production factors, and profitability was described by farm income.

FACTORS CREATING PROFITABILITY AND COMPETITIVENESS OF FARMS

Factors creating profitability and competitiveness can be generally divided into exogenous, which are independent of the farmer's decision and endogenous, which can be created by proper management. The first group of factors includes prices of products and means of production, however it should be stated that due to weak market position farmers have no influence on their creation. It is possible to negotiate more favourable prices (higher for products and lower for production means) provided that there is a large scale of production, which has to be connected with possessing potential of production which is big enough [Gołaś and Kozera 2003] or with cooperation between farms (horizontal integration). The exogenous factors also include instruments of agricultural policy in the form of payments, subventions or grants. While it is true that assumptions of the policy are admittedly consulted with the farmer's society, a single farmer shows rather passive attitude towards them. Scale of production potential (before all quantity and quality of land) is also independent of the farmer's decision especially in the short period. Structure of production and its efficiency is to a large measure endogenous factor, however it is limited by the land quality, surface of buildings and efficiency of machinery. Before all a farmer is able to manage the costs. This concept should be understood in two ways: firstly as a management of the number and structure of outlays (on the assumption that farmer has no influence on means of production prices) and secondly as a creation of relation between particular cost categories like: direct costs or costs of external factors [Goraj et al. 2004]. Suitable approach to the exo and endogenous factors is very crucial in farm management. With reference to the first ones a farm manager is able to conform which is understood as an approval of market prices and use of available support measures. That is why farm management should be aimed before all at forming endogenous factors, and consequently at optimization of production and costs. The final goal of such farm management is optimal utilization of resources of production factors [Poczta 2001] what is an essential condition for getting a competitive advantages.

MATERIAL AND METHODS

Examined population of farms consist of 49¹ farms from the Wielkopolska region that co-operate with Wielkopolska Agricultural Advisory Centre in Poznań. Analysed farms represented varied directions of production and were characterised by large diversity of economic strength but all of them produced before all on market. For that reason their results cannot be treated as a representative of the Wielkopolska region, where apart from farms of market orientation subsistence farms also existed [Sadowski et al. 2006]. For the sake of market production, examined farms potentially belong to the group that accept challenge of competition both at domestic and EU market. That is why determination of influence of costs management on the efficiency of farming is very crucial both from scientific and utilitarian point of view.

The base for this analysis was a questionnaire survey from year 2006 where following source data was obtained:

- 1) resources of production factors:
 - area of agricultural land in physical and conversion hectares,
 - annual work unit,
 - equity in PLN;
- 2) production and economic results:
 - yields in grain units,
 - value of production in PLN,
 - costs in PLN, including: intermediate consumption, depreciation and costs of external factors.

Value of production and particular cost categories were calculated according to the methodology of system Farm Accountancy Data Network (FADN) [Goraj et al. 2004, Mańko 2001].

On the basis of resources of production factors notional outlays were fixed, with application of the following indicators:

- outlays of land – on the basis of average Wielkopolska rent equivalent from Agricultural Property Agency in dt of wheat [Rynek... 2006] and its average price, value of notional rent was calculated at 380 PLN/ha,
- outlays of labour – on the basis of average gross wages in Wielkopolska in agriculture, hunting and forestry sectors [Rocznik... 2007] contracted value of wages was calculated at 12,09 PLN/h,
- outlays of current assets – assumed as the intermediate consumption [Poczta and Kołodziejczak 2004],
- outlays of fixed assets – assumed as the depreciation [Poczta and Kołodziejczak 2004].

Outlays productivity was calculated on the basis of value of production according to the FADN methodology. Profitability was related to the farm family income, because it contains all costs including depreciation and costs of external factors. Analysis based on this measure gives full possibilities of evaluation of particular cost management efficiency.

¹ Originally contained 50 farms, but during the analysis one item was removed for the sake of non-typical results that especially concerned productivity and profitability of production factors.

In order to determine the influence of costs management on productivity and profitability of production factors outlays, 6 classes of examined farms were created according to the share of intermediate consumption in total costs.

- class I: $\leq 60\%$,
- class II: 60-70%,
- class III: 70-75%,
- class IV: 75-80%,
- class V: 80-85%,
- class VI: $> 85\%$.

The criterion for class range determination was the similarity of objects belonging to each class, with preservation of appropriate number of items.

