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A Conceptual Framework for Agricultural Statistics

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ABSTRACT: To meet the needs for a conceptual framework for the design of the "Global Strategy to Improve Agricultural Statistics," this paper proposes a conceptual framework in which the current structure and framework used in food and agricultural statistics, namely the Supply and Utilization Account (SUA), and the Food Balance Sheet (FBS), are placed within the context of the System of National Accounts (SNA), and the System of Integrated Environmental and Economic Accounts (SEEA). Such a conceptual framework will play four useful roles: first, to translate policy issues into the language of statistics that is the data needs and requirements in a standard and coherent manner; second, to provide a sound basis for calculation of measures and selection of a menu and core set of economic, social, and environmental indicators; third, to reveal what the relationship of and how to better integrate agricultural statistics with other sectors of official statistics and the national statistical system; and fourth, to provide a consistent, comprehensive, and coordinating data framework to link data collected by different surveys and censuses together to build up an integrated database.

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Introduction

We propose the conceptual framework for agricultural statistics to be built on the System of National Accounts (SNA) and the System of Integrated Environmental and Economic Accounts (SEEA). A conceptual framework is critical and indispensable when we are seriously thinking about how to best use agricultural statistical data to meet the needs of policy issues. To organize agricultural statistics within the framework and system of economic and environmental accounts will facilitate the formulation and implementation of agricultural policy within an economic and environmental context and an integration of agricultural, economic, and environmental policies. From the methodological point of view, to apply the solid and well-developed SNA framework into agricultural statistics will help improve and uplift the conceptual and analytical strength and capability of agricultural statistics, which is the goal of the "Global Strategy to Improve Agricultural Statistics."

Based on SNA and SEEA, such a conceptual framework for agricultural statistics can be presented within the dashed areas in a matrix format as follows.

Table 1: Schematic Presentation of the Conceptual Framework

Account (classification)			Goods and services (CPC)			Generation of income			Distribution and Use of Income			Capital	ROW	Residuals	TOTAL
			Agr	manu	Serv	HH	Corp	Govt	HH	Corp	Govt				
			1a	1b	1c	3(a-d)	3(ef)	3g	4-6(ab)	4-6(c)	4-6(d)	7-8	10	13	14
Goods and Services (CPC)	Agr	1a	Intermediate consumption (1883)						Final consumption (1399)			FCF (455)	Export (499)	Fr industry	4236
	manu	1b													
	Serv	1c													
Generation of income	HH	3(a-d)	Payment to factors (1721)										FI fr ROW (6)		1727
	Corp	3(ef)													
	Govt	3g													
Distribution and Use of Income	HH	4-6(ab)				Labor incomes (1300)			Transfers (2120)				Transfers fr ROW (73)	From HH	2010
	Corp	4-6(c)				OS (321)									983
	Govt	4-6(d)	Tax on inputs (133)			Tax on labor & profits (104)									1058
Capital		7-8							Savings (455)			Capital tr (437)		From FCF	892
ROW		10		Imports (499)		LI to ROW (2)			Transfers to ROW (77)					By ROW	578
Natural resources		12	To industry						To HH				To ROW		
Ecosystem inputs		13	To industry						To HH				To ROW		
Residuals		14	Re-absorbed by production						To HH			To landfill sites	To ROW		
TOTAL (EXP)		15		4236		1727			2010	983	1058	892	578		

The matrix format has several straightforward advantages. The first is its simplicity. Each unit is both a paying and receiving unit and can be shown by one transaction. The whole accounting system can be portrayed and analyzed by means of a single table. The second is its virtue of consistency. Unified units, classifications, and single format are applied for presentation and analysis to different accounts, including an input-output table, institutional sector accounts, and both monetary and non-monetary data into the accounts. The third is Operational. It is easy for both expedient compilation and analytical use of the conceptual framework as it is suitable for mathematical treatment using matrix algebra.

In the rest of this paper, we will first describe the conceptual framework as in Table 1 and then examine how this conceptual framework can be used to address issues raised in various

chapters of the "Global Strategy to Improve Agricultural Statistics" such as in Chapter 2: "Data Requirements;" Chapter 6: "Menu of Indicators and Core Subset;" Chapter 8: "Integrating Agriculture in National System;" and Chapter 11: "The Integrated Data Base."

Presenting Economic, Social, and Environmental Activities

The conceptual framework can be viewed as a condensed form of a whole set of economic, environmental, and social accounts for agriculture. Agriculture, for FAO, includes forestry, fisheries, aquaculture and livestock.

First, for economic activities, the conceptual framework encompasses and depicts the entire "circular flow of income." The collection of activities of the economy uses materials, land, energy, or human skills to produce goods and services that can be exchanged for money (or for other commodities) including the use of these commodities by their final purchaser. Thus, income is generated by individuals providing labor to enterprises, receiving compensation for their employment in return, and then spending their income to purchase the goods and services which their labor has helped to create. Some of the goods and services made in the economy are used to make other goods and services, for example wheat being turned into wheat flour. These are described as intermediate consumption. Some are acquired as capital goods, used to make other goods and services over a long period, for example seeds for plantation as inventory. The economy also interacts with the rest of the world; and thus, other economies also supply products, as imports, and absorb some national production in the form of exports.

The above are captured by a sequence of various accounts from production (Columns 1a-1c), with an input-output table at the left top corner, income generation (Columns 3(a-d) – 3q), distribution and use of income (Columns 4-6(ab) – 4-6(d)), to saving by institutional sub-sectors and investment by industries (Column 7-8), and external trade with the rest of the world (Column 10). Across the rows, it shows the goods and services provided by each sector to others as inputs, which receives income and compensation. Down the column, it shows the use of goods and services by each sector, which spends and pays for. Thus, each cell depicts a money flow from the group of actors in the column heading to the group of actors in the row heading. Because total income (or output or demand) equals total outlays (or input or supply), the totals of the same row and column are always equal.

