

SUSTAINABLE DEVELOPMENT OF AGRICULTURE AND ITS ASSESSMENT CRITERIA^{*}

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Abstract. In the paper the sustainable development in historical view and theoretical aspects (conception, definition and aims of sustainable, dominant trends in UE agriculture) was presented. In the research on this problem, construction of the tools and models for the estimation of farms sustainable development level is necessary – the paper presents mythological trial of systematization of the principal indicators groups on this estimation.

Key words: agriculture, farm management, sustainable development, sustainable development indicators

INTRODUCTION

Experiences of high-developed countries within European Union (EU) significantly show that the development of agriculture that is based on intensification of production – bringing considerable success – brought serious threats to environment. As a result of intense erosion, water pollution, soil degradation etc. it is clear that scientific achievement within plant cultivation and animal husbandry, as well as “clean” economic criteria of free market and governmental protectionism included in Common Agricultural Policy (CAP) are not sufficient to provide stable and sustainable development of agriculture and rural areas. Actions undertaken by European Union and Organization for Economic Co-operation and Development (OECD) brought compromise between further growth of farm production, protection of environment and perspectives of rural people’s social development. Number of dossiers that modify CAP aimed at extending

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farm production as well as elaborating system of economical impulses that stimulate technologies decreasing environmental threats [Baum et al. 2001].

Therefore it was shown that it is essential to drop prevailing aims of agriculture which were focused on industrialization of food production and intensification of economical effectiveness. Negotiations with World Trade Organization (WTO) and EU enlargement determine changes and the direction of further CAP reforms. Thus keeping protecting instruments in farming is becoming hard. There are conceptions being created which are concentrated on leaving CAP instruments aimed at subsidizing sectors of farm production and start building, so called second pillar of CAP related with rural areas development all together with use of environmental instruments (relocation of financial sources from first pillar of CAP–direct payments) [Radzimińska 2004].

Further way of CAP evolution is indicated by carried out research related to future vision of agriculture and rural areas development [Raport... 2004]. Consumers' doubts food safety as well as common feeling that there is not enough concerning in environment protection and animal welfare are basis of expected changes. It is said that another reason of introducing corrections is deformation of economic factors because of using improper impulses for the agricultural producers. A starting point for future changes should be these functions, which in society's opinion the agriculture and rural areas ought to fulfill. According to leading agriculture economists and rural areas development experts, who participated in subject matter research, the function of agriculture and agricultural policy will change fundamentally within next 25 years. Present hierarchy of agricultural and food policy tasks will change. Its primary purpose will yet not certainly be the self-sufficiency in food production. Undoubtedly opinions in the subject of supporting farm income, prices stabilization, international competition or productivity growth will be reconsidered. Of importance will be purposes such as: procurement of safe and high quality food, animal welfare, quality of environment and cultural landscape of rural areas.

Mentioned experts' analysis show the need of introducing policy that will provide rural areas vitality – they are essential for sustainable spatial development. Furthermore vivid economic rural areas are important for natural and cultural heritage that favours creating own identity and esprit de corps. Agriculture should be rather based on economical diversification rather than on economy of scale and concentration. The policy of rural economy diversity should take into consideration:

- promotion of social and human capital development,
- maintenance of rural areas diversity as an European wealth,
- support of rural areas economy and community in building significant connections and exterior exchange,
- integration of issues connected with environmental protection, with non agricultural sectors activity and popularization of contemporary life standards.

Presumptions mentioned above (and their detailed recommendation) will not sustain unless they are based on a wide systemic conception of environmental protection and society development. It is the promoted conception of stable and sustainable development. This definition comes from verb “to sustain” (Latin: *sustinere*), meaning: to support, to carry, to keep alive, to endure, to hold out, to uphold.

The first definition of sustainable development, which was set up to state the model of further civilization development, was placed in the UN World Commission on Environment Report entitled “Our common future” in 1987, better known as The Brundtland

Report (after the Norwegian Prime Minister, Gro Harlem Brundtland). The report highlighted the idea of sustainable development and defined it as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [Brundtland 1991, Kundzewicz 2001].

