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ECONOMIC VALUATION OF NATURAL RESOURCES AS A TOOL FOR MANAGING OF SUSTAINABLE DEVELOPMENT IN RURAL AREAS

Mária Fekete-Farkas, Zsuzsanna Tóth-Naár, István Szűcs, Sergey A. Vinogradov
[1]*Szent István University, Hungary*

Annotation
Agricultural land is an important resource of rural areas. This paper focuses on economic evaluation of agricultural land. The new method of economic land evaluation presented by authors practically combines the return-based assessment with the comparison of prices established in land market. The automated land evaluation algorithm takes into consideration the ecological differences between land qualities, but also reflects the demand-supply relations for land and also takes into account the value of environmental services.
KEY WORDS: D-*e*-Meter land quality index, economic Land evaluation, Sustainable land use, Optimization of land use system

Introduction

The long-term development of socio-economic systems requires the sustainable use of natural resources. In order to fulfil the important tasks related to the optimization of land use system − which is necessary due to the responsible management of land, the observance of environmental protection aspects and the more fierce competition – it is inevitable to determine the economic value of land, as production factor.

The importance of the topic was also justified by the EU Sustainable Development Strategy (EU SDS): the environmental load has drastically increased owing to the expansion and extension of the production activities, which evokes the need for maintaining the environment. The EU SDS added a third, environmental dimension to the Lisbon Strategy of economic and social renewal. The necessary financial sources can be ensured by imposing taxes on arable land. The differentiation of land according to its quality is not enough for the fair taxation; it is also inevitable to make value estimation in economic terms.

By reviewing the international literature on the subject (Herdt, R.W.-Cochrane, W.W, 1966; Tweeten, L.G.-Martin, J.E., 1966; Harvey, D.R., 1974; Deal, B.-Pallathucheril, V., 2009; Featherstone A.M.-Baker, T.G., 1987; Pilis, P., 1978; Thapa, R.B.-Murayama, Y., 2008; Lins, D.A. et al., 1985; Traill, B., 1979; Battese, G.E. et al., 1988) and national (Szűcs, I. et al., 1990; Bakucs, L.Z.-Fertő, I., 2005; Tar, F., 1999), we have learnt that there are no uniformed land evaluation system within the European Union. Moreover, the French example (Brisson, N. et al., 1992; Van den Born, G.J.-Vogel, A.W., 1986) shows that the methods applied in the land value estimation practice may differ even within one member country. The experts in the field of land evaluation seriously demand the development of an unified land evaluation system within the European Union. The elaboration of the bases of unified land evaluation system is to be enhanced by the project initiated by the EU Committee, the primary object of which is the examination of suitability of arable lands in the Union for crop production purposes. The evaluation system is developed by the implementation of internationally recognized Automated Land Evaluation System (ALES) built up on FAO principles (FAO, 1976; Rossiter, D.G.-Van Wambeke, A.R., 1997).

During the accession negotiations, the candidate countries requested the possibility to maintain existing national provisions restricting the acquisition of agricultural land or forests. They considered these derogations necessary in order to preserve the socio-economic agricultural structure of the countries from shocks that might arise from the differences in land prices (as an example, the average market values of arable land (EU-DGARD, 2010) in 2008, EUR/ha in Hungary: 1600, in Poland: 848, in Bulgaria: 1202 in comparison with 4370 EUR/ha in France and 24888 EUR/ha in Belgium) and income with the rest of the union, and to be able to pursue an effective agricultural policy. They were also deemed necessary - due to an unfinished process of privatization and restitution of agricultural land - to the farmers in some countries. Some candidate countries provided detailed arguments justifying the transitional periods in the framework of the Common Positions expressed by the Council during the negotiations. As detailed in annexes V, VI, VIII, IX, X, XII and XIV of the Act of Accession of 2003, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland and Slovakia were granted transitional periods during which they could maintain existing provisions of their legislation restricting the acquisition of agricultural land or forest, in derogation to the freedom of capital movement enshrined in Art. 56 of the EC Treaty.

