MODERN TRENDS IN STATISTICS OF AGRICULTURAL TERITORIES

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Abstract. *This paper addresses the world modern development issues of agricultural and rural statistics. We reviewed in detail the Global Strategy to Improve Agricultural and Rural Statistics prepared by the World Bank in collaboration with the Food and Agriculture Organization of the United Nations (FAO). The paper provides a critical analysis and characteristic of conceptual framework and key element of Global Strategy. The outcomes of the research make possible to define directions for improvement of national strategies for the development of statistics.*

Key words: *statistics of agricultural areas, agricultural production, national statistical system, environmental accounting system.*

1. Introduction

In modern conditions the problem of agricultural statistics development is solved in a brand new way through transition to statistics of agricultural areas. Increased interest in the issue is caused by the need to analyze the socio-economic and environmental development of agricultural areas, which is now open to discussion and research. Leading international organization in the field of agricultural statistics, namely the United Nations Statistical Commission (UNSC), the World Bank, the Food and Agriculture Organization (FAO), the Statistical office of the European Union (Eurostat) work in this direction confirming the relevance of this issue.

2. Materials and Methods

Nowadays there is a need for data base in order to implement effective development strategies of agricultural and rural areas at the global, regional and national levels. Therefore, transformation of agricultural statistics and transition to statistics of agricultural areas is urgent issue of modern statistics. Recent requirements for agricultural statistics include not only information concerning conditions and development of agricultural production. They are intended to reduction of poverty, socio-economic development of rural areas and overcoming the ecological crisis.

3. Results

The recent food crisis and the ongoing debates on food price volatility, the impact of climate change on agriculture and food security clearly highlight the weaknesses in the available agricultural data. They also highlight the urgent need for evidence on which to base implementation of the relevant effective policies at the global, regional
and national levels. These data requirements are emerging at the same time that many countries, especially in the developing world, are lacking the capacity to produce and report even the minimum set of agricultural data needed to monitor national trends or inform the international development debate.

At its 41st session, the United Nations Statistical Commission (UNSC) endorsed the Global Strategy to Improve Agricultural and Rural Statistics. Global Strategy provides methodological and organizational basis for agricultural statistics, allows national statistical departments to improve the quality of statistical data and help the governments of these countries to build policies in the field of food security and sustainable agriculture and rural areas based on

reliable statistical information [1].

The purpose of the Global Strategy is to provide a framework which allows national and international statistical systems to collect and use data and basic information that should guide the decision-making in the twenty-first century. This strategy is based on three main components.

The first component is establishing a minimum set of core data that countries could collect to meet current and emerging needs.

The second component is integration of agriculture into national statistical systems in order to meet the needs of policymakers and other users who need data on comparable areas and over time. This integration will be achieved by development of universal sampling basis of agricultural data and implementation of basic principles of comprehensive examinations the results of which will be available for decision making purposes.

The third component is intended to ensure the viability of agricultural statistical systems through governance and statistical capacity building [4].

The Global Strategy to Improve Agricultural and Rural Statistics provides the framework essential to meeting the current and emerging data requirements and the demands of policy makers and other data users so that they can fill these urgent needs. The conceptual framework presented in the Global Strategy brings together the economic, environmental and social dimensions of agriculture to monitor how the well-being of households is determined by the productivity of agriculture, the land they use and the environment they share.

The economic dimension covers agricultural production (data on agricultural productivity, amount and cost of goods and factors of production); markets (information on demand, supply and market prices); farm and nonfarm income and survey data (net farm income and GDP from agriculture).

The social dimension reflects the need to reduce risk and vulnerability (information that will detect or predict potential risk factors), including the food security (information on commodity production, food trade and non-food use of agricultural products) and covers gender issues (presentation of data by gender).

The environmental dimension of agriculture mainly covers the field of environmental sustainability and provision of environmental services.

The starting point in determining the scope of required agricultural statistics is the system of national accounts (SNA), which provides international standards for concepts, definitions, and classifications of economic activities. The conceptual framework also points to the need for a system of environmental accounts with which to monitor the effects of agriculture on the environment. The System of Integrated Environmental Economic Accounting (SEEA)—which is a satellite account of the SNA—should be the starting point for environmental statistics. While there is a framework for household decision making, there is no equivalent internationally accepted standard for social statistics. The guiding principle will be to follow the socioeconomic variables captured within the national accounts [3].

According to FAO's World Program for the Census of Agriculture 2005 the agricultural holding is considered as the basic unit for economic statistics. The basic unit for social statistics is the household; for environmental statistics it is the land parcel. Linking these statistical units with geospatial data we can integrate these three aspects in the overall picture of land use.

