Sustainability of Farming Enterprise – Governance and Evaluation

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Abstract

The issue of governance and evaluation of sustainability of farming enterprise like individual and family farms, agro-companies, agro-cooperatives, etc. is among the most discussed among researchers, farmers, investors, politicians, interests groups and public at large. Despite the significant development of the theory and practice in that new area still there is no common understanding on "what is (how to define) sustainability of farming enterprises?", „what is the difference and relations between farm and agrarian sustainability?", "which are the critical factors of sustainability of farming enterprises?", "which are the governing mechanisms and forms for farms sustainability?", "how to select the most-efficient forms for governing of farms sustainability?", and "how to evaluate the sustainability level of farming enterprises" in a dynamic world, where hardly there is anything actually "sustainable.

This paper tries to give answer to all these questions. First, evolution of the "concept" of sustainability of farming enterprises is initially analyzed and discussed. On that base is suggested adequate definition of farming enterprise' sustainability as ability of a particular farm to maintain its governance, economic, social and ecological functions in a long term. After that principle mechanisms and modes of governance of sustainability of farming enterprise are specified, including institutional environment, market, private, collective, public and hybrid modes. Following applicable for the contemporary conditions of the development of Bulgarian agriculture framework for assessing the farm sustainability level is suggested. The later includes a system of appropriate principles, criteria, indicators, and reference values, which characterize the governance, economic, ecological and social aspects of farms sustainability as well as approach for their integration and interpretation. Finally, a framework for analyzing and assessing the efficiency of the individual components and the entire system of governance for farm enterprise' sustainability is suggested. Ultimate objective of this study is to discuss and experiment efficiency of suggested framework, and after improving it to suggest it for a wider use in farm and agri-business management, and improvement of policies and modes of public intervention in agrarian sector.

Key words: farming enterprise, sustainability, governance, economic, social, ecological aspects, market, private and public modes of governance

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1. Introduction

Around the globe the issue of assessment of sustainability of farming enterprises is among the most debated by the researchers, farmers, investors, policy-makers, interest groups, and public at large (Andreoli M. and V Tellarini; Bachev, 2010, 2013; Bachev and Petters; Bastianoni et al.; Berge and Stenseth; Beerbaum; Cauwenbergh et al.; Daily *et al.;* Edwards *et al.;* EC, FAO; Farah and Gomez-Ramos; Fuentes; Häni et al.; Garcia-Brenes; Lowrance *et al.;* Mirovitskaya and Ascher; OECD; Raman; Rigby et al.; Sauvenier et al.; UN; VanLoop *et al.*). For instance, at the current stage of development of European agriculture the questions "what is the level of sustainability of different type of farming enterprises during to new programing period of EU CAP implementation?" and "how to increase sustainability level of farms of different type?" are very topical.

Despite the enormous progress in the theory and practice in that new evolving area, still there is no consensus on "what is (how to define) sustainability of farming enterprises?", „what is the difference and relations between farm and agrarian sustainability?", "which are the critical factors of sustainability of farming enterprises?", "which are the governing mechanisms and forms for farms sustainability?", "how to select the most-efficient forms for governing of farms sustainability?", and "how to evaluate the sustainability level of farming enterprises" in a dynamic world, where hardly there is anything actually "sustainable[3].

This paper suggests a framework for assessing the system of governance and the sustainability level of farming enterprises in the conditions of EU CAP implementation. Initially, major shortcoming of dominating understandings of farming enterprise's sustainability and its governance are summarized. After that, evolution of the "concept" of sustainability of farming enterprises and major approaches for its evaluation are analyzed, and on that base attempt is made for more precise definition is suggested adequate definition of farming enterprise's sustainability. Next, principle mechanisms and modes of governance of sustainability of farming enterprise are specified. Following a system of criteria and indicators for assessing the levels of sustainability of farming enterprises for the contemporary conditions of the development of Bulgarian agriculture is suggested. Finally, a framework for analyzing and assessing the system of governance for farm enterprise' sustainability is proposed.

2. Shortcoming of dominating understandings of farming enterprise's sustainability and its governance

In academic publications, official documents and agricultural practices there is a clear understanding that "farms sustainability and viability" is a condition and an indicator for agrarian sustainability and achievement of sustainable development goals. Also it is widely accepted that in addition to "pure" production and economic dimensions, the farm sustainability has broader social and ecological aspects, which are equally important and have to be taken into account when measure the overall sustainability level. There are suggested and used numerous indicators for assessing agrarian sustainability at "farm level" and diverse approaches for their integration and interpretation.

However, most of the assessments of agricultural sustainability are at industry, national or international level (FAO, OECD), while the important "farm level" is usually missing[4]. Besides, often the estimates of farms sustainability and agrarian sustainability unjustifiably are equalized.

[3] That is a part of a larger problem for defyning agrarian sustainability as a whole, which led to a suggestion „to spend less time attempting to define sustainable agriculture and more time in achiving it" (Ikerd). However, is it possible at all to work for sustainale agriculture if it is not defined? Disgreement among experts is mostly in terms of ""means" for achiving agrarian sustainabiluit, rather than "goals" toward there are directed.

[4] Concequently, the important links between the farm managment and impacts on agro-ecosystmes and their sustainability are not properly studied (Sauvenier et al.).

Agrarian sustainability has larger dimensions and in addition to the sustainability of individual farms includes: the importance of individual (type of) farms in the overall resources management and the socio-economic life of households, region and industry; and the collective actions of diverse agrarian agents; and the overall (agrarian) utilization of resources and the impacts on natural environment; and the amelioration of living and working conditions of farmers and farm households; and the overall state and development of agriculture and rural households; and the (participation in) overall social governance; and the food security, and the conservation of agrarian capability, etc. (Bachev, 2015).

For example, the experience around the globe shows, that there are many "highly" sustainable farms little contributing to agrarian sustainability – numerous "semi-market" holdings and subsistence farms, large enterprise based on leased-in lands, public farms etc. in Bulgaria with "low" standards for environmental protection (Bachev, 2010). On the other hand, the sustainable agrarian development is commonly associated with the restructuring and adaptation of farms to constantly evolving market, institutional, and natural environment. That process (pre)determines the low sustainability (non-sustainability) and the diminishing importance of farms of certain type (public, cooperative, small-scale), and the modernization of another part of them (diversification of activity, transformation of family farms into partnerships, firms, vertically-integrated forms, etc.).

Furthermore, in most cases a holistic approach is not applied, and the "pure" economic (income, profitability, financial independence etc.), "pure" production (land, livestock and labor productivity, eco-conservation technologies etc.), "pure" ecological (eco-pressure, harmful emissions, eco-impact etc.), and "pure" social" (social responsibility) aspects of farm development are studies (assessed) independently from one another. In most of the available frameworks for assessing sustainability level there is no hierarchical structure or systemic organization of the aspects and the components of farm sustainability, which (pre)determines the random selection of sustainability indicators.

Also the critical "governance" functions of the farm, and the costs associated with the governance (known as "transaction costs"), and the relations between different aspects of farm sustainability are mostly ignored. Nevertheless, very often the level of the managerial (governance) efficiency and the adaptability of farm predetermine the overall level of sustainability independent from the productivity, social or ecological responsibility of activity (Bachev, 2004; Bachev and Peeters).

Now it is broadly recognized that the farm "produces" multiple products, "private" and "public" goods - food, rural amenities for hunting, tourism, landscape enjoyment), environmental and cultural services, habitat for wild animals and plants, biodiversity, including less desirable ones such as waste, harmful impacts etc. Therefore, all these socio-economic and ecological functions of the farm have to be taken into account when assessing its sustainability.

The farm is not only a major production but an important governance structure for organization (coordination) of activities and transactions in agriculture, with a great diversity of interests, preferences, goals, skills etc. of participating agents (owners, managers, workers, etc.). Therefore when assessing sustainability and efficiency of different type of farms (subsistent, member oriented, profit making, part-time employment, conservation, etc.) to take also into account their comparative potential in relation to the alternative market, private, public, etc. (including informal) modes of governance of agrarian activity (Bachev, 2004; Bachev and Peeters).

In each particular stage of the evolution of individual countries, communities, eco-systems, sub-sectors of agriculture and type of farms, there is a specific knowledge for the agrarian sustainability (e.g. for the links between human activity and climate change), individual and social value system (preferences for "desirable state" and "economic value" of natural resources, biodiversity, human health, preservation of traditions, etc.), institutional structure (rights on food security and safety, good labor conditions, clean nature and biodiversity, of vulnerable groups, producers in developing countries, future generations, animal welfare, etc.), and goals of socio-economic development.

Thus, the understanding, content, and assessment of the agrarian and farm sustainability are always specific for a particular historical moment (period) of time and for a particular socio-economic, institutional and natural environment, in which a farm is functioning. For example, many otherwise "sustainable" farms in East Europe were not able to comply with the high EU standards and restrictions for product quality, safety, ecology, animal welfare etc. and ceased to exist or entered into "unsustainable" grey sector after the accession of countries to the European Union.

A majority of suggested framework for sustainability assessment apply an "universal" approach for "faceless" farms, without taking into consideration the specificity of individual holdings (type, resource endowment, specialization, stage of development) and the environment in which they function (competition, institutional support and restrictions, environmental challenges and risks, etc.). What is more, usually most systems cannot be practically used by the farms and managerial bodies, since they are "difficult to understand, calculate, and monitor in everyday activity" (Hayati et al.).

This paper suggests a framework for assessing sustainability of farms in the condition of EU CAP implementation in Bulgaria. First, evolution of the "concept" of farm sustainability and the main approaches for its assessment is analyzed, and on that base an attempt is made to define more precisely the farm sustainability. After that a system of principles, criteria and indicators for assessing the level of sustainability of farms at the current stage of agrarian development in Bulgarian is proposed. The ultimate objective of this study is to assist farm management and strategies as well as agricultural policies and forms of public intervention in agriculture.

Similarly to evaluation of farm's sustainability, studies on forms and efficiency of its governance are also at beginning stage due to the "newness" of the problem, and the emerging new challenges at the current phase of development (globalization, climate change, strong competition with producers in other countries, other sectors, etc.), and the fundamental institutional modernization during recent years, and the "lack" of long-term experiences and relevant data, etc.

Most studies in the area include only the farmer (the manager of farming enterprise) as responsible and contributing with his behavior, actions or inactions for maintaining production, technological, ecological and social functions of the farm (the sustainability of farm), while a number of key agents like resources' owners (labor, land, capital, etc.), buyers, suppliers, interest groups, state, communities, final consumers, etc. are commonly ignored.

More comprehensive studies are usually focused on formal modes and mechanisms while the important informal institutions and organizations are not included into analysis. What is more, research is commonly restricted to a certain form (contract, cooperative, industry initiative, public program), or a management level (farm, eco-system, region) without taking into consideration the interdependency, complementarities and/or competition of different governing structures. Besides, widely used complex forms of governance (multi-lateral, multi-level, reciprocial, interlinked, and hybrid modes) are usually ignored by investigators.

Likewise, one-dimensional and uni-sectoral analyses are broadly used separating the management of farming activity from the governance of environmental and overall households and rural activities. Furthermore, most studies concentrate on "production costs" ignoring significant transaction costs associated with the protection, exchange and disputing of diverse property rights and rules. Moreover, "normative" (to some "ideal" or "model in other countries") rather than a "comparative institutional approach" (between feasible alternatives in the specific socio-economic and natural conditions of a country, region, sector, ecosystem) is employed.

Furthermore, uni-disciplinary approach dominates ("pure economic", "pure ecological", "pure political", etc.) preventing a proper understanding of the driving factors ("logic") and the full consequences (multiple effects, costs, risks) of a particular governance choice. Consequently, a complete understanding and adequate assessment of the system of governance of farm sustainability is impeded.

Therefore, there are strong theoretical and practical needs for proper understanding both the farm sustainability as well as the system of its governance.

3. Defining sustainability of farming enterprise

Sustainability as alternative ideology and new strategy

Sustainability movements among farmers and consumers initially emerged in the most developed countries as a response to concern of particular individuals and groups about negative impacts of agriculture on non-renewable resources and soil degradation, health and environmental effects of chemicals, inequity, declining food quality, decreasing number of farms, decline in self-sufficiency, unfair income distribution, destruction of rural communities, loss of traditional values, etc. (Edwards *et al*.). In that relation the term "sustainable agriculture" [5] is often used as an umbrella term of *"new" approaches* in comparison to the "conventional" (capital-intensive, large-scale, monoculture, etc.) farming, and includes organic, biological, alternative, ecological, low-input, natural, biodynamical, regenerative, bio-intensive, bio-controlled, ecological, conservative, precision, community supportive etc. agriculture.

After that in the concept of sustainability more topical *"social" issues* have been incorporated 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. (VanLoon et al.).

For the first time the Rio Earth Summit addressed the *global problem of sustainable development* and adopted its "universal principles" (UN, 1992). 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. In a numerous international forums since 1992 these principles have been specified, amplified and enriched. The last UN Conference on Climate Change in Paris concluded with an agreement to cut emissions and tackle climate change between most (196) countries of the planet (UN, 2015).

The emergence of that *"new ideology"* has been also associated with a considerable shift of the "traditional understanding" of the development as a theory and policy. In addition to the economic growth, the later now includes a broad range of social, ethical, environment conservation etc. objectives. The modernization of the policies of EU, and diverse international organizations (World Bank, FAO, etc.), and the (national, international) Programs for Agrarian and Rural Development are confirmation of that. In the official documents the general understanding of sustainability is specified and "translated" into language of practice in the form of laws, regulations, instruction, approaches for assessment, system of "good practices" for farmers, etc.

Apart from that general (declarative) description of the sustainability, there have also appeared more "operational" definitions for sustainability. For instance, sustainability of farm is often defined as *"set of strategies"* (Mirovitskaya and Ascher). The managerial approaches that are commonly associated with it 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; employment of holistic, life-cycle etc. management of farm and resources; full pricing of agricultural inputs and

[5] The term firstly intronduced by the australian scientists Gordon McClymont (Wikipedia).

charges for environmental damages, etc. Accordingly, the level of sustainability of a particular farm is measured through changes in the resources use (e.g. application of chemical fertilizers and pesticides) and the introduction of alternative (sustainable) production methods, and their comparison with the "typical" (mass distributed) farms.

However, interpreting sustainability as "an approach of farming" is not always useful for adequate assessment of sustainability and for "guiding changes in agriculture". Firstly, strategies and "sustainable practices", which emerge in response to problems in some (developed) countries, are not always appropriate for specific conditions of other countries. For instance, a major problem in the Bulgarian farms has been insufficient and/or unbalanced compensation with chemical fertilizers of taken with yields N, K, and P; low rate of farmland utilization and irrigation; widespread application of extensive and primitive technologies (insufficient utilization of chemicals, application of too much manual labor and animal force, gravity irrigation); domination of miniature and extensive livestock holdings, etc. (Bachev, 2010). Apparently, all these problems are quite different from the negative impacts on the natural environment as a result of the over-intensification of farms in the old states of the European Union and other developed countries.

Moreover, the priorities and hierarchy of the goals in a particular country also change in time, which makes that approach unsuitable for comparing sustainability of farms in different subsectors, countries and in dynamic (in time). For instance, in EU until 1990s the food security and maximization of output was a main priority, which was replaced after that by the food quality, diversity and safety; conservation and improvement of natural environment and biodiversity; protection of farmers' income; market orientation and diversification; care for animal welfare; preservation and revitalization of rural communities, etc.

Secondly, such understanding of farm sustainability may lead to rejection of some approaches associated with modern farming but nevertheless enhancing sustainability. For example, it is well-known that biodiversity and soil fertility are preserved and improved through efficient tillage rather than "zero tillage" and bad stewardship to farmland. Application of such approaches in the past led to enormous challenges and even to loosing of the "agrarian" character of many agro-ecosystems in Bulgaria and other countries alike (Bachev, 2010). At the same time, there are many examples for "sustainable intensification" of agriculture in many countries around the world.

