FRAMEWORK FOR ASSESSING SUSTAINABILITY OF FARMS

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Abstract

The traditional approach for assessing farm sustainability (based on indicators of "productivity", "profitability", and "financial dependency") fails to explain why there exist highly sustainable farms with different levels of "efficiency" such as low productive subsistent and part-time farming, non-for profit and cooperative enterprises, small commercial farms and large agro-corporations, etc. In this paper we adapt the New Institutional and Transaction Costs Economics perspective to agrarian sphere, and suggest a new framework for assessing sustainability of farms and farm structures.

Firstly, an analysis is made on various approaches for defining sustainability of agricultural systems: as "an ideology", as "a set of strategies", as "the ability to fulfill a set of goals", and as "ability to continue". The "problem of sustainability" in the economic model (mainly associated with "negative externalities", "tragedy of commons", "jointness of farm production") is also presented, and the "institutional" solutions of that problem discussed.

Second, we prove that analysis of institutions and transacting costs is important for proper understanding the farms sustainability. Institutional environment is the crucial factor, which determines the restrictions and costs of farm activities, and eventually - the level of sustainability of different farm organizations. In the specific institutional setting, agrarian agents use (or develop) a great variety of effective (cost economizing) market and non-market modes for governing of their exchanges. Therefore, studying the farm as a governance (rather than production) structure is the key for understanding the farm efficiency and sustainability.

Third, we define sustainability of farm as a state when it manages all transactions in the most economical way – that is the situation when there exist no transaction, which could be carried out with net benefit. When a farm experiences high costs and difficulties meeting institutional restrictions and carrying out transactions, comparing to other feasible modes, it will be unsustainable. That is because there will be strong incentives for exploring the existing potential (adapting to sustainable state) through reduction or enlargement of farm size, or via reorganization or liquidation of the farm. Thus the farm potential for adaptation to changing (market, institutional, technological etc.) environment is to be the main indicator for farm sustainability. Furthermore, the most effective form for organization of farm transactions will depend on individuals' characteristics (preferences, entrepreneurial abilities, risk aversion etc.) and specific attributes of each transaction (uncertainty, frequency, assets specificity, and appropriability). Consequently, effective farms of different type and size could persist (sustain) in agriculture.

Finally, we develop a principle matrix with the effective modes for governing of agrarian sustainability. Discrete structural analysis is used to define the transactions for which market, contract, and integral forms are efficient (sustainable). We also determine the situation(s), where there is strong need for a third-party public involvement in agrarian sphere - that is for transactions with low appropriablity, and high uncertainty and asset specificity. In later case, there are no sustainable market and private modes to organize such transactions effectively (e.g. supply of environmental goods). Next, we specify the spectrum of possible public forms for intervention in market and private transactions - assistance, regulation, hybrid and in-house organization, international cooperation, property rights and institutional modernization. The comparative efficiency of feasible modes for public involvement is to be assessed taking into account the overall costs and benefits. Sustainable agrarian development is compromised when both market and private forms fails, and no effective public intervention takes place.

Key words: assessing farm sustainability, governing of agrarian and farm sustainability, new institutional and transaction costs economics

Introduction

Assessment of farm sustainability is among the most topical issues of academic, business, and policies debates in developed, developing, and transitional countries. In recent years, it has become a part of a broader problem - evaluation of different aspects (economic, social, and environmental) of sustainability of agricultural systems and agrarian development in general (Peteers *et al*., 2004). Despite the enormous progress in that respect, the process of development of an efficient system for assessing sustainability of farms and agrarian structures is far from complete.

In dominating approach, assessment of farm efficiency and sustainability is facile since based on indicators for "productivity", "profitability", and "financial dependency". If income (profit) per employed resources/production costs in a particular farm is lower than (sub-sectoral, regional, agricultural, country's "comparable") average, then it is considered as unsustainable. Correspondingly, farm reliance on outside funding (e.g. dept financing, co-investment, public subsidies) is supposed to indicate low sustainability.

However, traditional framework has failed to explain why for long-periods of time there exist farms with significant differences in "level of efficiency". In most of the countries, variations of income per exploitation, per hectare, and per unit of labor for different farms have been considerable in post-war years. That approach has proved to be especially inappropriate for East-European countries where a fundamental transformation has taken place and a great variety of new (specific) structures evolved in the area. High sustainability of subsistent and part-time farming, cooperative and over-integrated forms, numerous informal and interlinked modes, which have been dominating since the beginning of transition now, cannot be properly evaluated with commonly suggested indicators. In Japan there are also many ("weekend", group, and public) farms, which "high" sustainability can be hardly explained by productivity and profitability motifs.

Furthermore, structure of funding of farms generally depends on factors like stage in the farm life-cycle, experience and innovation spirit of farmer, direct and indirect costs of agrarian credit, tax consideration, level of access to public support programs etc., rather to be connected to the farm sustainability. Moreover, high outside "funding dependency" (high public support, accessible agrarian credit) is often associated with the "higher" sustainability of farms, like it is in most of developed countries. Contrary, strong reliance on own funding in less developing and transitional countries is habitually result of missing public support and market for agrarian credit, and leads to mass failures of ten of thousands farming enterprises.

In more sophisticated models of the Neoclassical Economics, the farm is studied as a "black box" and the type of farm organization is not of economic importance. In that "institutions neutral" and "transaction costs free" framework there is a single mechanism for governing of overall economic activity and sustainable development – that is the free market. All types of farms are considered as "equally efficient" (and thus equally sustainable) in optimization of resources along with changes in market prices and technological opportunities. Besides, market financing (credit) and own funding (equity) are presumed as equally efficient and evenly possible (substitute) forms. Rare cases of "market failures" associated with "negative externalities" are also recognized but a perfect "government intervention" that maximize efficiency is always in place.

In the real agrarian economy with "positive" transaction costs, the type of institutional arrangements and farm organizations is a crucial factor for farm and agrarian sustainability ("institutions and organizations matters"). *New* developing *Institutional and Transaction Cost Economics* overcomes the shortcomings of the traditional approache, and helps better estimate factors for development and comparative efficiency of various governing modes.