To represent the economy, it requires the distinction of four types of statistical "units": products, business units (i.e. establishments), primary input units (e.g. employed persons), and institutional units (e.g. households, companies, and government units). The latter are those spend income on goods and services, including services from the "factor inputs." If income is not spent all, it becomes "savings." The transactions of money among the institutional sectors and units are "transfers." The conceptual framework records and links the interactions between economic processes with different types of agents together.

Second, for environmental issues, the conceptual framework includes the essence of the SEEA, that is, to measure flows that relate to the interaction of the economy and the environment and to examine how these flows are connected with the flows of products. The economy draws two types of inputs from the environment: "natural resources" (Row 12) covering mineral deposits, energy resources, water and biological resources, fish, and timber; and "ecosystem inputs" (Row 13) covering water and other natural inputs (e.g., nutrients,

carbon dioxide) required by plants and animals for growth, and the oxygen to breathe and permit combustion.

The economy also uses the environment as a sink for incidental and undesired outputs from the economy which generally have no economic value and may be recycled, stored within the economy or (more usually at present) discharged into the environment, including unwanted waste material using soil, land, water, and air as depositories for solid, liquid, and gaseous wastes. All these are described collectively as "residuals" (Row 14, and Column 13). The CO2 emissions can also be inserted as part of the column of the "residuals." Thus, we have natural resources and ecosystem inputs from the environment to the economy and flows of residuals in the opposite direction.

The interaction between the national economy and environment with the rest of the world is captured by the intersections of Rows 12-14 with Column 10 as well as Column 13 with Row 10. This includes not only the environment of other countries but the open seas, upper atmosphere and so on often referred to as the global commons. Such flows take place when units belonging to the national economy operate abroad. National airlines flying to another country consume oxygen from and discharge residuals to the rest of the world environment. Tourists consume ecosystem inputs and leave residuals behind. Flows between the rest of the world economy and the national environment also take place and need to be registered. Natural resources, ecosystem inputs, and residuals are expressed in terms of supply to the economy and use by the economy in physical flow accounts.

Third, the social aspects and issues, such as poverty, undernourishment population, and labor participation, can be presented and analyzed by expanding and disaggregating the column of household sector such as in Rows 3(a-d) and 4-6(ab), as well as in Columns 3(a-d) and 4-6(ab). For instance, the household sector can be expanded and disaggregated according to consumption behavior or income generation characteristics such as age group, sex, location of residence, within/outside the labor force, and educational attainment.

Non-monetary units may be necessary for various kinds of welfare attributes, for example, quantities of food items can be expressed in calories and proteins, in order to arrive at some measure for the nutritional status of the population; the consumption of educational services can be expressed in terms of years of schooling successfully completed, and so forth; and the welfare attributes derived from non-income generating production, such as services of childcare and housekeeping, may be measured by the time spent on these activities.

To Meet Data Needs and Requirements

As mentioned at the beginning of this paper, the most important function of a conceptual framework is to translate the policy issues into the language of statistics that is the data needs and requirements. Without a proper conceptual framework, many of the current and emerging policy issues would be considered and dealt independently and separately. Consequently, statistical data collections are disconnected and dismantled resulting in inevitable overlapping or gap in the collected data. Such datasets will definitely not allow a cross-cutting analysis to understand the impact on one sector caused by actions taken elsewhere in the current agricultural and rural statistics. This unfortunately is probably the current situation of agricultural statistics in most countries and at the global level.

The conceptual framework proposed above is an integrated system of accounts embracing different kinds of activities and sectors. By the nature of its design, such a conceptual framework is most suitable and appropriate to be used to organize statistical data at different levels of aggregation to meet the data needs and requirements of various kinds of users, governments, businesses, research institutes, universities, the press and the general public, for economic, environmental, and social analysis, decision-taking and policy-making.

Table 2 below shows that different "data requirements" for the current and emerging policy issues as listed in Chapter 2 of the "Global Strategy to Improve Agricultural Statistics" can be accommodated and met by various accounts in the conceptual framework; thus to achieve its goal of capturing the interrelationships of these emerging issues and ensure that appropriate indicators are defined and underlying data provided.

Table 2: Conceptual Framework to Meet Data Requirements

Data Requirements	**Conceptual Framework**	**Notes**
Supply and utilization of agricultural products	Supply Utilization Accounts (SUA) and Food Balance Sheet (FBS)	Crops, livestock, fisheries products are defined by CPC v.2.0. Prices and cost of production inputs will go beyond current SUA and FBS and part of the conceptual framework.
Efficient market system: - Supply and demand of agriculture - Market prices	Economic Accounts	Production Account provides information of supply and market prices; Use of Income Account provides information of demand of agricultural products.
Agriculture development and growth - GDP and value added by agriculture - Public spending on agriculture and on agricultural subsidies - Public spending on infrastructure in rural areas - Value of imports and exports - Number of agricultural workers	Production Account and Distribution and Use of Income Accounts	Production Account: GDP and value added by agriculture; Use of Income Account: public spending; ROW Account: value of imports and exports; Generation of Income Account: number of agricultural workers.
Capital stock: - Investments in equipment, buildings, irrigation systems, etc - Investments in infrastructure, research, and education - Information about all components is needed to guide developmental efforts	Capital Account	Capital Account is designed to provide information on savings and investments by different institutional units and sectors and industries.
Food security: - Food availability - Household economic situation by income class - Food consumption in terms of calories and nutrients available and consumed	SUAs and FBS; Distribution and Use of Income Accounts	SUAs and FBS are part of the conceptual framework: food availability and food consumption; Distribution and Use of Income Accounts: household income.
Poverty reduction: - Income, rural household income - Number of rural poor	Distribution and Use of Income Accounts; Household Sector.	Distribution and Use of Income Accounts and household sector: income