Third, such understanding of farm sustainability makes it impossible to evaluate the contribution of a particular strategy to sustainability since that specific approach is already used as a "criterion" for defining sustainability.

Forth, because of the limited knowledge and information during the implementation of a strategy it is likely to make errors ignoring some that enhance sustainability or promoting others that threaten (long-term) sustainability. For examples, the problems associated with the passion on "zero and minimum" tillage in in the past in Bulgaria are well-known. Similarly, many experts do not expect a "huge effect" on environmental sustainability from the "greening" of the EU CAP during the new programing period (Hendricks).

Fifth, a major shortcoming of that approach is that it totally ignores the economic dimensions (absolute and comparative efficiency of resources utilization), which are critical for determining the level of farm sustainability. It is obvious that even the most ecologically clean farm in the world would not be sustainable "for a long time" if it does not sustain itself economically.

Last but not least important, such an approach does not take into account the impact of other critical (external for the farm) factors, which eventually determine the farm sustainability, namely the institutional environment (existing public standards and restrictions), evolution of markets (level of demand for organic products of farms), macroeconomic conditions (opening up of high paid jobs in other industries), etc. It is well known that the level of sustainability of a particular farm is quite unlike depending on the specific socio-economic and natural environment in which it functions and evolves. For instance, introduction of the support instruments of the EU CAP in Bulgaria (direct payments, export subsidies, Measures of NPARD) increased further sustainability level of large

farms and cereal producers, and diminished it considerably for the small-scale holdings, livestock farms, vegetable and fruits producers (Bachev et al.).

Furthermore, some negative processes associated with the agrarian sustainability in regional and global scale, could impact "positively" the sustainability of some farms in a particular region or country. Example, focusing on harmful emissions of a particular farm does not make a lot of sense in the conditions of a high overall (industrial) pollution in the region (contrary it will be a greater public tolerance toward farms polluting the environment); global worming increases productivity of certain farms in Bulgaria and other Northern countries since it improves cultivation conditions, reduces the risk of frost, allows product diversification, etc. (Bachev, 2013).

Sustainability as a system characteristic

Another approach characterizes sustainability of agricultural system as *"ability to satisfy a diverse set of goals through time"* (Brklacich et al.; Hansen; Raman). The goals generally include: provision of adequate food (food security), economic viability, maintenance or enhancement of natural environment, some level of social welfare, etc. Numerous frameworks for sustainability assessment of farms are suggested which include ecological, economic and social aspects (Fuentes; Lopez-Ridaura, Masera, and Astier; Sauvenier et al.). According to the objectives of the analysis and the possibilities for evaluation, divers and numerous indicators are used for employed resources, activities, impacts, etc.

However, usually there is a "conflict" between different qualitative goals – e.g. between increasing the yields and income from one side, and amelioration of the labor conditions (working hours, quality, safety, remuneration) and negative impact on environment from the other side. Therefore, there is a standing question *which element of the system is to be sustainable* as preference is to be given on one (some) of them on the expense of others[6]. Besides, frequently it is too difficult (expensive or practically impossible) to determine the relation between the farm's activity and the expected effects – e.g. the contribution of a particular (group of) farms to the climate change.

For resolution of the problem of "measurement" different approaches for the "integration" of indicators in "numeric", "energy", "monetary" etc. units are suggested. Nevertheless, all these "convenient" approaches are based on many assumptions associated with the transition of indicators in a single dimension, determining the relative "weight" of different goals, etc. Not rarely, the integration of indicators is based on wrong assumptions that the diverse goals are entirely interchangeable and comparable. For instance, the "negative effects form the farming activities" (environmental pollution, negative effects on human health and welfare, etc.) are evaluated in Euros and Dollars, and they are sum up with the "positive effects" (different useful farm products and services) to get the "total effect" of the farm, subsector, etc. Apparently, there is not a social consensus on such "trade-offs" between the amounts of farm products and destroyed biodiversity, the number of sick or dead people etc.

Also it is wrongly interpreted that sustainability of a system is always an algebraic sum of the sustainability levels of its individual components. In fact, often the overall level of sustainability of a particular system-the farm is (pre)determined by the level of sustainability of the (critical) element with the lowest sustainability – e.g. if a farm is financially unsustainable it breaks down. Besides, it is presumed that farm sustainability is an absolute state and can only increase or decrease. Actually, "discrete" state of non-sustainability (e.g. failure, closure, outside take over) is not only feasible, but a common situation in farming around the globe.

Another weakness of the described approach is that "subjectivity" of the specification of goals link criteria for sustainability not with the farm itself but with the value of pre-set goals depending on

[6] By definition the agricultural production means distruction of natural «sustainability» of natural eco-systems, in particular distruction and demolition of natural biodivercity.

the interests of the and/or stakeholders, the priorities of the development agencies, the standards of the analysts, the understanding of the scientist, etc.). In fact, there is a great variety of (types of) farms as well as preferences of the farmers and farm-owners – e.g. "own supply" with farm products and services; increasing the income or profit of farm households, preservation of the farm and resources for future generations, servicing communities, maximization of benefits and minimization of costs for final consumers, etc.

Besides, at lower levels of the analysis of sustainability (parcel, division, farm, and eco-system) most of the system objectives are exogenous and belong to a larger system(s). For example, satisfying the market demands less depends on product of a particular (group of) farm(s); many ecological problems appear on regional, eco-system, national, transnational or even global scale, etc.

Actually, the individual type of farms and agrarian organizations have their own "private" goals – profit, income, servicing members, subsistence, lobbying, group or public (scientific, educational, demonstration, ecological, ethical, etc.) benefits. These proper goals rarely coincide (and often are in conflict) with the goals of other systems (including the system as a whole). At the same time, the extent of achieving all these specific goals is a precondition (incentive, factor) for the sustainability of the diverse type of organizations of agrarian agents (Bachev, 2004).

Furthermore, different type of farms (individual, family, cooperative, corporative) have quite unlike internal structure as goals of individual participants not always coincide with the goals of the entire farm. While in the individual and family farm there is a "full" harmony (the owner-farmer), in more complex farms (partnership, cooperative, corporation) often there is a conflict between the individual and the collective goals ("division of ownership from farming and/or management"). For instance, in Bulgaria and around the globe there are many highly sustainable organizations with a changeable membership of the individual agents (partners, cooperative members, shareholders, etc.).

Therefore, the following question is to be answered: *sustainability for whom* in the complex social system – the entrepreneurs and the managers of the farm, the working owners of the farm, the farm households, the outside shareholders, the hired labor, the interests groups, the local communities, the society as a whole.

Last but not least important, many of described approaches for understanding and assessing sustainability do not include the essential "time" aspect. However, as rightly Hansen pointed it out: "if the idea for continuation in time is missing, then these goals are something different from sustainability" (Hansen). The assessment of the sustainability of the farm has to give idea about *future,* rather than to identify past and present states (the achievement of specific goals in a particular moment of time). For example, the worldwide experience demonstrates that due to the bad management, inefficiency or market orientation of the cooperative and public farms many of their members leave, fail or set up more efficient (and sustainable) private structures (Bachev, 2010). Simultaneously, many farms with low sustainability in the past are currently with an increasing socio-economic and ecological sustainability as a result of the changes in the ownership, strategy, state policy and support, liberalization and globalization of economies, etc.

Another approach interprets sustainability as an *"ability (potential) of the system to maintain or improve its functions"* (Hansen; Lopez-Ridaura, Masera and Astier; Mirovitskaya and Ascher; VanLoon et al.). Accordingly, initially main system attributes that influence sustainability are specified as: stability, resilience; survivability; productivity; quality of soil, water, and air; energy efficiency; wildlife habitat; self-sufficiency; quality of life; social justice, social acceptance, etc. After that, indicators for the measurement of these attributes are identified and their time trends evaluated usually for 5-10 and more years. For instance, most often for the productivity indicators such as yield, product quality, profit, income etc. are used. In the Agricultural Economics they are also widespread models for the "integral productivity" of the factors of production (land, labor, capital, innovation).

The biggest advantage of such as approach is that it links sustainability with the system itself and with its ability to function in future. It also gives an operational criterion for sustainability, which

provides a basis for identifying constraints and evaluating various ways for improvement. Besides, it is not complicated to quantitatively measure the indicators, their presentation as an index in time, and appropriate interpretation of sustainability level as decreasing, increasing, or unchanged. Since trends represent an aggregate response to several determinant that eliminate the needs to devise complex (and less efficient) aggregation schemes for sustainability indicators.

Above suggested methods however, have significant shortcomings, which are firstly related with the wrong assumption that the future state of the system can be approximated by the past trends. What is more, for newly established structures and farms without a (long) history it is impossible to apply that approach for assessing sustainability. However, in most East European countries and in some other regions (Former USSR, China, Vietnam etc.), namely such structures dominate in farming which emerged in the last 10-20 years.

Furthermore, the "negative" changes in certain indicators (yield, income, water and air quality, biodiversity, etc.) could be result of the "normal" processes of operation of the farm and larger systems, part of which the evaluated farm is (e.g. the fluctuation of market prices, the natural cycles of climate, the overall pollution as a result of industrial development, etc.) without being related with the evolution of sustainability of the farm. For instance, despite the environmentally friendly behavior of a particular farm, the ecological state of the farm could be worsening, if the needed "collective eco-actions" by all farms in the region are not undertaken.

In order to avoid above mentioned disadvantages, it is suggested to compare the farm indicators not in time, but with the average levels of farms in the sub-sector, region etc. However, the positive deviation from the averages not always gives a good indication for the sustainability of farms. There are many cases when all structures in a particular (sub)sectors and regions are unsustainable (dying sectors, uncompetitive productions, "polluting" environment subsectors, deserted regions, financial and economic crisis, etc.). Also there are examples for entire agro-ecosystems, of which the individual "sustainable" farms are a part, they are with a diminishing sustainability or unsustainable as a result of the negative externalities (on waters, soils, air) caused by farms in other regions and/or sectors of the economy, the competition for resources with other industries or uses (tourism, transport, residence construction, natural parks, etc.).

In addition, an essential problem of such an approach is that it is frequently impossible to find a single measure for each attribute. The later necessitates some subjective "commensuratement" and prioritizing of the multiple indicators, which is associated with already described difficulties of other approaches for sustainability assessment.

That approach also ignores the institutional and macroeconomic dimensions, the unequal goals of different type of farms and organizations, and the comparative advantages and the complementarity of the alternative governing structures (Bachev, 2004, 2010). Namely these factors are crucial when we talk about the (assessment of) sustainability of micro-economic structures like individual and family farms, agro-firms, and agro-cooperatives.

Therefore, sustainability of the individual type of farms cannot be properly understood and assessed without analyzing their comparative production and governance potential to maintain their diverse functions in the specific socio-economic and natural environment in which they operate (Bachev, 2004; Bachev and Peeters). For instance, the high efficiency and sustainability of the small-scale holdings for the part-time employment and subsistency in Bulgaria and East Europe cannot be properly evaluated outside of the analysis of the household and the rural economy. Similarly, the high efficiency of the cooperative farms during the post-communist transition has been caused not by the superior comparative productivity comparing to the family holdings, but on the possibility to

organize activities with a high dependency ("assets specificity") for members in the conditions of a great institutional and economic uncertainty[7].

As a production and management unit, the sustainability of a particular farm will be determined both from its activity and the managerial decisions (efficiency, ability for adaptation to evolving environment), *and* the changes in the external environment (market dynamics and crisis, public support and restrictions, extreme climate, etc.). The later are able to significantly improve or deteriorate the sustainability of individual farms, independent of the management decisions of the individual holdings. Example, direct subsidies from the EU have increased considerably the sustainability of many previously less sustainable Bulgarian farms (Bachev at al.).

Finally, there exists no farm (individual, from a certain type) or any other system, which is sustainable "forever". Therefore, the assessment of the "sustainability" of the farm is also associated with the answer to the question *for how long – for what period of time* we are talking about?

Considering the constant evolution of the features and the concept of sustainability from one side, and the evolution of the entire agrarian system from the other side, the sustainability is increasingly perceived "as a process of understanding of changes and adaptation to these changes" (Raman). According to that new understanding, the agrarian (and farm) sustainability is always specific in time, situation, and component, and characterizes the potential of agricultural systems to exist and evolve through adaptation to and incorporation of the changes in time and space. For example, in the current stage of the development respecting the "rights" of farm livestock and wild animals ("animal welfare") is a substantial attribute of the farm sustainability.

Moreover, the incorporated internal dynamisms of the system also implies an "end life" (there is no system which is sustainable forever) as a particular agrarian system is considered to be sustainable if it achieves (realizes) its "expected lifespan". For instance, if due to the augmentation of the income of the farm households the number of subsistence and part-time farms is decreasing while the agrarian resources and effectively transferred to other (novel, larger) structures, this process should not be associated with a negative change in the sustainability of farms in the region or subsector. On the other hand, if a particular farm is not able to adapt to the dynamic economic, institutional and climate changes through adequate modernization in technology, product, and organization, it is to be evaluated as low sustainable.

The characterization of sustainability has to be "system-oriented" while the system is to be clearly specified, including its time and spatial boundaries, components, functions, goals, and importance in the hierarchy. That implies taking into account the diverse functions of the agricultural farms at the current stage of development as well as the type and efficiency of the farm, and its links (importance, dependency, complementarity) with the sustainability (economy) of the households, the agrarian organizations, the region, the eco-system and the entire sectors (industry).

The sustainability has to reflect both the internal capability of the farm to function and adapt to environment as well as the external impact of constantly evolving socio-economic and natural environment on the operation of the individual farm. However, it is to be well distinguished the features of relatively independent (sub)systems – e.g. while the "satisfaction from farming activity" is an important social attribute of the farm sustainability, the modernization of the social infrastructure and services in rural areas is merely a prerequisite (factor) for the long-term sustainability of the individual farm.

Furthermore, the sustainability approach is to allow a comparative analysis of the diverse agricultural systems – e.g. farms of different type and kind in the country, farms in different countries, etc. Thus all approaches, which associate comparability only with the "continues (quantitative) rather than discrete property" of a system (Hansen ; Sauvenier et al.) are to be rejected.

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[7] For evaluating the governance efficiency of the farms and the agrarian organisations not always are appropriate the quantitative indicators, but it is also necessary a profound qualitative (comparative, discrete, structural) analisis (Bachev, 2004, 2011).

In fact, there is no reason to believe that the sustainability of an agricultural system could only increase or decrease. Discrete features ("sustainable"-"non-sustainable") are possible, and of importance for the farm managers, interests groups, policy makers (Bachev and Peeters).

Characterization of the sustainability must also be predictive since it deals with future changes rather than the past and only the present. And finally, it should be diagnostic, and to *focus intervention* by identifying and prioritizing constraints, testing hypothesis, and permitting assessments in a comprehensive way.

In addition, the sustainability has to be a criterion for the guiding changes in policies, and farming and consumption practices, agents' behavior, for focusing of research and development priorities, etc. In that sense, analysis of the levels and the factors of "historical" sustainability of farms (the "achieved level of sustainability") in a region, subsector, other countries, etc. are extremely useful for the theory and practice. The assessments of the past states help us both to precise the approach and the system and importance of sustainability indicators as well as identify critical factors and trends of the sustainability level of farms. On the later base, efficient measures could be undertaken by the managers, state authority, stakeholders etc. for increasing the current and the future level through education, direct support, innovation, restructuring, partnerships, etc.