Incorporation of that new methodology into analysis of agriculture would *firstly*: allow evaluating efficiency and prospects of development of different farms and agrarian organizations in the specific institutional environment. And *secondly*, it would let access the comparative efficiency of existing and other feasible (market, private, hybrid, public) governing forms for achieving the goals of sustainable development. *The aim of this paper is to adapt the principles of that new powerful concept to agrarian sphere, and to suggest a framework for assessing sustainability of farms and farm structures.*

CONCEPT OF AGRICULTURAL SUSTAINABILITY

Ideology, strategy, or system characteristic

Sustainability movements have evolved in developed countries as a response to concern about impacts of agriculture on depletion of non-renewable resources, soil degradation, health and environmental effects of chemicals, inequity, declining rural communities, loss of traditional values, food quality, workers safety, decline in self-sufficiency, decreasing number of farms, etc. (Edwards *et al.*). Very often "sustainable" agriculture is used as an umbrella term of "new" approaches to "conventional" (capital-intensive, large-scale, monoculture, etc.) agriculture, and includes organic, biological, alternative, ecological, low-input, biodynamical, regenerative, etc. agriculture. More recently *"social" issues* such as modes of consumption and quality of life; decentralization; community and rural development; gender, intra ("North- South") and inter-generation equity; preservation of agrarian culture and heritage; improvement of nature; ethical issues (like animal welfare, use of GM crop) etc., all they have been incorporated into sustainability concept.

Rio Earth Summit (1992) addressed *global problem* of *sustainable development* and adopted Declaration of its "universal principles". They comprise: rights on healthy and productive life in harmony with nature for every individual; protecting the rights of future generation; integration of environmental, social and economic dimensions at all levels; international cooperation and partnerships; new international trade relations; application of precaution approach in respect to environment; polluter liability; environmental impact assessment; recognition of women, youth, and indigenous role and interests; peace protection, etc. Emergence of that *"new ideology"* has been associated with considerable shift of the "traditional paradigm" of development.

Apart from that general description, there have also appeared more *"operational" definitions* for sustainability. For instance, sustainability is often defined as *"set of strategies"*. Management approaches that are commonly associated with agrarian sustainability are: self-sufficiency through use of on-farm or locally available "internal" resources and know how; reduced use or elimination of soluble or synthetic fertilizers; reduced use or elimination of chemical pesticides and substituting integrated pest-management practices; increased or improved use of crop rotation for diversification, soil fertility and pest control; increase or improved use of manures and other organic materials as soil amendments; increased diversity of crop and animal species, reliance of broader set of local crops and local technologies; maintenance of crop or residue cover on the soil; reduces stocking rates for animals; full pricing of agricultural inputs and charges for environmental damages, etc. (Mirovitskaya and Ascher).

However, interpreting sustainability as "an approach" is not always useful for "guiding change in agriculture". Firstly, strategies, which emerge in response to problems in developed countries, may be inappropriate in regions where circumstances and problems are quite

different (e.g. underdeveloped, developing or transitional countries). Secondly, it may lead to rejection of some approaches associated with conventional agriculture but nevertheless enhancing sustainability. Next, it make impossible to evaluate the contribution of a strategy to sustainability since that particular approach is already been used as a "criterion" for defining sustainability. Finally, because of limited knowledge during implementation of a strategy it is likely to make errors ignoring some that enhance sustainability or promoting others that threaten (long-term) sustainability.

Another concept characterizes sustainability of agricultural system as *"ability to satisfy a diverse set of goals through time"* (Hansen). The goals generally include provision of adequate food (food security), economic viability, maintenance or enhancement of natural environment, some level of social welfare, etc. However, usually there is "conflicts" between different qualitative goals and that creates problems of assessment (integration, ranking, trade-offs). Besides, "subjectivity" of specification of goals link criteria for sustainability with value of pre-set goals (interests of stakeholders, priorities of development agencies, standards of analysts, etc.) rather than to the agricultural system itself. At last, at low levels of analysis (parcel, farms, sectors, regions) most of the objectives are exogenous and belong to a larger system.

Number of authors interprets sustainability as an *"ability (potential) of system to maintain or improve its functions"* (Hansen; Mirovitskaya and Ascher). Accordingly, main system attributes that influence sustainability are specified as: resilience; survivability; profitability; productivity; quality of soil, water, and air; energy efficiency; wildlife habitat; quality of life; and social acceptance, etc. Indicators for measurement of these attributes are identified and their time trends evaluated. Since trends represent an aggregate response to several determinant that eliminate the needs to devise aggregation schemes. Usefulness of that definition comes for suggesting operational criteria for sustainability, providing a basis for identifying constraints and evaluating various approaches to improvement of agrarian sustainability. The most common critics are that it is impossible to find a single measure for different attributes; assumption that future state of system can be approximated by the past trends; and ignorance of needs and goals of human actors within the system.

Sustainability has to be a *criterion* for guiding changes in policies, farming and consumption practice, agents behavior, focusing of research and development priorities, etc. Therefore, definition of sustainability has to be based on "literal" meaning of sustainability – thus perceived as a system characteristics and "ability to continue through time" (Hansen). Besides, characterization has to be *"system-oriented"* while system is to be clearly specified, including its time and spatial boundaries, components, goals, and context in hierarchy. Moreover, the approach is to allow *comparative analyses* of different agricultural systems[1]. Characterization of sustainability must be *predictive* since it deals with future changes rather than past and present. And finally, it should be diagnostic, and to *focus intervention* by identifying and prioritizing constraints, testing hypothesis, and permitting assessments in comprehensive way.

[1] Certain authors, like Hansen, wrongly associate comparability with "continues (quantitative) rather than discrete property" of a system. In fact, there is no reason to believe that sustainability of an agricultural system could only increase or decrease. Discrete features ("sustainable"-"non-sustainable") are possible, and of importance for farm managers, interests groups, policy makers.

Economics of agricultural sustainability

The problem of sustainability has been always an important part of the economic theory. Most often it is discussed in relation to (in)efficiency of using of common natural resources ("tragedy of commons") (Hardin), and to "negative externalities" associated with some activities (Pigou). In recent years, it is increasingly associated with multi-functionality (joint production character) of agriculture (OECD).