- Under weight children		level and distribution; household sector can be disaggregated into urban vs. rural households as well as adults vs. children.
Early warning: - Forecasts of agricultural production. - Forecasts of commodity prices.	Economic Accounts	Data in the accounts of the conceptual framework can be directly used as the foundation for economic and statistical analytical models for making forecasts of production and prices of agriculture.
Fisheries: - Number of fishers/fish farmers - Number of fishing vessels - Quantity and value of capture - Aquaculture productions, trade, fishery commodities - Quantity used for non-food use such as fish meal - Identification of households engaged in aquaculture and capture fishery	Production Account, Use of Income Account, and ROW Account.	Production Account can be disaggregated and compiled by various industries.
Forestry: - Area covered - Volume of wood - Quantities and value of wood removed - Utilization such as paper, fuel, lumber, and the value of other services provided - Deforestation, where and the rate it is occurring	Production Account, Environmental Accounts, Natural Resources	Production Account can be disaggregated and compiled by various industries.
Agriculture's affect on the environment: - Use of inputs irrigation, fertilizer, pesticides, and energy - Use of tillage methods, productivity - Change in crop yields - Impact of the use of inputs on the economic situation of the household - Exploitation rates of fishery resources - Impacts on the ecosystem by fisheries and aquaculture including discharge from the fishery and aquaculture sectors - Quantity of cultured seeds released into natural environments - Management of livestock	Environmental Accounts	Environmental accounts are developed to meet the challenges of data requirements for environmental issues, climate change.
Climate change: - Land use changes - Changes in agriculture production, - Use of agricultural practices such as tillage methods - Numbers of livestock	Environmental Accounts and Ecosystem Services	
Food and Feed products for Bio-fuels: - Area harvested and quantities of feedstock by crop type used for bio	Production accounts; Environmental Accounts	

fuels - Prices received for feedstock vs. other uses - Quantities of bio fuel produced - Economic impact on farms and rural households from bio fuel production - Changes in land use and cropping to provide feedstock for bio fuels - Quantities of food in terms of energy, protein, and fat by crop type used for fuel production - Prices received for food commodities for fuel production vs. human consumption		
Land Cover and Use: - Land use monitoring as it affects the climate and environment	Production Account, Environmental Accounts, Natural Resources	
Water use: - Use of water for agricultural and non agricultural purposes by source - Areal of land under irrigation - Crop yields by irrigated/non irrigation - Irrigation methods	Production Account, Environmental Accounts, Natural Resources	
Gender: - Data on sex of the agricultural holder	Production Account and Household Sector	A cross-cutting issue that can be applied to all the above topics.

Table 2 above also points to the accounts, i.e. supply utilization accounts (SUAs) and food balance sheet (FBS), production account and distribution and use of income accounts, capital account, household sector, row account, environmental accounts, natural resources, and ecosystem services, are among the first priority when we develop the conceptual framework.

In Support of Selection of Menu of Indicators and Core Subset

Both international standard classifications and the accounts embracing different kinds of activities and sectors in the conceptual framework will provide a sound basis for the calculation of measures and selection of a menu and core set of economic, social, and environmental indicators. Specifically, there are two ways to apply the conceptual framework to Chapter 6 "Menu of Indicators and Core Subset" in the "Global Strategy." One is to base on the international standard classification of products, i.e. the Central Product Classification (CPC), to select the "major commodities" in the core set of indicators; and another is to use the aggregates and balancing items of the accounts in the conceptual framework to construct the major economic, social, and environmental indicators. In addition, derived indicators can be compiled by combining aggregates and balancing items from individual accounts and tables, and composite or ratio indicators can be constructed by combining data from different accounts and tables.

The advantages to come up indicators in this approach are: First, it will ensure *consistency*, *completeness*, *standard*, and *comparability* among all indicators. This is because every indicator is derived from a single and consistent statistical information system, the list of the indicators will be complete, terminologies used for the variables are standard as they are based on the standard tables and international standard classifications, and the measurement

units for phenomena they describe will be the most suitable. As a result, the indicators are comparable across countries as well as with other sectoral statistics to support an effective integration of agricultural statistics into the national statistical system.

During the revision and update of CPC, the selection of the major commodities has been widely discussed globally inside and outside FAO; various criterions have been applied including their importance in production, trade, and nutrition. Given that CPC is a hierarchical system with different levels of details, it also provides a great flexibility for countries to decide at which level of details to be suitable for the particular situation of the country.

Second, it will ensure that the indicators so selected are significant. This is because the transactions of SNA and SEEA are ordered and organized in such a way to systematically represent meaningful aggregates for economic, environmental, and social policy analysis. Thus the indicators derived from the economic and environmental accounts may play a key role as they are part of an integrated framework with its close linkages between economic, environmental, and social issues.

The tables below show examples of what can be derived from CPC and the accounts in the conceptual framework.

Table 3: Commodities Listed in CPC

Agriculture, forestry and fishery products
Products of agriculture, horticulture and market gardening
Cereals
Vegetables
Fruit and nuts
Oilseeds and oleaginous fruits
Edible roots and tubers with high starch or inulin content
Stimulant, spice and aromatic crops
Pulses (dried leguminous vegetables)
Sugar crops
Forage products, fibres, living plants, cut flowers and flower buds, unmanufactured tobacco, and natural rubber
Live animals and animal products (excluding meat)
Live animals
Raw milk
Eggs of hens or other birds in shell, fresh
Reproductive materials of animals
Other animal products
Forestry and logging products
Wood in the rough
Non-wood forest products
Fish and other fishing products
Fishes, live, fresh or chilled
Crustaceans, not frozen; oysters; other molluscs and aquatic invertebrates, live, fresh or chilled
Other aquatic plants and animals
Agricultural or forestry machinery and parts thereof
Fertilizers and pesticides

More detailed breakdown of all the commodities can be found in the Annexes.