The historical background, the high share of agriculture in the GDP of the new member states of EU and the lack of properly working land market create increasing demand for information about the value of agricultural land in these countries. To understand this particular interest in economic value of land in new member state of EU some detailed information about the history of land ownership, farm structure and land market situation is needed. The structure of land estates and farm-sizes are the basis of a competitive and sustainable agricultural production, hence these questions belong to the evergreen themes both of theory and practice also on international level. However, while the development of family farms in the United States and in Western-Europe has been resting on unbroken, calculable and safe basis, the development of land estate and farm conditions in the Central and Eastern European countries has survived unexpected and incalculable breaks after the World War II (Szűcs, I. et al., 2003).

The land reform after the war distributed large share of the estate lands to small holders in these countries. The agrarian transformation brought about fundamental changes in the ownership system parallel with social class relations. They were motivated by political and social goals with less economic consideration. Agricultural policy in Central and Eastern European Countries was largely dominated by the centrally planned economy and the socialist political model with a strong emphasis on production increase from the beginning of 1950s. This was based on the principle of common use of land and during this time all effective land rights were in hand of the state or cooperatives, which operated on more thousand hectares. Only Poland is unique in the region. Polish collectivization failed completely, and as a consequence of it the agricultural sector became a margin and it was kept from development.

Radical political and economic changes which occurred in the Central and Eastern European Countries at the beginning of the 90s led to a sharp economic decline and originated the formation of new agricultural policy and a new agricultural structure built on private ownership. Agricultural land reform in former socialist countries revealed numerous contradictions. The restitution program, which was based on the outcomes of the land reform implemented after World War II was common used in CEECs. The choice of restitution over the distribution for farm was probably a strictly political decision driven by the memory of private landownership and by the desire to make clean break with the socialist past (Lerman, Z. et al., 2004). Only in two countries, in Hungary and in Romania was used a mixed system: most of land was resituated to former owner or their heirs and some of it was distributed to agricultural workers in interest of social equity and justice.

There were two ways of restructuring of farm sector: one of them is when the land and farm assets were distributed in physical form to the original or new owners, and the other one is the form of “paper shares”, representing certificates of entitlements to jointly held property. In the CEECs countries the physical distribution of land parcel was more common. Consequently, this process has contributed to the current situation of fragmentation of land ownership.

In Bulgaria the reform created over 2 million landlords with many plots, where each owning on average 3.8 plots with size of 0.53 hectares. In Hungary land privatization impacting on more than 50% of the total area of the country, creating approximately 2.5 million new properties and through a process involving compensation and land privatization affecting some 20% of the population with 2.2 ha in average. Only a small number of the new owners were actually able and willing to rely on agriculture as their main occupation. The importance of this issue is very high in Hungary, where 63% of the total land area consists of agricultural area, in contrast to the 43% of EU-25 countries. Poland entered the transition era with 76% of its agricultural land cultivated by family units, so the issues of privatization and restitution of land played much less role than in other countries, but it face the high fragmentation problem as well especially in central and eastern regions of the country. It is one of the main factors of lower productivity comparing with agriculture of EU-15 (Szűcs, I. et al., 2003).

By the liberal point of view on a well-functioning market the free flow of production factors can allocate them efficiently. The structural change is ideally guided by market signal which convey information about the social preferences and production possibilities. However, due to economic and political situation in the transition countries market forces is not functioning as a primary engine for land consolidation. We can mention as common feature that land market does not function properly (Fekete-Farkas, M. et al., 2007). The reasons of this - beside of official restriction - can be find both on demand and supply side of the market. Some factors of market imperfection also have to be mentioned. Most of CEECs introduced some restriction according to land ownership. As an example Hungarian land low of 1994 makes the land ownership possible only for state and individuals up to 300 ha, and not allows to have own land and for foreigners (until 2011) and the legal entities. The owners of small farms have no enough money to purchasing of additional farmland and them real estate cannot be used as a basic of collateral for farm loans.

As the population is increasing the business of feeding the world is become bigger business, this has pushed the land to become a major investment theme. In several countries are dominant player in the land market and number of them expected to increase. They are able to effect on land prices, because the small farmers have no bargaining power, and they also have no reference date which can be a basis for negotiation. The Central and Eastern Countries of Europe are characterized by large areas, which are threatened to a relatively small extent by urbanization and transport. It increases the demand of land for purpose other than agricultural. The loss of agricultural land to developed uses has been a very important public policy issues.

