RESEARCH PAPERS OF WROCŁAW UNIVERSITY OF ECONOMICS No. 177
Performance Measurement and Management 2011

Robert Pacuszka, Tomasz Kondraszuk
Warsaw University of Life Sciences

STATE OF WORK ON THE DEVELOPMENT OF AGRI-ENVIRONMENTAL INDICATORS FOR SUSTAINABLE DEVELOPMENT PURPOSES IN POLAND*

Summary: This article describes specific problems of agricultural management. The idea and state of work on the development of agri-environmental indicators for monitoring the sustainable development of agriculture by the institutions responsible for payments and for the management of agri-environmental measures in Poland are presented. In the future, cost calculation will be based on 26 indicators currently being developed simultaneously by all EU member countries. In Poland, indicator data is gathered by the national statistics office. The existing sources for the indicators in the entire EU are currently being analysed by the Polish Institute of Technology and Life Sciences. The conclusion of this article is that efforts should be made to develop a cost calculation system that allows for considering economic, ecological and social objectives.

Key words: agriculture, cost calculation, agri-environmental indicators, accounting, management.

1. Introduction

The idea of sustainable development developed in Western countries in the 1980s is not only considered at the level of individuals, but has become an attempt to respond to the practical needs of continued existence and development of entire societies. Today, the key issue in deciding on the direction of development seems to be the question of criteria in a micro- and macroeconomics. For a society faced with the problem of environmental degradation and depletion of natural resources, it is not easy to choose the direction of its development. This holds true, in particular, for highly industrial countries. The quality of life of the societies of such countries covers not only economic aspects, but also social, ecological, cultural, spatial,

* A study caried out as part of reseach grant No. 3688/B/H03/2011/40 entitled: *Rachunek kosztów w rolnictwie w warunkach zrównoważonego rozwoju* (Cost calculation in agriculture under conditions of sustainable development).

institutional, etc. This multi-faceted character of the criterion for development assessment is supposed to result in practices leading to the creation of a new and better world. This new, integrated order is expected to provide future generations with not worse, but better conditions for their continued development. Sustainable development is expected not to limit human activity, but rather to contribute to its dynamic and rational development in the long term. According to Woś [1992, p.10], the essence of this philosophy is "to plan socioeconomic development in such a way as to retain the conditions for the continued existence and self-restoration of different eco-systems".

In the case of single firm it has to have the imprint on measurement tools used to calculate performance.

The purpose of this article is to present the idea and current state of work on the development of agri-environmental indicators for assessing the progress of sustainable development in different countries, regions and in the single firm.

2. Micro- and macroeconomic measures of sustainable development

As the problem of sustainable development originated from a conflict between economics and ecology, it is sometimes understood literally, particularly by environmentalists and some politicians, as ecologically conditioned development, i.e. eco-development. This may lead to considerable disagreement. By rejecting the mechanisms of the market and the basic objectives of economic activity, our activities are doomed to failure. If principles and technologies intended to contribute to sustainable development are to be successfully implemented in agriculture, these should be of benefit to agricultural producers on the one hand and of benefit to society on the other. Figure 1 illustrates a theoretical model for determining the social optimum (social benefits) depending on the function of economic benefits and the costs of environmental impact. If E(x) represents the benefits obtained with the emission of factor (x), and if O(x) represents the costs of environmental impact caused by this emission, then the marginal benefits and costs will be determined by, respectively, E'(x) and O'(x). This theoretical model assumes the occurrence of the law of diminishing returns and the fact that unfavourable effects intensify as the emission level of factor (x) increases.

The social optimum is determined at the point where the marginal benefits are equal to (intersect with) the marginal costs. At this point, the surplus of the economic benefits of exploiting the natural environment over the costs of environmental impact is the largest.