Table 4: Indicators of Products, Intermediate Consumption, and Capital Formulation

Output

Products

- Agriculture, forestry and fishery products
- Products of agriculture, horticulture and market gardening
- Live animals and animal products (excluding meat)
- Forestry and logging products
- Fish and other fishing products

Related Service Activities

- For crop production
- For production of livestock and livestock products
- Preservation and improvement of natural resources
- Renting of farm and soil improving machinery
- Other agricultural services on a fee or contract basis, n.e.s.

Intermediate Inputs and Consumption

- Seed
- Feed and additives
- Fertilizers
- Pest and disease control means
- Power, heat, and light
- Livestock bought for fattening
- Special materials and services needed for care, maintenance and current minor repairs of production means and not included in other categories of input
- Miscellaneous current inputs of goods
- Agricultural services on a fee or contract basis

Gross Fixed Capital Formation

Fixed capital formation

- Dwellings and other buildings
- Other structures except land improvement
- Land improvement and plantation and orchard development
- Livestock for breeding, draught animals, dairy cattle and livestock raised for wool
- Machinery and equipment
- Transport equipment

Changes in inventories

- Work-in-process on cultivated assets
- Materials and supplies
- Finished products

Table 5: Examples of Indicators from Environmental Accounts

- Total sum of waste recycled
- National expenditure on environmental protection
- National saving net of total natural resource depletion
- Recycling rate of solid waste
- Expected life length of an asset

Key aggregates for the physical flow accounts

Residual accounts

- Gross emissions
- Net emissions
- Net accumulation on national territory
- Net cross boundary outflow by environmental media
- Absorption / recycling

Water accounts

- Total water abstraction
- Total use of water received from other economic units
- Total supply of wastewater to other economic units
- Total returns
- Total water consumption

- Reused water / total water supply to economic units

Key aggregates from the asset accounts
- Opening stock
- Changes due to transactions
- Additions to stock level
- Deductions from stock level
- Other changes in stock level
- Closing stock

Indicators derived from the main aggregates for depletion
Renewables
- (Natural Growth - Harvest) / Opening Stock
- Harvest / Opening Stock
- Natural Growth / Harvest
- Remaining Stock / Harvest
- Natural Growth / Remaining Stock
- Remaining Stock / Natural Growth

Non-Renewables
- Extraction / Opening Stock
- Remaining Stock / Opening Stock
- Remaining Stock / Extraction

The net emission to water and solid waste is equal to the gross emission to be subtracted by the amount of residuals reabsorbed by the economy. For example, most of the solid waste produced by economic activities is either recycled or burned in waste incineration plants (leading again to a range of residual outputs). Usually only small parts of the gross waste outflow contribute to environmental burdens via additions to landfills. In addition, the net emissions by residents can be corrected by transboundary emissions not caused by the domestic economic activities. This gives the possibly, the future storage of CO2 in the subsoil has to be treated as absorption by the economy.

Integrating Agricultural Statistics into National Statistical System

The fact that the currently used framework in agricultural statistics, namely, the Supply and Utilization Accounts (SUAs) and Food Balance Sheet (FBS), is part of the conceptual framework as shown below makes such a conceptual framework a powerful tool for integrating agricultural statistics into national statistical system. It helps demonstrate the relationship of agricultural statistics with other sectoral statistics and provides a direction on how to integrate agricultural statistics into national statistical system as advocated in Chapter 8 of the Global Strategy.

In the narrowest sense, the current agricultural statistics collected by most countries and at the global level are reflected by the intersections of Rows 1a, part of 1b, 10 with Columns 1a, part of 1b, 4-6, 10. These areas are the so-called SUAs and FBS. This is because, in volume or quantity terms, Rows 1a and part of 1b represent the supply of agricultural products (Row 1a) and the manufactured food items and agricultural inputs, such as fertilizers, and pesticides, as intermediate inputs to the production of agricultural and food products in Matrix 1a, 1a – 1b, 1b; as final products for consumption by household and the government sectors in Matrix 1a, 4-6(ab) – 1b, 3g, for inventory at Column 7-8, and for export at Column 10. Similarly, Row 10 reflects the imports of agricultural and food products for intermediate inputs, final consumption, and inventory.

Table 6: Food Balance Sheet (*Population: Thousand; Metric Tons: Thousand)*

Accounts (classifications)			Goods and services (CPC)		Distribution & use of income (HH)	Capital	ROW	Residuals	Food supply per caput
			Feed for Livestock	Food manu	Food	Change in stock - Seed	Exports	Waste	Calories/day Number
			1a-1 ... 1a-18		3a	7-8	10	13	15
Goods & Services	Cereals and products	1a-1							
	Roots, tubers and products	1a-2							
	Sugar and syrups	1a-3							
	Pulses	1a-4							
	Treenuts	1a-5							
	Vegetables and products	1a-6							
	Fruits and products	1a-7							
	Dried fruits	1a-8							
	Stimulants	1a-9							
	Spices	1a-10							
	Alcoholic beverages	1a-11							
	Meat and products	1a-12							
	Eggs	1a-13							
	Fish and fisheries products	1a-14							
	Milk and cheese	1a-15							
	Oils and fats vegetable oils	1a-16							
	Animals fats	1a-17							
	Miscellaneous	1a-18							
ROW (Imports)		10							

By putting SUAs and FBS side by side with the other sectoral statistics, such as those of manufacturing and services sectors in Columns 1b and 1c, *de facto*, the conceptual framework has integrated agricultural statistics with other sectoral statistics to establish the building blocks of the national official statistics. To be integrated together in a matrix format agricultural statistics along with other sectoral statistics, it requires and also enables all the sectoral statistics to follow and use the international uniform units, concepts, definitions, and classifications across the rows throughout a statistical system; that is, not only in economic statistics but also in social statistics. It will also help to cross-check the consistency among data from different data sources and to make all the data comparable. Just like the above figure shows that all the goods and services, including both agricultural and non-agricultural products, in this conceptual framework are classified by CPC, which, by across the rows, are applied to final consumption, inventory, and exports. Products are goods and services produced within the economic sphere and used within it, including flows of goods and services between the national economy and the rest of the world.

