

# Overview of methodological issues for research to improve agricultural statistics in developing countries<sup>1</sup>

**Naman Keita**, *Senior Statistician, Food and Agriculture Organisation of the United Nations*  
*Viale delle Terme di Caracalla*  
*00153 Rome, Italy*  
*E-mail: [Naman.Keita@fao.org](mailto:Naman.Keita@fao.org);*

**Elisabetta Carfagna**, *Professor, University of Bologna, Italy*  
*E-mail: [elisabetta.carfagna@unibo.it](mailto:elisabetta.carfagna@unibo.it)*

**Abstract:** This paper provides an overview of some of the major methodological issues facing agricultural statisticians in developing countries for generating reliable data on agriculture. It will take into account some of the findings of a recent survey conducted by FAO in Africa region in the framework of the preparation of the Implementation Plan for Africa of the Global Strategy to Improve Agriculture Statistics as well as research and advances being made in some countries and by specialized Agencies such as FAO and others to address some of the issues.

## 1. Introduction

The importance of agriculture to the national economy of developing countries and its key role for overall economic growth, increased incomes, poverty reduction and fight against hunger is well recognized in many recent development studies. This is particularly the case in African countries where agriculture is the most important economic sector with 30-50% of GDP and the basis of living for the majority of the population.

However, the lack of reliable data on the sector is a major challenge for developing adequate policies and programmes, monitoring and evaluation of their outcomes and impacts and informing the international development debate in a fast changing world. Agriculture sector is the one where data systems are the weakest and have been deteriorating over the last decades as documented by several recent assessment studies.

The Global Strategy to Improve Rural and Agricultural Statistics which was adopted by the 41<sup>st</sup> Session of the United Nations Statistical Commission in February 2010<sup>2</sup> aims at addressing the root causes of the declining trends of agricultural statistics, particularly in developing countries. The purpose of the global strategy is to provide a framework and methodology that will lead to the improvement of national and international food and agricultural statistics to guide policy analysis and decision making in the 21<sup>st</sup> century.

The Global Strategy is based on three pillars:

- The first pillar is the establishment of a minimum set of core data that countries will provide to meet the current and emerging demands.

---

<sup>1</sup> The authors would like to recognise with thanks the contribution received from Mr Gero Carletto from the World Bank LSMS project

<sup>2</sup> UN Statistical Commission Forty-first session 23 - 26 February 2010  
<http://unstats.un.org/unsd/statcom/doc10/BG-AgriStats.pdf>

- The second pillar is the integration of agriculture into the national statistical systems in order to meet policy maker and other data user expectations that the data will be comparable across countries and over time. The integration will be achieved by implementing a set of methodology that includes the development of a Master Sample Frame for Agriculture, the implementation of an Integrated Survey Framework, and with the results available in a Data Management System.
- The Third Pillar is the foundation that will provide the sustainability of the agricultural statistics system through governance and statistical capacity building.

The Global Strategy to Improve Agriculture Statistics identifies the lack of adequate technical tools, statistical methodology and survey framework to support data production efforts as one of the main reasons of insufficient and poor data quality on the agriculture sector.

## **2. Challenges for agriculture data collection in developing countries**

While there is a growing importance of commercial and modern farms, a considerable amount of agricultural production (particularly food crop production) in most developing countries still comes from small farmers, sometimes with low level of education, using a wide variety of agricultural practices (mix-cropping, continuous planting and harvesting on small and irregular shaped plots, etc.). In this context, there are specific methodological challenges to measuring, with an acceptable degree of accuracy, some of the most basic variables on agriculture, including crop area, yield and production, (particularly production for self consumption) when farmers do not keep any records and do not use standard measurement units.

Among developing countries, there is also a wide regional diversity between different parts of the country in terms of the importance of crops grown that require different methodologies for estimation of production. The agricultural year may also vary from one to two or three planting seasons.