The market imperfection and information asymmetry is very dangers when the poor farmers may forced to sell their land due to shocks or economic hardships as it is for example in Hungary. The liberalization of the Hungarian land market due to be done by 2011, will bring some changes which cannot be followed by the currently applied land evaluation methods based on the outdated Gold Crown (GC) land quality assessment system. The GC system was introduced in Hungary in the second half of the XIX century. After more than 130 years’ use of this system there is a need for a modern land quality index which could replace the obsolete GC index (Tóth-Naár, Zs. et al., 2004). In this paper we show the results of the project − supported by the National Research and

Development Program − whose main objective was to develop an integrated land evaluation system based on the D-*e*-Meter land quality assessment system (Gaál, Z. et al., 2006). The new system of the economic land valuation is based on the D-*e*-Meter land quality index which is calculated on-line with the help of a complex Geographical Information System of soil and other maps (Tóth, T. et al., 2006; Hermann, T. et al., 2007).

Results and Discussion

An automated integrated evaluation system for arable lands is based on the D-*e*-Meter land quality index. Integrated approach to the land evaluation means an assessment of ecological (soil, climatic and land relief conditions) and economic (transport conditions, composition of the market environment, etc.) factors in a unified and closed system. The economic evaluation systematizes the effects of economic factors in conformity with structure of the D-*e*-Meter physical land evaluation (land quality assessment) system.

Based on the existing GIS system for the on-line calculation of D-*e*-Meter land quality index of agricultural plots, we developed the framework for the digital database creating further opportunities to improve the sustainability of land use such as optimizing fuel utilization, crop rotation etc.

The physical land valuation is based on the computerized statistical processing of available soil and plant cultivation information about the sample area. Soil and yield data obtained from the Hungarian Soil Fertility Monitoring System. These data were collected between 1985 and 1989 from 60 thousand fields, covering 4 million hectares yearly. For the information system of the sample areas it was necessary to digitalize the 1:10000-scale operating genetic soil maps. This could be followed by the harmonization of the soil and plot maps also by computer and based on the 1:10000-scale maps. As sample areas were chosen 5 areas under agricultural cultivation each had an area of about 4-8 thousand hectares (Gaál, Z. et al., 2006).

The initial phases of the land quality assessment are followed by the definition of the fertilizer responses of the soils. This is meant to explore the causes of changes in the production potential resulting from fertilizer application of various intensities and to express the extent of such changes.

The Figure 1. shows six main steps in the calculation of D-*e*-Meter point (Tóth, T. et al., 2009). Base point calculated for which are as follows:

a) each genetic soil subtype of the Hungarian National Soil Classification Scheme specified for

b) crop type,

c) water regime of the soil, and

d) management intensity level (extensive or intensive),

e) each meteorological region of the grown crop and

f) each meteorological type of the year (dry, average, good in terms of the crop yield).

Different ranges of soil parameters are used to correct the effect (soil texture category, soil organic matter category, soil PH category, soil parent material).

Different levels of nutrients are used to correct the effect.

Relief and exposure are used to correct the effect.

Fore crops are used to correct the effect.

Crop areas are used to weighting crop-specific D-e-Meter points.

The concept of D-*e*-Meter land quality index has being extended from croplands (Tóth, T. et al., 2009; Tóth, G., 2009; Gaál, Z. et al., 2007; Debreczeni, B. et al., 2003; Makó, A. et al., 2007; Speiser, F. et al., 2007) for other land uses, such as grasslands (Dér, F. et al., 2003) and forests (Bidló A. et al., 2003). For purposes of economic analysis and help of economic decisions of stakeholders a physical land evaluation system was extended.

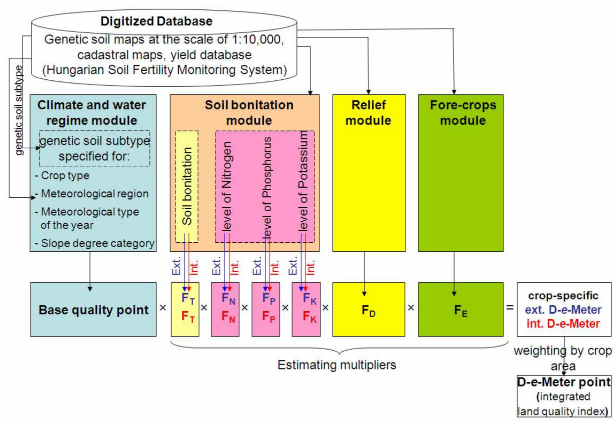

Fig. 1. An overview of the process of the land quality assessment in the D-*e*-Meter system, based on the arable land (Ext.= extensive, Int. = intensive management intensity level)

The basis of the integrated land evaluation system is establishing the equivalence between the index of land quality (in the D-*e*-Meter point) and the Gross Margin (GM) as a measure of profitability of production. The logic of the system can be interpreted as shown on the following figure (Figure 2.).