Because the complete set of data requirements identified in the conceptual framework exceeds the existing statistical capacity of many countries, a minimum set of core data is to be used as a starting point upon which to develop the Global Strategy. This core set of data will provide national and international policy makers necessary information that goes across national boundaries. The Global Strategy provides a framework for countries to add items of national interest to the set of core data and to determine the frequency with which they will be provided. The set of core data provides the beginning point for the improvement of agricultural and rural statistics.

Core crop items include: wheat, maize, barley, sorghum, rice, sugar cane, soybeans, and cotton. These account for a major proportion of agricultural land use, of overall food supply, and of value added from agriculture. Their production can vary considerably from year to year. Because their products can be used for a variety of purposes, including bioenergy, decisions about which

commodities to produce can have important implications for food supply. Data on these crops include:

- area planted and harvested, yield, and production
- amounts in storage at the beginning of harvest;
- area of cropland that is irrigated;
- producer and consumer prices;
- amounts utilized for own consumption, food, feed, seed, fiber, oil for food, bioenergy, and net trade or imports and exports;
- early warning indications such as precipitation, windshield surveys of crop conditions, and vegetative indices provided by satellite observations [5].

Core livestock items include cattle, sheep, pigs, goats, and poultry. These are major sources of food supply and agricultural income. The data required on the above elements include:

- inventory and annual births;
- production of products such as meat, milk, eggs, and wool, and net trade or imports and exports;
- producer and consumer prices.

Core aquaculture and fisheries products. These contribute significantly to food supplies, and in the case of aquaculture, production entails the use of land as well as of water resources. Fisheries provide livelihoods for small-scale and inland holdings. Data required include:

- area cultured, production, prices, and net trade or imports and exports for aquaculture;
- quantity landed and discarded, number of days fished, amounts processed for food and nonfood uses, prices, and imports and exports.

Core forestry production. Forestry is a major land use, provides income, and has a significant role in understanding the forces affecting climate change. Data required include:

- area in woodlands and forests, quantities removed, and their prices for land associated with agricultural holdings;
- area in woodlands and forests, quantities removed, and their prices for products from nonagricultural holdings and respective utilizations [2].

Area in woodlands and forests, quantities removed, and their prices for land associated with agricultural holdings. Core inputs to agricultural production include labor, chemicals, water, energy, and capital stocks.Inputs are considered core because, in combination with data about outputs, they provide measures of agricultural productivity important to monitoring and evaluating steps to reduce poverty and hunger. Data required include:

- quantities of fertilizer and pesticides utilized;
- water and energy consumed;
- capital stocks such as machinery by purpose (i.e., tillage or harvesting);
- number of people of working age by sex;
- number of workers hired by agricultural holders
- employment of household members on the agricultural holding.

The socioeconomic characteristics of agricultural and rural households include household income by source as a key measure of the economic wellbeing of rural households to guide policy decisions about developmental efforts to reduce poverty. Periodic data about the number of households, employment, population, age, gender, and education levels are also required.

A fundamental way to evaluate affect of agriculture on the environment is to monitor changes in land cover and use. Land cover does not change rapidly and data are not, therefore, required on an annual basis. However, mapping products or digitized data from remote sensing should provide complete coverage for the entire land mass of a country with the following classifications:

- cropland;
- forest land;
- grassland;
- wetlands;
- settlement;

- water;
- other lands [4].

Annual data are generally required for those items that, combined, account for more than three-fourths of a country's value of production. Items with production that can vary significantly from year to year should be included, particularly if the production fluctuations are a major source of risk for vulnerable households and food supplies. Items that account for a significant proportion of land used and that have short term effects on land use and the environment should be represented as well. Including items that are produced by only a small number of households or holdings or that account for only a small share of the country's land has sample design and resource implications.

Overlapping data requirements and the need to improve underlying statistics and methodology point directly to the need to integrate agriculture into the national statistical system. Incorporating agriculture into national statistical systems will facilitate the concentration of resources from multiple sources, and remove the duplication of efforts in producing statistics that is so common in developing countries. The Strategy provides the framework to achieve the integration based on the development of a master frame for agriculture, its use in an integrated survey system, and the implementation of a data management system.

The process of improving agricultural statistics will begin with the integration of agriculture into the national statistical system. This integration will be accomplished by the development of a master sample frame for agriculture to ensure relevance and completeness; its use in implementing a coordinated data collection program to produce timely and accurate data that are coherent and comparable; and a strategy for data dissemination to ensure accessibility. This integration of agriculture into the national statistical system is needed for several reasons [3].

In some countries, centralized organizational structures are already in place, and national statistical offices maintain the principal responsibility for agricultural statistics. However, this centralized role may not always meet the needs of the line ministries such as the ministry of agriculture. For that reason, the statistical responsibilities in many countries are decentralized with the agricultural statistics produced by the ministries of agriculture. Both systems have advantages and disadvantages. National statistical offices have experience with statistical methodology and sample frames that other ministries do not have. However, the other ministries have more knowledge about agriculture, forestry, fisheries, and land use. The purpose of the Global Strategy is to propose a framework for integration that builds off the strengths of both systems.

