

The Exploration & Practice of Jiangsu, China in Agricultural Statistics

Duliang

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The Chinese government has always attached great importance to agricultural statistics. It started the sampling survey of grain output and planting area in 1962. Since 1984, Jiangsu has carefully organized the implementation of the planting survey system based on modern statistical sampling theories and the sampling survey system on intermediate consumption of agricultural products, production prices, market prices, and major livestock and fowl prices, and the agricultural GDP accounting, and established the super-aggregate household-level data system and the internal data assessment system; and it has provided lots of authentic statistical data and analysis reports for the state and the local governments, rendered quality service for the decision-making of the governments at all levels, and won the comments and recognition of the major leaders of the State Council and the local government leaders. In 2010, Jiangsu took the lead in carrying out the sampling survey of crops on the ground and the non-probability sampling survey of the production prices and the intermediate consumption of agricultural products; **it has carried out the province-wide whole process fine quality control** and started the exploration and practice of the latest statistical theories. The Jiangsu Survey Organization of the National Bureau of Statistics of China will overcome the practical difficulties such as heavy workload and lack of funds to make the agricultural statistics develop in a more scientific, pragmatic and transparent manner.

I. The status quo of the agricultural statistics in Jiangsu, China:

(I) The field survey of crops in Jiangsu Province:

To further improve the quality of the statistical survey data concerning the major agricultural products such as grain, cotton, oil, and according to the unified arrangements of the National Bureau of Statistics of China, Jiangsu launches the provincial pilot project on sampling survey of crops in 2011 and will finally establish a crop survey monitoring system integrating the space, land and people that makes a comprehensive use of the sampling technology and the spatial information technology and taking full use of the agricultural census data, the land survey data and the remote sensing data of crops.

1. Subjects and contents of survey

It is to select some agricultural production and operation units from the cultivated land sampling frame that is in consistency with the province's crops planting structure as the subjects of survey and use the method of actual cropping and actual measurement to survey the yield per unit area of the agricultural products including wheat, corn, and rice planted in the chosen sample plots, and based on them project the sown area and structure of crops in the whole province and its parts.

2. Sampling methods

(1) Comparative assessment of consistency

Based on the second national agricultural census data, the target population is split into several subpopulations according to the geographical position and planting habits, and the target population and the sampled population receive comparative assessment of consistency in aggregate and structure.

(2) Preparation of sampling frames

The sampling frames are prepared in two phases. The first phase concerns the village-level sampling frame, which requires the space match of all village-level administrative areas in the second agricultural census data with the village-level administrative areas in the land survey data, and connection of the data required for the sampling, thus forming a complete village-level spatial sampling frame; the second phase concerns the plot-level sampling frame, which requires processing the original land polygons in all sampled villages in the land census data into standard plots of the same size according to the required standardization principle, thus creating a standard plot sampling frame for selecting sample plots.

(3) Sampling methods

(i) The sample selection in the survey of the sown area takes the cultivated land area in the land survey data as the design variable and adopts the layer of cropping intensity by variety and the method of Probability Proportionate to Size Sampling (PPS). In preparing the sampling frame, the administrative division information is used for spatial matching of the agricultural census data and the land survey data. In principle, the village-level administrative divisions in the land survey data are used as the primary units and the layered PPS sampling method is applied for selecting administrative villages. The land polygon data of the selected villages is divided into standard plots according to the principles set forth, and a certain number of final survey samples are selected randomly.

(ii) As the survey of the sown area of crops adopts the layered PPS sampling in the scope of taking the state's surveyed counties as the sampled population, the projected figures of the sown area of crops by variety are directly added to the sampled population firstly and then the figures of the target population, namely the provincial scope, are projected.

The selection of samples for the survey of yield per unit area: For specific crops surveyed, it is to make a thorough survey to obtain the crop yield per unit estimates in the sample plot of the sown area survey, make a rank according to the yield per unit, make the sown area multiplied by the weight number of this plot for accumulative total, and carry out random start and isometric sampling. The selected plots are arranged with a fixed number of small samples for actual measurement, and the actual cropping and actual measurement is adopted.