On the contrary, without an international agreed conceptual framework, sets of data are compiled with specific regulatory or administrative purposes in mind and, therefore, use a variety of concepts, methods, classifications, and units of measurement according to the need they serve. For this reason, disparate sets of statistics are generally not integrated with one another, or with sets of data relating to the economy or society. Thus, it is necessary to design the conceptual framework to bring a more systematic discipline to the organization of economic, social, and environmental statistics through encouraging the adoption of standard classifications in economic, social, and environmental statistics; encouraging the development of comprehensive and consistent data sets over time, and facilitating international comparison.

With the contribution of FAO, Both the new versions of ISIC and CPC have reflected much better the reality and the needs of agricultural statistics.

The conceptual framework also clearly shows that while SUAs and FBS are extremely useful not only because they have provided the bases for the calculation of undernourishment population but also they show the sources of the food shortage in terms of production and trade, within the context of the above conceptual framework, one can also easily notice that the limitation in terms of statistical information of the current SUAs and FBS. They have not included the statistics of agricultural employment and labor force, machinery, and land use, which are reflected in Matrix 3(a-d), 1a – 3g, 1c. They have also not included the investment in agriculture, which is reflected by Column 7-8. While data collected in volume or quantity terms, all the incomes, transfers, savings, and government taxation as reflected in the areas covered by Matrix 4-6(ab), 1a – 4-6(d), 10 are excluded from the current SUAs and FBS.

Contributing to the Integrated Database

By capturing the interactions between economic development, social change, and environmental issues, the conceptual framework also provides a consistent, comprehensive, and coordinating data framework to link data collected by different surveys and censuses together to build up an integrated database as in Chapter 11 of the Global Strategy. In many countries, official statistics tend to comprise a wealth of information, laid down in many different publications. The main difficulty is the lack of integration of these statistics, so that all kinds of events that are interrelated in reality can only be studied in isolation.

The accounts in the conceptual framework can be constructed by making the best possible use of whatever data available. Integrating outcomes of all kinds of costly censuses and surveys into a consistent overall framework increases both their relevance and their reliability. In particular, this applies to household surveys, population and agricultural censuses. The compilation of such a conceptual framework will pinpoint gaps in the data and discrepancies in the survey concepts. For example, household surveys tend to underestimate not only total incomes or expenditures, but also inequality among households. A reconciliation of these sources and the national accounts leads to a more reliable description of disparities between social strata and to more plausible inequality measures. It will help streamline the number of questions per survey and perhaps even reduce the required samples in each survey after identifying and removing duplications among different surveys and censuses.

The fully-fledged accounts in the conceptual framework may be built for those years when main surveys or censuses are held. The conceptual framework can then serve as benchmark datasets, updated yearly or even quarterly with the help of less detailed recent information, assuming that structural interrelationships have not altered since the conceptual framework reference period. In this way, consistent preliminary conceptual framework is rapidly estimated. The conceptual framework incorporates whatever source statistics have already become available, but contains more detailed and more complete information. A matrix framework is especially suitable in this regard, in view of the availability of various updating and reconciliation algorithms. The potential uses of the conceptual framework are greatly enhanced once a consistent and coherent time series has been established.

Summary and Conclusions

A conceptual framework for agricultural statistics to be built on SNA and SEEA can play important roles in many aspects and areas of the "Global Strategy to Improve Agricultural Statistics." By presenting the economic, social, and environmental activities, the conceptual framework organizes statistical data in a coherent and systematic way to meet the data needs and requirements for the current and emerging issues. By defining the boundary and domain of agricultural statistics, the conceptual framework clearly displays the relationship and linkage of agricultural and rural statistics with the other sectoral statistics. Embedded with SUAs and FBS, the currently used framework in agricultural statistics, the conceptual framework helps identify the direction on how to expand them into a full-fledged system of accounts for economic, social, and environmental analysis; that is, how to best integrate agricultural statistics with the other sectoral statistics and into the national statistical system. The conceptual framework will also provide complete variables and standard terminologies for identifying and designing a core and minimum set of agricultural and rural statistical indicators. It is a multi-purpose information system that can be used to integrate data from various surveys and censuses together into an integrated database.

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ANNEX: Classifications of Agricultural Sectors, Activities, Products, and Inputs

Annex 1: Agricultural Section and Activates (ISIC v.4.0)

Code	Description
Section A	**Agriculture, forestry and fishing**
Division 01	**Crop and animal production, hunting and related service activities**
011	**Growing of non-perennial crops**
0111	Growing of cereals (except rice), leguminous crops and oil seeds
0112	Growing of rice
0113	Growing of vegetables and melons, roots and tubers
0114	Growing of sugar cane
0115	Growing of tobacco
0116	Growing of fibre crops
0119	Growing of other non-perennial crops
012	**Growing of perennial crops**
0121	Growing of grapes
0122	Growing of tropical and subtropical fruits
0123	Growing of citrus fruits
0124	Growing of pome fruits and stone fruits
0125	Growing of other tree and bush fruits and nuts
0126	Growing of oleaginous fruits
0127	Growing of beverage crops
0128	Growing of spices, aromatic, drug and pharmaceutical crops
0129	Growing of other perennial crops
013	**Plant propagation**
014	**Animal production**
0141	Raising of cattle and buffaloes
0142	Raising of horses and other equines
0143	Raising of camels and camelids
0144	Raising of sheep and goats
0145	Raising of swine/pigs
0146	Raising of poultry
0149	Raising of other animals
015	**Mixed farming**
016	**Support activities to agriculture and post-harvest crop activities**
0161	Support activities for crop production
0162	Support activities for animal production
0163	Post-harvest crop activities
0164	Seed processing for propagation
017	**Hunting, trapping and related service activities**
Division 02	**Forestry and logging**
021	**Silviculture and other forestry activities**
022	**Logging**
023	**Gathering of non-wood forest products**
024	**Support services to forestry**
Division 03	**Fishing and aquaculture**
031	**Fishing**
0311	Marine fishing
0312	Freshwater fishing
032	**Aquaculture**
0321	Marine aquaculture