For the livestock sector, methodological challenges for data collection include enumeration of nomadic and semi-nomadic livestock, social constraints to obtaining accurate numbers on livestock in pastoral societies and estimation of livestock products, especially with regards to small animals.

Methodological challenges for the fishery sector include estimation of fish production for in-land, traditional fishery and marine fishery. In the forestry sector, estimation of edible forest products, fire wood production, estimation of the extent of deforestation etc, raise additional methodological challenges.

In many developing countries, most producers are also consumers and collecting relevant data for understanding the decision making of smallholder producers where they are making both production and consumption decisions simultaneously are another challenge. Other problems that affect statistical activities are the extent to which agricultural activities are determined by the environment in which they take place and the impact of external events, especially weather conditions. There is a requirement, therefore, for detailed time series data that are disaggregated by agro-ecological zone, which is a major challenge for data collection.

These factors, combined with the lack of well documented and factual information on the farming practices used, exacerbate the methodological challenges for data collection.

## **3. Importance of methodological research for improving agricultural statistics**

In the 50's up to end 80's important efforts were made to develop tools and methods to address some of the specific challenges above. FAO was at the forefront of this effort with the World Bank, see the contributions of Sukhatme (1970), Panse (1964), Narain (1955), Petricevic, Zarkovich (FAO 1982), Casley (1981), Leslie Kish (1989) etc..

The methods and tools for estimating crop area, yield and production were largely inspired by the research conducted in India in the 40's and 50's on objective measurement and crop cutting (teams of Mahalanobis and Sukhatme), with continuous efforts for updating and improvement.

The efforts resulted in publication of some basic methodological guidelines and practical handbooks on collecting agricultural statistics in developing countries and framework for integrated agricultural statistics system still widely used by agricultural statisticians in African countries.

In 90's and 2000's there was a decline in efforts for methodological research but still some important publications were produced by FAO and other institutions, such as the Decennial World Programme for Census of Agriculture (2000 and 2010), the Multiple Frame methodology (FAO 1996 and 1998), working documents on crop forecasting, enumeration of nomadic livestock, estimation of root crop production etc.

However, with the decline in attention and priority given to the agriculture sector on the development agenda and subsequently the reduction of resources allocated to agricultural statistics, the methodological research relevant to developing countries and particularly in Africa region became marginalized, despite repeated recommendations of the FAO Regional Commissions on Agriculture Statistics such as African Commission on Agricultural Statistics, Asia and Pacific Commission on Agriculture Statistics, etc.. Methodological research effort was not at the level of challenges of changing data requirements and data needs to inform policy on emerging issues and many basic publications were not updated to take full advantage of new advances in technology and methods.

There is a need for a comprehensive and integrated methodological research programme which can support efforts to improve agricultural statistics in these countries and in Africa in particular.

With technological advances, particularly the geospatial information and geo-referencing devices and experiences in other regions, alternative and more efficient methods and tools relevant to developing countries can be developed and implemented for improving data collection systems for better data quality.

Another factor to consider is the rapidly changing nature of agriculture and the emergence of new issues that make the available data and some methods obsolete. For example, information on bio-fuel, climate change and adaptation and mitigation practices as well as its impact on poverty is seldom collected and little is known about methods and best practices on how to collect that data.

In order to improve agriculture and rural statistics significantly and on a sustainable basis, all these problems need to be addressed as they are inter-related and partial solutions may provide short term improvement but will not be sustainable. Also, in implementing technical solutions, one key aspect often missing is cost-effectiveness and sustainability. Some interesting advanced tools and methods may be implemented on experimental basis. But their translation into operational tools and their sustainability is often not ensured. Therefore, there is still substantial work to be done in both developing new data collection methods and adapting, updating and validating existing methods for agricultural data collection in developing countries.

Sound and cost-effective methodologies and tools are cornerstones for building effective and sustainable agricultural statistics systems. This is why a comprehensive methodological research component is a key element of the effort to improve agricultural statistics . The results of this component will serve as inputs for other key components for the implementation of the Global Strategy, namely the training component and the technical assistance component.