As Goraj et al. [2004] claims, “intermediate consumption includes value of farm products, used for production aims coming from own production as well as materials from purchase (together with fuels), energy, external services [...], costs of business trips and other costs (i.e insurance)”. Costs that do not belong to this category included before all taxes, depreciation and costs of external factors (wages, interests and rents). They are to a high degree connected not with production process but with owned property. Part of the costs that belong to the intermediate consumption category (i.e. fuel, electricity) do not fulfil the definition of direct cost, because these costs are impossible to be allocated to the specific enterprise [Skarżyńska et. al 2005] but they are directly connected with operational activity, thus they have influence on the scale of production and its quality. Wasilewski [2007] claims that in the management process one should aim at maximization of direct cost share in structure of total costs, with rationalization of its level. With reference to a farm as a whole the same postulate can be applied to the intermediate consumption, because the analysis of only direct costs does not take into account costs like fuel and electricity, which are crucial for the production process.

The research determined the influence of share of intermediate consumption in total costs on productivity and profitability of production factors outlays. Improper costs management can be shown in two ways. The first one are incorrect proportions between particular categories – therefore excessive share of costs, related before all to the property, which do not influence the scale and quality of production. This situation indicates maladjustment of production to the value of property and is overinvestment. The second one is inappropriate outlays allocation, mainly means of production, which consequently lead to their low productivity and profitability and it can be caused by the unreasonable fertilization, plant protection or nutrition. This state can be reflected in costs structure, contrary to the overinvestment, by significant share of direct costs or wider – intermediate consumption.

RESULTS AND DISCUSSION

Examined farms are characterised by the diversification of area and yields in grain units (g.u) (Table 1). Farms from class 1 possess the largest area of agricultural land, from class IV the smallest one and the difference between them amounts to 25 ha. Farms from class I are characterised by the smallest yield in g.u. Large differences occur especially in livestock density on 100 ha UAA, where the rise from 3.62 livestock

unit (LU) in class I to 165 LU in class VI occurs. Farms which are characterised by smaller share of intermediate consumption (class I, II, III) can be defined as relatively big, extensive and oriented towards plant production. Farms where the share of intermediate consumption is lower (class IV, V, VI) are characterised by smaller area, but greater share of animal production. Smaller land resources induce them to more intensive production such as manufacture of products from animals, which are more processed. This way of farming leads to the necessity of bearing higher outlays, which eventually results in bigger share of intermediate consumption in costs structure. Hence present analysis is to some degree evaluation of efficiency of two farming strategies – extensive, mainly based on plant production on relative large area and intensive, based on animal production, with utilization of smaller area.

Table 1. General characteristic of farms according to share of intermediate consumption in total costs

Tabela 1. Ogólna charakterystyka gospodarstw rolnych według zużycia pośredniego w kosztach ogółem

Class of farms according to share of intermediate consumption in total costs Klasa gospodarstw według udziału zużycia pośredniego w kosztach ogółem	Quantity Liczebność	Area of agricultural utilized land (ha) Powierzchnia użytków rolnych (ha)	Yield (grain units/ha) Plon (jednostki zbożowe/ha)	Livestock unit/100 ha of agricultural utilized land Liczba dużych jednostek przeliczeniowych/100 ha użytków rolnych
Class I ≤ 60% Klasa I ≤ 60%	6	58.95	34.0	3.6
Klasa II 60-70% Klasa II 60-70%	6	41.84	43.4	58.0
Class III 70-75% Klasa III 70-75%	8	54.92	44.5	41.3
Class IV 75-80% Klasa IV 75-80%	9	44.79	43.0	101.2
Class V 80-85% Klasa V 80-85%	7	49.80	38.9	110.2
Class VI > 85% Klasa VI > 85%	13	33.94	36.8	165.9
Average for the whole population Średnio dla całej populacji		45.65	40.0	83.3

Source: own calculation on the basis of inquiry.
Źródło: obliczenia własne na podstawie badań ankietowych.

Production profitability is various in examined farms, and it is estimated both with reference to area and interrelationship between particular categories of economic results (Table 2). Generally both productivity and profitability of land increase together with

the rise of intermediate consumption. The lowest results were achieved in class II. Relation between production and intermediate consumption decreases subsequently in analysed groups which shows more effective utilization of means of production in farms where share of intermediate consumption is smaller. In respect of considerable costs which these farm need to bear, like depreciation, taxes or cost of external factors, relation between production and total costs (profitable index) is lower there than in class of larger share of intermediate consumption. The cause of lower production efficiency in farms with lower share of intermediate consumption are relatively high costs such a taxes, depreciation, and external factors costs, which have no direct impact an quality and quantity of produced items.