3. Site survey

The survey of the basic situation of the sample villages and the operators in the sample unit areas adopts the questionnaire method; and the survey of the sample unit areas on division of natural plots, irrigation facilities, coverage of non-cultivated land adopts the site registration combining GPS measurement and hand-drawn map for information collection; The survey of the sown area by sowing season in the sample unit areas adopts the site registration method with the assistance of the maps. The survey of the yield per unit area of the main crops adopts the method of actual cropping and actual measurement, and the survey of the yield per unit area of other crops adopts the method of single cropping and single measurement or riding the

field to estimate the yield.

4. The main work includes:

Survey of farmers' farming intentions: We carry out three times of survey for farmers' farming intentions.

Survey of sown area: We survey the cultivated crops of the sample units of cultivation according to the three seasons of sowing, i.e. autumn and winter sowing, spring sowing, and summer sowing.

Survey of yield per unit area: The yield per unit area of the crops concerned is surveyed by three cropping seasons, i.e. summer crops, early season rice, and autumn crops.

5. Projection of results

(1) Direct projection of sown area.

The direct projection method is applied for major crops such as rice, wheat, corn, cotton, etc. (the total sown area of all major crops accounts for over 80% of the province's total sown area). As the layered PPS method is applied in selecting samples, it requires projection of the sown area of the crops in each layer firstly and then summarizing the results of all layers. The formula is as follows:

$$\hat{X}_h = \sum_{i=1}^m \bar{x}_i N_i$$

The projection formula on the sown area of crops by variety of the province's target population or subpopulation is as below:

$$\hat{X} = (\sum \hat{X}_h) * (1/r)$$

"r" is the ratio of the planting intensify of the sampled population to the planting intensify of the target population of the crop multiplied by the ratio of the projected cultivated area of the sampled population to the cultivated area of the target population. The formula is as below:

$$r = (P_{\text{抽}} / P_{\text{总}}) * (\hat{Y}_{\text{抽}} / Y_{\text{总}})$$

(2) Indirect projection.

The structural projection method is applied for the sub-classes of the crops with direct projection or other crops, such as the sub-classes of soybeans, mung beans, red beans of the class of beans; according to the projected sown areas of beans, the proportions of composition obtained from the survey is used to project the sown area of each sub-class of beans. The proportion of composition changes with the season, which needs to be reflected in the seasonal report.

(3) The yield per unit area

Measured yield per mu of crop in sample plot = total gross weight of small samples of crop measured with yield in the plot/number of small samples*6000/area of small samples*standard water impurity rate - average loss per mu deducted

Yield per mu of the crop with single cropping and single measurement in sample plot = (single weight - loss) /sown area of crop with yield measured in the plot

Provincial average yield per mu of crop = sum of the yields per mu of all samples in the provincial sample plots/number of samples in the provincial sample plots

(4) Projection of the total yield

The province's total yield of crops = the province's average yield per mu * the province's total crop area

6. Data assessment

The representativeness of samples, the quality of survey, the logical relationship of reports, the impact of abnormal data, and the impact of change of external factors are assessed to ensure the representativeness of the samples and the validity of the findings. The assessment of the quality of survey is carried out through basic work inspection and post factum quality sampling. The calculation of sampling errors adopts the self-help method and is completed through special procedures.

(II) The survey of Jiangsu agricultural prices

1. The contents of survey

The survey of Jiangsu agricultural prices is composed of three parts, i.e. the survey of production prices of agricultural products, the survey of fair trade prices in rural areas, and the monitoring survey of the prices of key agricultural products:

(1) The survey of production prices of agricultural products. It is to know agricultural producers' received unit prices for first-hand (direct) sales of their products and prepare the corresponding production price index for agricultural products. Such survey is made quarterly

(2) The survey of fair trade prices in rural areas. It is to know the transaction prices of major agricultural products including 36 kinds of major agricultural, pasture and fishery products in the trade markets of the province's main producing areas. The survey is made monthly.