The overview provided in this paper focuses on work done mainly for Africa Region in the process of developing the Research component of the Regional Implementation Plan of the Global Strategy to Improve Agricultural Statistics. However, many of the methodological issues discussed are relevant to other developing country regions.

#### **4. Prioritisation of the research topics**

The aim of the research component of the Implementation Plan is to address specific methodological challenges faced by statisticians and data users in collecting and using agricultural statistics in Africa. The component takes into account the recommendations from the Stakeholders Conference in Tunis in February

2010, which discussed the main components to be included in the Implementation Plan for Africa of the Global Strategy to Improve Rural and Agricultural Statistics. The meeting identified the following key technical components that need to be developed:

- Technical Assistance
- Training
- Research

Regarding the research component, the first step was to identify the relevant research topics and to rank them. In fact, limited financial and human resources suggest focusing on the research areas which have the highest impact on the process of improvement of agricultural statistics.

The Tunis Meeting identified an initial list of possible topics, mainly based on the recommendations of various Sessions of the biennial meetings of the African Commission on Agricultural Statistics. This initial list includes:

- improvement of estimation of crop area, yield and production, especially in the presence of mixed and/or repeated cropping, yield of root crops, small area estimation, edible forest products, etc.;
- testing of integration of remote sensing into the production of agricultural statistics;
- methodology for food balance sheets compilation, informal cross border trade data, food stocks, farm gate prices;
- reconciling census data with current survey data;
- determination of user's (e.g. CAADP)<sup>3</sup> information needs for decision making;
- integrated agricultural survey methodology (master sampling frames and database); and
- integration of administrative data for improving agricultural statistics.

The Conference recognised that further work is needed for identifying and prioritising research topics and proposed the following criteria for prioritization of the topics:

- responding to explicit country data needs;
- concerning the core set of variables in the Global Strategy;
- producing economic and social benefit;
- ensuring the integration of agricultural statistics with other domain (e.g. household data integrated with area frame data);
- adding value to existing or planned operational programs.

#### *Stakeholder survey*

After the Tunis meeting and in order to identify and better prioritise research topics, a survey questionnaire was developed and sent to all key stakeholders for agricultural statistics in Africa and outside Africa. The population surveyed included Senior African agricultural statisticians, Senior international consultants with long experience in Africa and other developing countries, International and Regional Institutions with experiences relevant to Agricultural Statistics in Africa, academic and training institutions with experience relevant to Africa, selected development partners etc.

During the survey, it was mainly requested to stakeholders to rank the criteria for prioritising the topics and propose a ranking of a pre-defined list of research topics based on their expert knowledge and experience. They were also requested to suggest one or 2 important additional topics not included in the list provided.

For the criteria for prioritisation of the topics, the following possibilities were given for each criteria proposed:

- Fully agree
- Agree
- Disagree

---

<sup>3</sup> Comprehensive Africa Agriculture Development Programme

For the ranking of the pre-defined list of research topics, four modalities as follow:

- Very important
- Important
- Somewhat important
- Not important

The questionnaire of the survey is in the Annex I.

#### *Outcome of the Stakeholder survey*

Almost all stakeholders surveyed replied, thus 30 filled questionnaires were received and processed.

According to the replies the rank of the criteria for prioritisation of research topics is the following:

- Responding to explicit country data needs
- Concerning the core set of variables in the Global Strategy
- Ensuring the integration of agricultural statistics with other domain (e.g. household data integrated with area frame data)
- Adding value to existing or planned operational programs
- Producing economic and social benefit

The results of the survey also indicated 9 priority levels for the pre-defined list of topics according to the importance assigned to them by the stakeholders, with decreasing order:

#### **PRIORITY LEVEL 1**

- “Improvement of estimation of crop area, yield and production”

#### **PRIORITY LEVEL 2**

- "Use of GPS in the production of agricultural statistics";
- "Development of master sampling frames"

#### **PRIORITY LEVEL 3**

- “Methodology for the compilation of food security statistics”;
- “Methods for estimating crop area, yield and production of mixed and/or repeated cropping”;
- “Methods for estimating yield of root crops, edible forest products, etc.”