The integration of agriculture into the national statistical system will be based on statistical methodology using tools that establish a closer link between results from different statistical processes and different statistical units. This can be achieved by the development of a master sampling frame, the adoption of sample designs such as overlapping samples, and the synchronization of questionnaire designs and surveys [2].

The development of the master sample frame for agriculture starts by defining the population parameters which are physical land mass and natural environment of the country, the economic output of agriculture, and the well-being of the farm and rural populations. For data-collection purposes, the population needs to be defined in terms of the unit of measure or the statistical units. The statistical units defined in the conceptual framework include the farm or agricultural holding, the household, and the land parcels. The conceptual framework requires a link between the economic, environmental, and social dimensions and their statistical units. This entails the need for georeferencing the farms and households. All of these issues are considered in the development of the master sample frame.

The master sample frame must provide the basis for the selection of probability-based samples of farms and households with the capability to link the farm characteristics with the household and then connect both to the land cover and use dimensions.

The development of the master sample frame for agriculture begins with the need to link the economic and social dimensions of agriculture with those relating to land cover and other environmental issues. Because the master sample frame should be linked to land use, obtaining satellite imagery of the country's area is a useful starting point.

Once the land-use mapping is complete, the next step is to georeference (or digitize) the population and agricultural census enumeration areas to the satellite imagery. This enables

monitoring of land use over time, and can be used to relate land use to local administrative structures [1].

The timing and frequency of data collection are major issues for agricultural statistics. The timing of data collection affects the quality of the data, especially if a lengthy recall is required. As a result data collection should coincide with harvest periods. The minimum set of core data includes statistics about the production of major crop, livestock, aquaculture and fisheries, and forestry products. The second requirement is for economic data on the agricultural holding, including inputs and outputs. The third requirement is to collect data on the use of fertilizers, chemicals, tillage methods, and other land use activities to monitor how agricultural production affects the environment. The fourth requirement is to measure the social well-being of the farm and rural households.

The traditional methodology is to select independent samples and conduct separate surveys for each of the categories. Single-purpose surveys generally make it easier to target the selected sample. Recent developments in sampling theory provide an alternative using selection probabilities based on the measures of size for a number of different variables. This design is termed "Multiple Probability Proportional to Size" (MPPS) because the relative size of each farm (or enumeration area) is determined for more than one item of interest. It takes advantage of efficiencies of the Probability-Proportionate-to-Size sampling while adding the use of multiple measures of size. The use of MPPS is appropriate for multiple-purpose surveys in which the population sample units each only have a subset of the items of interest [1].

The current situation of poor-quality data leads to their limited use within countries and by the international community; this is an important underlying factor explaining the lack of financial support for agricultural statistics. Understanding the demand for statistical information at the national level and what is required to supply that information is, therefore, a key element of the sustainability of an agricultural statistics system. Demand can be supported and strengthened if the statistical system is responsive to users and provides statistics that are relevant, accessible, timely, and with a level of accuracy that meets their needs.

Governance at the national level involves the organization of a national statistical system that includes sector ministries and other agencies that provide data. A coordination mechanism is employed to ensure that the different data producers adhere to a common set of standards. Their compliance with these standards prevents duplications of efforts and resources as well as the publication of conflicting data from different reporting agencies. It also ensures statistical integrity by making the data available and accessible. The coordination mechanism should provide a common voice for seeking resources for the agricultural statistics system within the framework of the national statistical system. The governance it provides should enable the ministries and agencies involved in the collection of agricultural data to integrate agriculture into the preparation of the national strategies for the development of statistics.

A governance body such as a national statistics council should be established to organize the efforts of statistics stakeholders. Such a council would include the ministry of agriculture, the national statistical office, and other organizations providing statistics or administrative data to jointly organize and coordinate the development and use of the master sample frame, the integrated survey framework, and the database. It may be determined that certain ministries are best suited for activities such as those involving the master sample frame or the collection of specific types of data [3].

4. Conclusions

The Strategy should therefore be considered a long-range plan requiring an examination of governance at the national level, the establishment of statistical capacity building across the national statistical system, and the restoration of resources to carry it forward. The Global Strategy continues with the following chapters. It is expected that its implementation will increase the number of countries that will be able to collect, analyze and provide a minimum set of core data. Stable system of agricultural statistics requires management improvement and integration of agriculture into the national statistical system.

The National Strategies for the Development of Statistics (NSDS) should be reviewed and, where necessary, be revised to reflect the integration of agriculture into the national statistical system and to also reflect the implementation of the master sample frame, the integrated survey framework, and the data management system.

Given the dynamic nature of agriculture and its accompanying issues, the Strategy should be considered a living document to be updated when needed to reflect current situations.

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