(3) The monitoring survey of prices of key agricultural products.

It is to know the transaction prices of 16 key agricultural products in the trade markets of the province's main producing areas of agricultural products. The prices are collected twice a month.

2. Subjects of survey

The subjects of the survey of production prices of agricultural products is agricultural production and operation units and farm households selected. The subjects of the survey for fair trade market prices of agricultural products and the monitoring survey of prices of key agricultural products is the main producing counties of agricultural products chosen.

3. The method of summary of production prices of agricultural products

(1) Average price (the weighted arithmetic average) of each kind of agricultural product of the investigated unit. It is some surveyed unit's sum of sales of some product in the report period divided by the sum of quantity of products sold in the report period. The formula is:

$$p_i = \frac{\sum_{j=1}^n p_{ij} q_{ij}}{\sum_{j=1}^n q_{ij}}$$

(2) The national and provincial (autonomous region and municipality) product price average (weighted arithmetic average).

It is all surveyed units' sum of sales of some product in the report period divided by the sum of quantity of products sold in the report period. The formula is:

$$P_i = \frac{\sum_{j=1}^n p_{ij} q_{ij}}{\sum_{j=1}^n q_{ij}}$$

4. Determining the representatives of the agricultural products

A total of 180 representative products are chosen from 30 sub-classes, 14 classes, and four categories of agriculture, forestry, animal husbandry and fishery. These representative products feature considerable impacts on the national economy and the people's livelihood, stable production or reflection of the local characteristics.

(III) Accounting of the value added of agriculture, forestry, animal husbandry, and fishery (agricultural GDP accounting)

1. Notion:

The term of value added of agriculture, forestry, animal husbandry, and fishery refers to the value added from production of goods or rendering of services of the agriculture, forestry, animal husbandry, and fishery industries and the service sectors in these four fields, and it is the residual of the total output value at current prices of agriculture, forestry, animal husbandry, and fishery minus the intermediate inputs at current prices of the agriculture, forestry, animal husbandry, and fishery. Its advantage is avoiding double counting of intermediate products in the value added, eliminating the repetition factors when calculation of GDP, so the calculation results are the values of the final products.

2. The scope of accounting

All agriculture, forestry, animal husbandry, and fishery production units in various types of economic organizations and various systems, and the agriculture, forestry, animal husbandry, and fishery production units attached to non-agricultural units in the areas under administration.

3. The methods of accounting

The "production method" and the "distribution method" are applied for accounting.

(1) Production method: This is a commonly used method for calculation of value added. The value added is the residual of the total output value of agriculture, forestry, animal husbandry, and fishery at current prices minus the intermediate consumption of agriculture, forestry, animal husbandry and fishery (not including depreciation of fixed assets and overhaul fund).

(2) Distribution method: The distribution method is also called income method. The value added is the sum of the incomes obtainable of various production factors in the production process.

Value added of agriculture, forestry, animal husbandry, and fishery = depreciation of fixed assets + laborers' remuneration + net taxes on production (taxes on production - subsidies on production) + operating surplus

4. The specific accounting method of the value added of agriculture, forestry, animal husbandry, and fishery

In order to refine the method of calculation of the value added at current prices of agriculture, forestry, animal husbandry, and fishery, five specific industries of agriculture, forestry, animal husbandry, fishery, and the service of agriculture, forestry, animal husbandry, and fishery are divided for separate calculation. The production method is applied in calculating the value added of agriculture, forestry, animal husbandry, and

fishery. And the distribution method or the value-added rate method is applied for calculating the value added of the service industry of agriculture, forestry, animal husbandry, and fishery.