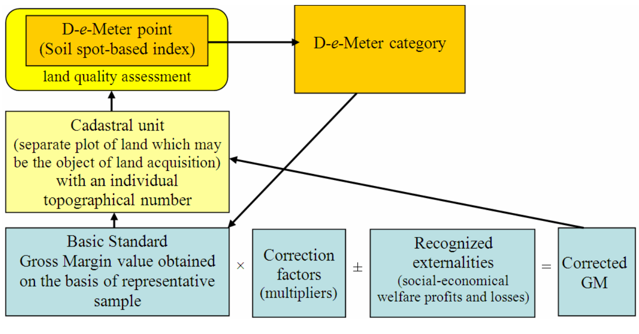

Fig. 2. Computation of Corrected Gross Margin value of cadastral unit (Szűcs, I.-Fekete-Farkas, M.-Tóth-Naár, Zs.-Vinogradov, Sz., 2008)

The precondition of the elaborated application of the land evaluation method in practice is to assign to each D-*e*-Meter category a weighted – so called standard – Basic Gross Margin value. The computation of Gross Margin is carried out by sampling. The responding units are the enterprises dealing with production of arable-land crops in the given region.

Production value (revenue) of the j-th plot for the i-th crop in year t:

$$R_{i,j}^{t} = q_{i,j} \cdot p_i + q_{i,j}^{m} \cdot p_i^{m} + u_{i,j} \quad (1)$$

where:

$q_{i,j}$ = production yield of the i-th crop on the j-th plot (t/ha);

p_i =selling price of the i-th crop (EUR/t);

$q_{i,j}^{m}$ =yield of by-product from the i-th crop on the j-th plot (t/ha);

p_i^{m} =price of by-product from the i-th crop (EUR/t);

$u_{i,j}$ =direct subsidy for the i-th crop on plot 'j' and the total amount of non crop-specific subsidies as divided to plots (EUR/ha).

The direct variable cost of the j-th plot for the i-th crop in year t:

$$Cv_{i,j}^{t} = \sum_{1=1}^{9} C_1^{i,j,t} \quad (2)$$

where:

$C_1^{i,j,t}$ = seed cost for the i-th crop on the j-th plot in year t (EUR/ha);

$C_2^{i,j,t}$ =fertiliser cost for the i-th crop on the j-th plot in year t (EUR/ha);

$C_3^{i,j,t}$ = cost of plant protection chemicals for the i-th crop on the j-th plot in year t (EUR/ha);

$C_4^{i,j,t}$ = irrigation cost of the i-th crop on the j-th plot in year t (EUR/ha);

$C_5^{i,j,t}$ =cost of fuel for machine work for the i-th crop on the j-th plot in year t (EUR/ha);

$C_6^{i,j,t}$ =drying cost for the i-th crop on the j-th plot in year t (EUR/ha);

$C_7^{i,j,t}$ = the part separated for the j-th plot of the direct marketing and processing cost in year t (EUR/ha);

$C_8^{i,j,t}$ =the part of direct insurance premiums separated for the j-th plot in year t (EUR/ha);

$C_9^{i,j,t}$ = part pertaining to the j-th plot in the other direct costs in year t (EUR/ha).

The GM of the j-th plot for crop 'i' in year t:

$$GM_{i,j}^{t} = R_{i,j}^{t} - Cv_{i,j}^{t} \quad (3)$$

The basic standard GM will be determined separately by regional levels, since there are big differences in infrastructural environment influencing the economic values, and they have to be taken into consideration during the construction of the system.

