COUNTRY PAPER - INDIA

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1. INDIAN STATISTICAL SYSTEM AND AGRICULTURAL STATISTICS SYSTEM IN INDIA

1.1   The Indian Statistical System functions within the overall administrative set up of the country. India has a federal structure of Government. The division of responsibility for administration between the Union Government and the State Governments is on the basis of three-fold classification of all subjects, namely, the Union List, the State List, and the Concurrent List. The subject "Statistics" comes under the Concurrent List. This category represents the areas where both the Union and State Governments can operate. There is a further division of responsibility, by subjects or groups of subjects, among the different Ministries/Departments of the Union Government and among the Departments of State Governments, on the basis of their administrative functions.

1.2   In accordance with this structure, the Indian Statistical System is largely decentralised with elements of central supervision. All-India large-scale statistical operations, such as Population Census, Economic Census, Agricultural Census and Livestock Census, and nation-wide sample surveys, including the Socio-Economic Surveys, as well as compilation of macro-economic aggregates like national accounts, All-India Price Indices and industrial production, are mainly Central activities, with substantial involvement of State agencies in data collection.

1.3   "Agriculture" being a state subject and "Statistics" falling in the concurrent list of the constitution, the Agricultural Statistics System is a decentralized one with the State Governments playing a predominant role in collection and compilation of agricultural statistics.   The States mainly undertake the generation of basic agricultural statistics because the subject of agriculture is in the State list of constitution. However, the subject of Statistics is under the concurrent list of the Constitution of India and this enables the Central Government to take initiatives in this regard in the national perspective. The initiative of the Central government to operate important schemes for generation and improvement of agricultural statistics becomes inevitable to facilitate the availability of these statistics at national level, desegregated in the desired administrative hierarchy in a harmonious manner, adopting unified concepts and methodology which otherwise is not convenient in the highly decentralised federal structure in which the agriculture sector is placed.

1.4   India has a well established and internationally acknowledged Agriculture Statistics System. It is a decentralized system with the State Governments - State Agricultural Statistics Authorities (SASAs) to be more specific – playing a major role in the collection and compilation of Agricultural Statistics at the State level while the Directorate of Economics & Statistics, an attached office of Ministry of Agriculture & Farmers Welfare at the centre is the pivotal agency for such compilation at the All India Level and is entrusted with the responsibility of collection, collation, dissemination and publication of statistical data on diverse facets of agriculture and allied sectors, required for planning and policy formulation by the Government.

1.5   Other principal agencies which collect data and conduct methodological studies on agricultural statistics are the National Sample Survey Office (NSSO), the Indian Agricultural Statistics Research Institute (IASRI), the State Directorate of Economics and Statistics (State DESs), etc. Ministry of Agriculture & Farmers Welfare has also set up Mahalanobis National Crop Forecast Centre (MNCFC) in 2012 to provide in-season crop forecasts and assessment of drought situation using state of the art remote sensing techniques and methodologies developed by Indian Space Research Organisation (ISRO).

1.6   The Agriculture Statistics System is very comprehensive and provides data on a wide range of topics such as crop area and production, land use, irrigation, land holdings, agricultural prices and market intelligence, livestock, fisheries, forestry etc. It has been subjected to review several times through expert committees since Independence to make it adaptive to contemporary changes in agricultural practices.

2.   COMMUNICATION AND ADVOCACY FOR AGRICULTURAL STATISTICS IN AGRICULTURAL POLICY ANALYSIS:

2.1   Agriculture plays a vital role in the Indian economy. Over 70% of the rural households depend on agriculture as their principal means of livelihood. The share of agriculture in employment was 48.9 per cent of the workforce [National Sample Survey Office (NSSO), 2011-12]. Agriculture alongwith fisheries and forestry accounts around 17% of the nation's Gross Domestic Product (GDP) and is its single largest contributor. Agricultural exports constitute one fifth of the total exports of the country. These factors

together with a strong determination to achieve self sufficiency in food grains production have ensured a high priority for agriculture sector in the successive development plans of the country.

2.2   India's record of progress in agriculture over the past four decades has been quite impressive. The agriculture sector has been successful in keeping pace with rising demand for food. The contribution of increased land area under agricultural production has declined over time and increases in production in the past two decades have been almost entirely due to increased productivity.

2.3   Contribution of agricultural growth to overall progress has been widespread. Increased productivity has helped to feed the poor, enhanced farm income and provided opportunities for both direct and indirect employment. The success of India's agriculture is attributed to a series of steps that led to availability of farm technologies which brought about dramatic increases in productivity in 70s and 80s often described as the Green Revolution era. The major sources of agricultural growth during this period were the spread of modern crop varieties, intensification of input use and investments leading to expansion in the irrigated area. In areas where 'Green Revolution' technologies had major impact, growth has now slowed. New technologies are needed to push out yield frontiers, utilize inputs more efficiently and diversify to more sustainable and higher value cropping patterns. At the same time, there is urgency to better exploit potential of rainfed and other less endowed areas if we are to meet targets of agricultural growth and poverty alleviation. Given the wide range of agro-ecological setting and producers, Indian agriculture is faced with a great diversity of needs, opportunities and prospects. Future growth needs to be more rapid, more widely distributed and better targeted. These challenges have profound implications for the way farmers' problems are conceived, researched and transferred to the farmers.

2.4   On the one hand agricultural research will increasingly be required to address location specific problems facing the communities on the other the systems will have to position themselves in an increasingly competitive environment to generate and adopt cutting edge technologies to bear upon the solutions facing a vast majority of resource poor farmers.

2.5   Given this backdrop, Agricultural Statistical System has to play a key role in improving farmers' welfare and enhancing food security in the country. In view of the

predominate position of the agriculture sector, collection and maintenance of Agricultural Statistics assumes great importance.

3.   TYPES   OF   AGRICULTURAL   STATISTICS   COLLECTED   IN AGRICULTURAL STATISTICS SYSTEM

3.1   Establishment and maintenance of strong database on vast domain of agriculture covering social and economic aspects of the activities is an essential component of Indian statistical system. Some of them are delineated as under:

3.1.1   Crop and Land Use Statistics

3.1.1.1 Crop and land use statistics from the backbone of the Agricultural Statistics System. Reliable and timely information on crop area, crop production and land use is of great importance to planners and policy makers for efficient agriculture development and for taking decisions on procurement, storage and public distribution, export, import and many other related issues. With an increasingly evident trend of decentralized planning and administration, these statistics are needed with as much disaggregation as possible down to the level of village panchayats. India possesses an excellent infrastructure and it has a long standing tradition of generating comprehensive series of crop and land use statistics through complete enumeration of fields in the villages in each of 3 specified crop seasons. With most parts of the country having detailed cadastral survey maps, frequently updated land records and the institution of a permanent village reporting agency, the country has all the necessary means to produce reliable and timely statistics.