When common ownership and "open access" to natural resources exists, there is tendency for inefficient use ("overuse") of resources. For example, there are certain natural limits for "sustainable" exploration of a meadow (for livestock farming) or a pond (for fishing or irrigation). Long-term efficiency (output) would decrease if number of grazing animals or caching fish increase beyond these norms of effective natural reproduction. In a one-person farm or private ownership, there will be no conflict between efficiency and sustainability (maximization of output over time). However, in a situation of *multiple users* and *open access*, there are strong individual interests for overusing common resources since private costs are not proportionate to private benefits. In that case, individuals get full output from increasing the number of animals (or fish catch) while bear a small portion of overall decrease in total yield as a result of over-exploitation. Consequently, constant overuse (non-sustainability) and low long-term efficiency come out as a result of this form of organization of natural resources.

Nonetheless, *"tragedy of commons"* could be avoided by alternative institutional arrangement. For instance, introduction of public regulation on exploitation of natural resources, such as distribution (and enforcement) of quotas for farmers and fishermen, would keep sustainability. In another instances, the privatization of natural resources would be an effective solution since it would create strong private incentives for long-term preservation of resources. In later case, a private agent (the owner) will contract and control an effective and sustainable use of limited natural resources.

Another classical case of "market failure" for allocation and sustainable use of natural resource is caused by the *negative externalities* of certain activities. Since free-market prices do not always reflect the effect on third party's welfare, they cannot govern effectively resource allocation and uses. For instance, price of livestock products do not comprise the costs of pollution of underground water by farm activity. Since private agents (farmers, consumers of farm products) do not pay the full price and costs associated with their activity, they are not interested in the most effective (and sustainable) use of natural resources. Maximization of social output and welfare cannot be achieved, and inefficient allocation and overuse of resources, and unsustainable development, comes out as a result. Thus efficiency and sustainability of some elements of the system (e.g. farms) are in conflict with efficiency and sustainability of other elements of the system (e.g. consumers) or system as a whole.

Therefore, elimination of *differences* between *"social"* and *"private"* prices ("internalization of externalities") through taxes, norms, etc. is commonly suggested. Besides, various methods for "evaluation of environmental resources and costs" are developed and used in analysis of overall efficiency. At the same time, effectiveness of suggested methods is questioned because the role and services of natural resources is not always known, and entire "social" (present and future) value could be rarely properly evaluated. Besides, all monetary assessments and dollars calculations of most part of negative externalities (e.g. adverse "impact" on human health; "value" of lost biodiversity; "exhausting" of non-renewable resources, etc.) do not often make sense since they are simply not socially acceptable (no "trade-offs" possible).

Coase proved that *problem of "social costs"* does not exist in the world of zero transaction costs and well-defined private rights (Coase, 1960). Situation of maximum efficiency is always achieved independent of initial allocation of rights. If for instance, farmer has the "right to pollute", the affected agents would pay him an appropriate "bribe" (equal to lost income) to stop the polluting activity. If the opposite is true and farmer does not have the "right to pollute", then he would pay the appropriate bribe for other agents to let him certain pollution. In either case, the welfare of all agents is maximized and maximum efficiency reached (Pareto optimum) without need for any public intervention. However, when transaction costs are significant, then costless negotiation and exchange of rights is not possible. Therefore, the initial allocation of property rights between individuals is critical for overall efficiency and sustainability. Consequently, institutional structures for carrying out of agrarian activities become important factor, which eventually determine the outcome of the system (efficiency) and type of development (sustainability).

"Jointness of production" is a fundamental characteristic of farming. The classical example is when a market-oriented farm produces "multiple products" such corn and hogs, and feed corn to the hogs. That is caused by opportunities for more productive use of resources (economy of scale and scope), but as well as risk reduction strategy (diversification, integration of critical transactions) of farm manager. In modern farming there are also outputs, which are less desired – e.g. wastes. And finally, farming outputs consists of a mix of both "private" and "public goods" such as food, rural amenities (hunting, landscape, etc), ecological and cultural services, habitat for wildlife, biodiversity etc. A great part of farms "non-commodity" outputs is "not-separable" from the major farming activities. Moreover, for these (public, quasi public) goods no markets exist or they function very poorly. Since these outputs are not "tradable" the farmers will have no incentives to produce them in a socially demanded scale. For effective execution of such "public" functions of farms and production of the appropriate amount of "positive externalities" by agriculture it is necessary to develop and apply other (non-market) modes for governance.

Principal role of governance structures for character and pace of development is recognized and intensively studied (North, Williamson). Specific institutional environment in which activity takes place eventually determine the level of economic performance and sustainability in different regions, countries or periods of history. Factors for emergence and evolution of various types of institutions are quite specific for each society, and require multidisciplinary analysis and explanation. In the long-run, institutions are endogenous parameters and "institutional development" is to be included in the model. On the other hand, in the specific institutional environment "sustainability" of the different market, private, collective etc. modes will depend on comparative efficiency (adaptability) of alternative governing arrangements. However, high efficiency and sustainability of different governing forms does not always means high efficiency and sustainability of development[2].

Today "multi-functionality" of agriculture is socially recognized, and sustainability is considered both as criteria and a goal (outcome) of development. It is also recognized that sustainability cannot be effectively achieved as a "side result" of totally decentralized actions (free market competition, collective initiatives). The sustainable development requires *effective governing* and *enforcement mechanisms* including a significant public involvement in market and private transacting. Therefore, analysis of governing modes for agrarian sustainability becomes essential both for defining the efficiency (potential and limits) of

[2] History of institutional development is full of examples of "failures" while organization modernization is usually a success story (North, Williamson).

market competition and private sector initiatives as well as for designing the most effective modes for Government interventions in agrarian sector.

THE NEW FRAMEWORK FOR ANALYSING FARM SUSTAINABILITY

Farm as a governing structure

Sustainability of a farm characterizes its *ability to maintain (continue) over time*. Since no economic organization would exist in a long-term if it were not efficient (otherwise it would be replaced by more efficient arrangement), the problem of assessment of sustainability of farms is directly related to estimation of factors and level of farm efficiency.

In the traditional (Neoclassical) framework, the farm is presented as a "production structure" and the analyses of efficiency are restricted to production costs ("optimization of technological factors according to marginal rule"). This approach fails to explain why (in any given country) for a long period of time there exist so many farms with different levels of "efficiency". In Bulgaria for instance, level of profitability and productivity in cooperative farms has been 5 times lower than in private farms (Kaneva). Besides, there have been more than a million highly sustainable subsistent and non-profit making farms in the country.