Poland after joining EU structures, in context of EU regulation adjustment and agriculture development (also growth of its productivity, employment reduction) will meet similar problems which occurred and still occur in Western Europe therefore there is the need of systematic research within the sector which will allow to elaborate models and instruments that are used in integrated and sustainable rural development.

The purpose of this paper is to define conditions of so called sustainable development and to identify assessment criteria which will help to identify degree of the adaptation of farms and agricultural companies into this conception.

On the basis of conducted research of the dominant direction in agriculture development within the EU countries, the authors in this paper make an attempt to systematize the problem of sustainable development in agriculture and to define preliminary assumption of the assessment of sustainable production degree in farm production.

DOMINANT DIRECTIONS OF EUROPEAN AGRICULTURAL DEVELOPMENT

Issues of Polish agricultural development cause dynamic scientific, political and social discussions. Question of a model, type of way to choose is a fundamental problem. The matter is to avoid mistakes made in Western Europe countries. Currently in European agriculture there are three fundamental development systems [König et al. 1989, Borowiecki and Podleśny 1992, Kuś and Fotyma 1992, Sołtysiak 1993, Kośmicki 1993, Wieland and Marchlewski 1998]:

- 1) conventional (industrial) agriculture with high-tech-agriculture variety,
- 2) integrated (pro-ecological) agriculture,
- 3) ecological (organic) agriculture.

1. The conventional agriculture: assumes that chemical and technical means of production undergo constant improvement towards plant production growth. Progress in animal husbandry as well as formula and technology enhancement in production and fodder dosing contributes to animal production efficiency growth. Family farms are a fundamental type of production. Conclusions of conducted research [König et al. 1989, Kośmicki 1993, Grosch and Schuster 1985, 1993, Ryszkowski 1997, Wieland and Marchlewski 1998] prove clearly that the development of this type of agriculture led to many negative results (Fig. 1).

The high-tech agriculture (toughened form of conventional agriculture) in its conception is based on assumption that any improvements of plant and animal production are connected with rapid implementation of genetic engineering and microelectronics. Therefore it causes farm automation and “despiritisation” such as in industrial companies. As a result the high capital intensive with significantly higher efficiency follows and the basic requirement is the farm size and the work organization (typical examples are industrial fattening pig farms). The biggest threats connected with super industrial agriculture are:

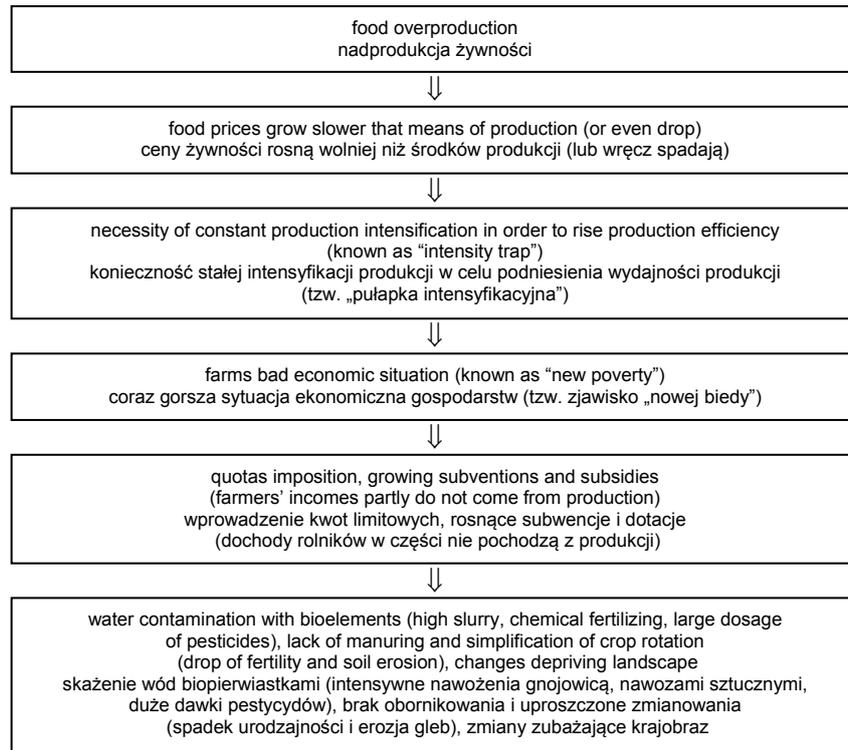


Fig. 1. Structural and ecological crisis of conventional agriculture in EU
Source: own elaboration based on: Wieland and Marchlewski [1998].