If the level of exploiting factor (x) continues to increase, the surplus is reduced, as the costs are higher per unit and the benefits obtained per unit are lower. The use of this model as a solution to the problems of taking into account and combining economic aspects with ecological aspects is the only reliable idea that in practice

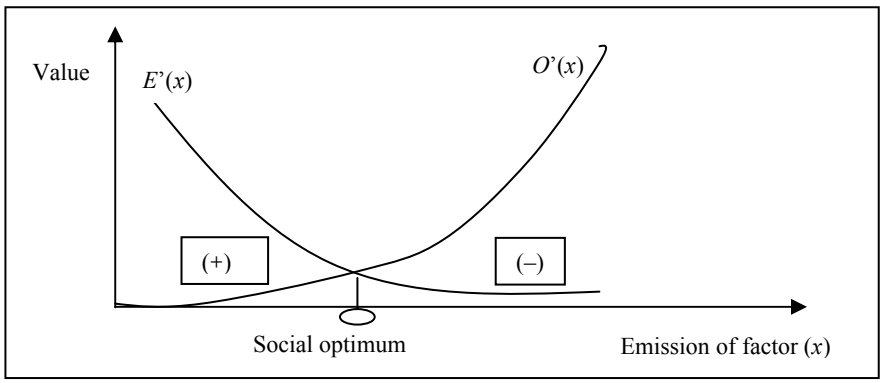

Figure 1. Determining the social optimum depending on the emission of factor (x) that results in environmental impact O(x) with the economic benefits of E(x).

Source: [Reisch., Zeddies 1995, p.45]

must be translated into appropriate mechanisms and instruments affecting the decisions of individual decision-makers. It is their decisions that will determine the options to be put into practice. However, it should not be forgotten that in maximising its returns, modern agriculture often uses technical means that allow for the intensive exploitation of the natural environment to an extent far greater than it is socially acceptable. This way, agriculture tries to make the most of its productive resources on the one hand and to retain control over the production process on the other. From the point of view of an agricultural holding, the curve representing the costs of environmental impact rises far more gently and very often relates to future periods. In such a case, the problem is to ensure that the objectives of individual farmers are consistent with social objectives and the protection of the natural environment.

The scale of the differences between the objectives of individual farmers on the one hand and the social objectives and the protection of the natural environment on the other can be illustrated by practical examples of farmers' practices. These practices can be controlled by imposing do's and don'ts whose violation would be subject to penalties imposed by the relevant authorities. However, it seems that it would be more appropriate to develop a system of agric-environmental indicators to support the desired practices on the part of farmers. This system should be based on economic calculation so as to show the mutual benefits. In the European Union, such initiatives can be undertaken, for example, within the framework of agri-environmental programmes, agricultural land afforestation programmes and programmes of compensatory subsidies for areas with unfavourable farming conditions.

It also seems necessary to introduce certain mechanisms for balancing investing and financing activities. Providing subsidies for pro-environmental investment projects allows for determining an appropriate direction for the future activities of agricultural holdings.

3. Selected problems of developing agri-environmental indicators from the statistical perspective and as part of the Common Agricultural Policy cost calculation

In recent years, we have seen the Common Agricultural Policy to evolve in a pro-environmental direction. The basis for reliable scientific research is usually a large amount of data covering a large number of characteristics, obtained from a basic statistical unit, i.e. an agricultural holding (data gathered during agricultural censuses). There are, of course, difficulties obtaining information at the agricultural holding level in the periods between censuses, therefore the statistics maintained by the European Union must be flexible enough to reflect the unavoidable changes (supplementing information gathered during censuses with scientific and administrative information). General Agricultural Censuses (conducted once in every ten years) and sample censuses (conducted once every two years), as well as the Polish farm accountancy database (PFADN), are insufficient due to the limitations resulting from the assumptions made in their development.

Agricultural statistics is forced to seek new practical solutions to the pro-environmental questions it is asked. This has given birth to European initiatives, such as AEI[1], which serve as a platform that combines the hitherto individual activities undertaken by the EU member countries, included by the Polish Ministry of Agriculture and Rural Development, which is responsible for monitoring agri-environmental measures.

The AEI set of 28 indicators is the result of IRENA, a project coordinated by the European Environment Agency and participated by the Directorates General of the European Commission (Directorate General for Agriculture and Rural Development, Directorate General for Environment, Eurostat and the Joint Research Centre (JRS)).

The indicators were developed at the request of the European Council in order to describe the relationships between agriculture and the environment for monitoring the integration of environmental policy with agricultural policy[2]. Unfortunately, these indicators are not managed by a single organisation, which is a serious problem.

3.1. Purpose and EU-level planning

The work already undertaken within the relevant working groups at the EU level has become the basis for a conclusion regarding the Regulation of the European Parliament and of the Council concerning the research into statistics on plant

[1] AEI (agri-environmental indicators), previously known as IRENA (indicators reporting on the integration of environmental concerns into agriculture policy) – a set of 28 agri-environmental indicators within the DPSIR framework (Driving forces, Pressures, States Impacts Responses).