In addition to production costs, modern farming (like any other economic activity) is also associated with significant *transaction costs*. There are enormous costs for finding the best partners and prices, for negotiating conditions of exchange and for contract writing, for enforcing and disputing agreements, for protecting property rights, etc. Rational agrarian agents will seek, chose and/or develop the most effective (less expensive) mode for organization of their transactions that minimize their bounded rationality, and safeguard their investments and (absolute and contracted) rights from hazard of opportunism[3]. In the *long run*, only effective governing structures that maximize benefits and minimize costs of transacting will tend to dominate (sustain) in agriculture (Bachev and Tsuji, 2001a).

If transaction costs were *zero*, then it would not be of economic importance whether agricultural activity is carried out by one-person or family farms, cooperatives or agro-corporations with different size, or by a single nationwide company. All information for the effective potential of transactions (for exploration of technological opportunities, satisfying demands, etc.) would be costlessly available, and individuals would costlessly trade (exchange) resources in their mutual benefit until exhausting possibilities for increasing productivity, maximizing consumption, and sustainable development[4].

However, when transaction costs are high, they could block otherwise effective transactions, and restrict farm size far bellow the technologically optimal level. Very often the high costs for market trading (e.g. for finding credit; marketing of output) and/or internal governance (e.g. deficiency of low transacting cost labor) limit the farm size to miniature subsistent farming or family borders. In other instances, existing effective potential to economize on market transacting costs could cause a vast extension of farm size through backward, lateral or forward integration of transactions. For example, high costs for market and contract trading after 1990 has turned the subsistent farming into the most effective (or only possible) forms for organisation of available agrarian assets (farmland, livestock, etc.) of more than a million Bulgarians (Bachev and Tsuji, 2001b). On the other hand, enormous costs

[3] Transacting costs have "behavioral origins" such as *bounded rationality* and *tendency for opportunism* of economic agents (Williamson).

[4] Currently there is a principle agreement (social contract) for global sustainable development.

of market trading have caused domination of integrated and interlinked modes of transacting, and concentration of commercial farming in few thousands large firms and cooperative farms.

Thus in the world of positive transaction costs, farms and other agrarian organizations have a significant economic role to play. They are not only production but also major *governing structures* – forms for organization of transactions and for minimization of transacting costs. Therefore, sustainability of different farms cannot be correctly understood and estimated without analyzing their comparative production *and* governance potential.

"Institutional aspect" of sustainability

Institutions ("rules of the game") determine individuals' rights in society and the way these rights are enforced. Formal and informal institutions affect (structure) human behavior and eventually determine the type of social development (North).

Institutional framework is a critical factor for farm and agrarian sustainability. For examples, cannabis farms are highly sustainable in one institutional environment and quite unsustainable in another type of environment. Level of sustainability of a farm is quite different depending on existence of public support programs; introduction of strict product quality, labor, animal welfare, and environmental standards; permitted legal modes for market and private transacting; efficiency of Laws and contract enforcement; tradition, etc.

Moreover, operational goals of sustainable development and mechanisms of their achievements are institutionally determined. For instance, (socially) acceptable norms for use of labor (e.g. employment of children, safety standards, minimum wages), plant and livestock (e.g. animal welfare, preservation of biodiversity, usage of GM crops), and environmental resources (e.g. water use rights; permissions for pollution of air, water, and soils), all they could differ even between various regions of the same country[5]. On the other hand, depending on prevailing development policy, the governance of the supply of food and non-food (such as clean nature, beautiful countryside, etc.) farm products could be left to free market, bilateral and multilateral private actions, or organized through hybrid or public modes.

Level of individual and overall transaction costs is greatly determined by the institutional environment. For instance, if state of Law, trust, good will, and stability dominate in a society, then costs for protection and exchange of private rights would be insignificant. Alternatively, if private rights were not well defined, enforced, or restricted, that would limit intensification of transactions and optimization of farms. Indeed rights on certain resources are often not well defined (e.g. rights on quiet and clean air, uncontaminated water etc.) and that creates big difficulties in effective allocation of resources (e.g. unsolvable disputes between polluting farmers and neighborhood). Consequently, less sustainable structures are applied, and some transactions are not carried out at socially effective scale.

Finally, if formal institutions "do not work", individuals develop and use more effective informal (or even illegal) modes to govern their exchanges. In most of East European countries, personal and interlinked private forms have been broadly used in conditions of high transitional market and institutional uncertainty (instability), and a significant share of overall economic activity is still governed by informal (gray and black) structures.

[5] In Valonia for instance, environmental standards are much more restrictive than in other two regions of Belgium (Flandria and Brussels).

Therefore, assessments of sustainability of farms have to be always done in the *specific institutional* rather than in unrealistic ("normative", desirable) *context*. For instance, in EU, USA, and Japan, the direct and indirect support for farming has been institutionalized for many years now. That is why it makes no sense to say that "strongly dependent from public subsidies farms have not been sustainable". Nevertheless, the *institutional aspect* is commonly missing in most of the suggested systems for assessing agrarian sustainability. Accordingly, non-feasible (ideal) norms rather than real-life alternative arrangements are used as criteria for efficiency - e.g. model of farming in developed countries, assumption for perfectly defined and enforced property rights, effectively working governments, situation without any public intervention and support to market and private transactions, etc. That "nirvana approach" is to be abandoned, and an analysis of *structure* (and *evolution)* of real institutional environment for farm transacting included in the assessment of farm sustainability.

Defining economic sustainability

Generally, every farm related transaction could be governed through a great variety of *alterative forms*. For instance, *supply of environmental preservation service* could be governed as: an own *voluntary* activity of a farmer; though individual or multilateral *private contracts* of the farmer with interested (affected) neighbors or other agents (food chains, NGOs); though *interlinked contracts* between the farmer and inputs supply or processing industry; though a *cooperation* with other farmers and interested agents (collective initiatives, code of behavior); though a (free) *market* or assisted by a private agent (NGO, certifying and controlling company) *trade* with special products ("origins", "organic" and "reduced chemical" products); though a *public contract* specifying farmers obligations and compensation; though a *public order* (mandatory regulations, taxation, quotas, sanctions etc.). Furthermore, organization of such supply by a farmer could be done individually as a *specialized* or *interlinked* activities; in *cooperation*; or *contacted* to another agent (farmer, cooperative, firm). On the other hand, that supply could be governed as a *non-for profit* or *profit-making* activities of a specialized entity - *pricing* the access to natural reserves and products of special origins; *interlinking* with eco-tourism, education farming, etc.; *contracting* provision with consumers, public and donors agencies, etc. And finally a *mix* or *hybrid* form(s) could be applied.