3.1.2   Crop Forecasts

3.1.2.1 The estimate of crop production based on area through field enumeration and yield rate through crop cutting experiments become available much after the crop is harvested. However, the government needs advance estimates of production for various decisions relating to pricing, distribution, export and import, etc. For every agricultural year (July-June), the Directorate of Economics & Statistics (DES), Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare releases four Advance Estimates (AE) followed by Final Estimates of crop area and production in respect

of principal food and non-food crops (food grains, oil seeds, sugarcane, fibers, etc.), which account for nearly 87% of agricultural output. These are based on preliminary eye estimation, analysis of priority enumeration of area and crop cutting experiments. The time of release and period covered under each of these estimates are as under:-

(i) First Advance Estimates are released in September when Kharif sowing is generally over. These cover only Kharif crops.

(ii) Second Advance Estimates are normally released in February of the following year when Rabi sowing is also over. The second advance estimates cover Kharif as well as Rabi crops. These take into account; (i) firmed up figures on Kharif area coverage; (ii) partly available data on crop cutting experiments for yield assessment of Kharif crops and (iii) tentative figures on area coverage of Rabi crops.

(iii) Third Advance Estimates incorporate revised data on area coverage for Rabi crops and better yield estimates of Kharif crops. These are released in April-May.

(iv) Fourth Advance Estimates are released in July-August of the next agricultural year. By this time fully firmed up data on area as well as yield of Kharif and Rabi crops are supposed to be available with the States. As such, Fourth Advance Estimates are expected to be very close to the Final Estimates.

(v) Final Estimates are released about seven months after the Fourth Advance Estimates in February of the subsequent year. This allows sufficient time to States to take into account even the delayed information while finalizing area and yield estimates of various crops. No revision in the State level data is accepted after release of Final Estimates.

3.1.2.2 The very purpose of having a series of four successive estimates during the year is that the estimates of agricultural production in the country may be refined and improved as the year progresses and better, firm data on sowing and yields become available.

3.1.2.3 Ministry of Agriculture & Farmers Welfare has set up a National Crop Forecasting Centre (NCFC) with the object of examining the existing mechanism of building forecasts of principal crops and developing more objective techniques. The NCFC takes into account information on weather conditions, supply of agricultural inputs, pests, diseases and related aspects in the formulation of scientific and objective forecasting methods to replace the

present system. The work of the NCFC is at developmental stage and needs more statistical support to be able to formulate appropriate models of forecasting.

3.1.3 Horticultural Statistics

3.1.3.1 There are two main sources that generate statistics of production of horticultural crops. The first is the Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare (DESMOA), which operates and centrally sponsored scheme "Crops Estimation Survey on Fruits and Vegetables" in 11 states covering 7 fruit and 7 vegetable and spice crops for estimating area and production. The fruit crops covered are Mango, Banana, Apple, Citrus, Grapes, Pineapple and Guava. The vegetable and spice crops are Potato, Onion, Tomato, Cabbage, Cauliflower, Ginger and Turmeric. However, the National Statistical Commission (NSC) observed that the methodology adopted for estimating the production of horticultural crops should be developed taking into account information from all sources, including market arrivals, exports and growers associations. In view of this, the Scheme was discontinued from 2013-14 and a new alternative methodology was developed by IASRI. The new methodology is now being tried out on pilot basis in 6 States under the project "Coordinated Programme on Horticulture Assessment and Management using Geo-informatics (CHAMAN)" of Department of Agriculture, Cooperation & Farmers Welfare. The programme has the objective to develop and firm up scientific methodology for estimation of area and production of horticulture crops. It has two main components namely: (1) Remote sensing (RS) Technology and (2) Sample Survey (SS) methodology for estimation of area and production of horticultural crops. The Remote Sensing aspect of the proposed programme is being implemented by Mahalanobis National Crop Forecast Centre (MNCFC) and has the following components: (i) Area and Production assessment of seven major horticultural crops in major states; (ii) Remote sensing for developmental studies like site suitability and postharvest infrastructure development; and (iii) Detailed scientific field level research studies for developing technology for crop identification, yield modeling and disease assessment for other horticulture crops.

3.1.3.2 The second source of horticultural statistics is the National Horticultural Board (NHB), which compiles and publishes estimates of area, production and prices of all important fruit and vegetable crops based on reports furnished by the State Directorates of Horticulture and Agriculture. These estimates are apparently based on the informed

assessment of local level officials dealing with horticulture and the reports of market arrivals in major wholesale fruit and vegetable markets.

3.1.4 Land Use Statistics

3.1.4.1 Statistics on land use are compiled from village land records maintained by village Patwari. The information of each survey number by its use under nine specified categories i) Forest ii) Area under non agriculture use iii) Barren and uncultured land iv) Permanent pastures and grazing land v) Miscellaneous tree crops vi) Culturable waste land vii) Fallow land other than current fallows viii) Current fallows and ix) Net Area sown are recorded and aggregated at successive administrative levels.

3.1.4.2 Land use statistics are also being collected through nationwide land mapping by the National Remote Sensing Agency (NRSA) according to 22 fold classification. The categories are much more detailed than the usual 9 fold classification.

3.1.5 Irrigation Statistics

3.1.5.1 Irrigation statistics mainly relate to data on crop wise area irrigated by different sources. The principal sources of irrigation statistics are the Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare (DESMOA), and the Ministry of Water Resources, River Development & Ganga Rejuvenation. Besides these, some data on irrigated area are available from the administrative reports of State Government departments and the Agricultural census. Rainfall and Weather data are available from the India Meteorological Department (IMD).

3.1.5.2 The Irrigation statistics in terms of source wise area irrigated is compiled by DESMOA through village land records as part of annual area statistics. On the other hand, the Ministry of Water Resources, River Development & Ganga Rejuvenation collects and compiles irrigation statistics in terms of irrigation potential created and utilized in disaggregated components of major, medium and minor irrigation sources of surface and ground water.