Last but to least important, the sustainability is to allow facile and rapid diagnostic, and possibility for intervention through identification and prioritizing of restrictions, testing hypothesis, and giving possibility for comprehensive assessments. The later suggests that the sustainability concept and assessment is easy to understand and practical to use by the agents without evaluation to require huge costs (economic "justification" of undertaking assessment or increasing its precision).

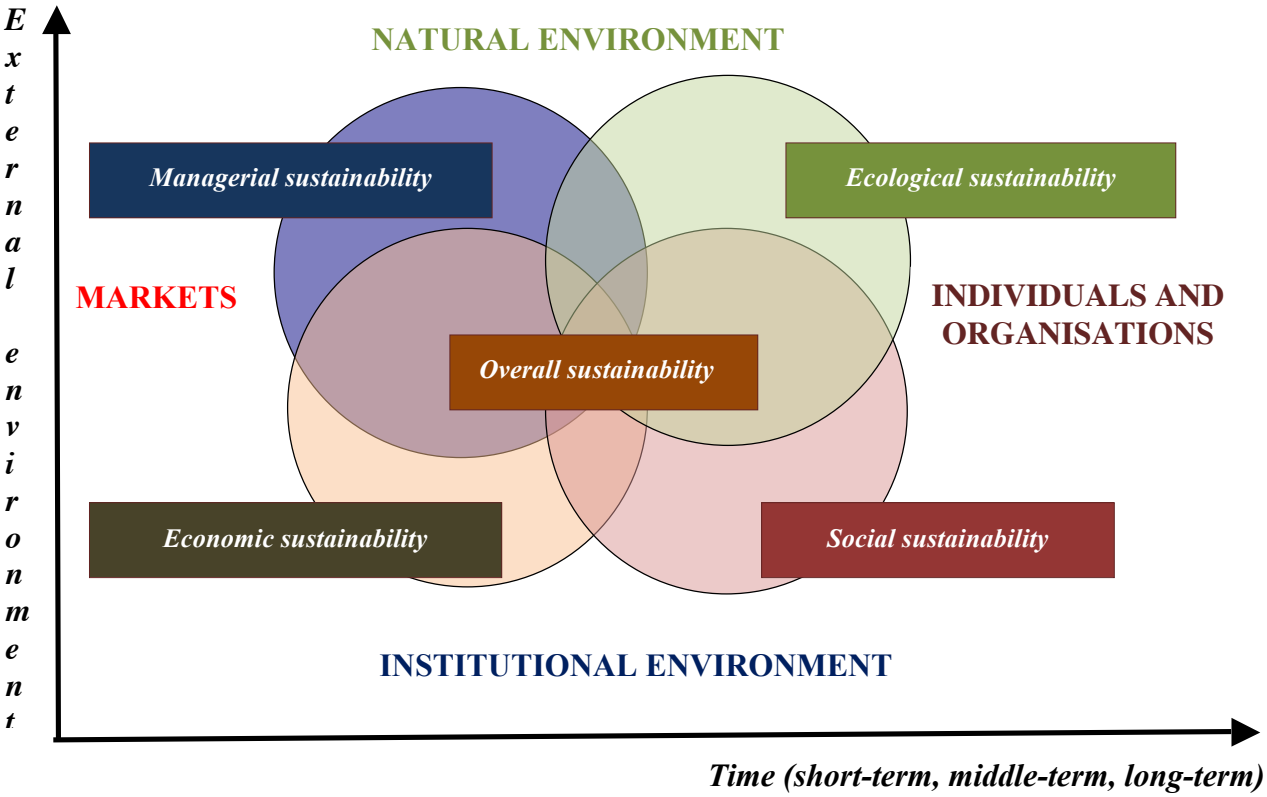
Accordingly it is to be worked out a system of adequate principles, criteria, and indicators for assessing the individual aspects and the overall level of sustainability of the farms in the specific conditions of each country, particular subsector, region, ecosystem, etc. Each of the elements of such a hierarchical system is to meet certain conditions (criteria) like: discriminating power in time and space, analytical soundness, measurability, transparency, policy relevance, transferability for all type of farms, relevance to sustainability issue, etc. (Sauvenier et al.).

For instance, in Bulgaria, like in many other countries, there is no such an "issue" nor any institutional restrictions (norms) exists, and when an assessment of the farm sustainability is performed it is not important to include the "contribution" to the greenhouse gas emission of the livestock and machineries[8]. At the same time, the number of animals on unit of farmland is of critical importance since the underutilization or over-exploitation of pastures as well as the mode of storing and utilization of the manure is critical for the sustainable exploitation of natural resources in the country.

The definition of the sustainability of the farm has to be based on the "literal" meaning of that term and perceived as a system characteristics and "ability to continue through time". It has to characterize all major aspects of the activity of a farm, which is to be *managerially sustainable*, and *economically sustainable*, and *ecologically sustainable*, and *socially sustainable* (Figure 1).

[8] Despite the fact that they are a major source of emmissions in the sector (EEA).

Figure 1. Sustainability of Farming Enterprise



Source: the author

Therefore, the farm sustainability characterizes the ability (internal potential, incentives, comparative advantages, importance, efficiency) of a particular farm to maintain its governance, economic, ecological and social functions in a long-term.

A farm is sustainable if:

- it has a good *governance efficiency* – that is to say it is a preferable for the farmers (owners) form and has the same or greater potential for governing of activities and transactions comparing to other farms or economic organizations (Bachev 2004);
- it is *economically viable* and efficient – that is to say it allows acceptable economic return on used resources and a financial stability of the enterprise;
- it is *socially responsible* in relation to farmers, hired labor, other agents, communities, consumers and society, that is to say it contributes toward improvement of welfare and living standards of the farmer and rural households, preservation of agrarian resources and traditions, and sustainable development of rural communities and the society as a whole;
- it is *environmentally friendly* – that is to say its activity is also associated with the conservation, recovery and improvement of the components of natural environment (lands, waters, biodiversity, atmosphere, climate, ecosystem etc.) and the nature as a whole, animal welfare, etc.

Depending on the combination of all four dimensions, the sustainability of a particular farm could be *high, good, unsatisfactory,* or the farm is *unsustainable*. For instance, the farm may have high governance and economic sustainability, and a low ecological and social sustainability. Nevertheless, in any case, the low or lack of sustainability of the farm in any of the four aspects (pre)determines the overall level of farm sustainability – e.g. inferior governance efficiency means a low overall sustainability of the farm.

The level of sustainability of the farm is to be evaluated in a *short-term* (the programing period), a *midterm* (the current generation of farmers) and a *long-term* (the next generation) scales.

The assessment of the sustainability of the farms has to be always made in the specific socio-economic, ecological, etc. rather than an unrealistic (desirable, "normative", ideal) context. In that sense, the employment of any "Nirvana approach" for determining the criteria for the sustainability (not related to the specific environment of the farm "scientific" norms of agro-techniques; a model of farming in other regions or countries; assumptions of perfectly defined and enforced property rights and institutional restrictions; an effectively working state administration; a situation without missing markets and public interventions, etc.) is not correct.

Taking into account of the external socio-economic and natural factors let also identify the major factors, which contribute to the sustainability of a particular farm – e.g. competitiveness, adaptability, evolution of farmers and agrarian organizations, access to public programs, level of state support, institutional environment, extreme climate, plant and livestock diseases, etc.

In a long-term there exists no economic organization if it is not efficient otherwise it would be replaced by more efficient organization (Bachev 2004). Therefore, the problem of assessment of the sustainability of the farms is directly related to the assessment of the levels of governance, production and ecological efficiency of farms.

In addition, it has to be estimated the potential of the farm for adaptation to the evolving market, economic, institutional, and natural environment through effective changes in the governing forms, size, production structure, technologies, behavior, etc. If the farm does not have potential to stay at or adapt to a new more sustainable level(s) it will diminish its comparative efficiency and sustainability, and eventually would be either liquidated or transformed into another type of organization (Bachev, 2004; Bachev and Peeters).

For instance, if a particular farm faces enormous difficulties meeting institutional norms and restrictions (e.g. new quality and environmental standards of the EU; higher novel social norms; new demands of rural communities, etc.) and taking advantage from the institutional opportunities (access to public subsidies and support programs); 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 in supply of needed farmland (a big demand for lands from other agrarian entrepreneurs or for non-agricultural use), or funding activities (insufficient own finance, impossibility to sell equity or buy a credit), or marketing output and services (changing demands for certain products or needs of cooperative members, a strong competition with imported products); or it is not able to adapt to existing ecological challenges and risks (e.g. weather warming, extreme climate, soils acidification, water pollution, etc.), then it would not be sustainable despite the high historical or current efficiency. Therefore, the *adaptability of the farm* characterizes to a greater extend the farm sustainability and has to be used as a main criteria and an indicator for sustainability assessment[9].

4. Mechanisms and forms of governance

A great part of agrarian activity is fully governed in a "decentralized" way by the *individual (private) actions* of independent agents (individual and family farms, agricultural cooperatives, agri-firms of different type, suppliers, buyers, consumers), the *"visible hand of the manager",* and the *market competition* ('invisible hand of market"). For instance, intra-farm distribution of land, labor, finance etc. resources between individual plots, productions, etc. is managed by the manager (the owner) of the farm; the "optimal" utilization of resources in agriculture and entire economy is "directed" and motivated by (free) market prices movement; farmers, suppliers and buyers adapt the production and technologies to market needs and demands; the low efficiency is 'punished" by the insufficient profit, failure, outside take over, etc.

[9] Our suggestion to use "adaptability" as a criteria and an indicator for sustainability has been already incorporated in the holistic System for Assessing Sustainability of Sgriculture Systems in Belgium (Sauvenier et al.).

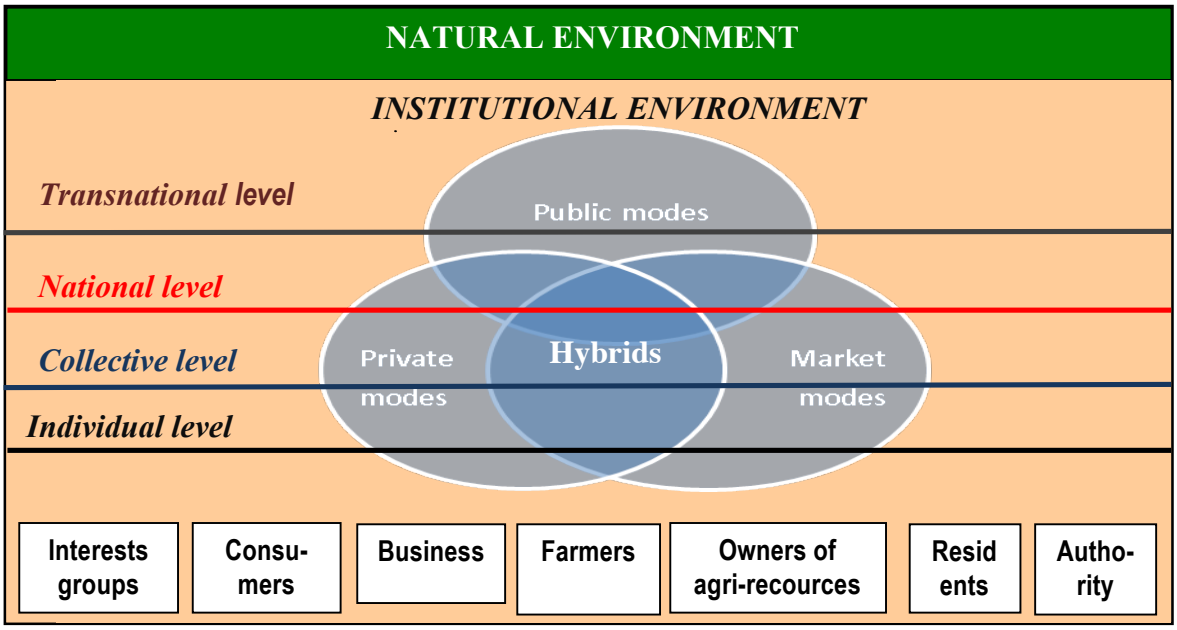
However, when the property rights are not well defined and enforced, and the transaction costs are high, then the market governance does not achieve the maximum efficiency (output, welfare) and sustainability in agrarian sector (Bachev 2004; Coase). The effective governance of farming activity usually necessitates *concerted (collective) actions* of a certain number of farms as it is in the case of efficient marketing of farming output, sustainable use of a common pasture, limited water supply, protection of local biodiversity, etc. Farming activity is also associated with significant positive and/or negative externalities, and production of multiple collective, quasi-public and public "goods and bads".

All these require a special *governance of relations* (cooperation, conflict resolution, costs recovery) between different farms as well as farmers and non-farmers (Bachev 2010). For example, adverse effects of agricultural activities on water and air quality are often felt by residents and businesses in neighborhood or other regions. Minimization of the negative effects is achieved through effective collective organization (partnership, cooperative, association, codes of behavior) (Hagedorn at al.) or "public intervention" (regulation, control, and sanctions by local and/or state authority) (Ostrom).

Governance of the modern farming sustainability more frequently requires "management" of collective actions of agents with diverse interests, power relations, awareness, capabilities etc. in large geographical, sectoral, and temporal scales, as well as additional" actions and integral management of social, economic, and natural resources at regional, national and transnational scale (Bachev 2010). That is associated with the needs for "balanced" development of rural areas and communities, and the management" of major natural resources and risks (waters, biodiversity, climate change), demanding an effective *regional, nationwide, international, and global management, coordination and control.*

The system of governance of farm sustainability includes a number of *distinct* mechanisms and modes, which manage behavior and actions of individual agents, and eventually (pre)determine the level of sustainability of farming enterprises (Figure 2):

Figure 2. Modes and levels of governance of farming enterprise's sustainability



Source: the author

First, *institutional environment* ("rules of the game") - that is the distribution of rights and obligations between individuals, groups, and generations, and the system(s) of enforcement of these

rights and rules (North). The spectrum of rights comprises material assets, natural resources, intangibles, activities, working conditions and remuneration, social protection, clean environment, food and environmental security, intra- and inter-generational justice, etc. The enforcement of rights and rules is carried out by the state, community pressure, trust, reputation, private modes, or self-enforced by agents.

A part of rights and obligations is constituted by formal laws, official regulations, standards, court decisions, etc. Usually there is a strict state regulation for ownership, usage, trade etc. of agricultural lands and other natural resources, mandatory standards for safety and quality of products, working conditions, environmental protection, animal welfare, etc. In addition, there are important *informal rights and rules* determined by tradition, culture, religion, ideology, ethical and moral norms, etc. In some East European countries many of the formal rights and rules 'do not work' well and the informal "rules of the game" predetermine ("govern") agents behavior as huge informal ("grey", "black") sector dominates (Bachev, 2010).

Institutional development is initiated by public (state, community) authority, international actions (agreements, assistance, pressure), and private and collective actions of individuals. It is associated with the modernization and/or redistribution of existing rights; and evolution of new rights and novel (private, public, hybrid) institutions for their enforcement. For instance, agrarian sustainability 'movement" initially emerged as a voluntary (private) initiative of individual farmers, after that it evolved as a "new ideology" (collective institution) of agrarian and non-agrarian agents, and eventually was formally "institutionalized" as a "social contract" and part of the "new public order". The EU membership of East-European countries is associated with adaptation of modern European legislation (Acquis communautaire) as well as better enforcement (outside monitoring, and sanction with non-compliance by EU). At current stage of development many of the institutional innovations are results of the pressure and initiatives of interests groups (eco-association, consumer organizations, etc.).