Different governance modes are alternative but not equal modes for organisation of transacting. They give individuals dissimilar opportunities to coordinate and control transactions, protect private investments from opportunistic expropriation, and profit from specialisation and exchange (Williamson). *Free market* ("price movement") has big coordination and incentive advantages ("invisible hand", "power of competition"), and provides "unlimited" opportunities to benefit from specialisation and exchange. However, market governance could be associated with high uncertainty, risk, and costs due to price instability, great possibility for facing opportunistic behaviour, "missing market" situation, etc. *Special contract form* ("private ordering") permits better coordination, intensification, and safeguard of transactions. However, it may require large costs for specification of contract provisions, adjustments with constant changes in conditions of exchange, enforcement and disputing (trough an expensive court system) of negotiated terms, etc. *Internal (ownership) organisation* allows greater flexibility and control on transactions (direct coordination and adaptation, internal dispute resolution). However, extension of internal mode beyond family boundaries may command significant costs for development (initiation and design, formal

registration, restructuring) and current management (for collective decision making, control of opportunism of members of coalition, supervision and motivation of hired labor, etc.).

Economic exchanges (transactions) let more profitable use of resources but also require additional costs. Farmers and other economic agents (resource owners, consumers) will tend to govern their relations though the *most effective forms* – that which maximise benefits and minimised their costs. Therefore, the most effective form and size of a farm will be determined through optimisation of *total* (production *and* transacting) *costs*, and *trade-offs* between gain in the productivity/benefits and gain in transacting costs. Hence farm will be efficient (sustainable) if it manages all transactions in the most economical for the owner(s) way – that is the situation when there *exist no transaction, which could be carried out with net benefit*. If a farm does not govern transactions effectively, it will be unsustainable since it experiences high costs and difficulties using institutions (possibilities, restrictions) and carrying out transactions *comparing* to other feasible organisation. In that case, there will be strong incentives for exploring the existing potential (adapting to sustainable state) through reduction or enlargement of farm size, or via reorganisation or liquidation of the farm. Thus either alternative farm or non-farm application of resources; or farm expansion through employment of additional resources; or trade instead of internal use of owned land and labor; or taking over by (or merger with) another farm, will take place.

Furthermore, transacting *modes* and acceptable *net benefits* will vary according to individual's preferences, entrepreneurship ability, risk aversion, opportunity costs of owned resources, etc. Expected benefits could be: monetary or non-monetary income; profit; indirect revenue; pleasure of self-employment or family enterprise; enjoyment of agricultural activities; desire for involvement in environment, biodiversity, or cultural heritage preservation; increased leisure and free time, other non-economic benefits. For instance, it is widely known that "desire for preservation of farm for future generation" has been a major reason for persistence (sustainability) of a great number of part-time farms in Japan.

In order to assess farm efficiency and sustainability we have to put *individual transaction* in the *centre of analysis*, and to assess level of associated costs and benefits. Major *types of farm transactions* are associated with *know-how* supply, *innovation* supply, *land* supply, *labor* supply, *inputs* supply, *finance* supply, *insurance* supply, and *marketing* of services and products. Therefore, an analysis is to be made on *comparative efficiency* of organisation of *every* major transaction of the farm. If significant costs (difficulties) of some type of transacting in relation to feasible alternatives is in place, then farm is to be considered as non-sustainable. Given the fact that an alternative form often diminish one type while increasing other kind of transacting costs, and widespread application of complex modes (e.g. interlinking credit supply with inputs supply and/or marketing), the overall (*internal* and *external*) transacting costs of the farm has to be taken into account.

Next, farm's *potential* (incentives, ability) *for adaptation* to the evolving environment through effective changes in governing forms (saving on transacting costs) and production structure (exploring technological possibilities for growth in productivity) is to be estimated. Thus if a farm does not have potential to stay at or adapt to new more sustainable level(s) it would be either liquidated or transformed into another type of farm. For instance, if a farm faces enormous difficulties meeting institutional opportunities and restrictions (e.g. new quality and environmental standards, production quotas); or it has serious problems supplying managerial capital (as it is in a one-person farm when an aged farmer does not have a successor), or supply of needed farmland (big demand for non-agricultural use of land), or funding activities (insufficient own finance, impossibility to sell equity or buy credit), or marketing output (changing demand for certain products, strong competition with imported

products), then it would not be sustainable despite the high historical or current efficiency. Currently there are numerous *unsustainable* farms in EU, which can hardly adjust to fundamental changes in CAP and associated new environmental, animal welfare etc. standards. Therefore, *adaptability of farm* characterizes to the greatest extend the farm sustainability, and thus has to be used as a main criteria and indicator for farm sustainability[6].

Assessment of transacting costs

Some transaction costs are well defined or could be easily specified – management, information, and marketing costs; fees for registrations, certificates, licenses; compensations for intermediaries; payments for lawyers and court suits; expenses for security; bribes, etc. However, a significant portion of costs of transacting is very difficult (expensive) or impossible to determine – costs for finding best partners, negotiations, controlling and enforcement of contractual terms, organizational development, interlinked transacting, unrealised and failed deals, future transactions, etc. Subsequently, assessments of overall farm efficiency could be merely based on traditional (accounting, statistical) data, and rarely done by precise calculation of transaction costs and comparison with production expenses[7].

Defining the *absolute* level of transaction costs is not always possible but we could and actually need determine which governing mode (among practically possible alternatives) commands *relatively least* costs of transacting. Since different governing modes (market, contract, internal organisation) differ in "discrete structural way", the *discrete structural* (rather than "marginal") *analysis* is more suitable for evaluation of efficiency of the alternative organisational forms (Williamson).

In the specific institutional environment, the most efficient forms for organization of a farm transaction will depend on the *specific characteristics* of each transaction (Williamson). Frequency, uncertainty, asset specificity, and appropriability have been identified as "critical dimensions" of transactions, and factors responsible for *variation* of transaction costs[8].

When *recurrence* of transactions *between same partners* is high, then both (all) sides are interested in sustaining and minimizing costs of their relations (avoiding opportunism, building reputation, setting adjustment mechanisms, etc.). Besides, costs for development of a special private mode for facilitating bilateral (or multilateral) exchanges could be effectively recovered by frequent transacting.