Table 2. Production efficiency in farms according to share of intermediate consumption in total costs

Tabela 2. Efektywność produkcji w gospodarstwach rolnych według udziału zużycia pośredniego w kosztach ogółem

Class of farms according to share of intermediate consumption in total costs Klasa gospodarstw według udziału zużycia pośredniego w kosztach ogółem	Production*/ha (zł) Produkcja*/ha (zł)	Farm income/ha (zł) Dochód z gospodarstwa rolnicze-go/ha (zł)	Production*/intermediate consumption Produkcja*/zużycie pośrednie	Production*/total costs Produkcja*/koszty ogółem
Class I ≤ 60% Klasa I ≤ 60%	3 524	1 161	1.8	1.1
Klasa II 60-70% Klasa II 60-70%	3 181	585	1.5	1.0
Class III 70-75% Klasa III 70-75%	3 382	1 029	1.7	1.2
Class IV 75-80% Klasa IV 75-80%	4 612	1 465	1.4	1.1
Class V 80-85% Klasa V 80-85%	5 376	1 924	1.6	1.3
Class VI > 85% Klasa VI > 85%	11 413	3 164	1.5	1.3
Average for the whole population Średnio dla całej populacji	5 498	1 639	1.6	1.2

*According to FADN methodology [Goraj et al. 2004].

Source: own calculation on the basis of inquiry.

*Według metodyki FADN [Goraj i in. 2004].

Źródło: obliczenia własne na podstawie badań ankietowych.

Diversification between examined classes can also be noticed in scope of outlays of production factors both with reference to land unit and their internal structure (Table 3). Labour outlays are larger in three classes characterised by the higher share of intermediate consumption, which should be recognized as a direct result of more significant role

of animal production and indirect symptom of strategy of intensive farming. Fixed assets outlays are differentiated in particular classes, but there is no legible dependence on increasing share of intermediate consumption. The cause of this state can be associated with general specific character of agriculture, which is manifested by the necessity of fixed assets involvement. [Sadowski and Poczta 2007], regardless of the strategy of farming and direction of production. Outlays of current assets increase in successive classes what is obvious because intermediate consumption is their measure. They constitute the biggest share of total outlays of production factors, so in successive classes value of total outlays also increases. It is noticeable that diversification of share of intermediate consumption is caused not by the overinvestment in groups, where the share is lower, but by running of low-outlay production in farms from these groups.

Table 3. Outlays of production factors in farms according to share of intermediate consumption in total costs

Tabela 3. Nakłady czynników produkcji w gospodarstwach rolnych według udziału zużycia pośredniego w kosztach ogółem

Class of farms according to share of intermediate consumption in total costs Klasa gospodarstw według udziału zużycia pośredniego w kosztach ogółem	PLN/ha agricultural utilized land Zł/ha użytków rolnych				Total outlays = 100 Nakłady łącznie = 100			
	labour outlays nakłady pracy	fixed assets outlays nakłady środków trwałych	current assets outlays nakłady środków obrotowych	total outlays nakłady razem	land outlays nakłady ziemi	labour outlays nakłady pracy	fixed assets outlays nakłady środków trwałych	current assets outlays nakłady środków obrotowych
Class I ≤ 60% Klasa I ≤ 60%	952	686	1 961	3 980	9.6	23.9	17.2	49.3
Class II 60-70% Klasa II 60-70%	1 184	898	2 098	4 561	8.3	26.0	19.7	46.0
Class III 70-75% Klasa III 70-75%	871	487	2 027	3 766	10.1	23.1	12.9	53.8
Class IV 75-80% Klasa IV 75-80%	1 184	640	3 239	5 443	7.0	21.8	11.8	59.5
Class V 80-85% Klasa V 80-85%	1 365	514	3 355	5 615	6.8	24.3	9.2	59.7
Class VI > 85% Klasa VI > 85%	1 735	691	7 569	10 375	3.7	16.7	6.7	73.0
Average for the whole population Średnio dla całej populacji	1 223	637	3 543	5 783	6.6	21.1	11.0	61.3

Source: own calculation on the basis of inquiry.
Źródło: obliczenia własne na podstawie badań ankietowych.

