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Transforming the agricultural sector for better sustainable development: perspectives from Russia as a member state of the Eurasian Economic Union

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Abstract. The agricultural sector is a core stone to many sustainable development goals and initiatives, including the largest one – the UN Sustainable Development Goals (SDGs). In order to achieve many of these goals, it is highly necessary to have effective policies aimed at the sustainable development of the agricultural sector, since it is very much connected to all other sectors of the economy and society and is central to achieving many SDGs. However, to formulate and achieve such diverse and multiple goals, one should be able to control the development of key indicators, track outcomes of the measures being taken, and review the whole array of methods being used in order to allow for guided course corrections. Despite SDGs present a global sustainable development perspective, it is necessary to use them with local and regional indicators that capture well the degree of sustainability in the agricultural sector of a particular country or region. The paper focuses on Russia and the member states of the Eurasian Economic Union (EAEU) as an local/regional example. A list of local/regional indicators is proposed in connection to the corresponding global SDGs.

1. Introduction

Being right in the center of the process of supplying human nutrition, the agricultural sector occupies the very important place in the development of any society. The sector not only largely and positively influences the interactions between society, economy, and the natural world at many levels, including local, regional, and global ones, but also may have a negative impact on the environment and human well-being. More than that, the development of agriculture is also the core stone in many endeavors aimed at reducing poverty (3/4 of the poorest population are inhabitants of rural areas), improving human development, and reducing negative impacts on the environment [1, 2, 3]. For instance, the UN Sustainable Development Goals (SDG) focus on the eradication of poverty and hunger (Goals No 1 & 2), achieving good health and well-being (Goal No 3), building sustainable cities and communities (Goal No 11, especially with respect to rural communities), taking actions on climate change (Goal No 13), and improving “Life on Land” (Goal No 15) [4]. After reviewing these goals, it becomes clear that the development of agriculture is an inevitable and compulsory part in all of them.



2. Problem statement

The Government of Russia also joined the SDG Agenda and became responsible for its national implementation [5]. At the same time, in order to achieve many of these goals, it is highly necessary to have effective policies aimed at the sustainable development of the agricultural sector, since it is very much connected to all other sectors of the economy and society and is central to achieving SDGs [6]. However, to formulate and achieve such diverse and multiple goals, one should be able to track the development of key indicators, track outcomes of the measures being taken, and review the whole array of methods being used in order to allow for guided course corrections. And given the diversity of Russia's agricultural potential across the country and of agricultural systems existing in the member states of the Eurasian Economic Union, it is of the highest importance to develop such a framework that would allow for the sustainable development of the agricultural sector, taking into account local, regional, and global perspectives.

Despite there are numerous studies on the sustainable agricultural development [7, 8, 9, 10, 11, 12, 13], there is no single study that addresses issues of the sustainable development of Russia's agricultural sector with respect to its status as a EAEU member state. The goal of the paper is to provide a general overview of the sustainable development challenges Russia is currently facing in the agricultural sector as a member of the EAEU and discuss some agricultural, environmental, and socioeconomic indicators that can be used for a better assessment of Russia's sustainability in agriculture.

The paper is organized in the following way. First of all, we discuss general issues in the development of the agricultural sector of Russia and other EAEU member states. Then, we provide a framework for assessing the concept of agricultural sustainability, taking in account the specific context at local and regional levels. We conclude with final thoughts and propose further research agenda.

3. Assessing the Concept of Agricultural Sustainability

In order to develop and implement effective policies aimed at sustainable development of the agricultural sector, it is necessary to, first of all, understand the decision context and select indicators. Despite there are common threats and challenges to the sustainable agricultural development existing in many countries of the world, there are still many nuances in the development of the agricultural sector existing in various regions of the world. Russia and other EAEU countries are no exceptions, as we discussed in the previous section.

Thus, there should be no universal approach to sustainable agricultural development. There are many combinations of local parameters, circumstances, and actors that largely influence the development of agriculture in a particular country or its regions, eventually influencing how we conduct our analysis. In our perspective, it is one of the main objectives of sustainability to take into consideration specifics of local territories and regions, as well as various boundaries existing in them with respect to political, economic, and social development within the environmental conditions. A perfect analysis focused on sustainability in the development of the agricultural sector should be able to describe the context, its economic, institutional, agricultural, and environmental essential features, capturing the essential dynamics, drivers, and feedbacks. Such an analysis should be based on the indicators that successfully cover various dimensions of sustainable development that is relevant to a particular context and takes into account local and regional specifics.