0322	Freshwater aquaculture

Annex 2: Crop and Livestock Products (CPC v.2.0)

Code	Description
0	**Agriculture, forestry and fishery products**
01	**Products of agriculture, horticulture and market gardening**
011	**Cereals**
0111	**Wheat**
01111	Wheat, seed
01112	Wheat, other
0112	**Maize (corn)**
01121	Maize (corn), seed
01122	Maize (corn), other
0113	**Rice**
01131	Rice, seed
01132	Rice paddy, other (not husked)
0114	**Sorghum**
01141	Sorghum, seed
01142	Sorghum, other
0115	**Barley**
01151	Barley, seed
01152	Barley, other
0116	**Rye**
01161	Rye, seed
01162	Rye, other
0117	**Oats**
01171	Oats, seed
01172	Oats, other
0118	**Millet**
01181	Millet, seed
01182	Millet, other
0119	**Other cereals**
01190	Other cereals
012	**Vegetables**
0121	**Leafy or stem vegetables**
01211	Asparagus
01212	Cabbages
01213	Cauliflowers and broccoli
01214	Lettuce and chicory
01215	Spinach
01216	Artichokes
01219	Other leafy or stem vegetables
0122	**Melons**
01221	Watermelons
01229	Cantaloupes and other melons
0123	**Fruit-bearing vegetables**
01231	Chillies and peppers, green (only capsicum)
01232	Cucumbers and gherkins
01233	Eggplants (aubergines)
01234	Tomatoes
01235	Pumpkins, squash and gourds
01239	Other fruit-bearing vegetables

0124	**Green leguminous vegetables**
01241	Beans, green
01242	Peas, green
01249	Other green leguminous vegetables
0125	**Root, bulb or tuberous vegetables**
01251	Carrots and turnips
01252	Green garlic
01253	Onions
01254	Leeks and other alliaceous vegetables
01259	Other root, bulb and tuberous vegetables, n.e.c.
0126	**Vegetable seeds, except beet seeds**
01260	Vegetable seeds, except beet seeds
0127	**Mushrooms and truffles**
01270	Mushrooms and truffles
0129	**Vegetables, fresh, n.e.c.**
01290	Vegetables, fresh, n.e.c.
013	**Fruit and nuts**
0131	**Tropical and subtropical fruits**
01311	Avocados
01312	Bananas
01313	Plantains and others
01314	Dates
01315	Figs
01316	Mangoes
01317	Papayas
01318	Pineapples
01319	Other tropical and subtropical fruits, n.e.c.
0132	**Citrus fruits**
01321	Pomelos and grapefruits
01322	Lemons and Limes
01323	Oranges
01324	Tangerines, mandarines, clementines
01329	Other citrus fruit, n.e.c.
0133	**Grapes**
01330	Grapes
0134	**Berries and the fruits of the genus vaccinium**
01341	Currants and gooseberries
01342	Kiwi fruit
01343	Raspberries, blackberries, mulberries and loganberries
01344	Strawberries
01349	Other berries, fruits of the genus vaccinium n.e.c.
0135	**Pome fruits and stone fruits**
01351	Apples
01352	Pears and quinces
01353	Apricots
01354	Cherries
01355	Peaches and nectarines
01356	Plums and sloes
01359	Other pome fruits and stone fruits, n.e.c.
0136	**Fruit seeds**
01360	Fruit seeds
0137	**Nuts (excluding wild edible nuts and groundnuts), in shell**

01371	Almonds, in shell
01372	Cashew nuts, in shell
01373	Chestnuts, in shell
01374	Hazelnuts, in shell
01375	Pistachios, in shell
01376	Walnuts, in shell
01377	Brazil nuts, in shell
01379	Other nuts (excluding wild edible nuts and groundnuts), in shell
0139	**Other fruits, n.e.c.**
01391	Locust beans (carobs)
01399	Other fruits, n.e.c.
014	**Oilseeds and oleaginous fruits**
0141	**Soya beans**
01411	Soya beans, seed for planting
01412	Soya beans, other
0142	**Groundnuts in shell**
01421	Groundnuts in shell, seed for planting
01422	Groundnuts in shell, other
0143	**Cottonseed**
01431	Cottonseed, seed for planting
01432	Cottonseed, other
0144	**Other oilseeds**
01441	Linseed
01442	Mustard seed
01443	Rape or colza seed
01444	Sesame seed
01445	Sunflower seed
01446	Safflower seed
01449	Other oil seeds, n.e.c.
0145	**Olives**
01450	Olives
0146	**Coconuts, in shell**
01460	Coconuts, in shell
0149	**Other oleaginous fruits**
01491	Palm nuts and kernels
01499	Other oleaginous fruits, n.e.c.
015	**Edible roots and tubers with high starch or inulin content**
0151	**Potatoes**
01510	Potatoes
0159	**Other edible roots and tubers with high starch or inulin content**
01591	Sweet potatoes
01592	Cassava
01593	Yams
01599	Edible roots and tubers with high starch or inulin content, n.e.c.
016	**Stimulant, spice and aromatic crops**
0161	**Coffee, green**
01610	Coffee, green
0162	**Tea leaves**
01620	Tea leaves
0163	**Maté leaves**
01630	Maté leaves
0164	**Cocoa beans**