[2] A proposal of indicators was contained in the Communication from the Commission to the Council and the European Parliament of 15 September 2006: COM(2006) 508 "Development of agri-environmental indicators for monitoring the integration of environmental concerns into the Common Agricultural Policy". Information on the indicators, and reports prepared based on the indicators are available on the Internet as http://www.eea.europa.eu/projects/irena.

protection products and into statistics on fertilisers which could be undertaken in the future.

With regard to the information from the Polish (FADN) Farm Accountancy Data Network and from agricultural censuses, only statistics on the consumption of plant protection products and fertilisers per agricultural holding are obtained. No information is obtained from plant cultivation data sheets as regards the quantity, dates, varieties or technology, which is fully understandable because such data are part of farmers' expertise and are protected by them.

At this point, standards are important which do not disclose particular farmer's expertise and which only bridge the gap with regard to plant protection and fertilisers (the last such statistics obtained in Poland experimentally with regard to the above (in fields, piggeries, barns, poultry houses, etc.) date back to the late 1980s) [Katalog Norm… 1991]. Therefore, no up-to-date and monitored standards for production and costs exist in Poland, and therefore no agri-environmental standards exist. The interest in agri-environmental costs is, however, significant, as these costs are essential for developing micro- and macro-models for simulations of the Common Agricultural Policy, more specifically for monitoring cross compliance, which is currently a priority of the Polish Ministry of Agriculture and Rural Development and which is causing difficulties due to lack of an idea for implementing a solution for monitoring adaptation changes at agricultural holdings.

3.2. Searching for sources of data for developing indicators in Poland

Currently, the work is being planned or nearing completion on 26 agri-environmental measures agreed upon by the 27 EU member countries.

These measures have included work in agri-environmental indicators. The aim of the work was to improve the already existing (similar) indicators, such as those reported at the regional level with regard to the productivity of particular crops as well as statistics on sales and consumption of mineral fertilisers.

The work on the previous indicators also included developing landscape indicators, such as hedge length, or – at the regional level – agricultural land area (pastures, meadows, etc.), the impact of structural characteristics (agrarian structure) and on the operation of agricultural holdings, and information on agricultural crops.

In addition, the EU's annual plan for 2007 included measures consistent with the emerging idea of agri-environmental indicators (Project Irena, 2006). As part of measures concerning the application of pesticides, the work was continued to gather and process data in this area and to improve the quality and speed of data transmission with the use of various methods and sources.

3.3. Implementing the indicators – an attempt to define the indicators

Before the indicators can be implemented, they need to be defined. Subsequently, a data source must be ensured for obtaining time series for agri-environmental indicators for the purpose of monitoring the indicators. This is the essence of the matter and the problem to be addressed and solved.

A set of 26 indicators (descriptions) has already been agreed upon at the EU level. The EU member countries can choose the names for the indicators (depending on the source of data required for their calculation, which data must be proposed independently by each member country). However, the number of the indicators was previously reduced from 35 to 26. Today, different sets of indicators are used. Only after the completion of Stage II can the problem of standardising agri-environmental indicators at the EU level be finally solved. Below are the sets of indicators prepared by the Department of Monitoring and Environmental Information, called "Sets of Environmental and Eco-Development Indicators Used Internationally", which are available on the Internet. The following are the most important indicators:

- SI (structural indicators) – a set of 14 structural indicators,
- SDI (sustainable development indicators) – a set of 128 sustainable development indicators and 11 secondary indicators,
- CSI (core set of indicators) – a core set of 37 indicators developed by the European Environment Agency,
- TERM (transport and environment reporting mechanism) – a set of 40 indicators for monitoring the progress and effectiveness of the integration of the environment policy and the transport policy,
- EERM (environment and energy reporting mechanism) – a set of 24 indicators for monitoring the progress and effectiveness of the integration of the environment policy and the energy policy,
- AEI (agri-environmental indicators), previously known as IRENA (indicators reporting on the integration of environmental concerns into agriculture policy) – a set of 28 agri-environmental indicators within the DPSIR framework, e.g. Indicator 2: Agricultural areas under Natura 2000, Indicator 4: Areas under organic farming, Indicator 12: Intensification/extensification, Indicator 15: Gross nitrogen balance, Indicator 19: Greenhouse gas emissions,
- SEBI 2010 (streamlining European 2010 biodiversity indicators) – the SEBI 2010 pan-European initiative was established in 2004 with the aim of developing biodiversity indicators for assessing the progress in achieving the objectives set for 2010, i.e. preventing the loss of biodiversity until 2010,
- EPI (environmental pressure indicators) – a set of 60 environmental pressure indicators developed by Eurostat to report on the key areas of human activity which adversely affect the environment,
- CEI (core environmental indicators) and KEI (key environmental indicators) – a base set of 24 OECD indicators and 10 key environmental indicators developed for the purpose of assessing the implementation of OECD environmental strategies and for the purposes of environmental reviews by OECD member states and other analytical work by OECD,
- SDI (sustainable development indicators) – a set of 96 sustainable development indicators, including 50 base indicators developed by the United Nations Conference on Sustainable Development,