Institutions and institutional modernization create unequal incentives, restrictions, costs, and impacts for individual aspects of agrarian sustainability. If the rights on natural resources are not well-defined or enforced, that leads to inefficient and unsustainable organization and exploration, constant conflicts among interested parties, and low economic, social and ecological sustainability, and vice versa. For instance, property rights on major agrarian resources (material assets, lands, waters) were not completely identified, transfected and enforced during most of the post-communist transition in Bulgaria. For a long period of time the management of a considerable portion of agricultural activity was carried out by 'temporary" structures (Land Commissions, Liquidation Councils, Privatization Boards, tenancy farms based on a short-term lease, household farms for part-time employment). Consequently, a significant part of material, biological and intangible assets was destroyed, and low productivity, bad agro-technics, semi-market character, unsustainable exploitation of agricultural lands, and degradation of entire agri-ecosystems dominated (Bachev 2010).

In modern society formal and informal institutions (pre)determine to a great extent a considerable portion of the behavior of agrarian and non-agrarian agents, and the level of agrarian sustainability. Nevertheless, there is no perfect system of preset "outside" rules and restrictions that can manage effectively the entire activity and behavior of individuals in all possible and quite specific circumstances and relations of agrarian activity.

Second, *private modes* ("private or collective order") – those are diverse private initiatives and decisions of individual agents (managers, owners of labor, lands, material and financial resources), and special contractual and organizational arrangements (long-term supply and marketing contracts, voluntary eco-actions, voluntary or obligatory codes of behavior, partnerships, cooperatives and associations, brads and trademarks, labels). For instance, the conservation of natural resources is a part of the managerial strategy of many green (eco, green) farms. In EU there are numerous initiatives of farmer organizations, food industry, retail chains, and consumer

organizations, which are associated with improvement of socio-economic and ecological sustainability.

Individual agents take advantage of economic, institutional and other opportunities, and deal with institutional and market deficiencies through selection or designing (mutually) beneficial private forms and rules for governing their behavior, relations and exchanges. The private modes negotiate "own rules" or accepts (imposed) existing private or collective order, transfer existing rights or gives new rights to counterpart(s), and safeguards absolute and/or contracted rights of agents (Bachev 2004). A great part of agrarian activity is managed by the voluntary initiatives, private negotiations, "visible hand of the manager", or collective decision-making. Nevertheless, there are many examples of private sector deficiency ("failures") in governing of socially desirable farming activity such as environmental conservation, preservation of traditional structures and productions, preservation and development of rural areas, etc.

Third, *market modes* ("invisible hand of market") – those are various decentralized initiatives governed by the decisions of autonomous managers, free market price movements and market competition – e.g. spotlight exchange of resources, products and services; classical purchase, lease or sell contract; trade with high quality, organic etc. products and origins, agrarian and ecosystem services, etc. (Bachev 2010).

Individual agents use (adapt to, impact) markets, profiting from specialization of activity and mutually beneficial exchange, while their voluntary decentralized actions "direct" and "correct" overall distribution of resources between diverse activities, sectors, regions, ecosystems, countries. There are many examples for lack of individual incentives and choice and/or unwanted exchange, and unsustainable development in agrarian sector – missing markets, monopoly or power relations, positive or negative externalities, disproportion in incomes, and working and living conditions between rural and urban regions, etc. Free market "fails" to govern effectively farming activity and exchange, and leads to low socio-economic and ecological sustainability.

Forth, *public modes* ("public order") – various forms of public (community, government, international) interventions in market and private sector such as public guidance, regulation, assistance, taxation, funding, provision, property right modernization, etc. For instance, in EU there are huge programs for agrarian and rural development aiming at "proportional" development of agriculture and rural areas, protection of incomes and improving the welfare of rural population, conservation of natural environment, etc.

The role of public (local, national, and transnational) governance increases along with the intensification of activity and exchange, and growing interdependence of socio-economic and environmental activities. In many cases, the effective management of individual behavior and/or organization of certain activity through market mechanisms and/or private negotiation would take a long period of time, be very costly, could not reach a socially desirable scale, or be impossible at all. Thus a centralized public intervention could achieve the willing state faster, cheaper or more efficiently (Bachev, 2004).

Public "participates" in the governance of farm sustainability through provision of information and training for private agents, stimulation and (co)funding of their voluntary actions, enforcement of obligatory order and sanctioning for non-compliance, direct organization of activities (state enterprise, scientific research, monitoring), etc. There are a great number of "bad" public involvements (inaction, wrong intervention, over-regulation, mismanagement, corruption) leading to significant problems of sustainable development around the globe.

Fifth, *hybrid forms* – some combination of the above three modes like public-private partnership, public licensing and inspection of private organic farms, etc.

In a long run the specific system of governance of agrarian sector and farm sustainability (pre)determine the type and character of social and economic development (Bachev 2010). Depending on the efficiency of system of governance of farming sustainability "put in place", the individual farms, subsectors, regions and societies achieve quite dissimilar results in socio-economic

development and environmental protection, and there are diverse levels and challenges in economic, social and ecological sustainability of farms, subsectors, regions and agriculture.

5. Framework for assessing sustainability of farming enterprises in Bulgaria

Major definitions

Farming enterprise (The Farm): The farm is the main organizationally independent production and management unit in agriculture, which produce agricultural products and services (food for humans and animals, raw materials for processing, bio-energy, agro-ecosystem services, etc.) and/or maintain agricultural lands in a good agricultural and ecological state.[10]

The production of diverse agricultural products and services, **and** the organizational and the managerial apartness (autonomy) are essential criteria for the identification of the farm. Accordingly, a farm could be diversified in many productions and located in many areas, if it is managed by a single farmer. A particular entrepreneur may have several farms (e.g. an own farm and participation in a partnership, for organic and conventional production, etc.), which are separately registered and managed. A particular farm may not be entirely independent if it is a part of a vertically or horizontally integrated organization (ownership) – e.g. a part of the overall activity of a family firm, a cooperative, a research or educational institution, a division of the processing enterprise, restaurant, retailer of exporter.

Sustainability of the farm: Sustainability of farming enterprise characterizes the ability (internal capability) of a particular farm to exist in time and maintain in a long-term its governance, economic, ecological and social functions in the specific socio-economic and natural environment in which it operates and evolves.

Aspects of sustainability of farming enterprise

Sustainability of the farm has four aspects, which are equally important and have to be always accounted:

- *managerial sustainability* – the farm has to have a good or high absolute and comparative efficiency for the organization of its activity and (internal and external) relations, and a high adaptability to evolving socio-economic and natural environment, according to the specific preferences (type of the farm, character of production, long-term goals, etc.) and capability (training, experience, available resources, connections, power positions, etc.) of the owners of the farm;
- *economic sustainability* – the farm has to have a good or a high productivity for utilization of natural, personal, material, and financial resources, enough ("acceptable") economic efficiency and competitiveness, and "normal" financial stability of activity;
- *social sustainability* – the far has to have good of a high social responsibility regarding farmers, workers, other agents, communities, and consumers, and contribute to the conservation of agrarian resources and traditions, improving welfare and living standards of farm households, and for the development of rural communities and the society as a whole;
- *ecological sustainability* – the far has to have a good and high ecological responsibility and its activity behavior) to be associated with a necessary ("socially desirable") conservation, recovery and improvement of the components of natural environment (landscape, lands, waters, biodiversity,

[10] According to the formal regulations in Bulgarian and EU farms do not have to be involved in agricultural production to get public subcidies, participate in public support programs etc. but they have to "manage agricultural land" requiring "maintaining a good agricultural and ecological state of agricultural lands".

atmosphere, climate, ecosystem services, etc.) and the nature as a whole, respecting animal welfare and other socially determined standards related to the nature.

Levels of sustainability assessment

The assessment of the sustainability of the farms could (is to) be done at different levels:
- an individual farm,
- farms of a particular type or kind,
- farms of a particular eco-system,
- farms in a particular region,
- farms of a particular subsector of agriculture,
- all farms in the country,
- farms in different countries.

The assessments at higher economic and special levels are aggregate of the assessment of the individual farms.

For a rapid diagnostic of the farm sustainability at higher levels may be also used a system of selected (farm level or aggregated) indicators, which adequately reflect the major aspects of the sustainability of individual holdings. For instance, level of N pollution in the ground waters in a region (ecosystem) could give a good insight on ecological sustainability of the farms in that region (ecosystem).

It is also necessary to estimate the importance of different (kind and type of) farms in the overall resources utilization, total agricultural output, social and economic life, impacts on environment, etc. of relevant ecosystems, regions, subsectors, and agriculture as a whole. The later "determines" the link of the sustainability of the farms with the agrarian sustainability, and makes it possible to take decisions for improving public policies and strategies of farms and agrarian organizations for sustainable development

Farms classification

The level of the sustainability of farms and their contribution to the agrarian sustainability usually depends on the farms' type and kind. The later requires classification of the farms according to a number of criteria.

The major types of farms according to the juridical status (forma registration) in Bulgarian are: Physical Person, Sole Trader, Corporation, and Cooperative, specified by the national legislation. Furthermore, they are forms with an open, close, mixed, publicly traded etc. membership.

According to the type of ownership, the farms could be private, state, municipal, community, public, local, foreign, and hybrid.

According to the economic and managerial autonomy there are (totally) independent, horizontally integrated and vertically integrated holdings.

According to the market orientation the farms are: subsistence holdings and farms for servicing of members, "semi-market" farms, commercial farms, and business enterprises.

According to their size the agricultural farms are: small scale, middle sized, and large as different criteria could be used to classify them for this indication – the size of managed land, number of grazed livestock, number of employed labor, gross income, "economic size" etc.

According to the production specialization the farms in the country are classified in more or less aggregated groups: crop production (field crops, horticulture, permanent crops, etc.), livestock production (grazing livestock, pigs, poultry and rabbits, etc.). mixed production (mixed crops, mixed livestock, mixed crop-livestock, etc.).

According to the ecological orientation and certification the farms are: with organic certification or in a transition period to organic certification, with conventional production, with ecological production, with mixed production, etc.

According to the special private or social objectives the farms could be: experimental, demonstrative, educational, conservation and recovery of traditional breeds of livestock or varieties of crops, protected and/or certified origins, products, services etc.

According to the location the farms are classified in different groups depending on which ecosystems they include or are part of (plain, mountainous, semi-mountainous, riverside, seaside, protected zoned and natural reserves, with high risk, etc.), and/or which administrative (region, municipality, country), geographical (border, North Bulgaria, etc.) or social and economic (well developed, developing, underdeveloped, unpopulated, declining activity) regions they are located in.

Taking into account of "time factor"

The assessment of the sustainability of the farms always is done in a specific historical moment of time (a certain date), which inevitably reflects the existing specific knowledge and preferences for the state of the farms and its impacts, the possibilities to identify, monitor, measure, and evaluate the different aspects of the sustainability and impacts of the farms, the available information and access to the first hand data from the farms, the needs of the farms' managers and agrarian policy, etc. in that particular moment (period) of time.

For the assessment of many of the dimensions of sustainability of the farms it is to be used (averaged) annual or multiannual data. That is required by the needs to eliminate the big variations of levels of the snapshot states (data, moment "picture") result of the "natural" economic, investment, agronomic, biological or climate cycles (e.g. profitability, financial liability, productivity, number of livestock, inputs of chemicals, volume of irrigation, crop rotation, etc.) or unavailability of another report, statistical, accountancy, first hand etc. information.

Two type of the assessment of the sustainability of the farm have to be distinguished:

- *historical* (retrospective) – for the level and dynamics during a certain "past" period of the evolution of the farm;
- *current* (actual) – giving idea about the "current" state of the farm and the likely level of sustainability in a shorter or longer perspective.

Moreover, it is to be distinguished and made assessment on the *short-term, mid-term* and *long-term sustainability* of the farms.

Often the sustainability of the farm is changeable in time, which necessitates the estimation of the realized or likely level for a particular (practical) horizon of time:

- *short-term* – the current programing period of the implementation of EU CAP or 5-7 years;

- *mid-term* – a relatively longer period of times (e.g. 5-10 years), as for the current assessment is necessary to take into account the remaining time of current generation of active farmers. The majority of Bulgarian farmers are in advanced age and they are going to retire in coming (10) years – that is why it is appropriate to use 8-10 years for that type of sustainability assessment.

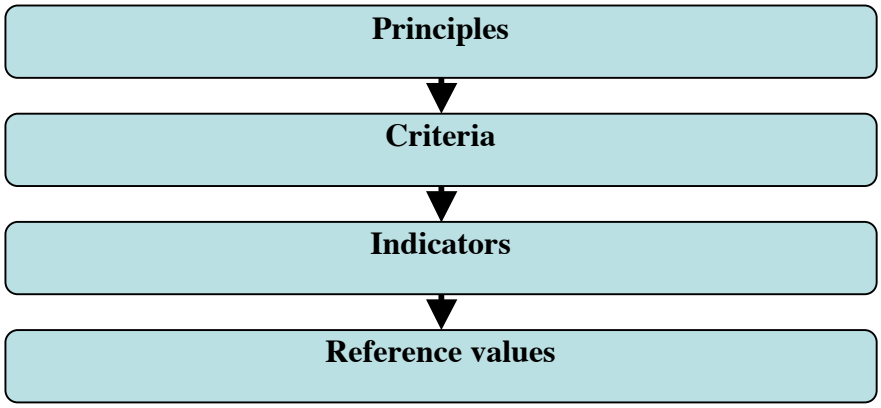
- *long-term* – in a foreseeable longer-term 10-15 and more years, which is to be also greatly related with the conservation and the transfer of the farms and agrarian resources into the next generation(s).[11]

[11] Assessment of the farms sustainability in a very long term (25-30 and more years) is both difficult (impossible) and impractical since there is litle (realible) information about future trends, factors, preferences, impacts etc. For such long-term "foresights" other methods of assessments are more appropriate (see COST) but they are beyond of the scope of this study.

Hierarchical levels and formulation of indicators for assessment

The hierarchical levels, which facilitate the formulation of the system for assessing the sustainability of the farms, include well determined and selected *principles, criteria, indicators* and *reference values* (Figure 3).

Figure 3. Hierarchical levels of system for assessment of sustainability of farming enterprise



Source: adapted by the author from Sauvenier et al.

Principles – the highest hierarchical level associated with the multiple functions of the agricultural farms. They are universal and represent the states of the sustainability, which are to be achieved in the four main aspects – managerial, economic, social and ecological. For instance, a Principle "the soil fertility is maintained or improved" in the Ecological aspect of the farm sustainability.

Criteria – they are more precise from the principles and easily linked with the sustainability indicators. They represent a resulting state of the evaluated farm when the relevant principle is realized. For instance, a Criteria "soil erosion is minimized" for the Principle "the soil fertility is maintained or improved".

Indicators – quantitative and qualitative variables of different type (behavior, activity, input, effect, impact, etc.), which can be assessed in the specific conditions of the evaluated farms, and allow to measure the compliance with a particular criteria. The set of indicators is to provide a representative picture for the farm sustainability in all its aspects. For instance, an Indicator "the extent of application of good agro-technics and crop rotation" for the Criteria "soil erosion is minimized".

Reference value – these are the desirable levels (absolute, relative, qualitative, etc.) for each indicator for the specific conditions of the evaluated farms. They assist the assessment of the sustainability level and give guidance for achieving (maintaining, improving) sustainability of the farm. They are determined by the science, experimentation, statistical, legislative or other appropriate ways.

As a Reference value it could be used:

- *specific rule or standard* – e.g. application of good agricultural and ecological practices; labor safety standards; standards for animal welfare, etc.
- *formal restriction* – e.g. norm for acceptable pollution of waters, soils and air; ecological limit for Nitrate pollution of lands and waters, etc.;
- *norm for comparison* – e.g. optimum rate for chemical fertilization, pesticides application, water irrigation; extent of conservation of traditions, etc.;

- *minimum or maximum requirement* - e.g. lack of unsolvable problems for supply of needed agricultural land, labor, etc.; optimum extend of farm's liability, etc.;
- *limits of variation* – e.g. number of livestock on a unit of pasture land; diversity of population of wild birds and animals, etc.;
- *average values for similar farms* – e.g. average productivity and profitability of the farms in the region or subsector; diversity of cultural plants, etc.;
- *trends* – e.g. level of income and welfare of rural households, emissions of greenhouse gasses from the farms; level of diversity of insects and plants, etc.;
- *personal or collective preferences* - e.g. satisfaction from farming activity, preservation of traditions, varieties and technologies, etc.