The basic standard Gross Margin (BSGM) is as follows for the k-th D-*e*-Meter category and for the r-th region:

$$BSGM_{rk} = \sum_{i=1}^{m} \sum_{t=1}^{5} \frac{\sum_{j=1}^{n} (GM_{i,j,t}^{r,k} \cdot S_{i,j,t}^{r,k})}{5 \cdot \sum_{j=1}^{n} S_{i,j,t}^{r,k}} \cdot g_{i,r} \quad (4)$$

where:

i= the i-th crop, i=1,2,….m;

j= the j-th land plot j=1,2,….n;

k= the k-th D-*e*-Meter category, k=1,2,….p;

r=the r-th region, r= 1,2,….7

t= data collection year 't", t=1,2,….5

$GM_{i,j,t}^{r,k}$ = Gross margin value for the j-th plot for the i-th crop, in region 'r' and in the year 't' and for the k-th D-*e*-Meter category;

$S_{i,j,t}^{r,k}$ = size of the j-th plot under the i-th crop and pertaining to the k-th D-*e*-Meter category in region 'r' and in the year 't';

$g_{i,r}$ = the proportion of the i-th crop in the seeding pattern of the r-th region.

The D-*e*-Meter point is obtained for the surveyed land area following by the identification on the cadastral, orthophotographic, topographic and soil spot maps. Given the knowledge of D-*e*-Meter point and administrative region which cover the map unit, the value of the basic standard GM is automatically established.

A set of correction factors (Table 1.) is also considered when the economic value of land is calculated.

Change in related cost and revenue due to the correction factors had been defined based on sampling experiments in a Hungarian region and then the changes in GM were corrected on the basis of the Hungarian expert judgement (Tóth-Naár, Zs.-Szűcs, I., 2006). Correction effects of selected factors on the GM-value were estimated by 90% confidence intervals, the data of table 1 are centers of confidence intervals. The size of the correction factors, and more importantly the thresholds, is likely to vary from country to country. It means that modifications should be made by locally. Model parameters can be changed easily and model can rerun with new estimated values of factors.

Information for correction factors can also be read on digital maps, whereby we ensure the automatic character of the valuation system. As an example, the establishment of slope category in study (this information is important not just for extra fuel cost consumption, but also necessary to comply of EU environmental requirements) site based on an online GIS (Figure 3.).

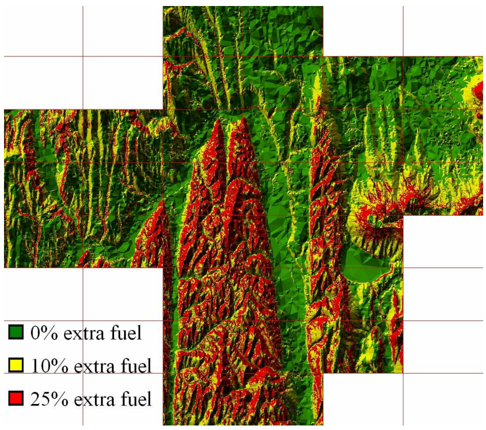

Fig. 3. Extra fuel consumption on the base of slope in study site (adopted from Hermann, T.-Makó, A.-Máté, F.-Speiser, F.- Tóth, Z.-Vass, J., 2007)

Table 1. Main correction factors in Hungarian case (Tóth, T. et al., 2009)

Serial Nr.	***Definition of the factor***	***Local assessment***			***Modification of Basic standard GM (multipliers)***
		Bad	***Middle***	***Good***	
1.	***Size and relief features of the area***	<10 ha, >200 ha	10 –200 ha		0.97 1.00
2.	***Irrigation possibility (irrigation canal)***	***available/not available***			1.15
3.	***On-land objects hampering tillage (infrastructure)*** Along electric power lines, in a zone of 10-40 m on both sides of the lines for the land under survey	more than one line crosses the area	one line crosses the area	no line crosses the area	0.80 0.90 1.00
4.	***Access to the area*** Per-hectare hard pavement road length over the farm area	0 km	1 km	more than 1 km	0.85 1.00 1.15
5.	***Infrastructure*** a) distance to the nearest product delivery sites (by rail, river or to processing plant)	more than 5 km	1-5 km	less than 1 km	0.90 1.00 1.10
	b) settlement with over 100 people	outside a circle of 5-km radius	1-5 km	within a circle of 1 km radius	0.85 1.00 1.15
	c) road conditions, approach to motorway, minutes	30<	15-30	15>	0.90 1.00 1.10
6.	Distance to the nearby waste dump : a) for hazardous wastes	1-2 km	2-5 km	> 5km	0.85 0.95 1.00
	b) for non-hazardous wastes	0.5-2 km	2-5 km	> 5 km	0.85 0.95 1.00
	c) for inert wastes.	0.3-1 km	1-2 km	> 2 km	0.85 0.95 1.00