3.1.5.3 The information on Major and Medium Irrigation projects and the command area covered by them is collected by Central Water Commission. Groundwater is the principal source for minor irrigation and the Central Ground Water Board (CGWB) is responsible for compilation of data on ground water which inter-alia include statistics on minor irrigation. The Minor Irrigation Division of the Ministry of Water Resources, River Development & Ganga Rejuvenation compiles exhaustive information on minor irrigation at the national level through periodic Minor Irrigation Census with State agencies carrying out enumeration of each dug well, shallow and deep tube well, surface flow and surface lift irrigation schemes. Command Area Development Division of the Ministry compiles and disseminates data on Command Area Development Programme (CADP) furnished by State Command Area Development Authorities (CADAs).

3.1.6 Land Holdings Statistics

3.1.6.1 For planning and implementation of land reforms, comprehensive information relating to the characteristics of different size classes of holdings is essential. This is also necessary to identify and formulate policies and programmes for the welfare of small and marginal farmers especially, the rural poor and economically weaker sections. The information is required by operational holding as distinct from ownership holdings. Land holding Statistics is collected and compiled by NSSO by way of Land Holding surveys and by Ministry of Agriculture & Farmers Welfare through quinquennial Agricultural Census.

3.1.6.2 Agricultural Census in the country is conducted by Ministry of Agriculture & Farmers Welfare at intervals of five years, as a part of the World Census of Agriculture (WCA). The census provided detailed statistics on the structure of operational holdings and their main characteristics like number and area, land use, irrigation, tenancy and cropping pattern. The census is carried out in three phases. During Phase I, a list is made of all the operational holding and their primary characteristics like location, area, gender and social group of the holder. During phase II, detailed data on tenure, tenancy, land use, irrigation, crop areas, etc. are collected. Phase III, popularly known as input survey, relates to collection of data on agricultural inputs (seeds, fertilizers, pesticides, etc.) according to five size groups of the holdings.

3.1.6.3 The census follows the method of re-tabulation of data from village land records in the temporarily settled States (accounting for 86 per cent of the total area). In the rest of the country, the census is taken through a household enquiry in a 20 per cent sample of villages. Even in the temporarily settled States, the data collected during Phase II is confined to a 20% sample of the villages. The input survey (phase III) is a household survey in a 7 per cent sample of villages selected from the 20 per cent villages (phase II) in respect of both the temporarily and permanently settled States.

3.1.7 Agriculture Input Statistics

3.1.7.1 For a comprehensive appraisal of the agricultural economy, information on inputs such as fertilizer, pesticides, agricultural credit, multiple cropping, inventory of agricultural machinery and implements, mechanism of plant protection, quarantine and storage, etc. are of as much importance as the data on production. The input surveys conducted as a part of quinquennial Agricultural Census are an important source for such data. Information on production, distribution and stocks held of fertilizers is available from the Fertilizer Association of India (FAI), but it does not provide details of actual consumption.

3.1.7.2 The Mechanization and Technology Division of the Department of Agriculture Cooperation & Farmers Welfare has been compiling and maintaining statistics relating to production and sale of tractors and power tillers from Tractors Manufacturing Association and Manufacturers of Tractors and Power Tillers.

3.1.7.3 The Directorate of Plant Protection, Quarantine and Storage (PPQ&S) in the Ministry of Agriculture & Farmers Welfare is the apex organization in India for promoting plant protection. Large amount of data are collected through Rapid Roving Surveys under the Pest Surveillance and Monitoring. In these surveys, the Surveillance Teams of the different Central Integrated Pest Management Centres Move thorough intensive crop belts on predetermined routes at regular intervals, stop at regular distances and collect information on weather, crops stage and status, and pest and disease situation in the field on both sides of the road. The Locust Warning Organization of the Directorate entrusted with the task of monitoring and controlling locusts over an area of 2 Lakh square kilometers in the desert areas across Rajasthan, Gujarat and Haryana collects information on locust development and movement together with related aspects. This information is centrally collated and a

fortnightly locust situation bulletin is brought out and circulated to various organizations including the Food and Agricultural Organization (FAO). In addition, data are collected on several other parameters relating to the plant protection and quarantine, by the Directorate of Plant Protection, Quarantine and Storage.

3.1.8 Agricultural Price Statistics

3.1.8.1 The Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare (DESMOA) is responsible for the collection, compilation and dissemination of the price date of agricultural commodities. The price date are collected in terms of (a) weekly and daily wholesales prices, (b) retail prices of essential commodities, and (c) farm harvest prices.

3.1.8.2 Weekly wholesale prices cover 140 agricultural commodities from 620 markets. The data are collected by price reporters appointed by the State Governments of Agricultural Marketing Committees and forwarded to the state Directorates of Economics and Statistics (DESs). Daily wholesale prices cover 12 commodities (rice, paddy, wheat, jowar, bajra, ragi, maize, barely, gram, sugar, gur and khandsari) from 617 market centres. On receipt of the prices from various State agencies, the Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare (DESMOA) forwards the same to the Economic Adviser, Ministry of Commerce and Industry for monitoring wholesale prices. Wholesale prices of certain important cereals, gram and sugar are also sent to the Cabinet Secretary on alternate days for direct monitoring. Retail prices of essential commodities are collected on a weekly basis from 8 market centres in respect of 88 commodities (49 food and 39 non-food) by the staff of the State Market Intelligence Units, State Directorates of Economics and Statistics (DESs) and State Department of Food and Civil Supplies..

3.1.8.3 Farm Harvest Prices are collected by the field staff of the State revenue departments for 31 commodities at the end of each crop season and published by the DESMOA.

3.1.9 Market Arrival Statistics

3.1.9.1 The Directorate of Marketing and Inspection in MOA has established AGMARKNET portal as a single window for collecting and disseminating information on prices and arrival of all important commodities from different regulated agriculture markets

across the country. The network links agriculture produce markets of the country and the State Agriculture Marketing Boards for facilitating information support to farmers and other concerned.

3.1.10 Cost of Cultivation Statistics

3.1.10.1 In order to pursue its price support policy, the Government of India announces from time to time, the minimum support prices of principal crops. This necessitates the availability of relevant data on the cost of production of the crop concerned. To meet this requirement, a comprehensive survey of the Cost of Cultivation of Principal Crops was initiated in 1970-71. The survey is in operation in 16 States and covers 29 crops, the number and choice of crops in each State depends upon their importance to the State.