Most of the Reference values show the level, which (presume to) guarantee the long-term farm sustainability. Depending on what extent it is achieved or overcome the farms could be with a *high, good*, or *low sustainability*, or to be *unsustainable*. For instance, the farms with higher than the average for the sector profitability or lower soils' acidity are more sustainable then others, while farms with accordingly inferior or greater values are with lower economic or ecological sustainability or (economically, ecologically) unsustainable.

Another part of the Reference values characterizes a condition for the sustainability, deviation of which indicates the state of insufficient sustainability or unsustainability. For instance, the farms not complying with the official standards for labor (working, safety etc.) conditions, animal welfare, application of banned chemicals and technologies, producing forbidden products (cannabis), etc.

The content and the importance of the principles, criteria, indicators and reference values are formulated/selected by the leading experts on farm sustainability. Moreover, they have to be permanently updated for the specific conditions of evaluated farms and according to the development of science, measurement and monitoring methods, available information, industry standards, social norms, etc.

We have profoundly studied out the available academic publications, official documents, and experiences in Bulgaria and other countries as well as carried our numerous consultations with the leading national and international experts in the area. On that base we have prepared a list (system) with potential principles, criteria, indicators and reference values for the contemporary conditions of Bulgarian farms.

After that we organized a special expertise with ten leading scholars working on the sustainability of the farms from the Institute of Agricultural Economics and the University of National and World Economy in Sofia, and the Agrarian University in Plovdiv. The experts discussed, complemented and evaluated the importance of the suggested by us principles, criteria, indicators and reference values, and selected the most adequate ones for the contemporary conditions of the development of Bulgarian farms (Table 1).

For the selection of the indicators for the sustainability assessment a number of criteria have been used[12]: relevance to reflect sustainability aspects, discriminating power in time and space, analytical soundness, intelligibility and synonymity, measurability, governance and policy relevance, and practical applicability. The goal was to select a balanced (around a half for the governance, economic and social aspects, and the rest for the ecological aspect) system with sufficient (1-5 for each criteria), but not to many indicators (not more than 50), which would guarantee the efficiency of use.

[12] For validation of sustainability indicators widely used method of Multicriteia Expert Assessment has been used, which is well presented in profecioanal publications (Sauvenier et al.).

Table 1. Principles, criteria, indicators and reference values for assessing sustainability of farms in Bulgaria

Principles	Criteria	Indicators	Reference values
Governance aspect			
Acceptable governance efficiency	Efficiency for governing of activity in relation to other feasible organization	Comparative efficiency for supply and management of workforce	Similar to alternative organization
		Comparative efficiency for supply and management of natural resources	Similar to alternative organization
		Comparative efficiency for supply and management of material inputs	Similar to alternative organization
		Comparative efficiency for supply and management of innovations	Similar to alternative organization
		Comparative efficiency for marketing of products	Similar to alternative organization
		Comparative efficiency for supply and management of finance	Similar to alternative organization
Sufficient adaptability	Farm adaptability	Level of adaptability to market environment	Good
		Level of adaptability to institutional environment	Good
		Level of adaptability to natural environment	Good
Economic aspect			
High economic efficiency	Economic efficiency of resource utilization	Level of labor productivity	Similar to the average for the sector
		Land productivity	Similar to the average for the sector
		Livestock productivity	Similar to the average for the sector

	Economic efficiency of activity	Profitability of production	Similar to the average for the sector
		Farm Income	Acceptable by the owner
Good financial stability	Financial capability	Return on own capital	Average for the sector
		Overall Liquidity	Average for the sector
		Financial autonomy	Average for the sector
Social aspect			
Good social efficiency for farmer and farm households	Farmers welfare	Income per a member of farm household	Similar to other sectors in the region
		Satisfaction of activity	Acceptable for the farmer
	Working conditions	Compliance with formal requirements working conditions	Standards for working conditions in the sector
Acceptable social efficiency for not farmers	Preservation of rural communities	The extent farm contributes to preservation of rural communities	Overall actual contribution
	Preservation of traditions	The extent farm contributes to preservation of traditions	Overall actual contribution
Ecological aspect			
Protection of agricultural lands	Chemical quality of soils	Soil organic content	Similar to the typical for the region
		Soil acidity	Similar to the average for the region
		Soil soltification	Similar to the average for the region
	Soil erosion	Extent of wind erosion	Similar to the typical for the region
		Extent of water erosion	Similar to the typical for the region
	Agro-technique	Crop rotation	Scientifically recommended for the region
		Number of livestock per ha	Within limits of acceptable number
		Rate of N fertilization	Within limits of acceptable amount
		Rate of K fertilization	Within limits of acceptable amount
		Rate of P fertilization	Within limits of acceptable amount
		Extent of application of Good Agricultural Practices	Approved rules
	Waste management	Manure storage type	Rules for manure storage

	Water irrigation	Irrigation rate	Scientifically recommended rate for the region
Protection of waters	Quality of surface waters	Nitrate content in surface waters	Similar to the average for the region
		Pesticide content in Surface waters	Similar to the average for the region
	Quality of ground waters	Nitrate content in ground waters	Similar to the average for the region
		Pesticide content in ground waters	Similar to the average for the region
Protection of air	Air quality	Extent of air pollution	Acceptance from rural community
Protection of biodiversity	Variety of cultural species	Number of cultural species	Similar to the average for the region
	Variety of wild species	Number of wild species	Similar to the average for the region
Animal welfare	Norms for animal welfare	Extent of compliance With animal welfare norm	Standards for animal breeding
Preservation of ecosystem services	Quality of ecosystem service	Extent of preservation of ecosystem services	Acceptance from communities

Source: the author and experts assessment

Calculation, presentation, interpretation and integration of assessments

For assessing the sustainability level of individual farms it is necessary to use firsthand information provided by the farm managers (for behavior, activity, results, objectives), available report and statistical information, expert assessments by the professionals in the area, etc.

Often there are a number of (quite) different ways for calculating the level of each particular indicator. For instance, the Profitability of Production of the farm may be calculated by dividing the Net (Total, Agricultural) Income, the Gross (Total, Agricultural) Profit, the After Tax Profit etc. to the Total (Overall, Agricultural) Costs, the Current (Overall, Agricultural) Costs, the Variable (Overall, Agricultural) Costs etc. It is the same for most of other governance, economic, social and ecological indicators. It is important always to use the same (and most appropriate for the specific conditions of the evaluated farm) approach for calculating all sustainability indicators.[13] The same applies for the Reference Values employed in the sustainability assessment.

After the qualitative or quantitative value of every indicator is determined, it is to be compared with the relevant Reference Value. A level of a particular indicator on, within or close to the Reference Value(s) means a good or high sustainability, and vice versa.

Indicators which are not appropriate for a particular farm are to be excluded – e.g. "compliance with animal welfare norms" for holdings without livestock activity, "preservation of rural communities" for a single and remote from the residence areas high mountainous farm(s), etc.

Usually there is a "state of sustainability" of the farm with different values of a particular indicator. Thus the level of the sustainability is to be specified. We have asked the experts to

[13] E.g. details about calculation of most of the governance and economic indicators for the Bulgarian conditions are presented in our previous publications (Bachev, 2010a ; Koteva and Bachev).

determine different qualitative states of the sustainability (high, good, low, insufficient, none) for diverse deviations of the indicators values from the Reference values (Table 2).

Table 2. Levels of sustainability depending on the extent of achievement of the Reference Values for the sustainability indicator

Indicators	Reference value (RV)	Levels of sustainability				Non sustainable
		High	Good	Low	Insufficient	
1.Comparative efficiency for supply and management of workforce	Similar to alternative organization	>RV	= RV	< RV	< < RV	< < < RV
2. Comparative efficiency for supply and management of natural resources	Similar to alternative organization	>RV	= RV	< RV	< < RV	< < < RV
3. Comparative efficiency for supply and management of material inputs	Similar to alternative organization	>RV	= RV	< RV	< < RV	< < < RV
4. Comparative efficiency for supply and management of innovations	Similar to alternative organization	>RV	= RV	< RV	< < RV	< < < RV
5. Comparative efficiency for marketing of products	Similar to alternative organization	>RV	= RV	< RV	< < RV	< < < RV
6. Comparative efficiency for supply and management of finance	Similar to alternative organization	>RV	= RV	< RV	< < RV	< < < RV
7. Level of adaptability to market environment	Good	>RV	= RV	< RV	< < RV	< < < RV
8. Level of adaptability to institutional environment	Good	>RV	= RV	< RV	< < RV	< < < RV
9. Level of adaptability to natural environment	Good	>RV	= RV	< RV	< < RV	< < < RV
10. Level of labor	Similar to the average	>RV	= RV	< RV	< < RV	< < < RV

productivity	for the sector					
11. Land productivity	Similar to the average for the sector	>RV	= RV	< RV	< < RV	< < < RV
12. Livestock productivity	Similar to the average fo the sector	>RV	= RV	< RV	< < RV	< < < RV
13. Profitability of production	Similar to the average fo the sector	>RV	= RV	< RV	< < RV	< < < RV
14. Farm Income	Acceptable by the owne	>RV	= RV	< RV	< < RV	< < < RV
15. Return on own capital.	Average for the sector	>RV	= RV	< RV	< < RV	< < < RV
16. Overall liquidity	Average for the sector	>RV	= RV	< RV	< < RV	< < < RV
17. Financial autonomy	Average for the sector	>RV	= RV	< RV	< < RV	< < < RV
18. Income per a member of farm household	Similar to other sectors in the region	>RV	= RV	< RV	< < RV	< < < RV
19. Satisfaction of activity	Acceptable for the farm	>RV	= RV	< RV	< < RV	< < < RV
20. Compliance with formal requirements for working conditions	Standards for working conditions in the sector	>RV	= RV	< RV	< < RV	< < < RV
21. The extent farm contributes to preservation of rural communities	Overall actual contribution	>RV	= RV	< RV	< < RV	< < < RV
22. The extent farm contributes to preservation of traditions	Overall actual contribut	>RV	= RV	< RV	< < RV	< < < RV
23. Soil organic content	Similar to the typical for the region	>RV	= RV	< RV	< < RV	< < < RV
24. Soil acidity	Similar to the average for the region	<RV	= RV	> RV	>>RV	>>>RV
25. Soil soltification	Similar to the average for the region	<RV	= RV	> RV	>>RV	>>>RV
26. Extent of wind erosion	Similar to the typical fo the region	<RV	= RV	> RV	>>RV	>>>RV
27. Extent of water erosion	Similar to the typical for the region	<RV	= RV	> RV	>>RV	>>>RV
28. Crop rotation	Scientifically recommer for the region	= RV	> RV	>>RV	>>>RV	>>>>RV
29. Number of Livestock per ha	Within limits of acceptable number	= RV	> RV<	>>RV<<	>>>RV<<<	>>>>RV<<<<
30. Rate of N fertilization	Within limits of acceptable amount	= RV	> RV<	>>RV<<	>>>RV<<<	>>>>RV<<<<

31. Rate of K fertilization	Within limits of acceptable amount	= RV	> RV<	>>RV<<	>>>RV<<<	>>>>RV<<<<
32. Rate of P fertilization	Within limits of acceptable amount	= RV	> RV<	>>RV<<	>>>RV<<<	>>>>RV<<<<
33. Extent of application of Good Agricultural Practices	Approved rules	= RV	> RV	>>RV	>>>RV	>>>>RV
34. Manure storage type	Rules for manure storage	= RV	> RV	>>RV	>>>RV	>>>>RV
35. Irrigation rate	Scientifically recommended rate for the region	= RV	> RV<	>>RV<<	>>>RV<<<	>>>>RV<<<<
36. Nitrate content in surface waters	Similar to the average for the region	>RV	= RV	< RV	< < RV	< < < RV
37. Pesticide content in surface waters	Similar to the average for the region	>RV	= RV	< RCV	< < RV	< < < RV
38. Nitrate content in ground waters	Similar to the average for the region	>RV	= RV	< RV	< < RV	< < < RV
39. Pesticide content in ground waters	Similar to the average for the region	>RV	= RV	< RV	< < RV	< < < RV
40. Extent of air pollution	Acceptance from rural community	>RV	= RV	< RV	< < RV	< < < RV
41. Number of cultural species	Similar to the average for the region	>RV	= RV	< RV	< < RV	< < < RV
42. Number of wild species	Similar to the average for the region	>RV	= RV	< RV	< < RV	< < < RV
43. Extent of compliance with animal welfare norm	Standards for animal breeding	>RV	= RV	< RV	< < PC	< < < RV
44. Extent of preservation of ecosystem services	Acceptance from communities	>RV	= RV	< RV	< < RV	< < < RV

Source: experts assessment

Suggested approach let us determine and analyze the sustainability level for each indicator as well as undertake measures for the improvement of sustainability for areas (indicators) with inferior values. For instance, all indicators for the sustainability in a particular farm may be good but for the compliance with the animal welfare norms. Thus putting efforts to introduce and enforce the animal welfare standards in the farm would enhance the ecological and the overall sustainability of that holding.

In order to present visually in a graphic form diverse aspects and dimensions of the sustainability of a particular farm, and integrate different type of indicators for a particular criterion, principle and aspect of sustainability for one or a group of farms, the qualitative levels of each indicator are transformed into unitless Index of Sustainability (IS_i) using Table 3.

Table 3. Scale for transformation of qualitative levels into Index of Sustainability for a particular indicator

Levels of sustainability	Index of Sustainability (IS_i)
High	1
Good	0,75
Low	0,50
Unsatisfactory	0,25
Nonsustainable	0

Source: the author

Figure 3 presents a result of the assessment on the level of sustainability of a case study farm in Bulgaria with a mix crop-livestock activity (Figure 4). It is apparent that in order to increase the overall sustainability of the holding it is to improve significantly the environmental protection activities of the farm. The later implies both a change in the strategy of the farm as well as targeted support policy of the state for stimulation of the eco-activity (function) of the farm.

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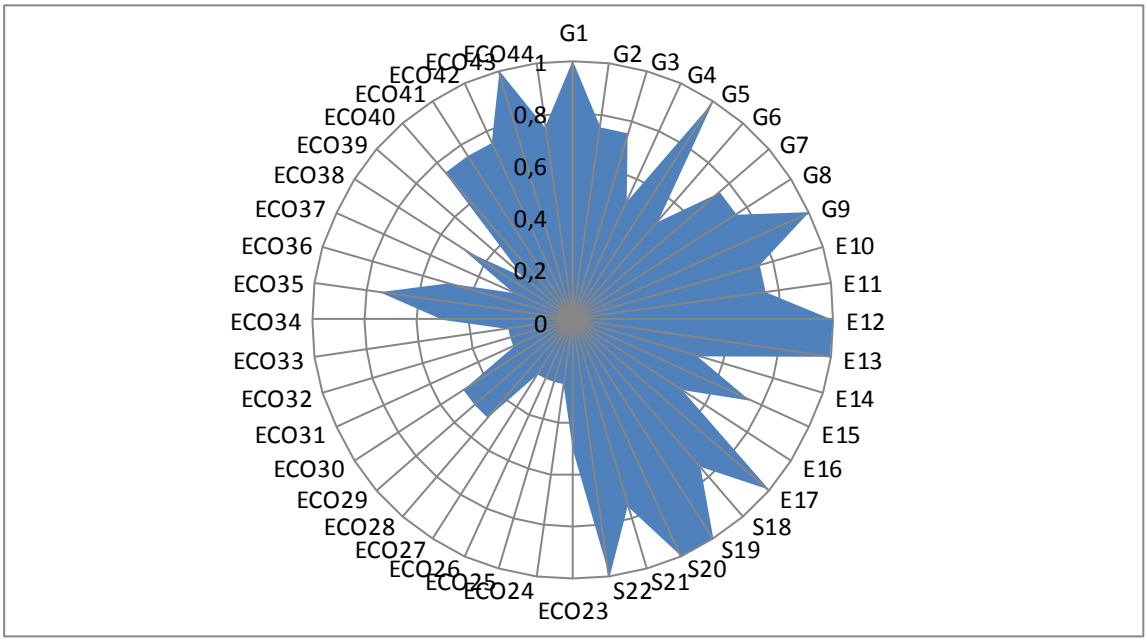
Figure 4. Level of sustainability of a case study farm for all indicators



Source: the author

Very often individual indicators for each criterion and/or different criteria, principles and aspects of sustainability are with unequal, and frequently with controversial levels. That significantly hardened the overall assessment and requires an integration of the indicators.