#### **PRIORITY LEVEL 4**

- “Development of an integrated survey programme”

#### **PRIORITY LEVEL 5**

- “Linking area frames with list frames”;
- “Estimation of food stocks”;
- “Estimation of farm gate prices”

#### **PRIORITY LEVEL 6**

- “Reconciliation of census data with survey data”

#### **PRIORITY LEVEL 7**

- “Use of remote sensing”
- “Determination of user’s information needs for decision making”

#### **PRIORITY LEVEL 8**

- “Use of small area estimation methods for improving agricultural statistics”

#### **PRIORITY LEVEL 9**

- “Estimation of informal cross border trade data”;
- ”Use of administrative data for improving agricultural statistics”

#### **4.1. Analysis by category of stakeholders**

We have performed also an analysis of the results considering the African agricultural statistician as one category as compared to all stakeholders and the institutions and the international experts separately.

First of all, we have considered the senior African agricultural statisticians and we have noticed that the rank they assign is not very different from the one of all stakeholders. It is interesting to notice that the use of administrative data for improving agricultural statistics, that has been receiving great attention in Europe in the last decades, did not have a high level of priority for the African agricultural statisticians as well as for all stakeholders, probably because they believe that the quality of administrative data is poor.

The countries give higher priority than all stakeholders to the use of GPS in the production of agricultural statistics (priority level 1), on this subject [see Keita and Carfagna, 2009 and Keita et al. 2010]; moreover, FAO, World Food Programme and the Joint Research Centre of European Union are preparing a Handbook on the use of GPS and PDAs in Agricultural Statistics.

**Table 1: Comparison of the rank of the research topics proposed by all stakeholders and by African agricultural statisticians**

<b>All stakeholders (30 respondents)</b>	<b>African agricultural statisticians (13 respondents)</b>
<b>PRIORITY LEVEL 1</b>	<b>PRIORITY LEVEL 1</b>
<ul style="list-style-type: none"> <li>- "Improvement of estimation of crop area, yield and production"</li> </ul>	<ul style="list-style-type: none"> <li>- Improvement of estimation of crop area, yield and production</li> <li>- Use of GPS in the production of agricultural statistics</li> <li>- Methodology for the compilation of food security statistics</li> <li>- Estimation of food stocks</li> </ul>
<b>PRIORITY LEVEL 2</b>	<b>PRIORITY LEVEL 2</b>
<ul style="list-style-type: none"> <li>- "Use of GPS in the production of agricultural statistics";</li> <li>- "Development of master sampling frames"</li> </ul>	<ul style="list-style-type: none"> <li>- Estimation of farm gate prices</li> </ul>
<b>PRIORITY LEVEL 3</b>	<b>PRIORITY LEVEL 3</b>
<ul style="list-style-type: none"> <li>- "Methodology for the compilation of food security statistics";</li> <li>- "Methods for estimating crop area, yield and production of mixed and/or repeated cropping";</li> <li>- "Methods for estimating yield of root crops, edible forest products, etc."</li> </ul>	<ul style="list-style-type: none"> <li>- Linking area frames with list frames</li> </ul>
<b>PRIORITY LEVEL 4</b>	<b>PRIORITY LEVEL 4</b>
<ul style="list-style-type: none"> <li>- "Development of an integrated survey programme"</li> </ul>	<ul style="list-style-type: none"> <li>- Estimation of informal cross border trade data</li> <li>- Methods for estimating crop area, yield and production of mixed and/or repeated cropping</li> </ul>
<b>PRIORITY LEVEL 5</b>	<b>PRIORITY LEVEL 5</b>
<ul style="list-style-type: none"> <li>- "Linking area frames with list frames";</li> <li>- "Estimation of food stocks";</li> <li>- "Estimation of farm gate prices"</li> </ul>	<ul style="list-style-type: none"> <li>- Development of an integrated survey programme</li> <li>- Development of master sampling frames</li> <li>- Methods for estimating yield of root crops, edible forest products, etc.</li> <li>- Determination of user's information needs for decision making</li> </ul>
<b>PRIORITY LEVEL 6</b>	<b>PRIORITY LEVEL 6</b>
<ul style="list-style-type: none"> <li>- "Reconciliation of census data with survey data"</li> </ul>	<ul style="list-style-type: none"> <li>- Reconciliation of census data with survey data</li> </ul>
<b>PRIORITY LEVEL 7</b>	<b>PRIORITY LEVEL 7</b>
<ul style="list-style-type: none"> <li>- "Use of remote sensing"</li> </ul>	<ul style="list-style-type: none"> <li>- Use of remote sensing</li> </ul>