Rys. 1. Kryzys strukturalny i ekologiczny rolnictwa konwencjonalnego w UE
Źródło: opracowanie własne na podstawie: Wieland i Marchlewski [1998].

- further farm reduction,
- drop of employment in agriculture,
- boost of negative ecological results (pollutions),
- uncontrolled implementation of genetic engineering.

The German example precisely shows the dynamic growth of work efficiency and power absorption after the Second World War achieved mainly thanks to the development of two systems mentioned above. In years 1949-1983 the number of employees in agriculture dropped from 5.1 to 1.2 mln but at the same time the usage of power and means of production increased:

- chemical fertilizers by 708%,
- feed by 821%,
- machinery use by 2 717%,
- pesticides by 4 500%,
- energy by 5 245%.

At the same time over half of the farms went into liquidation (in 1949 there were 1.65 mln farms, in 1983 only 743 000) [Grosch and Schuster 1985, 1993].

2. The integrated agriculture is a milder form of conventional agriculture. Its purpose is to guarantee a stable productivity while using industrial means in moderate amounts. The use of pesticides, fertilizers and slurry has specified, minimal levels in such a way that the bioelements will not leave the agroecosystems. The plants should be grown according to their habitat conditions and crop rotation recommendation, with the emphasis on legumes and stubble crops.

Main characteristics of integrated agriculture:

- idea mainly related to plant production,
- so called integrated plant protection, which requires better education in biology among farmers,
- farm size limitation up to 75-100 ha in order to chemicalization and intensification of production,
- maintenance of family farms structure,
- protection of work place,
- maintenance of environment protection requirements.

3. The ecological agriculture as a third, main conception, resigns from using artificial fertilizers, pesticides, growth regulator and synthetic feed additives. Closed circle production is very characteristic: soil-plant-animal.

The determinants of ecological agriculture (in western model) are:

- higher work inputs,
- lower production costs (approx. of 25%),
- higher prices on products,
- good farm financial condition,
- formalized activity and abidance of ecological agriculture standards,
- small, but growing significance in agriculture as a whole.

The analysis of systems mentioned above shows that in Poland's naturalistic conditions, it is advisable to create and implement integrated agriculture model that generates high quality and moderate price food and does not rapidly increase unemployment in rural areas. This system is a compromised solution to the sustainable development idea and it seems to be optimal in current socio-economic conditions (especially for family farms) [Baum and Majchrzycki 2000].

THE PROBLEM OF THE DEFINITION OF SUSTAINABLE DEVELOPMENT ASSESSMENT

A complex action is an essence and at the same time necessary condition of luck of considering idea. Working out the conception of firm and sustainable development on a macro scale should be based on indicating the direction and stating the factors that determine the change process in which the exploitation of sources, investment and technical development directions and institutional changes stay in harmony and preserve current (and future) possibilities of human needs and fulfillment of aspirations [Brundtland 1991]. In agriculture, actions aimed at environment protection and serving the integrated and sustainable restructurization of rural areas, within proposed solutions, can be downed to solving, by the rural areas, problems related to secure firm and conflict free fulfillment of diverse functions. For farms it means the necessity of proper production

directions and intensity adjustment to current environment conditions. Sustainable agriculture should fulfill these requirements [Mizgajski 1998, Fotyma and Kuś 2000]:

- high quality food products in convenient amount production,
- environmentally friendly production technologies (soil, water, air protection, ecosystem stability and diversity maintenance-biodiversity) usage,
- appropriate life standard for the rural areas inhabitants (technical infrastructure, work assurance and noble incomes that cover not only current farmer's family needs but also facilitate the development or at least to reproduce the production assets) assurance,
- and develop the countryside and recreation of rural areas (the role of landscape, possibilities of rural people alternative activities development, e.g. rural tourism) maintenance,
- people's and animals' health and comfort (farmers' and consumers' health safety, farm animals' welfare) guarantee.