There is a need to change the paradigm in measuring and assessing land returns or yields, in the sense that when interpreting farm output, one should consider performance elements not measured or not measurable through the basic yields (and by-products); these elements are the effects called ‘external’ and the positive-effect returns derivable from the latter ones and even the negative-effect costs.

Agricultural externalities occur in two forms:

1. the so-called linked products when the external element is created unintentionally via the production of traditional farm food products or non-food articles (fodder, energy plant) – (soil-related effects, or effect on soil and river water, oxygen production and carbon sequestration);
2. independent products, mostly in the form of public goods, when the activity is directly aimed at maintaining bio-diversity, landscape and soil protection, etc.

When determining the value of farmland by the application of the return principle, the discounted value of the private or social services expected from the land now or in the future is to be modified with the negative social effects of land usage, i.e. with the so-called external costs.

Four factor groups should be mentioned, which obviously affecting the economic value of land or will affect it in the foreseeable future, although they are difficult to measure:

1. oxygen-producing capacity of farm crops, and their carbon sequestration;
2. utility for recreation and as cultural landscape;
3. soil erosion;
4. environment-damaging effects of concentrated livestock-farming.

The future research is required for quick solving of money value of external effects.

The combined effect of corrective factors and value of external effects on standard GM:

$$BSGM^{DM} \cdot (1+\sum_{i=1}^{6}(k_i - 1)) + E \quad (5)$$

where:

k_i = the change in standard GM due to the i-th corrective factor.

E = value of net external effects.

Based on the corrected GM we can estimate the economic land value.

From economic point of view a certain difficulty arises, because the returns of land as a production factor are not separated from net margin, so the capitalization in classical sense (land price = capitalized land rent) cannot be carried out. The research team have applied an estimation method that deduces the share (γ-value) of land rent within total income from the conditions of real land market.

In case of necessary number of selling transactions of land estates, the extent of Land rent can be determined by knowledge of land prices and real interest rate:

$$\textit{Land rent} = \textit{Land market value} \times \textit{real interest rate} \quad (6)$$

By means of this formula, the percentage of Land rent within the corrected Gross Margin can be determined:

$$\gamma = \frac{\textit{Land rent}}{\textit{Corrected GM}} \quad (7)$$

From (7):

$$\textit{Economic value of land} = \frac{\gamma \cdot \textit{Corrected GM}}{\textit{interest rate}} \quad (8)$$

By employing this method (Figure 4.) we have practically combined the land prices calculated on return (income) basis with those current on the land market, whereby an up-to-date economic land value is obtained that not only respects the ecological quality of arable lands but also reflects the demand/supply conditions for land price.

The advantages of the integrated land evaluation system based on the D-*e*-Meter land quality index can be summarized as follows. In contrast to many currently applied systems the D-*e*-Meter system is an automated complex land evaluation system which could be reached by the user (land owner, agricultural producer, bank, etc.) through Internet on his own computer.

The fundamental structure of D-e-Meter land quality assessment system is different: here the qualification of crop production conditions is made on yield basis. Those land qualities and their combinations are selected with the classification process which affect the fluctuation of yield to the greatest extent. The determination of productivity of each field crop is made in the size of potential yield expressed on a scale from 0 to 100 (Tóth, T. et al., 2007).

The economic evaluation of land units for example in ALES – which was elaborated by a research group of Cornell University, Department of Soil, Crop and Atmospheric Sciences − is made on the basis of farming data. The land quality is built in the model involving yields. The economic evaluation does not use the results of physical evaluation. The economic evaluation gives the economic suitability of the land unit concerning the realization of the given type of land use, separately on the basis of the four economic indices (gross margin, net present value, benefit/cost ratio, internal rate of return) (Rossiter, D.G.-Van Wambeke, A.R., 1997).