3.1.10.2 The Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare (DESMOA) has the overall charge of implementing the survey programme through the Agricultural Universities in 13 States and general universities in three States by providing them hundred per cent financial assistance. The survey design followed is that of three-stage stratified random sampling with the tehsil or taluka as the first stage unit, a cluster of villages as the second stage unit and an operational holding as the third and ultimate stage unit. Universities engage full time field men for this purpose.

3.1.10.3 The Cost of Cultivation Studies is primarily intended for use by the Commission for Agricultural Costs and Prices (CACP). In addition, these data are used by the Central Statistical Office, Planning Commission, other Economic Ministries of Government of India as well as research organizations.

3.1.11 Livestock Statistics

3.1.11.1 Data on livestock numbers are collected through quinquennial Livestock Census by complete enumeration of all households with regard to livestock population, poultry, agricultural machinery and fishing craft. The species covered under the census are Cattle, Buffaloes, Yaks and Mithuns, Sheep, Goats, Horses & Ponies, Mules, Donkeys, Camels, Pigs, and Dogs. The information is collected through numerical enumeration according to age, sex and breed. Livestock Census is a centrally sponsored scheme coordinated by

Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare (DESMOA). The census is conducted by the State Animal Husbandry Departments with the help of their field staff. In some States, the field operations are entrusted to the village Patwari Agency with technical supervision provided by the Department of Animal Husbandry. Department of Animal Husbandry carries out integrated sample surveys for estimation of production of major livestock products i.e. milk, eggs, wool and meat as well as cost of production of milk and eggs.

3.1.12 Fisheries Statistics

3.1.12.1 Fisheries of India can be broadly classified into two types namely, marine fisheries and inland fisheries. The Fisheries Statistics Section of the Department of Animal Husbandry and Dairying in the Ministry of Agriculture & Farmers Welfare is in charge of compiling the data relating to this sector. At present data on items like fish production, prawn production, fish seed production, disposal of fish catch, preserved and processed items and aquaculture are being collected from State Governments.

3.1.12.2 A multistage sample survey is used to estimate the fish production from the marine sector. The survey design developed by the Indian Agricultural Statistics Research Institute (IASRI) and the Central Marine Fisheries Research Institute (CMFRI) consists of sampling of landing sites of the fishing craft as well as sampling over time of the landings. Data on deep-sea fishing are obtained through reports required to be furnished by trawlers and other deep-sea fishing vessels.

3.1.12.3 So far as inland fisheries are concerned, there were several attempts to develop suitable sampling techniques for estimation of catch since 1955, but they have remained inconclusive. The Central Inland Fisheries Research Institute (CIFRI), Barrakpore lately devised a methodology for collection of data relating to some important still water areas. This involves dividing water sources into two categories namely, fresh water and brackish water bodies each with a distinct ecology, and classifying them further into three groups according to the level of production. Different sampling methods are adopted for assessment of fish production in each group. There is still a large data gap in coverage not only geographically but also in terms of several sources of inland fisheries such as rivers, canals etc.

3.1.13 Forestry Statistics

3.1.13.1   Reliable forestry statistics are required for planning, policy-making, analysis and decision-making on forestry investment and development programmes. These statistics are collected mainly as a by-product of administrative reports of the State Forest Departments. On the recommendation of the National Commission of Agriculture (1976), the Forest Survey of India (FSI) was created in 1981 with the objective of monitoring the forest resources at a macro level, storing and retrieving forestry related data, designing methodology for forest surveys, etc. Besides the FSI, the Indian Council of Forestry Research and Education (ICFRE) are mandated to collect, collate and compile primary and secondary data generated by the State Forest Departments and various Central ministries. The data on the forestry are obtained through a set of periodical reports furnished by the State Forest Departments and other concerned agencies. In addition to details of forest area, the reports provide information on forest products (wood and non-wood), forest land under cultivation, and grazing land etc.

3.1.13.2   Since 1987, the FSI has begun using Remote Sensing (RS) technology to collect data on forest cover under three broad classes (dense forest, open forest and mangroves) on a country-wide scale through a biennial survey. The latest survey used satellite data with digital image processing. Introduction of digital interpretation has helped in reducing the time lag in the availability of the area estimates to just a few months after the completion of the survey.

3.1.14 Marketable Surplus Statistics

3.1.14.1   The Directorate of Marketing and Inspection (DMI), Ministry of Agriculture & Farmers Welfare has been conducting surveys on marketable surplus and post-harvest losses of food grains. The surveys provide information on marketable surplus ratios as well as on a variety of other important items like farm retention for family consumption, for seed, feed and wastage, etc. The surveys cover the following crops: Paddy, Wheat, Jowar, Bajra, Maize, Ragi, Barely, Red Gram, Green Gram, Black Gram and Lentil.

3.1.14.2 The fieldwork of the surveys is conducted by Designated State Agencies through field investigators employed by them under the overall supervision of the Directorate of

Marketing and Inspection. The data so collected are analyzed with the support of IASRI and published. The information collected through these surveys is used in the National Accounts Statistics, and Ministry of Commerce and Industry in fixing the weights for certain agricultural commodities while compiling the all-India Index Number of Wholesale Prices in addition to its uses in planning and procurement operations and market development programmers.

3.2   AGRICULTURE STATISTICS IN SURVEYS CONDUCTED BY NSSO

3.2.1   Directorate of Economics & Statistics, an attached office of Ministry of Agriculture & Farmers Welfare is the nodal agency for Agricultural Statistics at the Central level, the NSSO deals in qualitative improvement of Agriculture Statistics. NSSO plays a significant role in the improvement of crop statistics through supervision of the area enumeration and crop estimation surveys of the State agencies.

3.2.1.1   Statistics of land use and crop area in the state originate as a by-product of Land Revenue Administration. The state system envisages field-to-field enumeration by Patwari (State Primary Worker) in the village in his jurisdiction in each crop season. The details of the crop area and land use particulars are recorded in a register termed as Khasra Register. Based on this document, area statistics get aggregated at successive higher levels leading to working out area under the crop at the State level. NSSO aims at qualitative improvement by way of supervision through sample check of the primary fieldwork relating to area enumeration and area aggregation of few villages in each agriculture season. The supervision work inter-alia includes date and status of Girdawari, village cadastral map condition, khasra entry of crop and crop area and actual status by observation, seed and irrigation particulars, crop and crop area missed in recording and crop mixture sown. Further, Directorate of Economics and Statistics at the Central level (under the M/o Agriculture and Farmers Welfare) prepares National level Estimates based on the inputs received from State Govts.

