



European Network of Agricultural and
Rural Policy Research Institutes
*Thematic Network on Trade Agreements
and European Agriculture*

Seminar Paper No. 2 • January 2004

**Theoretical, Methodological and Analytical Questions
of Multifunctionality with regard to Czech Agriculture**

Background for Modelling Multifunctionality

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1. Methodological questions and definitions

Multifunctionality of agriculture – concept and outputs

Multifunctionality of agriculture is defined as the ability of the agricultural sector to produce both the commodity and non-commodity outputs demanded by society.

Commodity outputs can take the form of:

- a) traditional agricultural commodities for both food and non-food use (food, fibre, flowers, pharmaceuticals and energy);
- b) services connected with the land and environment (such as land conservation and maintenance of wetlands); and
- c) services and products resulting from the non-agricultural activities of farms (maintenance of roads, crafts, agro-tourism, etc.).

Non-commodity outputs take the form of externalities linked to agricultural production or externalities linked to the function of farming as a whole. A multifunctional agriculture addresses the production of positive externalities, meaning that negative externalities ('public bads') are undesirable outputs. As a rule, the dividing line between positive and negative externalities is represented by various standards (related to the environment, food safety, animal welfare, etc.) or codes of good farming practises.

Examples of the main positive externalities include: maintenance of the landscape (e.g. through extensive cattle-breeding) including the maintenance of a specific, traditional

landscape pattern (vineyards, hop-gardens and orchards); the reduction of environmental loads of water and soil; the creation of better conditions for biodiversity; rural employment; and the development of human and social capital in rural areas, etc.

Private/public goods and multifunctionality

Private goods are competitive and excludable, and are realised in the form of commodity outputs as a rule. Public goods are non-competitive and non-excludable, and take the form of non-commodity outputs and a larger part of environmental services. The latter outputs can also be manifested as semi-public or ‘club’ goods.

Private goods are realised on the market of private goods. Public goods are realised on the quasi-market of public goods, where its demand side is usually represented by public finance (state budget, budgets of regions or municipalities, sources of non-governmental institutions, etc.). The public willingness-to-pay is confronted with willingness-to-produce in the market of public goods. Some public goods can be converted into the category of private goods (e.g. farmers paid by hoteliers to maintain the landscape in localities with high tourism. ‘Club’ goods are paid for by members of a club.

Competition in multifunctional agriculture

All commodity outputs – except agricultural commodities – can also be provided by non-agricultural firms; farms must take into consideration competition with these firms for private or public resources. Resources for agricultural commodities and all non-commodity outputs are available to the competition only through farmers.

2. Agricultural policy supporting the multifunctionality of agriculture and possible responses by farmers to policy measures

Policy measures supporting the multifunctionality of agriculture

Within the EU common agricultural policy (CAP) and Czech agricultural policy the stimulation of multifunctionality in agriculture is provided by the following types of measures:

- a) regulatory/legislative measures – laws affecting farming (such as those on land protection, water, food, environmental protection, ecological taxes, etc.);¹

¹ Regulatory measures are also based on the polluters-pay principle. Ecological taxes on inputs are not applied to the Czech agriculture at present. On the contrary, ‘green oil’ is applied to the Czech agriculture.

- b) semi-regulatory measures – directives and regulations for food safety, animal welfare and protection of the environment as a part of *cross-compliance* conditions for direct payments;²
- c) incentive measures such as investment or operational supports – compensations for higher costs or lower incomes resulting from participation in programmes and schemes (such as agro-environmental schemes); and
- d) absolute compensatory measures, such as support to farms in the less favourable areas (LFA).³

The development of multifunctionality in agriculture is thus supported by a matrix of policy measures. In this matrix, policy measures supporting the production of public goods – substituting the social demand for these goods – play an important role. The ‘market equilibrium’ in the quasi-market of public goods is backed by the relationship between *willingness-to-pay* (the willingness of taxpayers to pay for public goods) and *willingness-to-produce* (the willingness of farmers to produce public goods). The money of taxpayers can be ‘saved’ by an enforcement to produce public goods through legislation (including the application of the *polluters-pay principle* or ecological taxes on inputs). Such enforcement, however, is limited by constitutional rights and by government fears of pressures on the competitiveness of domestic farmers (with the absence of similar regulations at the international/multilateral level, such as those under WTO agreements). Semi-regulatory measures in the EU for the period of 2004–13, used as *cross-compliance* conditioning for the direct payments (without which the farm viability/sustainability can be seriously threatened), is an example of an ‘elegant’ solution to the previously mentioned discrepancies.

Possible responses by farmers to policy measures supporting the multifunctionality of agriculture

The European model of agriculture promoted by the EU in the WTO negotiations is based on a balanced ratio of commodity and non-commodity outputs, for the production of private and public goods. It aims at reducing agricultural (over)production, which has negative effect on the environment (category I of outputs), and increasing other products of multifunctional

² In the Czech agricultural sector, cross compliance is substituted by the Czech codex of good farming practices in the period of 2004–06. After 2006, full EU cross compliance shall be applied, except during agreed transitional periods (e.g. for the nitrate directive and for animal welfare in hen-rearing).