01640	Cocoa beans
0165	**Spice and aromatic crops, raw**
01651	Pepper (Piper spp.), raw
01652	Chillies and peppers, dry (Capsicum spp., Pimenta), raw
01653	Nutmeg, mace, cardamoms, raw
01654	Anise, badian, coriander, cumin, caraway, fennel and juniper berries, raw
01655	Cinnamon (canella), raw
01656	Cloves (whole stems), raw
01657	Ginger, raw
01658	Vanilla, raw
01659	Hop cones
0169	**Stimulant, spice and aromatic crops, n.e.c.**
01690	Stimulant, spice and aromatic crops, n.e.c.
017	**Pulses (dried leguminous vegetables)**
0170	**Pulses (dried leguminous vegetables)**
01701	Beans, dry
01702	Broad beans, dry
01703	Chick peas, dry
01704	Lentils, dry
01705	Peas, dry
01709	Pulses, n.e.c.
018	**Sugar crops**
0180	**Sugar crops**
01801	Sugar beet
01802	Sugar cane
01803	Sugar beet seeds
01809	Other sugar crops n.e.c.
019	**Forage products, fibres, living plants, cut flowers and flower buds, unmanufactured tobacco, and natural rubber**
0191	**Forage products**
01911	Maize for forage and silage
01912	Alfalfa for forage and silage
01913	Cereal straw, husks, unprepared, ground, pressed, or in the form of pellets
01919	Forage products, n.e.c.
0192	**Fibre crops**
01921	Cotton, whether or not ginned
01922	Jute, kenaf, and other textile bast fibres, raw or retted, except flax, true hemp and ramie
01929	Other fibre crops, raw, n.e.c.
0193	**Plants and parts of plants used primarily in perfumery, in pharmacy, or for insecticidal, fungicidal or similar purposes**
01930	Plants and parts of plants used primarily in perfumery, in pharmacy, or for insecticidal, fungicidal or similar purposes
0194	**Beet seeds (excluding sugar beet seeds) and seeds of forage plants**
01940	Beet seeds (excluding sugar beet seeds) and seeds of forage plants
0195	**Natural rubber in primary forms or in plates, sheets or strip**
01950	Natural rubber in primary forms or in plates, sheets or strip
0196	**Living plants; cut flowers and flower buds; flower seeds**
01961	Live plants; bulbs, tubers and roots; cuttings and slips; mushroom spawn
01962	Cut flowers and flower buds including bouquets, wreaths, floral baskets and similar articles
01963	Flower seeds
0197	**Unmanufactured tobacco**
01970	Unmanufactured tobacco
0199	**Other raw vegetable materials, n.e.c.**

01990	Other raw vegetable materials, n.e.c.
02	**Live animals and animal products (excluding meat)**
021	**Live animals**
0211	**Bovine animals, live**
02111	Cattle
02112	Buffalo
0212	**Other ruminants**
02121	Camels and camelids
02122	Sheep
02123	Goats
02129	Other ruminants, n.e.c.
0213	**Horses and other equines**
02130	Horses and other equines
0214	**Swine / pigs**
02140	Swine / pigs
0215	**Poultry**
02151	Chickens
02152	Turkeys
02153	Geese
02154	Ducks
02155	Guinea fowls
0219	**Other live animals**
02191	Rabbits and hares
02192	Other mammals
02193	Ostriches and emus
02194	Other birds
02195	Reptiles
02196	Bees
02199	Other live animals, n.e.c.
022	**Raw milk**
0221	**Raw milk from bovine animals**
02211	Raw milk of cattle
02212	Raw milk of buffalo
0229	**Other raw milk**
02291	Raw milk of sheep
02292	Raw milk of goats
02293	Raw milk of camel
02299	Other raw milk n.e.c.
023	**Eggs of hens or other birds in shell, fresh**
0231	**Hen eggs in shell, fresh**
02310	Hen eggs in shell, fresh
0232	**Eggs from other birds in shell, fresh, n.e.c.**
02320	Eggs from other birds in shell, fresh, n.e.c.
0233	**Eggs for hatching**
02330	Eggs for hatching
024	**Reproductive materials of animals**
0241	**Semen**
02411	Bovine semen
02419	Semen, n.e.c.
0242	**Embryos**
02420	Embryos
029	**Other animal products**

0291	**Natural honey**
02910	Natural honey
0292	**Snails, fresh, chilled, frozen, dried, salted or in brine, except sea snails**
02920	Snails, fresh, chilled, frozen, dried, salted or in brine, except sea snails
0293	**Edible products of animal origin n.e.c.**
02930	Edible products of animal origin n.e.c.
0294	**Raw animal materials used in textiles**
02941	Shorn wool, greasy, including fleece-washed shorn wool
02942	Pulled wool, greasy, including fleece-washed pulled wool; coarse animal hair
02943	Fine animal hair, not carded or combed
02944	Silk-worm cocoons suitable for reeling
0295	**Hides, skins and furskins, raw**
02951	Raw hides and skins of bovine animals
02952	Raw hides and skins of equine animals
02953	Raw hides and skins of sheep or lambs
02954	Raw hides and skins of goats or kids
02955	Raw furskins
02959	Raw skins of other animals
0296	**Insect waxes and spermaceti, whether or not refined or coloured**
02960	Insect waxes and spermaceti, whether or not refined or coloured
03	**Forestry and logging products**
031	**Wood in the rough**
0311	**Logs of coniferous wood**
03110	Logs of coniferous wood
0312	**Logs of non-coniferous wood**
03120	Logs of non-coniferous wood
0313	**Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms**
03130	Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms
032	**Non-wood forest products**
0321	**Natural gums and resins, gums-resins and oleoresins**
03211	Balata, gutta-percha, guayule, chicle and similar natural gums in primary forms or in plates, sheets or strip
03219	Lac, resins, balsams, natural gums and other resins n.e.c.
0322	**Natural cork, raw or simply prepared**
03220	Natural cork, raw or simply prepared
0323	**Wild edible products**
03230	Wild edible products
0324	**Parts of plants, without flowers or flower buds, and grasses, mosses and lichens, suitable for ornamental purposes**
03241	Christmas trees
03249	Other parts of plants, without flowers or flower buds, and grasses, mosses and lichens, suitable for ornamental purposes
0325	**Vegetable materials of a kind used primarily for plaiting or as stuffing or padding; raw vegetable materials of a kind used primarily for dyeing or tanning; vegetable products n.e.c.**
03250	Vegetable materials of a kind used primarily for plaiting or as stuffing or padding; raw vegetable materials of a kind used primarily for dyeing or tanning; vegetable products n.e.c.
04	**Fish and other fishing products**
041	**Fishes, live, fresh or chilled**
0411	**Fish, live**
04111	Ornamental fish
04119	Other live fish
0412	**Fish, fresh or chilled**
04120	Fish, fresh or chilled
042	**Crustaceans, not frozen; oysters; other molluscs and aquatic invertebrates, live, fresh or chilled**
0421	**Crustaceans, not frozen**