3.2.1.2 The statistics of yield rates for 71 crops (food and non-food) in the States are obtained through General Crop Estimation Surveys (GCES) organized and conducted under the overall control of Directorate of Economics and Statistics (DES) or Agriculture Department of the State Govt. by applying the technique of random sampling. The primary workers for the conduct of experiments in the state are the officials of Directorate of

Economics and Statistics (DES) and Department of Agriculture (as per the state setup). NSSO plays a significant role in the improvement of crop statistics by supervising the crop cutting experiments of the State agencies on sample basis in each agricultural year. The supervision work inter-alia includes the correctness of selection of field, field dimension, dates of harvest and threshing, weight of produce, details of post harvest operations, availability and use of crop cutting equipments, input details, crop condition and details of crops sown.

3.2.2 National Sample Survey Office (NSSO) conducts Situation Assessment Survey (SAS) of Farmers/ Agricultural Households, decennially, since 2003 in the rural areas of the country. The survey was designed to have information for a comprehensive assessment of the situation of farmers/ agricultural households in the country. So far, there were two such surveys: (i) SAS of Farmers (2003) during NSS 59th round and (ii) SAS of Agricultural Households (2013) during NSS 70th round. The survey provided estimates on the following characteristics of Farmers/ Agricultural Households:

(i)   Number of Farmers/Agricultural households
(ii) Land possession and Principal source of Income
(iii) Farming practices and preferences, resource availability
(iv) Expenditure and receipts from crop production, farming of animals, non-farm business
(v) Income, Consumption Expenditure, Indebtedness per agricultural household
(vi) Awareness and access to Minimum Support Price (MSP), Crop Insurance, Modern Technology in the field of agriculture

All the estimates are available by State, Social Group, Size class of land possessed, MPCE class. In the same rounds, Land and Livestock Survey (only rural) and Debt and Investment Survey (rural & urban) were also conducted, which are extended over all households.

3.2.3 *NSSO survey on Situation Assessment Survey of Agricultural Households (2013):*

3.2.3.1 This survey was conducted in NSS 70th round (January - December 2013) to have a comprehensive picture of the farming community in India. The survey collected information

on various aspects of farming activities from the agricultural households in rural India. The survey, with its two visits, made a detailed assessment of the situation of the agricultural households for the agricultural year July 2012 - June 2013.

3.2.3.2 It provides estimates related to the economic characteristics of the agricultural households such as their receipts from and expenditure incurred in farm and non-farm business. It also provides estimates of their indebtedness, consumption expenditure, productive assets and income generated from all economic activities including farm and non-farm business and wage/salary employment.

3.2.3.3 Wherever State wise figures are discussed, it is restricted to 18 major States only. However, in the detailed tables estimates are presented for those States for which number of sample households was at least 300. Figures of all UTs have been clubbed together and shown under the head 'group of UTs' as sample number of households for each of the UTs was less than 300. The all-India level estimates of different parameters are also discussed with respect to the size classes of land possessed and decile classes of MPCE. However, State-wise and social group-wise details within each such size classes are available in the detailed tables provided the sample number of households belonging to a particular social group in a State was at least 100.

3.2.3.4 Detailed reports based on the NSSO survey on Situation Assessment Survey of Agricultural Households are available on the website of the Ministry of Statistics and Programme Implementation for free download.

4   COST OF AGRICULTURAL PRODUCTION STATISTICS

4.1   Production of agriculture economic performance indicators is a key instrument in economic analysis and a fundamental requirement for effective policy-making. Among these indicators, calculating the cost of production has historically been one of the most useful of these indicators. Providing users with access to complete and comprehensive production costs allows all stakeholders with information that will contribute to making markets more efficient.

4.2   Cost of production for agricultural products: basic concepts

4.2.1   Estimating the cost of production for agricultural products involves estimating all economic costs and revenues associated with the production of the commodity. All costs should be measured, whether purchased or owner supplied. The basic concept is that if it is necessary for production, then it must be valued. Cost items that are purchased and expended during the production period include inputs such as seed, fertilizer and pesticides. They can also be hired capital expenses such as rented machinery or bullock livestock. Costs also include all charges for labour whether paid for or not, hired or owner provided, paid in kind or in cash or sourced to unpaid family members.

4.2.2   Cost items whose service life extends over several production periods, such as capital service costs (depreciation on owned machinery and buildings), also need to be measured. Finally, the imputed opportunity cost of owned capital, including cash used to purchase inputs and the alternative investment return from the use of owner supplied land and animals, needs to be estimated if one is to fully account for the economic costs associated with producing agricultural goods.

4.2.3   It is absolutely critical that revenues (returns) be related to costs as they form the basis of the construction of gross and net margins. The questions on revenues will be greatly affected by the timing of the data collection vehicle. To collect cost data, it is preferable to conduct the survey as soon as possible after the point when the product has been produced and most variable costs have been incurred. This reduces memory bias and increases data quality. The different timing of production, cash expenses and selling of products might create inconsistencies between the different indicators. This needs to be taken into consideration from a data collection perspective (design of the questionnaire and interview process) as well as from an data estimation point of view (inflation adjustment and time discounting, see below). In the case where one common survey is used, questions could focus on total production and expected marketed production as well as on the amount to be used on the farm or taken for own consumption. What is not sold can be valued as a prospective sale or accounted for in inventory using market (or administrative) prices.

4.2.4   Measuring revenues consist of the adding together returns from the sale of agricultural products, government program receipts, and other miscellaneous revenues. In principle,

measuring revenue from the sale of farm products is straightforward and is the price 14 received from the sale of the product multiplied by the quantity sold, while government program receipts are program or support payments that relate to the sale or production of these same products. Miscellaneous receipts are those receipts related to the sale of the agriculture product under investigation (sales of cows from a dairy operation for example).

4.3   Valuation- which prices should be used: basic concepts

4.3.1   The prevailing market price is the best price to use to value economic costs and returns. Where there is no market, then an imputation that best approximates the market price should be used. In particular, owner supplied inputs should be valued at the market opportunity cost, i.e. the cost of purchasing the same (or similar) input on the market. This includes owner and unpaid family labour.

4.3.2   The principle of opportunity cost also applies to other inputs produced and used on the farm, such as animal feed: the cost of purchasing this input should be valued as if the input were purchased from an off farm source at prevailing market prices.