There is an array of various indicators that can be used for analyzing sustainable development in agricultural systems. Such indicators also could be successfully applied to analyze how sustainable Russia's agricultural sector is developing in the context of its sustainability and with respect to Russia's membership in the EAEU. In our perspective, such indicators could be divided into three large categories: (a) agriculture indicators; (b) environment indicators; (c) human well-being indicators. These indicators capture local and regional specifics of the agricultural sector development very well. In our perspective, another important aspect of conducting an analysis of policies and

measures aimed at achieving sustainable development of agriculture is to bridge them with the UN SDGs, which bring a global perspective to local/regional indicators. The indicators being chosen should provide strong confidence that the measured concept is actually well reflected. Also, the numbers should be accurate and reliable. And, finally, it should be comfortable to measure and monitor the indicators being used over time.

The indicators focusing solely on agriculture include such measurements as: (a) yield (kg/ha); (b) yield gap (attainable yield – actual yield, kg/ha); (c) input efficiency (kg grain/kg N); (d) labor productivity (kg product / labor time); (e) cropping intensity (crop rotations / year); (f) fodder production (tons/year); input use intensity (kg pesticides / ha); stocking rate (animals / ha). In turn, with the purpose of expanding the scope and focus, SDG targets can be added into an analysis: (a) double productivity and incomes (No 2.3) and (b) sustainable agriculture (No 2.4).

The environmental dimension of sustainable development in agriculture can use the following indicators: (a) soil quality (%); (b) biodiversity (number of species); (c) greenhouse gas emissions (CO₂ eq.); (d) water quality (mg pollutant/ml); (e) water quality (m³); (f) land cover type/change (% converted). The corresponding SDG targets: (a) sustainable development of agriculture (No 2.3); (b) integrate climate measures into national policy (No 13.2); (c) reverse land degradation (No 15.3); (d) reduce marine pollution (No 14.1); (e) protect terrestrial ecosystems (No 15.1); (f) sustainable forest management (No 15.2); (g) halt biodiversity loss (No 15.5); (h) improve water quality (No 6.3); (i) protect aquatic ecosystems (No 6.6).

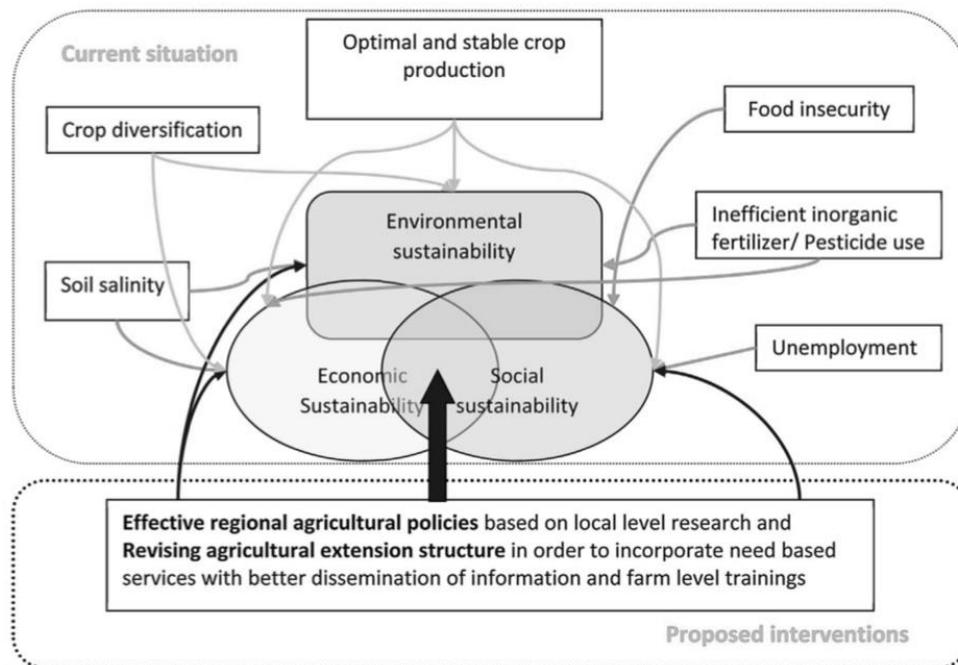
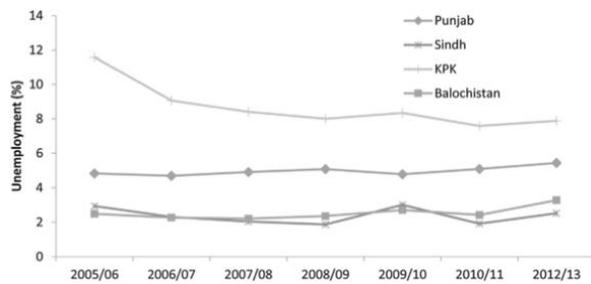
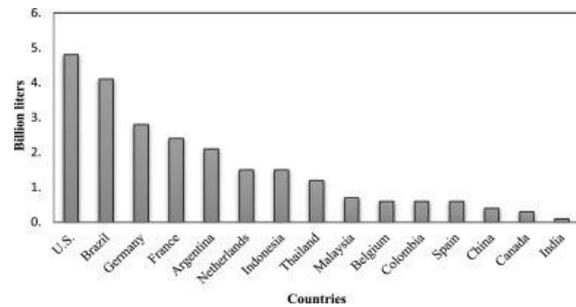