The Integral Index for a particular criterion (IS_c), principle (IS_p), aspect of sustainability (IS_a) or overall level for the farm (IS_o) is an arithmetic average of indices of relevant indicators:

$$IS_{(c, p, a, o)} = \sum ИУ_{(i, c, p, a)}/n \qquad (n - \text{number of indicators})$$

Integral Index 1 or close to 1 means a high sustainability, Index around 0.75 means good sustainability, while Index 0 or close to 0 a state of nonsustainability. For interpretation of the integral assessments the Table 4 could be used.

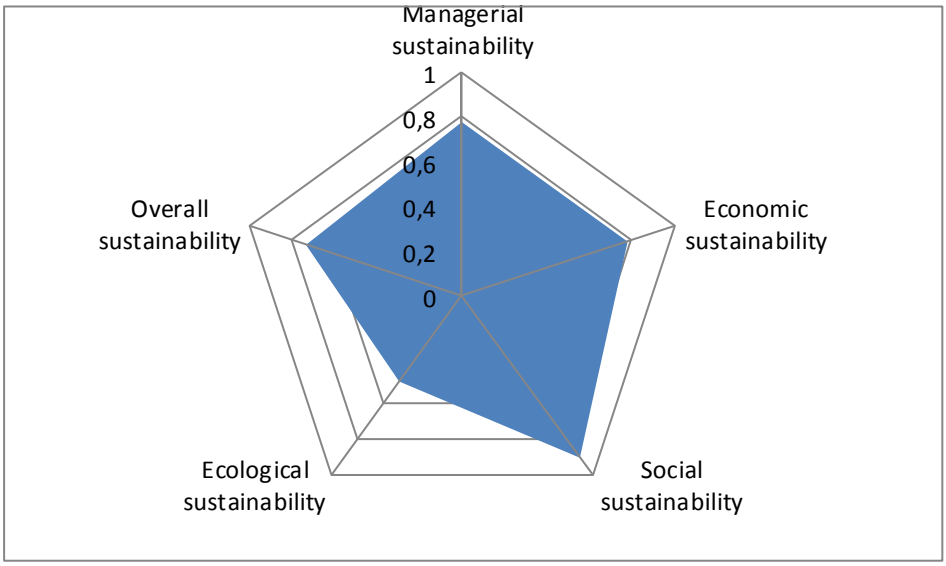
Table 4. Limits for grouping of integral assessments of sustainability of farms

Integral Index of Sustainability ($ISI_{p,a,o}$)	Sustainability level
0,86 - 1	High
0,63 - 0,85	Good
0,36 - 0,62	Low
0,13 - 0,37	Unsatisfactory
0 - 0,12	Nonsustainable

Source: the author

Figure 5 represents the integral assessment of a case study farm for all aspects of the sustainability. It is apparent that the evaluated farm is with a good overall sustainability, which is determined by the high social sustainability and the good economic and managerial sustainability. At the same time the evaluated holding is with a low integral ecological sustainability, which requires taking measures for improvement of eco-performance.

Figure 5. Integral level of managerial, economic, social and ecological sustainability of a case study farm



Source: the author

It is well known that every integration of indicators of different type is associated with much provisionality, as it implies an "equal importance" and certain "interchangeability" of the individual dimensions of sustainability. In particular, it presumes, that a low level of sustainability or a state of non-sustainability for one (several) indicator(s) could be "compensated" with a higher value of another (other) indicator(s) without a change in the integral level of sustainability. However, the later not always is true for the majority of indicators for the managerial and economic sustainability in a short-term, as well as in a longer-term for many of the indicators for social and ecological sustainability. For instance, a lack of governance or economic sustainability rapidly makes the entire farm unsustainable (transformation, failure).

According to the panel of experts it is not necessary to give a different weight for the individual indicators when calculating the Integral Index for a particular criteria, principle, aspect or the overall level of sustainability. However, when the level of sustainability for any of the indicators

is unsatisfactory or zero, it is to be analyzed its importance for the evaluated farm(s). Furthermore, in longer periods of analysis the lowest level of sustainability for any indicators (criterion) will also (pre)determine the integral level for the particular aspect and the overall level of the sustainability of the farm (Bachev, 2010).

The overall and particular (aspect, principle, criterion, indicator) sustainability of the farms of a specific type, kind, and location is an arithmetic average of these of the individual farms.

The integration of indicators does not diminish the analytical power since it makes it possible to compare sustainability of the diverse aspects of the individual farm as well as of farms of different type and the entire sector. Besides, since the assessment of the sustainability levels for the individual indicators is a (pre)condition for the integration itself, the primary information always is available and could be analyzed in details if that is necessary.

Depending on the final users and the objectives of the analysis the extent of the integration of indicators is to be differentiated. While farm managers, investors, researchers etc. prefer detailed information for each indicator, for decision-making at the highest level are needed more aggregated data for the farms as a whole, major aspects of sustainability etc.

6. Identification and assessment of mechanisms and forms of governance of farm sustainability

Governance "needs" are associated with the necessity for building adequate mechanisms and forms for stimulation, coordinating, directing, and harmonizing behavior and actions of interested agents, for maintaining economic, social, and ecological functions of agriculture, and reviling problems and risks associated with agrarian sustainability and its individual aspects.

Certain governing mechanisms and modes exist in the moment of assessment, since they are a part of the overall institutional environment or result of the "development" of market, private and public order in agrarian sphere. It is to be analyzed to what extent managerial needs associated with major aspects of farm sustainability are "satisfied" by existing system of governance. Specific forms of governance of farm sustainability, which are used in the conditions of a particular farm, ecosystem, region, subsector, or agriculture are to be identified and evaluated. For instance, integration of a farmer in the "organic" supply chain coordinates well relations between producers and final consumers, and contributes to economic and ecological sustainability. Nevertheless, the positive effect could be negligible, if simultaneously there is not established a mode for coordination of relations (collective actions) with other farmers in the region or a system for achieving required minimum scale for a positive eco-impact. Besides, needs of governance of social sustainability not always are satisfied effectively by introduction of organic production principles.

Analysis is to embrace the entire system of governance of farm sustainability, and characterize formal and informal institutions, market, private, collective and public forms of governance. The entire spectrum of *"de-facto"* (rather than "de-jure") rights on material and ideal assets (material and intellectual agrarian and eco-products), natural resources, certain activities, clean nature, food and eco-security, intra- and inter-generational justice, etc., which are related to farm sustainability, are to be scrutinized. Furthermore, efficiency of the enforcement system of rights and rules by the state, community pressure, trust, reputation, private and collective modes, and by agents themselves is to be analyzed.

After that, an assessment is to be made on which extent the institutional environment creates incentives, restrictions and costs for individual agents and society for achieving farm sustainability and its economic, social and ecological dimensions, intensifying exchange and cooperation between agrarian agents, increasing productivity of resource utilization, inducing private and collective initiatives and investments, developing new rights, decreasing divergence between social groups and regions, responding to socio-economic and ecological challenges, conflicts and risks, etc.

Next, various market forms of governance of agrarian activity are to be specified, and the extent in which "free" market contributes to coordination (direction, correction) and stimulation of farming activity and exchange, and effective allocation and utilization of agrarian (material, finance, intellectual, natural, etc.) resources analyzed.

Market governance is effective for an immense portion of activity and transactions in agrarian sector, since it is characterized with many participants, standard products, "free" competition and price formation, high frequency of transactions and low specificity of assets (Bachev, 2004). Despite that there are numerous "failures" of market in governing of critical for farms activities like innovations, long-term investments, infrastructural development, environmental protection, etc. which are associated with a high uncertainty and risk, low frequency and appropriability, great specificity, insufficient size, etc.

It has to be identified all cases of market "failure" leading to lack or insufficient individual incentives, impossibility for a choice or unwanted exchange, and deficiency for effective maintenance of economic, social and ecological functions offarms. For instance, many stallholders experience significant difficulties and costs of market exchange, often face situations of "missing" markets, monopoly or asymmetry trade positions, while the sector "produce" considerable positive or negative externalities, and serious social, economic and ecological challenges and risks.

After that it is to be analyzed how and with what forms individual agents take advantage of economic, market, institutional etc. opportunities, and overcome existing restrictions and risks through choice or design of new (mutually) beneficial private or collective modes (rules, organization) for governing their activity and relationships.

Agrarian sector is rich of diverse private organizations of different type based on contract agreements, quasi or complete (horizontal, vertical) integration in land, labor, finance, inputs supply, marketing of products, etc. (Bachev 2010). For instance, collective marketing organization of farmers increases negotiation positions, decreases market uncertainty and risks for members, minimizes costs (searching of information, certification, promotion and marketing of product, contracting and enforcement, packaging, storage), and increases revenues (market prices and share) of marketing augmenting income, profitability and economic sustainability of farming activity.

"Rational" (private) agents usually use and/or design such forms for governing of diverse activities and relations, which are the most efficient for the specific institutional, economic and natural environment, and which maximize their overall benefits (production, ecological, financial, transaction, social) and minimize their overall (production, transaction, etc.) costs (Bachev 2004). However, outcome of such private optimization of farm management and activity not always is the most efficient allocation of resources in society and maximum possible sustainability. There are many instances for private sector "failure" in governing of socially desirable farming (economic, social, ecological) activity, which are to be identified and analyzed. For example, due to low possibility for protection ("low appropriability"), impossibility for achieving minimum efficient scale, and/or high costs for contract negotiation, monitoring, implementation and enforcement, the supply with eco-products cannot be effectively organized through private forms (internal organization, contract, association) (Bachev and Nanseki).

After that, analysis is to be made on diverse forms of public "involvement" in agrarian management through provision of information and training for private agents, stimulation and (co)funding of their voluntary actions, imposition of obligatory order and sanctions for non-compliance, direct organization of activities (state enterprise, scientific research, monitoring, etc.). That analysis also has to include specific (economic, social, ecological) benefits and overall costs for individual agents and society related to particular public intervention. Often there are cases for public "failure" (inactions, wrong interventions, over-regulations, mismanagement, corruption) leading to significant problems for sustainable agrarian development. All these cases are to be identified and analyzed.

A great portion of employed agro-management modes are integral, and affect more than one aspects of farm sustainability. Besides, improvement of one aspect through a particular form often is associated with negative effects for other aspect, component or element. For instance, product or direct subsidies increase farms income and economic sustainability, but could lead to overall intensification and ecological problems, further differentiation of efficiency and sustainability of holdings. Thus, it is also to be taken into account the overall efficiency of a particular form, particular "package" of instruments, or the system of management as a whole.

All existing and other practically feasible (potential) forms for agro-management is to be identified, analyzed and assessed as well as complementarities (mutual or multiplication effect) and contradictions between individual forms and mechanisms of agro-management specified. For instance, often private (eco)initiatives of individual agents are in "conflict" with each other and/or the interests of third parties; usually, public, collective and private forms are mutually complementary, etc.

Analysis and assessment of the system of governance of agrarian sustainability is a complex, multi-facet, and interdisciplinary process, requiring profound knowledge of advantages and disadvantages of diverse governance modes, and in-details characterization of their efficiency (benefits, costs, effects) in the specific conditions of each agrarian agent, holding, type of farms, ecosystem, subsector, region, etc. Here quantitative indicators are less applicable, and more often is applied qualitative (Discrete structural) analysis of comparative advantages, disadvantages, and net benefits (Williamson). In our previous publications we have incorporated the comparative institutional analysis and presented a framework for assessing efficiency of diverse market, private, public and hybrid modes of governance in agrarian sphere (Bachev 2004, 2010).

Identification and assessment of the specific forms and mechanisms of governance of farm enterprise sustainability at farm, ecosystem, regional and sectoral scales is an object of a separate microeconomic study. For instance Table 5 summarizes major forms for governing of farm sustainability in Bulgaria during post-communist transition and European integration.

Table 5. Mechanisms and modes of governance of farm enterprise sustainability in Bulgaria in the conditions of EU CAP

Institutions	Private modes	Market Modes	Public modes
Well-defined and enforcement rights and rules; "Concept of sustainability"; EU Community Acquis; Collective institutions; Monitoring and sanctions from EU	Unregistered farms; Firms; Cooperative farms; Specialized and multipurpose cooperatives; Long-term inputs supply and marketing contracts; NGOs; Codes for professional behavior; of behavior; Diversification into processing, services marketing; Credit cooperatives; Water User Associations; Professional producers organizations; Vertically integrated modes; Eco-associations, Eco and other labels; Protected origins and brands	Direct marketing; Wholesale, terminal and exchange markets trad Trade with formal l origins, organic products, and ecosystem services; E-commerce with agrarian products; Free (monopoly) agricultural water pricing; Insurance against disasters	Implementation of EU regulations and standards; EU Operational Programs; National programs for eco-management waters, waste, emissions, etc.); National Program for Agrarian and Rural Development; Direct EU payments; National tops-ups; Export subsidies; Milk quotas; Agricultural Advisory Service; Regional programs for agrarian development; System of social, economic and eco-monitoring, analysis and control; Protected zones (NATURA); Compensations for natural disasters; Mandatory training for farmers; Income and garbage taxation; Support to trans-border initiatives; Social security and assistance system; State companies for research, maintenance of eco-systems, etc.; State promotions, fairs etc. for farm produces and services

Source: the author

7. Elements, levels and factors of governance of farm enterprise sustainability

Analysis of the system and forms of governance is to be done for farm sustainability as a whole, and for each of its major aspects – managerial, economic, social, and ecological. For every aspect the analysis further deepens for major elements – principles and components of farm sustainability (Figure 2). The later are characterized with significant specificity in terms of governance needs, forms, factors, and efficiency. For instance, composite components of the governance of ecological sustainability of farms are: (effective) management of soils, waters, atmosphere, biodiversity, landscape, climate, etc.; of economic sustainability: management of production and governance efficiency, adaptability, financial stability, etc. of farms and the sector; of social sustainability: amelioration of welfare of farmers, wellbeing of rural communities, etc.

Some of the specific forms of governance are relevant only for one aspect of farm sustainability, while others are *integral* and concern two or all of them. A particular mode is to be assessed independently only if it affects significantly managerial, social, economic, and ecological sustainability. In case that two or more forms of governance are complementary and impact sustainability jointly, they have to be evaluated together as a "package".

According to the specific objective the analysis of the system of governance of farm sustainability could (and is to) be made at four different levels (Figure 2):

- *individual* – an individual farming enterprise;

- *collective* – a complex farm (cooperative, partnership, corporation), a special organization (inputs supply, group eco-activity, etc.); a particular ecosystem or region, etc.;
- *national* – certain subsector of agriculture, agriculture as a whole;
- *trans-national* – in regional, European, or global scale.