4.3.3   There are also inputs that are by products of another farm activity. For example, manure, a by-product of livestock production, is used to provide fertilizer for crop production. When this is encountered, the manure used should be valued at the prevailing market price. If it is possible to separate the different activities of the farm, manure should be accounted for as a cost for the cropping activity of the farm and as production for the livestock activity. This ensures consistency and completeness of farm accounts.

4.3.4   Ideally the statistician needs to take into account the variability in the quality of the commodity produced since it affects its marketability and ultimately its selling price. A true result can therefore be obtained for the revenue component of the cost and returns equation. Not all national statistical institutes gather production data with quality attributes in part because quality is often determined only in the marketing channels. Nevertheless the use of average market prices can be used to value this production since average prices reflect the spectrum of product sold and when used to value product sold mirror the variation in quality of product sold.

4.3.5 The main categories of inputs may be considered for estimating of cost of production are purchased inputs, capital inputs, non-specific (or overhead) inputs, labour, land and pre-productive costs. They are succinctly defined below:

4.3.5.1 **Purchased inputs:** Defined to be those items that are purchased and entirely used during the production year and that can be unambiguously attributed to the commodity production process (fertilizers, pesticides, seed, etc.).

4.3.5.2 **Capital inputs:** Defined to be those items owned by the farm that are necessary to the commodity production process and that are not entirely used up during the production year (buildings, machinery, land, etc.). A capital input in turn is defined as an input which provides services for multiple time periods.

4.3.5.3 **Non-specific inputs:** Defined to be those inputs that are shared in the production process, i.e. that cannot be objectively attributable to a specific commodity production process. Non-specific inputs include machinery and building upkeep, energy, contract work, property taxes, and other indirect costs (water, insurance of farm buildings, for example). An allocation key has to be determined to allocate the costs to the respective commodities.

4.3.5.4 **Labour inputs**: Defined to be the amount of labour used for the commodity production process during the production year. Paid and unpaid external and family labour should be valued, as well as the time spent working on the farm by the owner of the agricultural holding.

4.3.5.5 **Pre-productive costs:** Defined to be the costs incurred in advance of the time period when the commodity can actually be sold on the market. These expenses can be incurred several years in advance of a sale from the farm and culminate with the sale of the product or have a life extending to several productive years.

4.4   Commission for Agricultural Costs & Prices (CACP)

4.4.1   The Commission for Agricultural Costs & Prices (CACP) is an attached office of the Ministry of Agriculture & Farmer Welfare and Farmers Welfare, Government of India. It came into existence in January 1965. Currently, the Commission comprises a Chairman,

Member Secretary, one Member (Official) and two Members (Non-Official). The non-official members are representatives of the farming community and usually have an active association with the farming community.

4.4.2 It is mandated to recommend minimum support prices (MSPs) to incentivize the cultivators to adopt modern technology, and raise productivity and overall grain production in line with the emerging demand patterns in the country. Assurance of a remunerative and stable price environment is considered very important for increasing agricultural production and productivity since the market place for agricultural produce tends to be inherently unstable, which often inflict undue losses on the growers, even when they adopt the best available technology package and produce efficiently. Towards this end, MSP for major agricultural products are fixed by the government, each year, after taking into account the recommendations of the Commission.

4.4.3 As of now, CACP recommends MSPs of 23 commodities, which comprise 7 cereals (paddy, wheat, maize, sorghum, pearl millet, barley and ragi), 5 pulses (gram, tur, moong, urad, lentil), 7 oilseeds (groundnut, rapeseed-mustard, soyabean, seasmum, sunflower, safflower, nigerseed), and 4 commercial crops (copra, sugarcane, cotton and raw jute).

4.4.4 CACP submits its recommendations to the government in the form of Price Policy Reports every year, separately for five groups of commodities namely Kharif crops, Rabi crops, Sugarcane, Raw Jute and Copra. Before preparing aforesaid five pricing policy reports, the Commission draws a comprehensive questionnaire, and sends it to all the state governments and concerned National organizations and Ministries to seek their views. Subsequently, separate meetings are also held with farmers from different states, state governments, National organizations like FCI, NAFED, Cotton Corporation of India (CCI), Jute Corporation of India (JCI), trader's organizations, processing organizations, and key central Ministries. The Commission also makes visits to states for on-the-spot assessment of the various constraints that farmers face in marketing their produce, or even raising the productivity levels of their crops. Based on all these inputs, the Commission then finalizes its recommendations/reports, which are then submitted to the government. The government, in turn, circulates the CACP reports to state governments and concerned central Ministries for their comments. After receiving the feed-back from them, the Cabinet Committee on Economic Affairs (CCEA) of the Union government takes a final decision on the level of

MSPs and other recommendations made by CACP. Once this decision is taken, CACP puts all its reports on the web site for various stakeholders to see the rationale behind CACP's price and non-price recommendations.

4.4.5 Determinants of Minimum Support Price (MSP)

While recommending price policy of various commodities under its mandate, the Commission analyzes

1) demand and supply;
2) cost of production;
3) price trends in the market, both domestic and international;
4) inter-crop price parity;
5) terms of trade between agriculture and non-agriculture; and
6) likely implications of MSP on consumers of that product.

It may be noted that cost of production is an important factor that goes as an input in determination of MSP, but it is certainly not the only factor that determines MSP.

4.5   Cost estimates of Principal Crops which include cost of cultivation and cost of production during 2013-14; All-India projected cost of production of major crops in India; All-India annual average daily wage rate in rural India for various agricultural operations cull out from "Pocket Book of Agricultural Statistics 2016" of Ministry of Agriculture & Farmers Welfare, Government of India and enclosed with this paper (kindly refer filename: Agriculture Statistics scanne.pdf) for ready reference.

4.6   Some estimates related to crop production during the two halves of the agricultural year July 2012- June 2013 based on the Situation Assessment Survey of Agricultural Households conducted by NSSO during NSS 70th round (January-December, 2013):

4.6.1   As per the results obtained from the survey, an estimated 86.5 percent of the agricultural households were engaged in cultivation during July-December, 2012. The estimated share of cultivating agricultural households during the period January-June, 2013 was 71.1 percent.

4.6.2   During the period July-December, 2012, the estimated average gross cropped area per agricultural household was 0.937 hectare of which 50 percent was irrigated. The estimated

average gross cropped area per agricultural household was 0.782 hectare during the period January-June, 2013.