When *uncertainty*, which surrounds transactions increases, then costs for carrying out and secure transactions go up (costs for overcoming information deficiency, safeguarding against risk, etc.). While certain risks could be diminished by production management (stock keeping, reallocation, diversification) or a special market mode (e.g. purchase of insurance), the governing of most of transacting risk would require special private forms – trade with origins, giving guarantees, using share-rent or output-based compensation; providing economic hostages; participating in a risk-pooling, inputs-supply or marketing cooperative, internal organization.

[6] Our suggestion to use adaptability as a criteria and indicator for sustainability has been already incorporated in the holistic System for assessing sustainability of agriculture systems in Belgium.

[7] All these "measurement problems" make it also impossible to extend the Neoclassical models simply by adding a new "transacting" activity (Furuboth and Richter).

[8] First tree factors have been identified by Williamson while appropriability has been added by Bachev and Labonne.

Transaction costs gets very high when *specific investments for relations with a particular partner*[9] are to be made. Relation specific investments are "locked" in transactions with a particular buyer or seller, and cannot be recovered through "faceless" market trade (if transaction does not take place or it is terminated before the effective life-span of invested capital). Therefore, if a transaction requires significant highly specific assets, the farm has to safeguard dependant investment with a special form (such as long-term contract, interlinking, hostage taking, joint investment, ownership integration). Otherwise, specific investments would not be made, and transactions either take no place or occur without (or loss in) comparative advantages in respect to productivity (quality).

Transacting is particularly difficult when *appropriability* of product or service is low. "Natural" low appropriability have most of the agrarian intellectual products (agro-market information, agro-meteorological forecasts, a big part of new agrarian technologies and varieties, software for agriculture, etc.). Besides, all products and activities with big positive or negative externalities are to be included in this group. Here costs and benefits are independent for individual participants. For such transactions possibility for unwanted (market or private) exchange is great, and costs for protection of private ownership, for detection of cheating, and for disputing rights - extremely high. Farmers would either over produce (negative externalities) or under organize such transaction (e.g. provision of environmental goods) unless they are governed by an efficient private or hybrid mode (trade secrets, cooperation, strategic alliances, long-term contract, or public order). For instance, since there is not an effective system for protection of rights on organics products in Bulgaria (independent certification and control; special marketing channels, etc.), farmers have no incentives to invest in organic production despite existing consumer demand and potential profitability.

GOVERNING OF AGRARIAN AND FARM SUSTAINABILITY

Principle governing matrix

Following transaction costs minimizing logic we could determine the effective (most sustainable) forms for governing of farm related transactions. In the specific institutional environment, according to combination of specific characteristics of each transaction, there will be different the most effective and sustainable form for governing of farm transactions[10].

Principle modes for effective (sustainable) organization of farm transactions are presented at Table 1[11]. Transactions with high frequency, big uncertainty, great assets specificity (dependency), and high appropriability, have to be organized *within the farm* (ownership mode). For instance, managerial and technological knowledge is quite specific to a farm and its supply has to be always governed through a permanent labor contract and coupled with ownership rights. Long-term investments in land (orchard, vineyard, irrigation, building) are to be made on owned or long-leased rather than rented land (high site specificity). Dairy farm would never leases but owns cows, and all “critical” to farm material

[9] Several forms of assets specificity have been identified - physical, human, site, dedicated assets, and brand name capital (Williamson).

[10] *Operationalization* of the Transaction cost minimizing concept is done namely by “*aligning* transactions (differing in their attributes) with governance structures (differing in their costs and competence) in discriminating (mainly transaction cost economizing) way” (Williamson).

[11] Table shows only the extreme levels (high-low) of critical factors of agrarian transacting. In the real agrarian economy there is a big variation of critical dimensions and thus of effective governing forms (including mixed, hybrid, interlinked etc. modes).

assets will be internally organized (production of forage for animals; important machineries; water supply for irrigated farming). Moreover, according to the level of farm specificity of assets, funding of investment projects will be effectively (possibly) done by quite different governance modes: while universal capital could be effectively financed by market (loan, bank credit) form, highly specific investments can be only made through internal (own funding, equity) funding (Williamson).

Table 1. Sustainable (The Most Effective) Modes for Governing of Farm Transactions

Generic modes*	Critical dimensions of transactions								
	Appropriability								
	High								Low
	Assets Specificity								
	Low				High				
	Uncertainty								
	Low		High		Low		High		
	Frequency								
	High	Low	High	Low	High	Low	High	Low	
M	✓	✓							
SCF			✓			✓			
IO					✓		✓		
TPI				✓				✓	
PI									✓

* M – free market; SCF – special contract form; IO – internal organization; TPI – necessity for a third-party involvement; PI – necessity for public intervention

Depending of the personality of resource owners and (transacting) costs of their coalition, different *type of farm* will be preferred - one-person farm (firm), family farm (firm), group farm or partnership (firm), cooperative farm, and corporative farms. Moreover, in the specific institutional environment (legal framework, support policies, tradition, level of transacting costs) various types of farm will have quite different effective *horizontal* and *vertical boundaries*. For instance, in *transitional* conditions of high market and institutional uncertainty, and inefficient property rights and contract enforcement system, most of agrarian investments happened to be in a regime of high specificity (dependency). As a result (over) integrated modes such as low productive subsistent household and group farming, or large production cooperatives and agro-companies, have been dominating in East European agriculture. Alternatively, in more matured economies, where markets are developed and institutions stable, agrarian assets are with more universal character. Therefore, farm borders are greatly determined by family borders, and more market and mixed (contract rather than entirely integrated) forms prevail.

If specific capital cannot be effectively organized within the farm (economy of scale and/scope explored, funding made)[12], then an effective governing form *outside farm-gates* is to be used (group farming, joint ownership, cooperative, lobbying for public intervention). Very often transacting costs for initiation and maintaining of such "collective organization" is great because of the big number of coalition, different interests of member, opportunism of "free-riding" type (Olson). Consequently, that creates serious problems for efficiency

[12] Integration of transactions would either increase management costs (needs to buy from or sell to competitor) or it would be loss-making comparing to outside production costs (price) competition.

(sustainability) of individual farms - missing markets, monopoly or quasi-monopoly situation, impossibility to “induce” public intervention, etc.

Farm transactions with good appropriability, high certainty, and universal character of investments (partner can be changed anytime without significant additional costs) could be effectively carried *across free market* through spotlight or classical contracts. Here organization of transactions with a special form or within the farm would only bring extra costs without producing any transacting benefits.