For each level relevant forms and mechanisms of governance of farm sustainability are to be identified and analyzed. Specification of elements of the system of agro-governance in every level is to be done carefully. Some dominant forms at national or sectoral level may not be relevant for farms of a particular type. For instance, a great parts of EU CAP instruments do not impact at all the majority of Bulgarian farms due to impossibility for participation in public programs (formal restrictions, high costs), low interests, enormous difficulties and costs for detection of non-compliances and sanction by the authority, etc. At certain levels (farm, region) there may be no specific (formal) structure of governance of farm sustainability at all, and the later to be carried by farms and farm organizations and/or the general system of management of the sector/country.

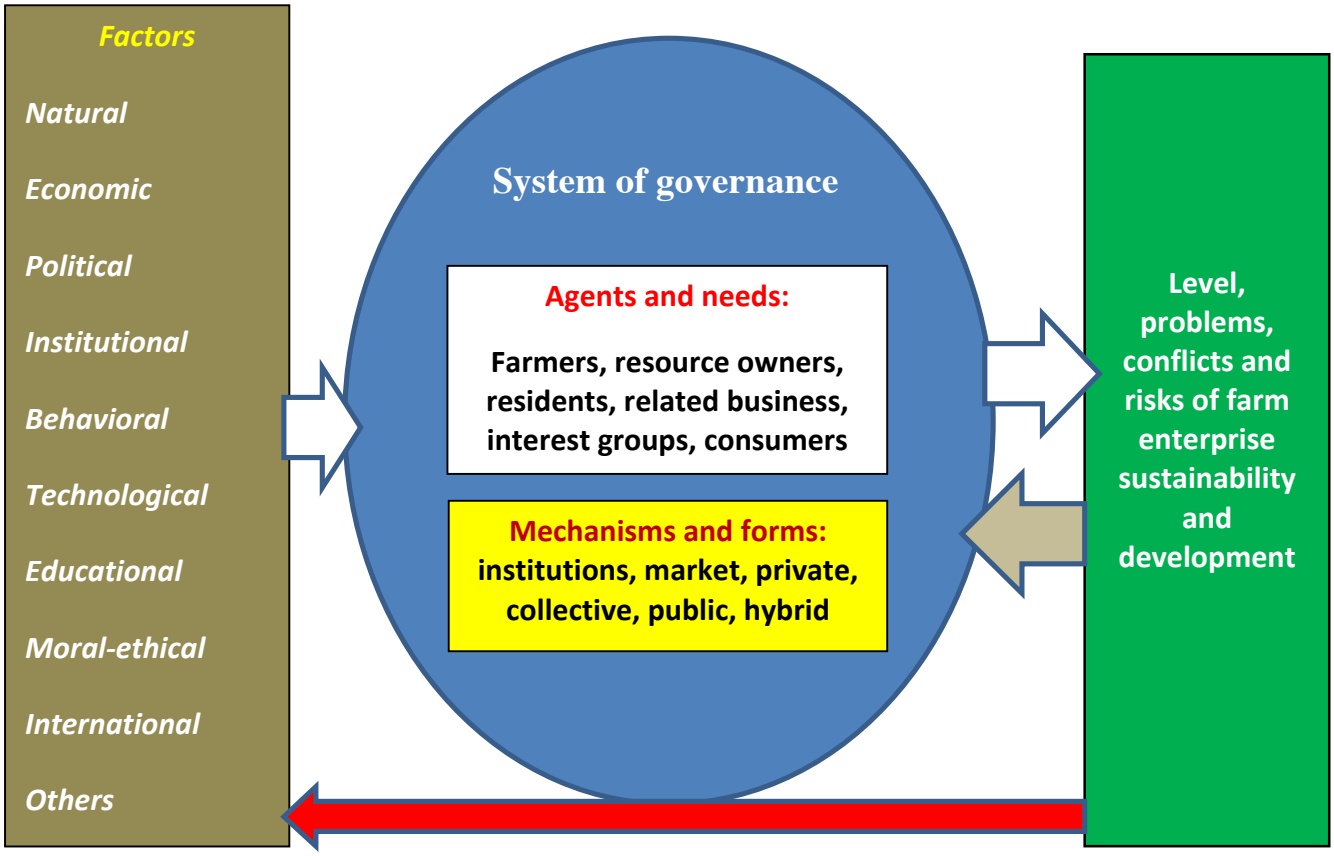
As a rule, effects and costs at a particular level and upper management levels are not simple sums of those of composite elements or lower levels of management. It is to be taken into consideration the necessity for "collective actions" for achieving a minimal economic, social, ecological and technological size for a positive effect, mutual and multiplication effects and spillovers, contradictory effects and costs, and externalities in different subjects and management levels, in space and time horizon.

Farming enterprises (farms) are the main element of the system of agrarian governance. That necessitates to evaluate the *comparative* and *absolute potential* (internal incentives, capability, costs, intentions) of different type of farms (subsistent, semi-market, family, commissioned, cooperatives, corporation, public) for: sustainable agriculture and innovation, conservation and restoration of natural resources, long-term investment, minimization of direct and indirect negative effects, dealing with existing challenges, minimizing related costs and risks, effective adaptation, etc.

Such an analysis is more complex for farms with complex internal structure (multimember partnerships, agricultural cooperatives, agri-corporations, public farms), which are characterized with division of ownership from management, and multiple owners and hired labor with diverse interests, personal preferences, capability, etc. For upper(farm) levels of management the governance of agrarian sustainability is either integrated in the main mechanisms of influence (requirement for "eco-compliance", "good agricultural practices) or it is a specialized structure (programs for income support, agro-ecology, mandatory standards for product quality and safety, working conditions, environmental protection, animal welfare).

Evolution of the system of governance of farm sustainability and choice of one or another form by agents depend on diverse economic, political, institutional, behavioral, technological, international, natural, etc. factors (Figure 6). For instance, type and evolution of forms of agro-management strongly depends on the *personal characteristics* of farmers and other participants – personal preferences, experiences, knowledge, capability, ideology, etc.

Figure 6. Factors, forms and efficiency of governance of farm enterprise sustainability



Source: the author

Another important factor is science and technological advancement, which determine the extent of knowledge of factors and consequences of sustainable development, give further information on socio-economic and ecological problems and risks (extent of degradation and pollution of natural environment, specific impact of different farms and technologies), and provide opportunities for effective management (improvement, adaptation) of diverse aspects of agrarian sustainability. Choice of governance form also depends on market and social demand (pressure) for sustainable exploitation of natural resources and agrarian development. Character of that demand depends of general socio-economic development, priority (social, economic, ecological) challenges at the current stage of development, opportunities for profiting and investment, and overall evolution of institutional environment (rules, standards, support, etc.).

Another important factor determining the system of governance are public (national, European) policies as well as implementation of international conventions and agreements related to different aspects of agrarian sustainability. For instance, a good part of Bulgarian farms adapt its production and technologies to new instruments (restrictions, standards, support) of EU CAP introduced after 2007. Finally, the system of governance of sustainability is affected by the "natural" evolution of natural environment (warming, extreme climate, drought), which imposes forms facilitating confrontation to negative trends and/or adaptation to natural changes.

Specific factors for governance of farm sustainability are to be identified and their importance and compatibility at the contemporary stage of development of agriculture, its subsectors, different regions, type of agri-ecosystems, farms, etc. analyzed.

In a long term the level of farm sustainability, and the economic, social, and ecological sustainability in agriculture, and associated with them risks, conflicts and costs, depends on the efficiency of "established" system of governance in society, sector, region, economic organization, etc. However, in each specific moment or a shorter-period of analysis not always could be found adequate data and/or determine direct links between the system of governance (and its individual forms) and agrarian sustainability. The latter is caused by:

- *time period* (delay) between the management actions ("improvement" of governance), and the changes in agents behavior, and the positive, negative or neutral effects on the state of farm sustainability and its individual aspects;
- *"impossibility" for adequate assessment* of all managerial, social, economic, and ecological aspects, and associated risks and costs, due to the lack of "full" knowledge on the state and processes of change in agrarian sector, rural areas and nature, the type of correlation with farming activities (in particular with new products and technologies, traditional organizations), and future costs associated with deterioration, restoration and conservation of agrarian structures, communities, and natural environment;
- *insufficient factual data* for social and economic process in farming and rural areas ("viability'), and the state and risks of natural environment (extent of eco-degradation and pollution in agriculture) due to the lack of monitoring, precise measurements, methodologies or studies in that area;
- *"undervaluation"* of social capital and natural resources by agents, social groups or society, and/or "lack" of any system of governance of some aspects of farm sustainability. .

In order to overcome above difficulties, individual governing forms are also evaluated by:

- *how affect behavior of agents* (intentions, actions, impacts);
- *to what extent induce individual behavior and actions* for maintenance and improvement of governance, economic, social, and ecological functions of farming enterprise;

It is to be taken into consideration that the state and changes in socio-economic shape of agriculture, rural areas and natural environment are consequences not only of the system of management in a particular farms, region, subsector, or country, but other factors as well: overall demographic evolution (aging of population, depopulation of regions). impact of other industries in the country and internationally (competition, financial crisis, contribution to global warming), natural evolution of environment, etc. Consequently, the real improvement or deterioration of the governance of sustainability in a particular farm, region, subsector, or country could be associated with a lack or controversial change in the level of agrarian sustainability at relevant levels and as a whole.

In many cases, it is impossible "influence" economic, social or natural environment through (agro)management, and the effective adaptation is the only possible strategy for overcoming socio-economic and ecological consequences for farm enterprises. Therefore, the potential of farms and sector for adaptation to constantly evolving market, institutional and natural environment is one of the main factor and indicator for assessment for agrarian sustainability (Bachev 2010). At all levels of analysis diverse "external" and "internal" factors are to be identified and their importance estimated in order to assess adequately efficiency of the system of agro-management and farm adaptation.

There is no "universal" form of governance equally applicable (efficient) for all aspects of farm sustainability and for all possible contingencies in which agents operate. Efficiency of individual modes is quite different since they have unlike potential to: provide adequate information, induce positive behavior, reconcile conflicts and coordinate actions of parties, improve sustainability and mitigate risks, minimize overall management costs for agents with different preferences and capability, and in the specific (socio-economic, natural) conditions of each holding, eco-system, community, industry, region, and country.

For instance, appropriate eco-information and training would be enough to induce voluntary actions by a "green" farmer, while most commercial enterprises would need outside incentives (price

premium, cash compensation, punishment); market prices would coordinate well relations between water suppliers and users, while regulation of relations of water polluters and users would require a special private or public order; independent actions of farmers would improve the state of local eco-systems, while dealing with most regional, national, and global social and eco-challenges requires collective actions in large geographical and temporal scales, etc.

Individual governing modes are often alternative but not equally efficient for organization of activities (Williamson). Each form has distinct advantages and disadvantages to protect rights and investment, coordinate and stimulate socially desirable behavior, explore economies of scale and scope, save production and transaction costs.

Principally, *free market* has a big coordination and incentive advantages ("invisible hand", "power of competition"), and provides "unlimited" opportunities to benefit from specialization and exchange. However, market management could be associated with high uncertainty, risk, and costs due to lack (asymmetry) of information, low "appropriability" of some rights, price instability, and a great possibility for facing opportunistic behavior and situation of missing and underdeveloped markets.

Special contract form ("private ordering") permits a better coordination and intensification of activity, and safeguard of agent's rights and investments. However, it may require large costs for specification and writing contract provisions, adjustments with constant changes in conditions, enforcement and disputing of negotiated terms, etc.

Internal organization allows a greater flexibility and control on activity (direct coordination, adaptation, enforcement, dispute resolution by a fiat). Extension of internal mode beyond small-partnership boundaries, which allow achievement of minimum technological or ecological requirements, and exploration of economies of scale and scope, may command significant costs for development (finding partners, design, formal registration, restructuring), and current management (collective decision making, coordination of activity, control on coalition members opportunism, supervision and motivation of hired labor).

Separation of the ownership from management (cooperative, corporation, public farm/firm) gives enormous opportunities for growth in productivity and improvement of management efficiency – internal division and specialization of labor; achieving requirements of social and ecosystems; exploration economies of scale and scope; introduction of innovation; diversification; risk taking and sharing; investing in product promotion, brand names, relations with customers, counterparts and authorities. However, it could be connected with huge transaction costs for decreasing information asymmetry between managers and shareholders, decision-making, adaptation, etc.

Cooperative and non-for profit form also suffers from a low capability for internal long-term investment due to non-for-profit goals and non-tradable character of shares (horizon problem). Evolution and maintenance of large collective organizations is usually associated with significant costs – for initiating, informing, collective decision-making and internal conflict resolution, controlling opportunism of current and potential members, modernization, restructuring, and liquidation.

Finally, *pubic forms* often command high internal (internal administration and coordination) and outside (for other private and public agents) costs – for establishment, functioning, coordination, controlling, mismanagement, misuse by private and other agents, reorganization, and liquidation. Unlike market and private modes, for public organizations there is no automatic mechanism (competition) for selection of ineffective forms. Here public decision making is necessary, which is associated with huge costs and time, and often affected by strong private interests (lobbying groups, politicians and associates, bureaucrats, employees) rather than efficiency. Applying "market like" mechanisms in public sector (competition, auctions), and not pure (state) but more hybrid (public-private) forms is a way to overcome some disadvantages of public modes.

8. Efficiency of governance of farm enterprise sustainability

Efficiency of the governance of farm enterprise sustainability represents the specific effectiveness in relations to the extent of realization of practically (managerially, technologically, agronomically, socially, politically, economically) possible level of social, economic, and ecological sustainability of agriculture, and minimization of the overall costs for management.

Assessment is made on the *overall efficiency* and the *partial efficiency* as the first one includes the system of governance as a whole, while the latter is for the main components (instruments) of governance.

According to the objectives and period (past, current, future) of analysis, and available information, the assessment of efficiency of the system of governance or some of its element is for the *potential efficiency* or the *actual efficiency*. The former indicate the *potential* of the system or individual mode to change behavior, action or impacts of agents for achieving farm sustainability, while later shows the *ultimate result* (effect, impact, costs) in relation to farm sustainability.

Efficiency of the specific system of governance of farm sustainability eventually finds expression in certain level and dynamics of managerial, social, economic and ecological sustainability of farming enterprises. Accordingly a *high or increasing farm sustainability means a high efficiency of the system of governance, and vice versa*. Suggested in the previous parts of this paper approach could be used to assess the overall and partial sustainability of farming enterprises, and thus the efficiency of its governance.

In management practice and design often it is necessary to assess governance efficiency through potential efficiency, which allows timely assessment of its level, detecting low "efficiency" and possibility for augmentation, and undertaking measures for improvement of applied system. That is a consequence to the fact that often there is not or it is too expensive to collect needed information for some (or all) elements of efficiency, or it is impossible to determine quantitatively the contribution of a certain form to the final result.

In all these instances it is to be used a system of appropriate indicators for assessing the potential of individual modes for effective managerial, economically viable, socially responsible, and ecologically sustainable activity of farms. However, improvement of activity not always is associated with progressive change in farm sustainability, due to low actual efficiency or impact of other factors. It has to be bear in mind that, certain governing forms have unlike applicability, benefits, and costs for different agents, and therefore dissimilar potential and incentives for improving farm sustainability.

Table 6 presents uncomplete list of indicators for activity, which could be used for assessing potential efficiency of governing forms of managerial, economic, social and ecological sustainability (Table 6).