– “Determination of user’s information needs for decision making”	
<b>PRIORITY LEVEL 8</b>	<b>PRIORITY LEVEL 8</b>
– “Use of small area estimation methods for improving agricultural statistics”	– Use of small area estimation methods for improving agricultural statistics
<b>PRIORITY LEVEL 9</b>	<b>PRIORITY LEVEL 9</b>
– “Estimation of informal cross border trade data”; – ”Use of administrative data for improving agricultural statistics”	– Use of administrative data for improving agricultural statistics

Considering the institutions<sup>4</sup> only, we have obtained very different results, since a stronger accent is given to methods. The development of a master sampling frame, which has priority level 5 for the countries, is considered as the most important research topics by the institutions. Despite the very low importance given by the African agricultural statisticians to the use of administrative data for improving agricultural statistics, the institutions attribute priority level 2 to this subject.

**Table 2: Comparison of the rank of the research topics proposed by all stakeholders and by the institutions**

<b>All stakeholders (30 respondents)</b>	<b>Institutions (12 respondents)</b>
<b>PRIORITY LEVEL 1</b>	<b>PRIORITY LEVEL 1</b>
– “Improvement of estimation of crop area, yield and production”	– Development of master sampling frames
<b>PRIORITY LEVEL 2</b>	<b>PRIORITY LEVEL 2</b>
– "Use of GPS in the production of agricultural statistics"; – "Development of master sampling frames"	– Use of administrative data for improving agricultural statistics”
<b>PRIORITY LEVEL 3</b>	<b>PRIORITY LEVEL 3</b>
– “Methodology for the compilation of food security statistics”; – “Methods for estimating crop area, yield and production of mixed and/or repeated cropping”; – “Methods for estimating yield of root crops, edible forest products, etc.”	– Development of an integrated survey programme
<b>PRIORITY LEVEL 4</b>	<b>PRIORITY LEVEL 4</b>
– “Development of an integrated survey programme”	– Use of small area estimation methods for improving agricultural statistics – Methods for estimating yield of root crops, edible forest products, etc.
<b>PRIORITY LEVEL 5</b>	<b>PRIORITY LEVEL 5</b>
– “Linking area frames with list frames”; – “Estimation of food stocks”; – “Estimation of farm gate prices”	– Estimation of farm gate prices – Improvement of estimation of crop area, yield and production – Methods for estimating crop area, yield and production of mixed and/or repeated cropping

<sup>4</sup> The following institutions responded to the survey European Union Joint Research Center (Jacques Delincé and Javier Gallego), World Bank (Graham Eele), OECD/PARIS21 (Francois Fonteneau), Indian Agricultural Statistics Research Institute (V K Bhatia), DfID (Kim Bradford Smith), UK - University of Reading (Roger D. Stern), Fara - Africa (Irene Annor Frempong), NASS-USDA (Cynthia Clark), WB (LSMS Team), Bill and Melinda Gates Foundation (Chris Gingerich), Centre National de Recherche Scientifique de Côte d’Ivoire (Doumbia Sekou)