4.6.3 The estimated average value of total crop production (which includes value of harvested crop, pre-harvest sale and by-products) per agricultural household was Rs. 40580/- during the period July-December, 2012. During the period January-June, 2013, the estimated average value of total crop production per agricultural household was Rs. 36696/-.

4.6.4 The awareness about Minimum Support Price (MSP) was very low among the cultivating agricultural households which reported sale of their crops during the reference period. Except for sugarcane, only less than half of the households which were aware about MSP, sold off their crops to procurement agencies. Non-availability of procurement agency', 'no local purchaser' and 'better market price over MSP' were the reasons frequently reported by the agricultural households for not selling to the procurement agencies.

4.6.5 Some relevant estimates relating to the economic characteristics of the agricultural households, such as receipts from and expenditure incurred in farm and non-farm business, estimates of their consumption expenditure, productive assets and income generated from all economic activities including farm and non-farm business and wage/salary employment are cull out from the Chapter 3 of the NSS Report No. 576 (based on NSS 70th round data) are enclosed with this note (kindly refer filename: Relevant extract from Chapter 3 of NSS Report 576.docx) for ready reference.

5. CHALLENGES AND CONCLUDING REMARKS

5.1 Agriculture in Statistical Master Plan

5.1.1 The National Statistics Commission has been set up in India in 2006 as the nodal and empowered body for all statistical activities of the country. It is to evolve, monitor and enforce statistical priorities and standards and to ensure statistical coordination among the different agencies involved. The Commission has identified Agriculture as the core sector and the plans and actions are oriented towards priority given to timeliness and reliability in the compilation of agriculture statistics, agriculture census and surveys at the State level and technical manpower provided at the field level. While recognizing the merits and robustness

of the methodology of data collection on various aspects of Agriculture, greater emphasis has been laid on improvement of the quality of data. In India, bulk of agriculture statistics flows from State Government organizations and these are needed with as much disaggregation as possible down to the level of village panchayats. Therefore States are constantly geared up for collection and compilation of agriculture statistics using latest techniques including information and communication tools to improve timeliness, reliability and adequacy of agriculture statistics. Annual conference on Improvement of Agriculture Statistics is organized by Directorate of Economics and Statistics. It is an effective forum to highlight the methodological, technical and administrative issues in collection of agriculture statistics by State Governments. The conference is attended by various organizations concerned with planning, methodological studies, collection and use of agricultural statistics.

5.2   Capacity building

5.2.1   Training is an integral part for promotion of human resource development and capacity building, which, in turn, includes development of leadership and managerial traits. Accordingly, promotion of human resource development in official statistics and encouraging research and development in theoretical and applied statistics is one of the missions of the Ministry of Statistics and Programme Implementation. Trained manpower in Statistical activities is essence of sound statistical system. Regular interaction with State Government and other organizations on all aspects of collection of statistics is held in Conference of Central and State Statistical Organisations (COCSSO). This helps in understanding the users need and identifying and overcoming the infirmities in the system of data collection.

5.3   Measuring Welfare and Monitoring Impact

5.3.1   Assessing the impact of various development interventions is crucial to get the best out of scarce resources and competing demands. The surveys conducted by NSSO through several rounds covers a wide range of welfare indicators across diverse geographies and population. A meaningful combination of the results when put against relevant questions can facilitate formulation of suitable policies and appropriate interventions to bring out the poor and marginalised in the countryside, including farmers.

5.4   Global Perspective on Statistics in Agriculture

5.4.1   In a globalized world where barriers for flow and exchange of commodities and information are vanishing, and where nations are addressing the challenge of achieving growth with equity, our statistical systems should be well equipped to capture these complexities and its distributional patterns and welfare implications. To achieve the SDGs, we need to focus our efforts on the most deprived and vulnerable population spread across various geographies, agro-ecologies, cultural and socio-economic landscapes. The basic requirement and necessary condition for such an act is a robust, scientific and high quality statistical information that can support analysis and informed policy decision making. This undoubtedly points to the importance of a global perspective of statistics on agriculture. The pace of agricultural growth has direct implication on the pace of eliminating poverty and hunger and ultimately achievements of our development goals. A statistical database on global agriculture, which is of high quality and having high standards of comparability that can capture the specificities and diversities of varied and complex agricultural production systems across the world can equip us with robust analysis and informed policy decisions in support of sustainable development. In the backdrop of a looming threat of climate change that can impact lives and livelihoods of millions of vulnerable population, a sustainable global statistical capacity to produce reliable and timely statistics and indicators measuring a country's progress, particularly of agricultural sector is a necessary condition to make planet earth a better place to live.

5.5   Sustainability Concerns

5.5.1   Several indicators highlight increasing concerns of sustainability in areas which have largely contributed to increased production in the 'Green Revolution' era. Adoption of high yielding cultivators is virtually complete. In the higher production regions yields are plateauing and most traditional sources of productivity growth having been exhausted future gains in production have to come from elsewhere. Many farmers believe that the input levels have to be continuously increased in order to maintain high yields. The growth rate of system productivity has been declining relative to growth rate of nutrients use.

5.5.2   Lowering of groundwater tables due to intensive rice-wheat system in many areas is resulting in increased costs of lifting water in the intensively cultivated high production areas,

disease, and pest problems are turning more serious than ever before and pose both short and long large problems.

5.5.3 Other emerging problems threatening sustainability of intensive cropping system e.g. .rice-wheat include loss in biodiversity related issues. Large areas planted to a single/few varieties of a crop is a potential cause of concern.

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5.5.4 Groundwater is the major source of meeting the irrigation needs of irrigated agriculture. Large-scale groundwater development has led to fall in the water table in many areas. Changes in water quality are adversely affecting agriculture and vice-versa. Inefficient and/or over use of fertilizers and pesticides in agriculture and untreated disposal of industrial and urban wastes are leading to increasing contamination by such elements.

5.6 Changing Land-Use and Future of Agriculture

5.6.1 One of the most important consequences of growing pressure on land is the declining trend in the average farm size and the pattern of holdings. Increasing population and economic growth are changing patterns of land use making potentially unsustainable demands on the country's natural resources.

5.6.2 The pressure on India's land and water resources is seriously threatening native plant and animal diversity. India has uniquely rich and diverse genetic base. With increasing agriculture and economic development the genetic pool is declining. This decline, if unchecked and poorly managed can have unforeseen and adverse consequences for the sustainability of agriculture of the region.