Table 6. Indicators for Assessing Potential Efficiency of Governance Forms of Farm Enterprise Sustainability

Managerial sustainability	Economic sustainability	Social sustainability	Ecological sustainability
Lack of serious difficulties for supply of needed workforce; Lack of serious difficulties for supply of needed land and resources; Lack of serious difficulties for supply of needed material inputs; Lack of serious difficulties for supply of needed innovation and know-how; Lack of serious difficulties for supply of needed finance; Lack of serious difficulties for marketing of products and services	Share of marketed output; Innovation activity; Extent of implementation of required agro-technique operations; Share of private investment; Participation in support programs; Amount of public subsidies; Amount of external investment; Implementation of systems for quality control; Long-term inputs contract; Long-term contract for marketing of output; Membership in farm organization; Training of personnel; Number of protected and used origins, brand names etc.	Participation in social initiatives of farms and farmers organizations; Extent of implementation of working condition standards; Extent of diversification of activity; Participation of women in management of farms; Number of hired labor; Number of involvement in collective initiatives; Membership in community and interests groups organizations; Dynamics of remuneration; Extent of social assurance; Amount of costs for social development	Implementation of efficient crop rotation; Implementation of Good Agricultural and Ecological Practices; Introduction of professional codes of eco-behavior and standards; Transition to eco or organic production; Introduced eco-products and services; Amount of costs for environmental protection; Amount and coverage of signed public eco-contracts; Membership in eco-cooperatives or associations; Number and coverage of agro-ecological payments; Amount and share of uncultivated farmland; Number of type of animals per unit farmland; Amount of chemicals for crop protection total and per unit of utilized farmland

Source: the author

It is also to be made an assessment of the *absolute* and the *comparative efficiency* of the governance of farm sustainability. The absolute efficiency represents the effectiveness in relation to the state before introduction of a .particular form or improvement of the entire system. *If sustainability as a result of the new system of governance is improving or its further deterioration is prevented, then the form e (more) efficient, and vice versa.* For instance, evaluation is made on the impact of direct subsidies of EU CAP on levels of farm sustainability in new member states, the efficiency of new "green payments" on eco-behavior and ecological sustainability, contribution of NPARD measures for enhancing social, economic, and ecological sustainability of the sector, etc.

The comparative efficiency shows the effectiveness (effects, costs) of a particular form or the system of governance in relation to another alternative form (system). It is to be assessed if it is at all practically possible alternative system of management, which is able to increase the level of farm sustainability or achieve certain level with less overall (private and public) costs. That approach is also used for comparison of two or more feasible forms in order to select the most efficient one(s).

For instance, the social and economic sustainability of a farming enterprise could be improve through a number of alternative modes of public intervention: direct income support to farmers based

on product subsidies, decoupled subsidies for farms, preferential taxes and crediting, price regulation (water for irrigation, electricity, farm produce), trade measures (export subsidies, quotas, tariffs), indirect support (free training, state services), etc. Similarly, the ecological sustainability could be increased through public support to eco-associations, public eco-contracts, general and specific (green, unfavorable regions) direct payments, etc. The comparative efficiency of each of this form evaluates comparative advantages and disadvantages (additional costs, additional farm, social, and ecological effect) in respect to alternative forms.

At management decision stage, the analysis of comparative efficiency are means for selecting the most-efficient option of management of farm sustainability (behavior, investment, cooperation, benefits) between institutionally, financially, and technologically possible alternative forms. Therefore, they are tools for increasing the absolute efficiency of the governance.

It is to be distinguished and made assessments on the *short-term, the mid-term* and the *long-term efficiency* of the system of governance of farm sustainability. That is conditioned by the fact that the needs and conditions of governance change in time, while analysis is made in a particular moment in time or for certain period of time. Taking into account of "time" factor is done through evaluating of:

- *short-term efficiency* – usually up to 5 years or current programing period (7 years);
- *mid-term efficiency* – a relatively longer period of time (e.g. 5-10 years). The majority of the European farmers are in advanced age and they are going to retire in coming years, that is why it is appropriate to use 8-12 years;
- *long-term efficiency* – in a foreseeable longer-term 12-15 and more years, which is to be greatly related with the conservation and transfer of agrarian resources into next generation(s)

When the effects, costs and efficiency of individual components of governance are evaluated it is to be taken into account their different temporal scale, joitness, complementarity, controversies, temporal and social apartness, and potential for development in the conditions of constantly changing socio-economic and natural environment. For instance, many assessments of efficiency usually include only direct costs and benefits, and ignore significant indirect costs and benefits. Besides, when evaluating governing forms often it is not fully accounted for significant private and social *transaction costs*, while they are critical for adequate assessment of efficiency (Bachev, 2004).

Two types of transaction costs have to be distinguished: the *long-term* (for design and introduction of a particular governing mode) and the *current* (for using a particular form by different agents)[14].

Therefore, assessment of the costs of governance is to include:

- purely *"production" costs and investment*, which are associated with the technology of agrarian production, social development and natural conservation; and
- *transaction costs*, which are associated with the governance of relations with other agents – costs of finding labor, acquiring information, negotiation, organizational development, registration and protection of rights and products, controlling opportunism, conflicts resolution, adaptation to market and institutional environment, etc.

Furthermore, the assessment of public forms is to include overall costs, which usually comprise: direct program costs of tax payers and/or assistance agency (for program management, funding of private and collective activity, control, reporting, disputing implementation), transacting costs (for coordination, stimulation, control of opportunisms and mismanagement) of bureaucracy, private and collective costs for individuals' participation in public modes (for adaptation, information, negotiation, paper works, payments of fees, bribes), costs for community control over

[14] Detailed classification of the transation costs and major approaches for their proper measurement are presented in our previouse publications (Bachev 2004, 2010).

and reorganization (modernization, liquidation) of public forms, and (opportunity) "costs" of public inaction (negative effects on economy, human and animal health, lost biodiversity, etc.).

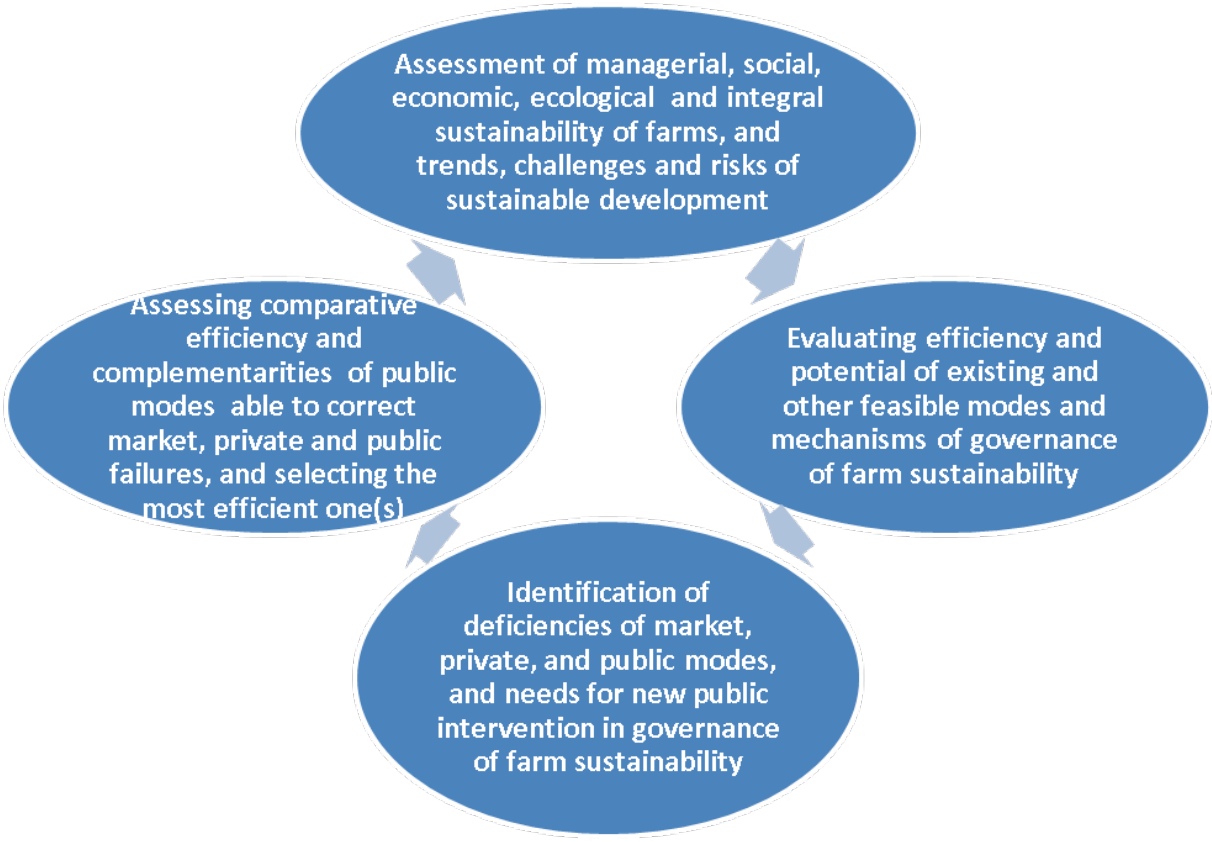
9. Improvement of the system of governance of farm sustainability

Most frequently, there is no perfect system of governance of farm sustainability and there are numerous socio-economic problems, challenges and risks associated with farm enterprises development (Bachev 2010). What is more, certain level of managerial, social, economic and ecological sustainability often is achieved with too many costs for individual farms and society. At contemporary stage there is also a great dynamic of socio-economic and natural processes, which sooner or later makes "inefficient" existing good working system of governance of farm sustainability. All these require adequate alteration of the system of governance and its constant modernization. To a great extent the analyses and assessments of the system of governance and individual modes are conditioned by the needs to assist that process of improvement.

Improvement of the system of governance of farm sustainability is to include following stages (Figure 7):

First, trends, factors and risks associated with farm enterprise sustainability are to be identified, and levels of managerial, social, economic and ecological sustainability of farms assessed. The lack of serious managerial, social, economic, and ecological problems, conflicts and risks is an indicator that there is an effective system of governance of farm sustainability. However, usually there are significant or growing governance, social, economic, and ecological problems and risks associated with farming development.

Figure 7. Stages for Improvement of Sustainability of Farming Enterprises



Source: the author

Second, it is to be assessed the efficiency and potential of existing and other feasible modes and mechanisms of governance of farm sustainability, for overcoming existing, emerging and likely governance, social, economic, and ecological problems and risks associated with farming development. Analysis is to embrace the system of governance and its individual components – institutional environment and various (formal, informal, market, private, contract, internal, outside, individual, collective, public, simple, complex, etc.) forms for governing activities of farms and other interested parties.

Efficiency of individual modes are to be evaluated in terms of their absolute and comparative potential to safeguard and develop agents rights and investments, stimulate socially desirable level of rural welfare, economic growth and environmental protection activity, rapid detection of problems and risks, cooperation and reconciliation of conflicts, and save and recover total governing costs. Assessment is to be also made on complementarities and/or contradictions between different governance forms – e.g. high complementarities between (some) private, market and public forms of governance; conflicts between "gray" and "light" sector of agriculture, etc.

Efficiency checks are to be performed periodically even when the system of governance of farm sustainability seems "working well". Good level of farm enterprise sustainability may be achieved at excessive private and social costs or further improvement of farm sustainability with the same total costs could be missed. In both cases there is an alternative more efficient organization of management, which is to be introduced. For instance, often too expensive for taxpayer "state eco-management" (in terms of incentives, total costs, adaptation and investment potential) could be replaces with more effective private, market or hybrid mode (public-private partnership).

Third, deficiencies ("failures") in dominating market, private, and public modes is to be determined, and needs for new public intervention in governance of farm sustainability identified. The later could be associated with impossibility for achieving socially desirable and practically possible socio-economic and environmental goals, significant transaction difficulties and costs of participating agents, inefficient utilization of public and private resources, etc.

Finally, alternative modes for new public intervention able to correct (market, private and public) failures are to be identified, their comparative efficiency and complementarities assessed, and the most efficient one(s) selected. Only practically (managerially, technically, agronomical, economically, politically, etc.) possible modes of new public intervention in governance for the specific socio-economic, organizational and natural environment at current stage of development are to be compared.

Suggested analysis is to be made at different levels (farm, eco-system, regional, sectors, national, international) according to the type of governance, social, economic, and ecological challenges, and the scale of collective actions necessary to mitigate specific problems and risks. It is not one time exercise completing in the last stage with a perfect system of governance of farm sustainability. It is rather a permanent process, which is to improve the governing system along with evolution of socio-economic and natural environment, specific challenges and risks, individual and communities (social) awareness and preferences, and modernization of technologies, organizations, and institutional environment. Besides, public (local, national, international) failure is also possible (and often prevail) which brings us into the next cycle in improvement of governance of farm sustainability.

(New) public intervention is not always more efficient from the existing state. There are many examples, for inappropriate, over, under, not timely or too expensive public involvement at all levels. Here the public intervention either does not correct market and private sector failures, or correct them with more total costs, or lead to new failures and additional costs. Therefore, *criterion* for assessment is to reflect *whether it is being realized socially desirable and practically possible social, economic and ecological goals (levels of farm enterprise sustainability) with minimum possible total costs* (direct, indirect, private, public, production, ecological, transaction, etc.).

Accordingly inefficiency indicates either failure to achieve set up objectives (possible level of sustainability, overcoming certain social problems, decreasing existing economic risks, reducing losses, restoration and amelioration of natural environment), or its accomplishment with excessive costs in comparison with other feasible form of governance.

Suggested analysis also enables us to predict likely cases of new public (local, national, international) failures. The later could be due to impossibility to mobilize sufficient political support and necessary resources for improvement of governance and/or ineffective design of governance system of otherwise "good" policies in the specific socio-economic environment of a particular farming enterprise, region, sub-sector, ecosystem, etc. Since public failure is a feasible option its timely detection permits foreseeing persistence or rising of certain social, economic and environmental problems, and informing interested agents and community about associated risks.

Conclusion

In this paper we have tried to prove that there is possible to work out a practically abdicable system of analysis and assessment of farm enterprise sustainability and the system of its governance. It is also become clear that it is not possible to work out a "perfect" system, which would be equally efficient for all type of farming enterprises, subsectors of agriculture, specific scoio0economic and natural environment of each farm, region, or country.

Analysis of the system, factors, and efficiency of governance of agrarian sustainability are extremely important both in academic, and practical (policy, farm and business forwarded) respects. Nevertheless, in many countries such analyses are far behind from the modern developments in theory, and the needs and evolution of agrarian practice.

Suggested framework for assessing the governance of agrarian sustainability is to de discussed and further improved. After that it could be used for identification and assessment of specific mechanisms and modes of governance of agrarian sustainability in a particular subsector, type of ecosystems, regions of a country, and entire agriculture in a country. However, it is necessary to collect additional microeconomic information for agrarian agent's preferences and behavior, activities and efficiency of farming organizations, effects and impacts on social, community and natural environment, etc. The ultimate goal of this study is to improve farm management and strategies, and agricultural policies and forms of public intervention in agriculture.

Nevertheless, suggested framework let get an idea on levels of sustainability of farming enterprises as a whole and in all their aspects, analyses principle mechanisms and modes of its governance, and identify major direction for its improvement through modernization of farm management strategies and public policies.

Analysis of levels and the governance system of farm sustainability are extremely important both in theoretical as well as in immediate practical terms. In Bulgarian and other countries such analysis are far behind the modern development of theory and the needs and development of agrarian practice.

Suggested in this paper framework for assessing the level and the system of governance of farms enterprise sustainability is to be further discussed and improved. We are planning to test that system with farming enterprises of different type and location, and after correcting, complementing and improving it to recommend it for utilization in scientific and managerial practice in the country. The ultimate goal of this research is to improve research methods in that important area as well as assist farm enterprise management and public policies in agrarian sector. However, for achieving that objectives it is necessary to collect additional micro and macro-economic data for behavior and activity of farms and other agrarian agents, impacts on communities and natural environment, etc.

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