04210	Crustaceans, not frozen
0422	**Oysters**
04220	Oysters
0429	**Other molluscs and aquatic invertebrates, live, fresh or chilled**
04291	Other molluscs, live, fresh or chilled
04299	Other aquatic invertebrates, live, fresh or chilled
049	**Other aquatic plants and animals**
0491	**Coral and similar products, shells of molluscs, crustaceans or echinoderms and cuttle-bone**
04910	Coral and similar products, shells of molluscs, crustaceans or echinoderms and cuttle-bone
0492	**Natural sponges of aquatic animal origin**
04920	Natural sponges of aquatic animal origin
0493	**Seaweeds and other algae, fresh, frozen or dried, whether or not ground**
04930	Seaweeds and other algae, fresh, frozen or dried, whether or not ground

Annex 3: Agricultural Machinery, Fertilizers, and Pesticides (CPC v.2.0)

Code	Description
441	**Agricultural or forestry machinery and parts thereof**
4411	**Soil machinery (Agricultural, horticultural or forestry machinery for soil preparation or cultivation; lawn or sports-ground rollers)**
44111	Ploughs
44112	Harrows, scarifies, cultivators, weeders and hoes
44113	Seeders, planters and transplanters
44114	Manure spreaders and fertilizer distributors
44115	Parts of soil machinery
44119	Other soil machinery, n.e.c.
4412	**Harvester and threshers; machines for cleaning, sorting or grading agricultural products**
44121	Mowers for lawns, parks or sportsgrounds
44122	Combine harvester / threshers
44123	Other mowers, including cutter bars for tractor mounting
44124	Other haymaking machinery
44125	Straw or fodder balers, including pickup balers
44126	Root or tuber harvesting machines
44127	Machines for cleaning, sorting or grading eggs, fruit or other agricultural produce
44128	Machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables
44129	Other harvesting and threshing machinery, n.e.c.; parts for harvesting, threshing and grading machinery
4413	**Milking and dairy machines**
44131	Milking machines
44132	Dairy machinery
44139	Parts of milking and dairy machines, n.e.c.
4414	**Agricultural tractors**
44141	Pedestrian controlled tractors
44142	Track-laying tractors
44149	Other agricultural tractors
4415	**Mechanical appliances for projecting, dispersing or spraying liquids or powders for agriculture or horticulture**
44150	Mechanical appliances for projecting, dispersing or spraying liquids or powders for agriculture or horticulture
4416	**Self-loading or self-unloading trailers and semi-trailers for agricultural purposes**
44160	Self-loading or self-unloading trailers and semi-trailers for agricultural purposes
4419	**Other agricultural machinery**
44191	Presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices or similar beverages.
44192	Machinery for preparing animal feeding stuffs
44193	Poultry incubators and brooders
44194	Poultry-keeping machinery

44198	Other agricultural machinery n.e.c.
44199	Parts of agricultural machinery
346	**Fertilizers and pesticides**
3461	**Mineral or chemical fertilizers, nitrogenous**
34611	Urea
34612	Ammonium sulphate
34613	Ammonium nitrate
34614	Double salts and mixtures of calcium nitrate and ammonium nitrate
34615	Mixtures of ammonium nitrate with calcium carbonate or other inorganic non-fertilizing substances
34619	Other nitrogenous fertilizers and mixtures, n.e.c.
3462	**Mineral or chemical fertilizers, phosphatic**
34621	Superphosphate
34629	Other phosphatic fertilizers, n.e.c.
3463	**Mineral or chemical fertilizers, potassic**
34631	Potassium chloride (muriate of potash)
34632	Potassium sulphate (sulphate of potash)
34639	Carnallite, sylvite and other potassic fertilizers, n.e.c.
3464	**Mineral or chemical fertilizers containing at least two nutrients of nitrogen, phosphate and potash**
34641	Fertilizers containing three nutrients: nitrogen, phosphorus and potassium
34642	Diammonium hydrogenorthophosphate (diammonium phosphate)
34643	Monoammonium phosphate
34644	Fertilizers containing two nutrients: nitrogen and phosphorus
34645	Fertilizers containing two nutrients: phosphorus and potassium
34646	Potassium nitrate
34649	Other mineral or chemical fertilizers containing at least two nutrients (nitrogen, phosphate, potash), n.e.c.
3465	**Other fertilizers**
34651	Ammonia, anhydrous
34652	Ammonia, in aqueous solution
34653	Ammonium chloride; nitrites
34654	Excreta of animals useful for manure/fertilizer and fuel preparation
34659	Fertilizers n.e.c.
3466	**Insecticides, fungicides, herbicides and disinfectants**
34661	Insecticides
34662	Fungicides
34663	Herbicides, anti-sprouting products and plant-growth regulators
34664	Disinfectants
34666	Hazardous pesticides
34669	Other insecticides, fungicides, herbicides and disinfectants

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