³ In the Czech agricultural sector, the LFA payments will be conditioned by the codex of good farming practices and by other criteria (e.g. keeping a minimum and maximum livestock density per utilised agricultural area of a farm).

farming (category II of outputs). Farmers respond to signals from the markets for private and public goods and optimise the profits generated in both markets. The responses to market signals can be presented as a ratio between outputs I and outputs II, taking into account the competition for production resources for both types of outputs and with the ‘jointness’ embedded in the production of non-commodity outputs. The various kinds of responses by farms are shown in Table 1.

Table 1. Responses by farmers to market signals

	Outputs I	Outputs II
a	+ (++) = prevailing (or partial) orientation to the effective production of agricultural commodities	- (--) = low (or partial) orientation to outputs II
b	- = lower orientation to the effective production of agricultural commodities	+ = prevailing orientation to outputs II
c	+ = orientation to the effective production of agricultural commodities	+ = orientation to outputs II
d	- = low orientation to the effective production of agricultural commodities	- = low orientation to outputs II

The reaction of each farm (within each farm category) depends on its internal situation and long-term orientation. Understandably, reaction *d* is not sustainable from a long-term perspective and can be considered only in short-term periods (and predictions in modelling). Under the supposition that the preference of outputs I limits the production of outputs II, reaction *c* should be expected mainly for commodity outputs (such as a combination of agricultural production with non-agricultural activities on a farm), because of the competition between commodity and non-commodity outputs for resources.

Reactions *a* and *b* are of major importance for the development of multifunctional agriculture and for its defence in the WTP negotiations. If farmers react according to formula *a*, the European model of agriculture cannot be defended. Agricultural policy should stimulate the reaction of farmers towards scenario *b* or *c*.

In this context, it is reasonable to stress that direct payments, together with market price supports (pillar I of the CAP) absorb some 80–85% of all EU taxpayer supports for agriculture, even in the reformed CAP. Without a strict cross-compliance element, pillar I would undoubtedly stimulate farmers to react according to the scenario *a*. It is also useful to add that failing to keep cross-compliance conditions will only lead (in the period of 2004–13) to a reduction of direct payments.⁴ Thus there are objections by CAP opponents in the WTO negotiations that reform of the CAP is not sufficient to increasing the liberalisation of world trade conditions.

Different kinds of farms generate different reactions to policy measures that support the multifunctionality of agriculture

There is a hypothesis that different kinds of farms may have different reactions to policy measures that support the multifunctionality of agriculture. From this point of view, we can recognise the following types of farms in the current Czech agricultural sector:

- subsistence farms, oriented mainly towards self-supply or hobby farming (a relatively large number of farms with a negligible total acreage of agricultural land, almost exclusively in their ownership).
- family farms – the European model of agriculture, promoted by the EU in the WTO negotiations, is based on a concept of small/medium-sized farms of a family character (with labour prevailingly provided by family members). This kind of farm, however, only occupies about 10% of the agricultural area utilised in the Czech Republic at present, but the farms own a larger part of the land used (generally, the larger the farm is, the lower the share of owned land).
- large-scale farms based on an individual ownership of a farm or partnership. This type of farm has been developing particularly in the LFA and in border regions. There are even such farms with more than 10,000 hectares. The land is almost completely leased from the state or from private owners.
- collective farms (cooperatives and companies), in which a relatively high concentration of capital and economic power is in the hands of their management. This type of farm has quickly developed in formal or informal ways and occupies roughly about 40–45% of the

⁴ In this case, direct payments function as compensations for higher costs/lower incomes incurred by the directives and regulations of cross compliance. Nevertheless, it should be mandatory to observe these regulatory measures.

Czech agricultural area. The land of the farms is almost completely leased from private owners, including those owners who are themselves self-employed. The behaviour of such farms in the market is gradually approaching the behaviour of large-scale, individual farms.

- collective farms (cooperatives and companies), where the capital and economic power is proportionally distributed among members/owners of the farms and where the management is still strongly influenced by (partly self-employed) members. This type of farm occupies roughly about 30–35% of the Czech agricultural area. The land of the farms is almost completely leased from private owners, including self-employed owners.