All the functions have to be seen as completing not excluding each other and realized in an atmosphere of mutual integration [Adamowicz 2000].

The issues mentioned above are the purpose of research on organization and farm performance rules in various nature, economic and organizational conditions [e.g. Kuś 2003]. In spite of search for optimal production structure which will enable effective use of farm as well as proper affiliation of plant and animal production, the assessment of farms in fulfillment of all requirements of sustainable development becomes an important issue. The necessity of measuring how much the farms are focused on sustainable development is related to the possibility of obtaining specified EU funds.

Despite the actions undertaken in Poland [Fotyma and Kuś 2000], there is not any complex list of parameters (attributes, determinants) or range of sustainable agriculture. The creation of a group of model farms was not possible neither.

In order to observe methodical correctness of farm sustainable development assessment, the criteria of sustainable development and method of parameters' selection should be defined at the beginning of research. To interpret correctly sustainable agriculture in general, the complex perception is necessary – as a bio-tech and social system, which is made out of many connected to each other links and of a single farm (relations with environment) which go beyond the lines. Furthermore, agriculture is just one of the places of a complex realization of sustainable development conception (of commune, region, country) [Baum 2003, 2006, 2007, Baum and Wielicki 2004, 2005, Baum et al. 2005].

To summarize, yet in the assessment assumption there has to be seen the integration of three (domains) orders: ecological, social and economic. Some researchers distinguish also ethical and "territorial" aspect [Mouchet 1998]. Within three domains mentioned above, there should be detailed objectives distinguished, which have to be fulfilled by the farm to be recognized it as a sustainable one. The assessment of fulfillment of detailed objectives criteria needs the selection of a certain number of indicators and the specification of its range.

Results from own elaboration show that detailed objectives (its list is obviously not definitely closed) to carry out an assessment are [Baum 2000, 2002, Baum and Majchrzycki 2000, Baum et al. 2001, Wielicki et al. 2001 a, b, Baum and Wielicki 2004]:

- 1) water protection and management,
- 2) soil protection,
- 3) air protection,

- 4) non renewable sources management,
- 5) landscape protection and management,
- 6) biodiversity protection and management,
- 7) farmer's and his family life quality,
- 8) livestock welfare,
- 9) ethics,
- 10) products quality,
- 11) farm profitability,
- 12) social awareness,
- 13) technical adaptation,
- 14) employment,
- 15) coherency of three domains.

It results from the complexity of the sustainable agriculture problem (mutual infiltration, cohesion of areas and objectives) that the fixed indicator should fulfill two, three or even more detailed objectives at the same time. For example if in "ecology" domain we will establish "pesticides usage" indicator (its use in sustainable development should be minimized), not getting into the way and scale of its assessment, its estimation will be certainly based on analysing how the objectives 1, 2, 3, 6, 7, 10, 11 and 15 from the list below are fulfilled. The overall scheme of procedure while assessing is shown in Figure 2.