The economic evaluation in D-*e*-Meter system fully utilizes the outcomes of land quality assessment, thus meeting the requirements towards complex land evaluation methods. The basis of economic evaluation is given by the estimation of returns on land but the method also presumes the analysis of land market data. By combining the two approaches – land evaluation based on returns and the market – a totally new method has been developed which enables the elimination of specific errors of the two above mentioned evaluation processes. This method may be able to be used for the assessment of land value devoid of speculation.

The excluding of effect of speculation in land economic evaluation is especially important in Central and Eastern EU countries where the land market is also undeveloped with lot of imperfection and potential possibilities of moral hazards.

We regard D-*e*-Meter automated complex land evaluation system − even in international terms concerning its methodology − a modern and interesting solution of economic land evaluation based on land quality assessment.

Conclusions

In this paper a theoretical framework of integrated land evaluation system was presented. The investigations of this research topic were motivated by internationally recognized demand of decision makers for uniformed land evaluation system. The starting point of our research was the critical assessment currently applied land evaluation models. During the literature overview it was considered that although the FAO Framework for Land Evaluation (FAO, 1976) – the initial for number of land evaluation worldwide – provides guidelines for "purpose oriented" evaluation, but the currently applied systems are insufficient for comply the needs of Central and Eastern EU countries where the land market is also undeveloped (Ciaian, P.-Swinnen, J.F.M., 2006).

Based on the D-e-Meter land quality index of agricultural plots, we developed the framework of land evaluation based on an online GIS. The new complex evaluation system is useful for getting the realistic land value and land price. The economic value of land based on the calculation of potential Gross Margin, which includes the total social-economic return of the plot. It can also be used to define the requirements for the alternative usage for land and to estimate the value of development rights.

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ECONOMIC VALUATION OF NATURAL RESOURCES AS A TOOL FOR MANAGING OF SUSTAINABLE DEVELOPMENT IN RURAL AREAS

S u m m a r y

In this paper the authors describe the steps of building of a new automated complex land evaluation system based on the D-*e*-Meter land quality index. This model combines the physical and economic evaluation.

Complex evaluation means an organic systematization of ecological and economic factors. The ecological evaluation signifies the elaboration of the D-*e*-Meter point system, while the economic evaluation systematizes the effects of economic factors in conformity with structure of D-*e*-Meter system.

The main point of automated land evaluation is that the elaborated system reads off the values of factors influencing land values (i.e. the quantified values of influencing factors) from the digital soil maps by site numbers (evaluation units), and then the system computes the complex land return values or rather the complex land prices in Euros per hectare according to a given computation algorithm. The so computed, estimated land value indicates the social values of land estates on the basis of their rent-production ability. These values can differ from land-estate prices formed on land market, nevertheless they are decidedly adequate to replace the Hungarian current system of land valuation, *Gold-crown System* and to solve whole series of objectives connected with land evaluation.

The new land evaluation system is useful for estimating the realistic land value, but also helps to manage the land use on sustainable way.

KEYWORDS: D-e-Meter land quality index, economic Land evaluation, Sustainable land use, Optimization of land use system

Mária Fekete-Farkas, PhD, Habil, Professor, Szent István University, Faculty of Economic and Social Sciences, Institute of Economics, Law and Methodology, Field of scientific research: valuation and management of production factors, focusing on natural resources, H-2100 Gödöllő, Páter Károly u. 1, Hungary, Tel.: +36-20-970-4987; Fax: +36-28-522-912, e-mail: Farkasne.Fekete.Maria@gtk.szie.hu

Zsuzsanna Tóth-Naár, PhD, Associate Professor, Szent István University, Faculty of Economic and Social Sciences, Institute of Economics, Law and Methodology, Field of scientific research: economic land evaluation, e-mail: Toth.Zsuzsanna@gtk.szie.hu,

István Szűcs, DSc, Professor, Head of PhD School of Management and Business Administration, Szent István University, Faculty of Economic and Social Sciences, Field of scientific research: Agricultural Economics, economic land valuation, 2100 Gödöllő, P.O.Box. 303, Hungary, e-mail: Szucs.Istvan@gtk.szie.hu

Sergey A. Vinogradov, PhD, Associate Professor, Szent István University, Faculty of Economic and Social Sciences, Institute of Economics, Law and Methodology, Field of scientific research: complex economic land evaluation, e-mail: Vinogradov.Szergej@gtk.szie.hu