Recurrent transactions with low assets specificity, high uncertainty and appropriability, could be effectively governed through a *special contract*. Moreover, *relational* contract has been invented, when detailed terms of transacting are not known at outset (high uncertainty), and a framework (mutual expectations) rather than specification of obligations is practiced. Partners (self)restrict from opportunism and are strongly motivated to settle emerging difficulties (situation of frequent bilateral trade). Besides, no significant risk is involved since investments could be easily (costlessly) redeployed to another use or users (no assets dependency exist).

A special contract forms is also efficient for rare transactions with low uncertainty, high specificity and appropriability. Dependent investment could be successfully safeguarded through contract provisions since it is easy to define and enforce relevant obligations of partners in all possible contingencies (no uncertainty surrounds transactions). Here the occasional character of transactions does not justify their internalization within the farm.

However, serious transacting problems arise when condition of assets specificity is combined with high uncertainty, low frequency, and good appropriability of transactions. Given that elaboration of a special governing structure for private transacting is not justified, specific investments are not made, and transactions fail to occur at effective scale ("market failure", "contract failure"). Similar difficulties are also encountered for rare transacting associated with high uncertainty and appropriability. In these cases, *a third part* (private agent, Government, local authority) *involvement* in transactions is necessary (through assistance, arbitration, regulation) in order to make them more efficient or possible at all. For instance, when State establishes and enforces quality and safety standards for farm inputs (chemicals, machinery) and produces, or certify providers of agrarian services, or regulate employment relations, or guarantee minimum price for farmers, all that considerably facilitates and intensifies (market and private) transactions and increases farm sustainability.

When appropriability associated with a transaction is low, there is no pure market mode to carry such transactions effectively. Transactions could be still governed by “good will” (private initiatives, voluntary actions), or through a private mode if high frequency (pay-back of investment is possible) and mutual assets dependency (thus incentive to cooperate) exists. In these cases, trade secrets, interlinking, bilateral or collective agreements, close-membership cooperatives, codes of professional behavior, alliances, internal organization, etc. are used. However, emerging of special large-members organizations for dealing with low appropriability would be very slow and expensive, and they unlikely be sustainable in a long run (“free riding” problem). Therefore, there is strong need for *a third-party public* (Government, local authority, NGO, international assistance) *intervention* in order to make such transaction possible or more effective.

For example, supply of environmental goods by farmers could hardly be governed through private contracts with individual consumers because of the low appropriability, high uncertainty, and rare character of transacting (high costs for negotiating, contracting, charging all potential consumers, disputing). At the same time, supply of additional environmental protection and improvement service is very costly (in terms of production and organization

costs) and would unlikely be carried out by farmers on voluntary basis. Besides, financial compensation (price-premium) of farmers by willing consumers through a pure market mode is also ineffective (high information asymmetry, enforcement costs, etc.). A third-party mode with a direct Government involvement would make that transaction effective: on behalf of the consumers the Government agency negotiates with farmers "contracts for environment conservation and improvement service", coordinates activities of various agents (including direct production management), provides public payments for compensation of farmers, and controls implementation of negotiated terms. Namely, individual and voluntary *public environmental contracts* have been broadly used in EU[13] and in some other developed countries (USA, Switzerland, Japan) as an effective form to govern the supply of socially desirable level of environmental preservation and improvement services. In some countries (Canada, Australia, New Zealand) public support is more directed to collective (groups, community) initiatives and thus *collective contracts* are broadly employed.

Alternatively, a public or independent system for certification, control, and marketing of special (organic, fair-trade) products could be organized, and sustainable governance of (environmentally friendly and socially just) agriculture carried out. Emergence and unprecedented development of the organic farming and system of fair-trade in last 15 years are good examples in that respect. In EU organic farming is one of the most dynamic sectors having an annual growth of 25% between 1993-98, and around 30% since then. On the other hand, world sales of fair-trade products has grown 3,2 folds since 1997 having an increase of 42.3% just in 2002-2003.

Effective modes for Government intervention

There is a big variety of possible *forms for public intervention* in market and private transacting. The comparative advantages and costs of alternative modes for public involvements is to be assessed, and the *most efficient* one selected. Frequently that calculation is not made at all or it does not include *all* costs – e.g. direct tax payer contribution, transacting costs of bureaucracy (coordination, stimulation, mismanagement, reorganization), costs for individuals' participation and usage of public modes (for information, time and efforts spent, payments of fees and bribes, etc.). Consequently, there are plenty of examples for bad Governments interventions in agrarian sphere around the world.

Low appropriability is often caused by unspecified or badly specified private rights. In some cases, the most effective government intervention would be to introduce and enforce *new private property rights* – e.g. rights on natural, biological, and environmental resources; tradable quotas for polluting; private rights on intellectual property, origins, etc.). In other instances, the most economical will be to put in place and enforce *regulations* for utilization of resources (water user rights) and reducing negative externalities – e.g. limits for comfort diminution (noise, odor); norms for contamination of water, soil, and air; rules for using GM crops; taxes for polluters. Often providing *public information*, *education*, or *support* (assistance in organization formation, public or quasi-public funding, tax relieve) to private, collective or community organizations would be the best solution.

In some cases, *pure public organization* (in-house production, public provision) will be the most effective as in the case of agrarian research and education, agro-market information, agro-meteorological forecasts, etc. In other instances, *hybrid modes* (public-private partnership) would be much more efficient than pure public forms given coordination, incentives, and control advantages. In majority of cases, involvement of farms and farms organizations in supply of non-food services such as preservation and improvement of

[13] Currently agri-environmental programs cover about 20% of EU agricultural land.

biodiversity, and landscape, and historical and cultural heritages, etc. is the most economical form[14]. That is determined by farmers information superiority, strong interlinks of activity with traditional food production (economy of scope), high assets specificity to the farm (farmers competence, high cite-specificity of investments to the farm and land), and spatial interdependency (need for cooperation of farmers at regional or wider scale), and not less important - farm's origin of negative externalities ("polluter liability principle").

And finally, there are transactions, which are to be initiated or governed by *international* (regional, European Union, worldwide) *organizations* due to the strong necessity for trans-border cooperation or consistent (national, local) "government failures".