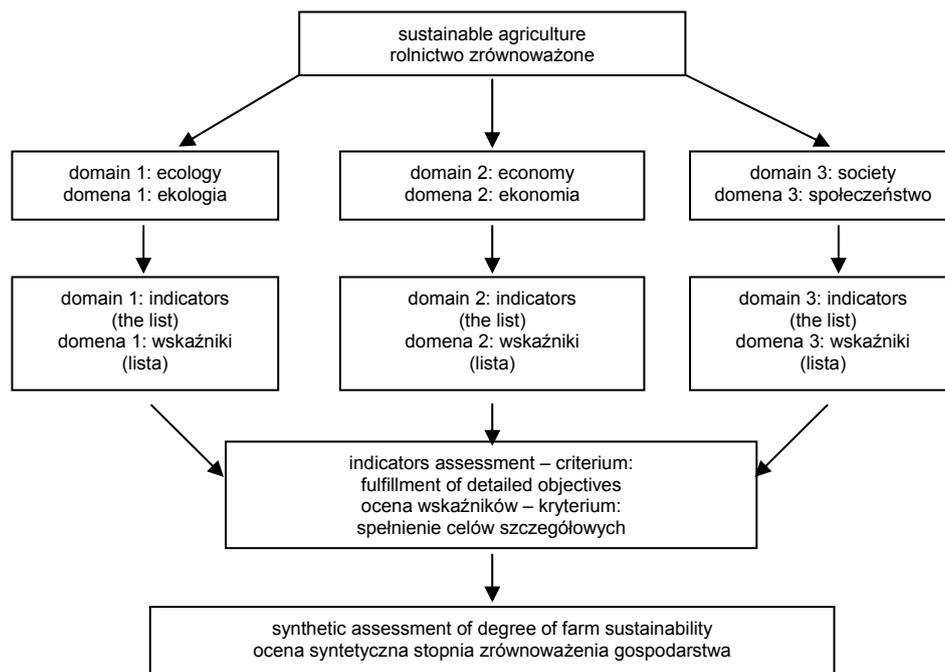


Fig. 2. Methodical scheme of assessment stages of farm sustainable development [Baum 2003]

Rys. 2. Schemat metodyczny etapów oceny zrównoważonego rozwoju gospodarstwa rolnego [Baum 2003]

The basic condition of holistic description is to articulate all of quantitative as well as qualitative parameters within the same units. It can be done with help of normalization procedures by deriving numerical or descriptive values of the parameters into non-limited units included within the scale established in advance. The last step after the normalization of the parameters is their integration, which allows to overall farm assessment in degree of management sustainability. The elaborated indicators should take into account that:

- in ecology domain – agriculture (not only the highly developed one) because of its specific production has a huge impact on environment. Therefore the farm and the nature are related according to ecodevelopment rules, the farm has the aim to maintain and valorize its nature surrounding;
- in social domain – the farm has a certain space which is used for production to generate income. The farm itself is not closed, it keeps the constant contact with the outer surrounding (the farmer can offer for example agricultural landscape and in return gets the stable place in society);
- in economic domain – it is necessary to look through an economic account on correlation between all aims mentioned before.

CONCLUSIONS

The agricultural policy in current socio-economic situation should aim at development and use of competitive advantages of Polish farms. The most important are: rich, in comparison to EU countries, soil resources, high volume of production, lower labor costs, farmers' age (significant part of young farmers) or relatively environmentally friendly production technologies – the reduction of mineral fertilizing and plant protectors in last years made Polish agricultural products to represent higher ecological quality than the same western products. It lies in Poland's interest to protect significant agricultural potential (production results and products' quality) – especially because of the advantage of the multifunctional family farms fulfilling integrated agriculture criteria.

Conducted analysis proves that in agriculture (like in other sectors of economy) the idea of sustainable development cannot be narrowed down only to environmental balance though this aspect is stressed (Good Agricultural Practices Codex, Simple Good Agricultural Practices, agri-environmental undertakings). Sustainable agriculture should refer to methods of running the farm in manners which assure the realization of productive, economic, eco and social goals at the same time [Runowski 2004]. Present developing systems of agriculture (types of agriculture) fulfill this philosophy distinctly. In the free market conditions the success in agriculture and its income value are made by supply and demand for cheap and commonly available food. The EU experience shows that in the nearest future the demand for cheap food will make an impact on the directions of the Polish agriculture development. Therefore the economic conditions will limit eco agriculture development in Poland in the nearest future. On the other hand, the example of Western Europe indicates that the conventional and high-tech agriculture will have to meet impassable ecological barrier thus one should be careful in developing this kind of system. In this situation, especially in Poland, the development possibilities appear in front of agriculture which has satisfactory economic effectiveness, minimaliz-

ing the scale of environmental and social hazards at the same time. This compromising, in-between the two types mentioned above and at the same time socially acceptable, develop system is integrated (pro-ecological) agriculture.