(IV) Organizing the implementation of survey

The Jiangsu Survey Organization of the National Bureau of Statistics of China carries out "whole process" quality control of the statistical survey data from quite a few aspects. The first is defining the surveyors' responsibilities and making a unified management of surveyors; the second is strengthening inspection and management of the survey outlets of agricultural product prices; the third is intensifying training for survey of prices of agricultural products to convey complete business knowledge and requirements to all assistant surveyors; the fourth is standardizing management of basis books, eliminating accounting fraud and securing the accuracy and authenticity of the source data; the fifth is establishing and implementing the grassroots survey procedures to standardize the work of primary records, sorting, coding, entry, review and summary report of the survey data; the sixth is intensifying data assessment and carrying out analytical management of "traceability" over the quality of the survey data on prices of agricultural products. The seventh is making the prior inspection of data quality. The meeting of detailed inspection of the basic data tables is held in advance to make the grassroots surveyors learn from peer review.

II. The difficulties and defects in the statistical work

(I) There is inadequate funding for rural survey.

At present, the Jiangsu Survey Organization of the National Bureau of Statistics of China is mainly funded by the allotment of the National Bureau of Statistics of China and the funds provided by the local government for special surveys. Overall, the financial supply is difficult to meet the demand in executing the surveys required by the State. Various rural surveys are carried out simultaneously in more than 800 villages throughout Jiangsu, so the daily workload is heavy. There are more than 1200 employed grassroots assistant surveyors that are not official staff of the statistic organs, which has resulted in the tight financial supply in almost all levels of statistical organs.

(II) The quality of primary investigators needs to be improved.

Currently the persons staying in the rural homes in Jiangsu Province are dominated by elderly people aged over 50, who are less educated and have difficulty in knowing and understanding the statistical knowledge and requirements, which leads to difficulties in completing primary data. In addition, the remuneration for the staff of rural statistical stations is poor, therefore, it is difficult to retain high-quality persons to engage in the statistical work and those still working on the post are lack of enthusiasm with the work.

(III) The means and methods of statistics need to be improved.

The unreasonable and inadequate statistical methods and means have resulted in a certain amount of statistical errors. China is building its socialist market economy with Chinese characteristics, the statistical work at this stage is still in the level of a developing country.

III. The future trend of rural statistics in Jiangsu

To this end, we intensify the publicity on the statistical work for social recognition and support. We provide legal education on statistics to use the law to guide the statistical work. It is aimed at facilitating the statisticians to adhere to the principles in their practice and dare to fight against the offense on the authenticity of the statistical figures.

With the gradual transformation of government functions, it has gradually become an important component of the statistical work to open to the public and serve the community. Openness to the public is determined by the nature of the statistical work. Statistics uses figures to describe and reflect the development changes of things and their laws; as the market's basic role in resource allocation has become stronger, the demand for statistical information will be promoted accordingly. The law is applied to grant the government functions for the use of public services. The statistics open to the public is determined by the need of integrating with the international practice. Therefore, we regularly and often release statistical information to the public through various media. And we will expand the openness of information. Our statistical information from the calculation methods, collection channels to the release forms will be more open and transparent.

ABSTRACT

This paper mainly introduces the practice and exploration of Jiangsu, China's leading agricultural province and major grain producing area, in conducting sampling survey of agricultural statistics, and focuses on expounding how Jiangsu gears into international statistics, conducts the pilot work of sampling survey of land parcels regarding the cultivated area of crops in a scientific manner in accordance with the Statistics Law, and replaces the traditional way of reporting data as a whole with sampling survey data. It mainly accounts for the theoretical basis, institutional contents, and conditions of producer price of agricultural products of non-probability samples based on the survey system of super summarization of farmer data and the intermediate consumption survey, including overall evaluation of samples, confirmation of survey theme of crops, selection of samples, reckoning method of Provincial overall data, county-level reckoning and sample expansion, and sample management and maintenance, etc.

This paper also makes a brief introduction to such information that Jiangsu establishes strict internal data assessment system, practices whole-process refined control and management of the quality of the survey data in agricultural statistics throughout the Province, provides reliable data to the agricultural GDP accounting, and provides high quality service to governments at different levels for their decision making. In addition, this paper has also made a list of actual difficulties and challenges Jiangsu has presently encountered in sampling survey of agricultural statistics, and put forward projection and suggestions for Jiangsu's practice of more scientific and transparent agricultural statistics and survey work in the future.