Quasi-market of public goods – the risk of its failures and how to eliminate these

The relationship between demand (*willingness-to-pay*) and supply (*willingness-to-produce*) on the quasi-market of public goods is evidently more complicated than that of the market for private goods. There are more risks in the market of public goods that can lead to its failure, including:

- overcompensation of measures that promote multifunctionality, accompanied by the growth of supply (*willingness-to-produce*), but at very high costs for the society;
- undercompensation of measures that promote multifunctionality, accompanied by a lower *willingness-to-produce* public goods on the part of farmers;
- instability of the measures (compensations and other incentives); even with a relatively strong incentive the response of farmers can be poor (because of the expectation of changes in the policy – a lack of stable policy measures has been typical for Czech agricultural policy during the reform period);
- over-centralisation of the agricultural policy, without respect to regional/local problems and needs, which also leads to failures in the implementation of policies;
- conditions of cross compliance or codes of good farming practices that are too-weak;
- failures in the monitoring and control functions of the state administration or other institutions responsible for these functions;
- inconsistent policy measures, particularly among measures under the competence of the different ministries; and

- unsuitable structural characteristics of agriculture, e.g. the discrepancy between the ownership and usage of land, extremely large and management-oriented farms without deeper links to villages and rural areas, the lack of readiness of all actors/stakeholders for change, etc.

Nevertheless, the risk of failure in the market of public goods can be (at least partly) eliminated in the following ways:

- stimulating the internalisation of externalities (e.g. promoting land purchases by farmers, supporting small and medium-sized farms owned by families, supporting education and extension services for stakeholders, etc.);
- stimulating the conversion of public goods into private goods (such as maintaining the landscape in localities with high tourism, paid for by private firms in the tourist industry);
- a consistent decoupling linked with stricter conditions of cross compliance;
- decentralising agricultural policy along with creating room for bottom-up initiatives and with improving relations between farms and municipalities; and
- improving the state administration in policy-making, implementation and its monitoring and control.

3. Specific problems of the Czech agriculture related to its multifunctionality

There are three fields related to multifunctionality in the Czech agriculture in which we recognise specific problems and barriers: a) the farm/land usage structure; b) the production of public ‘goods’ and ‘bads’ on farms; and c) failures in policy implementation or delivery.

Farm/land-usage structure

- The extremely high proportion of leased land on farms (92% on average) accentuates usage rights over ownership rights. This first fact influences the care regarding soil quality from a long-term perspective. Yet it also represents a barrier to more sustainable methods of land usage, because of a low sensitivity about it on the part of the larger number of landowners.
- In terms of the overall farm structure, 5% of farms occupy more than 75% of the Czech-utilised agricultural area. The extreme dominance of very large collective or individual (estate) farms with weak links to villages usually leads to a gradual deterioration of the quality of the human capital on farms and to a dissolution of ‘healthy’ social relations

between farms and municipalities (agriculture is not a generator of effective social links in rural areas).

- The land usage is characterised by extremely large fields cleaned from all natural barriers for the still prevalent large-scale farming. The return to more sustainable land usage patterns through land consolidation procedures is very expensive and slow.

Production of public 'goods' or 'bads' by farms

- Agriculture has a prominent role in water pollution, much of it quite typical for large-scale livestock production units (pigs, poultry).
- There is a low retention capability of agricultural land after long-term large-scale farming. This fact is evident particularly in the recent years after frequent droughts or floods.
- The deterioration of the soil quality and the silting of water flows as a result of the water erosion of agricultural land have negative effects: about 42% of the Czech-utilised agricultural area with large-scale farming practices is exposed to the water erosion with a serious negative impact on society.
- A large number of ponds and other agricultural water basins and flows are used as intensive fisheries, leading to the deterioration of recreational potentials for rural areas.
- Conditions for the maintenance and improvement of biodiversity on the intensively used agricultural land are worsening.
- The relationship of agriculture to its labour sources: there is maintenance of (over)employment in rural areas, but with the lowering of the quality of the human capital, particularly on large farms with predominately hired labour.
- The relationship of agriculture to the development of the rural social capital: particularly large farms with prevailing, hired labour exacerbate conditions for social relations in rural areas (i.e. villages change into sleeping rooms for hired people).

Failures in the field of agricultural policy (implementation, delivery)

- There is a prevailing policy orientation towards income stabilisation/improvement on farms, to the detriment of policy measures and financial sources that could stimulate multifunctionality.
- Policy delivery (education, extension services, public information) has been a neglected state function.

4. Need for multifunctionality modelling and research

The impact of agricultural policy (including trade measures) on non-trade concerns are permanent topics of Czech research (particularly in the RIAE). Among the research projects, concerns about the effects on the environment (such as biodiversity and soil quality) dominate. Other issues such as food safety, animal welfare, rural development, and human and social capital are just beginning to receive consideration. The situation is better in the field of economic issues, where attention is given to how the farm and agri-business sectors respond to policy measures in production, trade flows, farm incomes, etc. In this field more models are applied along with qualitative assessments (e.g. for developments in farm structure).

The main problems related to the application of quantitative models in the area of multifunctionality are as follows:

- clustering (or classifying) farms according to their response to policy measures that stimulate multifunctionality;
- defining the indicators and data availability for monitoring and assessing multifunctionality; questions in these areas are especially pertinent for rural development, the quality of (rural) human and social capital, and food safety; and
- implementing the right variables in the quantitative models that represent multifunctional indicators.

To improve the situation, the RIAE has been undertaking and participating in more research projects, especially under EU research programmes (IDARA, IDEMA, SEAMLESS, etc.).