The aim of the analysis of productivity of production factors outlays is to determine how cost management in farms influences efficiency of transferring of particular outlays onto new products (Table 4). In case of productivity of land outlays, its increase in following classes takes place similarly to productivity of land resources. Productivity of

labour outlays is in turn similar in each class with the exception of class VI, where it is even twice as high as in other ones. Increase of productivity in successive classes also takes place in case of fixed assets, which is disrupted only in class II, where the average value is the lowest. There is no clear direction in case of current assets outlays. It can result from the fact that along with increase of fixed assets outlays, the value of production and consequently productivity of other factors also rises, but individual productivity of current assets is to a large degree the result of external causes which aren't connected with relation between production factors outlays and production. These causes may have environmental character and come from diversification of land quality or atmospheric conditions during vegetation period. There is also no clear relationship between productivity of total outlays of production factors, although farms from class I obtained the lowest productivity and from class VI the highest one.

Table 4. Productivity of production factors outlays in farms according to share of intermediate consumption in total costs

Tabela 4. Produktywność nakładów czynników produkcji w gospodarstwach rolnych według udziału zużycia pośredniego w kosztach ogółem

Class of farms according to share of intermediate consumption in total costs Klasa gospodarstw według udziału zużycia pośredniego w kosztach ogółem	Production*/land outlays Produkcja*/nakłady ziemi	Production*/labour outlays Produkcja*/nakłady pracy	Production*/fixed assets outlays Produkcja*/nakłady środków trwałych	Production*/current assets outlays Produkcja*/nakłady środków obrotowych	Production*/total assets outlays Produkcja*/nakłady razem
Class I ≤ 60% Klasa I ≤ 60%	9.3	3.7	5.1	1.8	0.9
Class II 60-70% Klasa II 60-70%	8.4	2.7	3.5	1.5	0.7
Class III 70-75% Klasa III 70-75%	8.9	3.9	6.9	1.7	0.9
Class IV 75-80% Klasa IV 75-80%	12.1	3.9	7.2	1.4	0.8
Class V 80-85% Klasa V 80-85%	14.1	3.9	10.5	1.6	1.0
Class VI > 85% Klasa VI > 85%	30.0	6.6	16.5	1.5	1.1
Average for the whole population Średnio dla całej populacji	14.4	4.5	8.6	1.6	1.0

*According to FADN methodology [Goraj et al. 2004].

Source: own calculation on the basis of inquiry.

*Według metodyki FADN [Goraj i in. 2004].

Źródło: obliczenia własne na podstawie badań ankietowych.

Analysis of outlays profitability, estimated on the basis of the farm income, presents evaluation of influence of cost management on efficiency of farming (Table 5). Relatively high share of intermediate consumption in cost structure brought about the better

use of land, labour and fixed assets resources, because in case of these factors higher profitability was noticed in class IV, V, VI. This observation is important in context of investment planning or wider – in context of fixed assets management (including land), because it proves that for optimal fixed assets use appropriate proportion between production and property costs should be maintained, aiming at the minimization of the last ones. That is why one can claim that investment activity should perform supplementary role in relation to operating activity, what should be understood as an adjustment of fixed assets to the scale of production or as a necessity of enlargement of production scale and quality in case of investment [Sadowski 2003 a and b]. Similar conclusion concerns the influence of costs management on efficiency of the labour outlays utilization. Profitability of the current assets outlays is diversified, but there is no clear direction, which could be a base for unequivocal definition of influence of cost management on efficiency of these outlays utilization. The highest profitability occurs in class I, and the lowest in class II. Diversification also takes place in case of total outlays. The lowest profitability characterizes farms from class II, and the highest was noticed in class V and VI. This state indicates that costs management in farms has an influence on efficiency of outlays utilization, because farms where the share of intermediate consumption is at relatively high level, displayed higher total outlays efficiency.