In any case, if there is strong need for a third-party public involvement but an effective government intervention is not introduced in a due time, development of farms and farm structures would be substantially deformed. In Bulgaria, there have been a great number of bad examples for Government under and over interventions in agrarian sector since the beginning of transition now (Bachev and Tsuji, 2001b). Consequently, primitive, uncompetitive or unsustainable small-scale farming; predominance of over-integrated and personalized rather than market exchanges; ineffective (large, non-productive, inflexible, non-transparent, corrupted) agrarian bureaucracy; and blocking out of all class of agrarian transactions (e.g. innovation and extension supply, long-term finance supply, infrastructure development, supply of environmental goods), etc. all they have come out as a result.

CONCLUSIONS

In the traditional framework there is only one mechanism for governing of sustainable agrarian development. "Free market prices" (and market competition) effectively coordinate and stimulate entire activity of resource owners, entrepreneurs, and consumers. Accordingly all farms constantly "adapt" to price movements being equally efficient and sustainable. Rare cases of market disturbances ("failures") are also recognized ("negative externalities", "tragedy of commons") but perfect "government intervention" is seen as a remedy. All that leads to an interrupted global sustainable development.

In the real market based agrarian economy, there are additional important factors affecting individual choice and farms sustainability (namely institutions and transacting costs), and a great variety of effective governing mechanisms. Institutional environment is a crucial factor, which eventually determine the "type" and level of sustainability of different agrarian structures (markets, different contractual arrangements and organizations). In the specific institutional setting, economic agents use or develop a great variety of effective (and thus highly sustainable) market and non-market modes to govern their exchanges. Consequently, studying out the farm as a governance (rather than production) structure becomes a key for understanding the farm efficiency and sustainability.

Agrarian agents tend (have) to govern available resources in the most economical way adapting to institutional environment and minimizing costs of their transacting. If some transactions are not managed through the most effective way, comparing to feasible alternatives, then farm will be unsustainable. In relation to individual agent's preferences, experience, risk aversion, opportunity costs, and critical attributes of each transaction, there will be different effective structure for organization of available resources and exchanges

[14] Environmental cooperatives have been very successful in some EU countries. In Holland for instance, there are 81 environmental cooperatives with 6600 farmer-members, which accounts 6% of all farms and 7% of the total farmland (Hagedorn).

(market trade, internal organization, cooperation, etc.). Accordingly, at any given period of time, farms of various type (subsistent, family, cooperative, corporative) and size could persist (sustain) in agriculture.

In the suggested new approach, the analysis is focused on assessment of the comparative efficiency (potential to face institutional restrictions, for growth in productivity, and economizing on transaction costs) of a farm, and farms of different type, sub-sectors, regions, etc. Moreover, direct qualitative methods are combined with indirect or pure qualitative (discrete structural) approach for assessing sustainability level. All that requires collection and use of new type of micro-economic data for farm transactions, their critical dimensions, and specific institutional environment for agrarian and related activities.

The new framework helps us better understand the factors for sustainable development and the "Government's role" as well. Analyses of the transaction costs identify an immense range of "market failures" associated with unspecified or badly specified property rights; inefficient public contract enforcement system; high uncertainty and asset specificity, and low appropriability of transactions. Economic agents deal with market failures developing different (and highly sustainable) private forms for effective transacting. However, private sector (contract or internal modes) also "fails" to organize some transactions at effective scale. Thus there is a strong need for a third-party public involvement in market and private transactions aiming at facilitating and minimizing costs of exchange, reducing uncertainty and asset specificity, and increasing appropriability and frequency of transactions. Sustainable development is significantly compromised if both market and private sector fails, and no effective public intervention (property rights and institutional modernization, assistance, mediation, hybrid and public organization) takes place.

Therefore, high current and historical efficiency does not mean high sustainability of farms. Moreover, big sustainability of farms does not always mean sustainable agrarian development. On the other hand, sustainable development does not exclude fundamental modernization of farms (enlargement, transformation into other types, etc.). Finally, different forms of public interventions are with unequal efficiency in respect to farms sustainability and sustainable agrarian development ("government failure" is possible). Our new approach not only opens different horizon for analyses of farm efficiency and sustainability but also have direct implications for improvement of public policies and agro-business strategy formation.

References:

Bachev H. and M.Labonne (2000): About Agrarian Innovations, Montpellier, INRA

Bachev H. and M.Tsuji (2001a): Governing of Agrarian Transactions, in Farm Management and Rural Planning No 2, Kyushu University, Fukuoka, 185-202

Bachev H. and M.Tsuji (2001b): Structures for Organization of Transactions in Bulgarian Agriculture, Journal of the Faculty of Agriculture of Kyushu University, No 46 (1): 123-151

Coase R. (1960): The Problem of Social Costs, Journal of Law and Economics 3: 1-44

Edwards C.,R.Lal, P.Madden, R.Miller and G.House (editors), (1990): Sustainable Agricultural Systems, Soil and Water Conservation Society, Iowa

Furuboth E. and Richter R. (1998): Institutions and Economic Theory: The Contribution of the New Institutional Economics, Ann Arbor, The University of Michigan Press

Hagedoen K. editor (2002): Environmental Cooperation and Institutional Change, Cheltenham, Edward Elgar

Hardin G. (1968): The Tragedy of the Commons, Science 162

Hansen J. (1996): Is Agricultural Sustainability a Useful Concept, Agricultural Systems 50: 117-143

Kaneva K. (2004): Indicators for efficiency measurement of agricultural production units, in: Efficiency of Agricultural Organizations, Sofia, IAI, 35-42

Mirovitskaya N. and W.Ascher – editors (2001): Guide to Sustainable Development and Environmental Policy, Duke University Press, London

North D. (1990) Institutions, Institutional Change and Economic Performance, Cambridge University Press

OECD (2001) : Multifunctionality; Towards an Analytical Framework, Paris

Olson M. (1969): The Logic of Collective Actions: Public Goods and the Theory of Groups, Cambridge, Harvard University Press

Pigou A. (1920): Economics of Welfare, Macmillan and Co. London

Peeters A., M.Hermy, E.Mathijs, B.Muys, M.Vanclooster, and C.Bielders (2004): Framework for Assessing Sustainability Levels in Belgium Agricultural Systems – SAFE, Intermediary report on project CP/04, Brussels, Belgium Science Policy

Williamson O. (1996): The Mechanisms of Governance, New York, Oxford University Press