5.7 Agriculture in the Changing Global Scenario

5.7.1 Steady globalization of trade has profound implications for future agricultural development. The diversity of India's agro-ecological setting, high bio-diversity and relatively low cost of labour provide potential for agricultural competitiveness in a globalized economy. It is expected that with increasing globalization of markets over the years there will be demands for agricultural intensification. This will also be favoured because of greater backward and forward linkages between agriculture and food industry. Therefore, increase in

production and productivity are bound to be strategically important to economy. Intensification will not only favour alleviation of rural poverty but will also improve resource conservation particularly in the small farming sector where farmers can be encouraged to take up organized production of high value crops such as fruits, specialty vegetables, flowers medicinal and aromatic herbs etc. Stronger demands for crops of the small farmers will not only improve incomes and welfare but will also make investments in technology and resource conservation more attractive.

5.8   Extension Strategies

5.8.1   Since early fifties a number of public funded agricultural development programmes have been sponsored. Though these programmes had a perceptible impact the efforts did not get replicated over different areas and categories of farmers. In mid seventies based on pilot level project in Rajasthan Canal and Chambal command area a 'Training and Visit' (T&V) system of extension was promoted in different states. However, there appears much to be desired in the way that extension programmes are conceived and implemented.

5.8.2   At present, extension programmes are implemented in largely a top-down fashion leaving little scope for localized planning and action. Farmers are almost passive receivers and their involvement in the process of technology generation and adoption is almost absent. Extension services, at present, are almost exclusively in the public sector domain and there is no effort or institutional support for other operators e.g. the NGOs, the corporate bodies etc.

5.8.3   Extension programmes sponsored by the government operate largely in isolation and there appears a strong need to view the extension programmes as an integral part of the research and development process.

5.8.4   The challenges facing agricultural development call for fundamental changes in our approach to technology transfer/extension programmes. Changes are necessary in the context of changing economic environment following policy adjustments in relation to privatization, deregulation and globalization calling for greater efficiency and effectiveness of the extension system.

5.9   Technological Needs and Future Agriculture

5.9.1   It is apparent that the tasks of meeting the consumption needs of the projected population are going to be more difficult given the higher productivity base than in 1960s. There is also a growing realization that previous strategies of generating and promoting technologies have contributed to serious and widespread problems of environmental and natural resource degradation. This implies that in future the technologies that are developed and promoted must result not only in increased productivity level but also ensure that the quality of natural resource base is preserved and enhanced. In short, they lead to sustainable improvements in agricultural production.

5.9.2   Future growth needs to be more rapid, more widely distributed and better targeted. Responding to these challenges will call for more efficient and sustainable use of increasingly scarce land water and germplasm resources.

5.9.3   New technologies are needed to push the yield frontiers further, utilize inputs more efficiently and diversify to more sustainable and higher value cropping patterns. These are all knowledge intensive technologies that require both a strong research and extension system and skilled farmers but also a reinvigorated interface where the emphasis is on mutual exchange of information bringing advantages to all. At the same time potential of less favoured areas must be better exploited to meet the targets of growth and poverty alleviation.

5.9.4   Most technological solutions will· have to be generated and adapted locally to make them compatible with socio-economic conditions of farming community.

5.9.5   These challenges have profound implications for products of agricultural research. The new generation of technologies must be not only aimed at increasing farmers technical knowledge and understanding of science based agriculture but also taking advantage of opportunities for full integration with indigenous knowledge. It will also need to take on the challenges of incorporating the socio-economic context and role of markets.

5.9.6   Another important implication of increasing globalization relates to the need for greater attention to the quality of produce and products both for the domestic and the foreign markets which can be achieved only by setting global standards of research, focus on well

defined priorities and mechanisms which permit close interaction of farmers with researchers, the private sector and markets.

5.10 Measures to Improve Productivity

Government has initiated various measures to overcome the problem of low agriculture productivity but some of the measures which may be required to strengthen the agriculture development are outlined as under:

(i) Effective Implementation of Land Reforms

The land reforms will help to provide incentives and motivation to farmers to improve productivity and investment in agriculture sector. It will also have social implication by providing due share in the output. The strong political will and better administrative skills are required to operationalize these reforms at the grass root level.

(ii) Greater Usage of Modern Technology

The components of modern technology in terms of improved seeds, fertilizers and pesticides have to be made available easily to the farmers at fair prices. Farmers are required to be given training about the usage of these components especially fertilizers and chemical pesticides. The services of constant expertise, guidance and counseling about seeds sowing, time of sowing etc. needs to be developed..

(iii) Better Credit Facilities

The timely and sufficient financial assistance is the precondition to improve usage of better technology. Government had launched various schemes and institutions to improve agricultural credit such as establishment of cooperative banks, rural branches of nationalized banks, grameen banks etc. However, there is a lack of coordination under the multi-agency credit system. Further, there is an absence of appropriate motivation and knowledge especially amongst commercial banks to provide agriculture credit in the rural areas.

(iv) Restructuring Cropping Pattern

The scientific research has mainly focused upon two major crops viz, wheat and rice. The breakthrough in terms of improved varieties of seeds has to be explored for other crops.

(v) Development of Irrigation Facilities

The main obstacle in the exploitation and use of modern technology is the water shortage. The inter-linking of river projects needs to be implemented speedily to reduce the ill-effects of floods and droughts. The greater use of dry and commercial cropping that requires lesser use of water should be encouraged. The surface-irrigation and water-pumping arrangements should be increased.

(vi) Development of Research Institutes

The research labs and agricultural universities have to be established, upgraded and sustained. The problems such as lack of resources, equipment and experts in these institutes need to be addressed immediately.

(vi) Betterment of Warehousing and Distribution Services

The warehousing facilities are so under-developed that it renders the stored goods unsuitable for consumption. The modern warehousing facilities, transportation system and marketing methods needs to be developed to increase the availability of food to the masses. This would provide incentives to marketable surplus among farmers and go a long way to improve productivity.

(vii) Introduction of Co-Operative Farming and Marketing

The co-operatives in India are suffering due to strict Government controls and legislations. The co-operative should be given greater operational freedom and allowed to enlarge their activities including banking and marketing of agro products.

5.11 In short, this paper is an attempt to explore the Agricultural Statistics System in India and to assess the availability of Agriculture Statistics, especially the Agricultural Production Statistics, in the Indian Statistical System. The paper also explore the readiness to use the data for SDG monitoring and policy formulation. The training and technical guidance would be helpful to further enhance the knowledge and revisit the data requirement as per SDG monitoring and policy formulation.

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