Fig. 1. Schematic framework of agricultural sustainability. Source: [13].

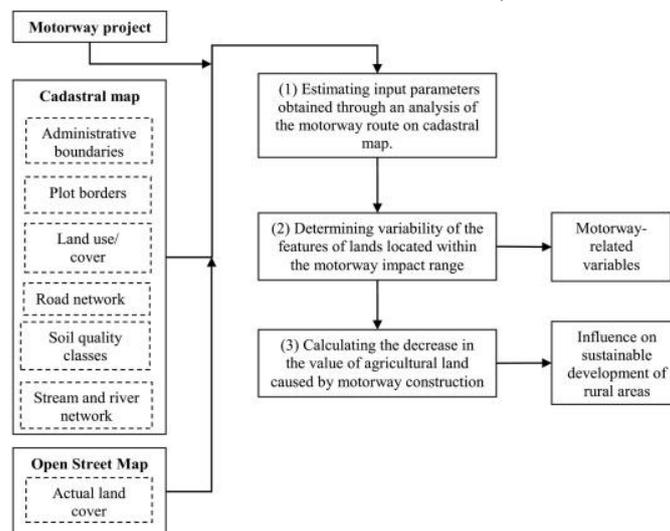
And the last dimension relevant to the sustainable agricultural development is “human well-being”, which can be measured with following indicators: (a) agricultural income (\$/ha); (b) poverty in rural areas (% population); (c) employment (on-and and off-farm employment rate); (d) food security (proxies: food availability; food access; dietary intake; food utilization; food utilization); (d) nutrition; (e) empowerment (using, for instance, Women’s Empowerment in Agriculture Index). The corresponding SDG targets: (a) double agricultural productivity and incomes (No 2.3); (b) end extreme poverty (No 1.1); (c) reduce poverty by half according to national definitions (No 1.2); (d) employment for all (No 8.5); (e) end hunger (No 2.1); (f) double agricultural productivity and incomes (No 2.3); (f) end malnutrition (No 2.2); (g) halve global food waste (No 12.3); (h) ensure equal opportunity for women (No 5.5).



(a) Unemployment of rural labor force (10 years and above).



(b) Biodiesel production in leading countries of the world, 2015.



(c) The scheme shows the simplified method stages and the data used in the process.

Fig. 2. Various ways to visualize frameworks, indicators, scenarios in the agricultural sector. Sources: [14, 16, 17].

There are many opportunities to build models on the basis of the indicators outlined above in order to evaluate the sustainable development in the agricultural sector, taking into account local, regional, and global perspectives. For instance, Zulficar and Thapa use a number of indicators to build a schematic framework for agricultural stability, on the basis of which they propose a number of interventions (Figure 1).

Kanter et al. state that there are four categories of modeling approaches that can be used to estimate indicator values: (a) empirical models (based only on observed relationships); (b) economic process-based models (rely on fundamental concepts); (c) biophysical process-based models [15]. Any of these models can be used to evaluate the concept of sustainable development of agriculture in Russia and the EAEU countries. Also, there are many visualization approaches to illustrate sustainable development in the agricultural sector, demonstrate main features of the frameworks being developed, or graphically show alternative agricultural scenarios (Figure 2a-2c).

4. Conclusions

Since the agricultural sector is connected to numerous SDGs, it has many interactions with other spheres of economy and society. Thus, it is of high importance to ensure that there are effective policies in place that help the agricultural sector to develop in a sustainable ways. In this paper, we proposed an array of local sustainable development indicators that capture well three dimension:

“agriculture”, “environment”, and “human well-being”. In addition to these local/regional indicators, we proposed to use SDG target goals that bring a truly global perspective to the concept of sustainable development in agriculture, allowing to track the development of key indicators, track outcomes of the measures being taken, and review the whole array of methods being used in order to allow for guided course corrections.

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