– MEI (main environmental indicators) – a set of 14 main environmental indicators developed by the United National Statistics Division, covering the following areas: water, air, waste, Earth area and climate change.

At the national level (e.g. Poland), the guidelines contained in the European law are implemented differently in different countries. Those owners of agricultural holdings who voluntarily undertake to participate in the agri-environmental programme are provided with financial assistance as compensation for their loss of income and any other additional costs incurred by them. Agri-environmental activities are carried out on the basis of long-term agreements signed with the state institutions responsible for managing European Union funds, i.e. paying agencies. The participating farmer is required to participate in the programme for at least 5 years or – in the case of some European Union countries – even 10 years. Cost calculation data at the agricultural-holding level would be very useful for the manager of the holding.

In contrast, Polish managing institutions are looking forward to the development of the 26 indicators so that these could replace the sets of indicators developed by the institutions themselves for the purposes of monitoring and measuring the application of the European law at the micro level (Polish paying agencies) and the macro level (Polish managing institutions).

3.4. Research into Eurostat's agri-environmental indicators in Poland

After an approx. 2.5 year-long break in academic debate in the EU, the issue of agri-environmental indicators is back on the agenda. Since the end of 2009, the Agricultural Department of the National Statistics Office has been continuing work with the aim of finding the best sources of data for the indicators (more specifically, an indicator for the indicator name proposed by the EU, in fact with the aim of finding a definition of the indicator).

Poland, as a member of the EU, OECD and other international organisations and as a party to environmental conventions, provides data/indicators for the indicators managed by these organisations. Therefore, it can be said that measures undertaken at the national level are largely stimulated by international initiatives. At the national level, there are certain authorities responsible for ensuring the provision of data to the relevant international institutions, e.g. The Polish Chief Inspectorate of Environmental Protection (GIOŚ) is a partner with regard to indicator sets managed by the European Environment Agency and OECD, while the Polish National Statistics Office is a partner of Eurostat.

Efforts are being made to find a quasi institution of state administration and scientific institutions that would supplement the indicator data gathered by the Polish National Statistics Office for use by Eurostat and, therefore, by the European Commission – with the results of their own research. This would give the institutions both a strong position in the academic community and prestige.

The Institute of Technology and Life Sciences (ITP) in Falanty near Warsaw is carrying out extensive research aimed at identifying different sources of agri-

environmental indicators at the level of EU countries, including Poland (a joint project carried out by the Institute of Wageningen, the Netherlands, and a Polish partner).

The Warsaw University of Life Sciences is carrying out research aimed at analysing the trends in cost calculation change within the general business theory under conditions of sustainable development. The development of a system of agri-environmental indicators for dairy farms and of standards applicable to such farms with regard to production expenditure, combined with the implementation of the system on a pilot basis at dairy farms in selected regions of Poland, are the objectives now being pursued by the Department of Business Economics and Organisation of the Warsaw University of Life Sciences. Hence the common objective and interest on the part of the Polish National Statistics Office, the Institute of Technology and Life Sciences and the Warsaw University of Life Sciences, and hence the need for these three institutions to co-operate in the future.