Currently European agriculture enters stage of so called sustainable development in which economic, social, and ecological problems are treated equally. Nowadays the farm sustainability assessment in its setting is essential, especially as an answer to the practice demand. It is obvious that complex and synthetic assessment method will be applicable in benefiting European Funds and will be the basis in elaborating different kinds of projects connected with agriculture and rural areas development.

After accession into EU the new possibility of benefiting from structural funds, especially the ones from European Agriculture Guidance and Guarantee Funds, appeared. The analysis of programs such as Rural Development Plan or Sectoral Operational Programme “Restructuring and Modernization of the Food Sector and Rural Development 2004-2006” allows to state that sustainable development of rural areas is one of the strategic objects for Polish rural areas and agriculture. The possibility of benefiting from the financial support and its scope in majority cases is determined by respecting the rules of Simple Good Agricultural Practices, which are obligatory requirements for the beneficent – e.g. less favoured areas, action 3 of RDP. The agri-environment schemes (Rural Development Plan, action 4-Support for agri-environmental undertakings and improvement of animal welfare) encourage farmers to provide environmental services which go beyond following good agriculture practice and basic legal standards [Baum 2004].

Preliminary analysis of agriculture financing rules in years 2007-2013 also indicates that the sustainable agriculture development will be one of the priorities of new rural areas development policy. Additionally it has to be reminded that the direction of changes in CAP assume the separation of direct payments from the structure and size of agriculture production (the introduction of Single Payment Scheme) and connecting this payments with the environment protection requirements, animal welfare and consumers’ safety (cross-compliance rule). Despite the new EU countries, including Poland, do not have the responsibility to introduce cross-compliance system in a period of single area payment scheme application but the system will be in force also in our country at the latest in 2009 during the transition into SPS.

Clear definition of sustainable agriculture and its complexity, diagnostic tools construction (methodical problems), where the biggest problems are: parameter choice (their amount, interaction, etc.) as well as the normalization of indicators (scale-problem with fixing maximum and minimum levels, objectivity in assessment gradation, transformation from indicative measurement to synthetic assessment, etc.) are main, key matters which are still to be solved in sustainable agriculture development.

Deliberations shown in the paper, based on own elaboration and on series of different authors’ survey certainly do not exhaust the issue of sustainable agriculture development. In this article there were taken up the actions of setting in order and completing specified scope of science knowledge–creation of new platform for further studies over directions of agriculture development, rules and goals of sustainable agriculture as well as its quantification.

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Streszczenie. Rozwój rolnictwa po II wojnie światowej, oparty na intensyfikacji produkcji rolnej – przynosząc znaczne sukcesy – doprowadził do wielu negatywnych zjawisk (nadprodukcja, poważne zagrożenia dla ekosystemu, pogorszenie jakości produktów itp.). W ostatnich latach podjęto wiele działań modyfikujących Wspólną Politykę Rolną. Zmierzają one do ekstensyfikacji produkcji rolnej oraz do opracowania systemu bodźców ekonomicznych stymulujących technologie, zmniejszające zagrożenie dla środowiska. Wymienione wyżej działania nie zakończą się sukcesem, o ile nie zostaną oparte na szerokiej systemowej koncepcji ochrony środowiska i rozwoju społeczeństwa. Jest nią propagowana koncepcja trwałego i zrównoważonego rozwoju. W artykule przedstawiono rys historyczny i teoretyczne aspekty zrównoważonego rozwoju (koncepcja, definicja i cele, dominujące tendencje w rolnictwie Unii Europejskiej). W dalszych badaniach nad tą problematyką kluczowym i niezbędnym elementem staje się wypracowanie metod służących ocenie stopnia zrównoważenia gospodarstw rolnych. Praca przedstawia metodologiczną próbę systematyzacji podstawowych grup wskaźników i kryteriów takiej oceny.

Słowa kluczowe: rolnictwo, zarządzanie gospodarstwem, zrównoważony rozwój, wskaźniki zrównoważonego rozwoju

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