Table 5. Efficiency of production factors outlays in farms according to share of intermediate consumption in total costs

Tabela 5. Efektywność nakładów czynników produkcji w gospodarstwach rolnych według udziału zużycia pośredniego w kosztach ogółem

Class of farms according to share of intermediate consumption in total costs Klasa gospodarstw według udziału zużycia pośredniego w kosztach ogółem	Farm income/land outlays Dochód z gospodarstwa rolniczego/nakłady ziemi	Farm income/labour outlays Dochód z gospodarstwa rolniczego/nakłady pracy	Farm income/fixed assets outlays Dochód z gospodarstwa rolniczego/nakłady środków trwałych	Farm income/current assets outlays Dochód z gospodarstwa rolniczego/nakłady środków obrotowych	Farm income/total outlays Dochód z gospodarstwa rolniczego/nakłady razem
Class I ≤ 60% Klasa I ≤ 60%	3.1	1.2	1.7	0.6	0.3
Class II 60-70% Klasa II 60-70%	1.5	0.5	0.7	0.3	0.1
Class III 70-75% Klasa III 70-75%	2.7	1.2	2.1	0.5	0.3
Class IV 75-80% Klasa IV 75-80%	3.9	1.2	2.3	0.5	0.3
Class V 80-85% Klasa V 80-85%	5.1	1.4	3.7	0.6	0.3
Class VI > 85% Klasa VI > 85%	8.3	1.8	4.6	0.4	0.3
Average for the whole population Średnio dla całej populacji	4.3	1.3	2.6	0.5	0.3

Source: own calculation on the basis of inquiry.
Źródło: obliczenia własne na podstawie badań ankietowych.

CONCLUSION

The aim of this analysis was to show the influence of costs structure on the efficiency of outlays utilization. Since examined costs were on the one hand connected with running of production (intermediate consumption) and on the other hand with management of farm property (depreciation, taxes, rents), the examinations which were carried out concerned relation between operational and investment activity. They proved that for efficient utilization of possessed resources and outlays connected with them it is necessary to maintain appropriate proportion between financing funds allocated to both activities. The main emphasis should be put on the operational activity, because it constitutes the basic source of income and costs which are born on this activity affect farming intensity, which in conditions of growing production concentration, has to be enlarged constantly. Investment activity or wider – farm property should be treated as an auxiliary with reference to operational activity. Hence investigating this problem from an angle of farmer's decision, one should adjust size and structure of fixed assets to the scale of production or plan investments only in range which will contribute to such scale of production enlargement which will make possible improvement of efficiency of resources and outlays utilization. Otherwise phenomenon of overinvestment will take place which is manifested by the generation of additional property costs (depreciation, insurance, maintenance of buildings and machinery costs), which will not be covered by the value of additional production. Priority of operational activity in relation to the investment is understood from the point of view of efficiency of outlays utilization analysis, but may rise doubts in context of relatively weak provision of fixed assets in Polish agriculture and necessity of investment which follows from that. However if the relative low productivity of Polish agriculture will be taken into consideration [Poczta 2003], the process of its modernization should be considered in context of increasing of global agricultural production. In this situation apparent conflict between necessity of modernization and outlays efficiency will not take place. Direction and scope of modernization have to be correlated with the scale and quality of production. This postulate concerns both decision taking at the level of agricultural policy creation and individual decision of farm managers who plan the investments.

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EKONOMICZNA EFEKTYWNOŚĆ NAKŁADÓW CZYNNIKÓW PRODUKCJI W KONTEKŚCIE ZARZĄDZANIA KOSZTAMI

Streszczenie. W pracy przedstawiono wyniki badań dotyczących relacji pomiędzy strukturą kosztów w gospodarstwie a produktywnością oraz efektywnością wykorzystania nakładów czynników produkcji. Badania przeprowadzone zostały w 49 gospodarstwach rolnych z Wielkopolski. Wykazano, że w strukturze nakładów czynników produkcji największy udział mają nakłady środków obrotowych. Zmienność w zakresie udziału zużycia pośredniego w kosztach ogółem jest w dużej mierze odzwierciedleniem relacji pomiędzy działalnością operacyjną i inwestycyjną. Z analizy wynika, iż gospodarstwa charakteryzujące się wyższym udziałem zużycia pośredniego, uzyskują wyższą produktywność oraz dochodowość nakładów ziemi, pracy oraz środków trwałych. Pośrednio świadczy to o dominującej roli działalności operacyjnej w poprawie efektywności wykorzystania nakładów.

Słowa kluczowe: gospodarstwo rolne, zarządzanie kosztami, opłacalność produkcji, nakłady czynników produkcji

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