4. Summary

Practitioners and economists have been for a long time interested in the problem of sustainable development as a set of certain principles and, at the same time, management philosophy. Given the contemporary development challenges, it has become necessary to re-define the problem of rational management. According to Stecewicz [1993], "the question about the rationality of management under contemporary conditions is a question about the rationality of resource allocation, the rationality of management methods and the rationality of objectives; it is therefore a question about a rational 'management philosophy". In the field of business economics and organisation, the beginnings of academic debate on this issue can be traced back to disputes between "analysts" and "organics". The disputes have significantly influenced the cost calculation rules applied by agricultural holdings. The conclusion is that efforts should be made to develop a cost calculation system that allows for considering economic, ecological and social objectives.

Within this context, it is of great importance to correctly define agri-environmental indicators that would be the basis for the decision-making processes at agricultural holdings. Their decisions are expected to help improve the well-being of both individuals and society, which well-being should be understood as the sum of various benefits in the short term and in the long term, with special emphasis on the provision of environmental services. However, it must be remembered that the optimum that would take into account the benefits and costs for an individual agricultural holding will be far above the optimum that is socially acceptable. The problems of sustainable development will, therefore, concern not only the potential conflict between the production technology used and environment protection, but also between the objectives of individuals and the objectives of society in both the short and the long term. This leads to a certain challenge in the field of business economics and organisation, i.e. to define cost calculation principles and methods (to develop decision-making models) that would allow farmers to develop appropriate attitudes in line with the idea of sustainable development.

It is becoming necessary to ensure a balance between the obligations of a "good citizen" and the need to manage a business in a way that generates profits. This approach should also be applied in relation to agricultural activity, as the basis for the well-being of individuals and society is economically managing agricultural holdings' activities being reasonably profit-oriented and using the available means (goods, services, rights) at all levels and in various areas of business activity [Reisch, Zeddies 1995, p.15].

Literature

1. Borys T., *Wskaźniki zrównoważonego rozwoju*, Department of Monitoring and Environmental Information (GIOŚ), Report on the work on environmental indicators and eco-development within the context of work in progress at the international level, Warszawa-Białystok 2005, http://zj.ae.jgora.pl/wskzr.html.
2. COM(2006) 508, Communication from the Commission to the Council and the European Parliament: Development of agri-environmental indicators for monitoring the integration of environmental concerns into the common agricultural policy, 15.9.2006, http://eur-lex.europa.eu.
3. Katalog Norm i Normatywów, Wydawnictwo SGGW, Warszawa 1991.
4. Schmidt T., Osterburg B., *Aufbau des Berichtsmoduls „Landwirtschaft und Umwelt" in den Umweltökonomischen Gesamtrechnungen Projekt II: Ergänzungen und Anwendung der Ergebnisse aus Projekt I. Endbericht. Forschungsprojekt im Auftrag des Statistischen Bundesamtes*, Braunschweig Mai 2009, http:// www.vti.bund.de.
5. Reisch E., Zeddies J., *Wprowadzenie do ekonomiki i organizacji gospodarstw rolnych*, Wydawnictwo AR w Poznaniu, Poznań 1995.
6. Stecewicz J., *Pomiędzy społeczeństwem ekonomicznym i ekologicznym*, PAN IRWiR, Warszawa 1993.
7. Woś A., *Rolnictwo zrównoważone*, „Zagadnienia Ekonomiki Rolnej" 1992, nr 2.

STAN PRAC NAD KONSTRUKCJĄ WSKAŹNIKÓW ROLNO-ŚRODOWISKOWYCH NA POTRZEBY ZRÓWNOWAŻONEGO ROZWOJU ROLNICTWA W POLSCE

Streszczenie: W artykule opisano specyficzne problemy gospodarowania w rolnictwie. Przedstawiono ideę i stan prac nad konstrukcją wskaźników rolno-środowiskowych służących do oceny monitorowania zrównoważonego rozwoju rolnictwa przez instytucje płatnicze i zarządzające działaniami rolno-środowiskowymi w Polsce. Szacunek kosztów (rachunek kosztów) opierać się będzie w przyszłości na 26 wskaźnikach, które obecnie opracowywane są jednocześnie na poziomie wszystkich krajów członkowskich UE. W Polsce wskaźniki zbierane są na prośbę Eurostatu przez Główny Urząd Statystyczny (GUS). Diagnozę istniejących już źródeł dla wskaźników w całej UE sporządza obecnie polski Instytut Przyrodniczo-Techniczny (ITP). W zakończeniu artykułu stwierdzono, że należy dążyć do opracowania systemu rachunku kosztów, pozwalającego na uwzględnianie celów ekonomicznych, ekologicznych i społecznych.