<b>PRIORITY LEVEL 6</b>	<b>PRIORITY LEVEL 6</b>
– “Reconciliation of census data with survey data	– Reconciliation of census data with survey data – Determination of user’s information needs for decision making
<b>PRIORITY LEVEL 7</b>	<b>PRIORITY LEVEL 7</b>
– “Use of remote sensing” – “Determination of user’s information needs for decision making”	– Use of GPS in the production of agricultural statistics – Linking area frames with list frames – Methodology for the compilation of food security statistics
<b>PRIORITY LEVEL 8</b>	<b>PRIORITY LEVEL 8</b>
– “Use of small area estimation methods for improving agricultural statistics”	– Use of remote sensing – Estimation of food stocks
<b>PRIORITY LEVEL 9</b>	<b>PRIORITY LEVEL 9</b>
– “Estimation of informal cross border trade data”; – ”Use of administrative data for improving agricultural statistics”	– Estimation of informal cross border trade data

The international experts differentiate the importance of the research topics less than the African agricultural statisticians and the institutions; in fact, the analysis of the questionnaires does not assign any research topic to priority levels 8 and 9. The importance given to the use of remote sensing is higher, since it goes from priority level 8 as for the African agricultural statisticians to level 6.

**Table 3: Comparison of the rank of the research topics proposed by all stakeholders and by the experts**

<b>All stakeholders(30 respondents)</b>	<b>Experts (5 respondents)</b>
<b>PRIORITY LEVEL 1</b>	<b>PRIORITY LEVEL 1</b>
– “Improvement of estimation of crop area, yield and production”	– Methods for estimating crop area, yield and production of mixed and/or repeated cropping – Methods for estimating yield of root crops, edible forest products, etc.
<b>PRIORITY LEVEL 2</b>	<b>PRIORITY LEVEL 2</b>
– "Use of GPS in the production of agricultural statistics"; – "Development of master sampling frames"	– Use of GPS in the production of agricultural statistics – Improvement of estimation of crop area, yield and production
<b>PRIORITY LEVEL 3</b>	<b>PRIORITY LEVEL 3</b>
– “Methodology for the compilation of food security statistics”; – “Methods for estimating crop area, yield and production of mixed and/or repeated cropping”; – “Methods for estimating yield of root crops, edible forest products, etc.”	– Reconciliation of census data with survey data
<b>PRIORITY LEVEL 4</b>	<b>PRIORITY LEVEL 4</b>
– “Development of an integrated survey programme”	– Linking area frames with list frames – Development of an integrated survey programme
<b>PRIORITY LEVEL 5</b>	<b>PRIORITY LEVEL 5</b>
– “Linking area frames with list frames”;	– Methodology for the compilation of food

<ul style="list-style-type: none"> <li>- “Estimation of food stocks”;</li> <li>- “Estimation of farm gate prices”</li> </ul>	<ul style="list-style-type: none"> <li>security statistics</li> <li>- Development of master sampling frames</li> <li>- Determination of user’s information needs for decision making</li> </ul>
<b>PRIORITY LEVEL 6</b>	<b>PRIORITY LEVEL 6</b>
<ul style="list-style-type: none"> <li>- “Reconciliation of census data with survey data</li> </ul>	<ul style="list-style-type: none"> <li>- Use of remote sensing</li> <li>- Estimation of informal cross border trade data</li> <li>- Estimation of food stocks</li> <li>- Use of administrative data for improving agricultural statistics</li> <li>- Use of small area estimation methods for improving agricultural statistics</li> </ul>
<b>PRIORITY LEVEL 7</b>	<b>PRIORITY LEVEL 7</b>
<ul style="list-style-type: none"> <li>- “Use of remote sensing”</li> <li>- “Determination of user’s information needs for decision making”</li> </ul>	<ul style="list-style-type: none"> <li>- Estimation of farm gate prices</li> </ul>
<b>PRIORITY LEVEL 8</b>	<b>PRIORITY LEVEL 8</b>
<ul style="list-style-type: none"> <li>- “Use of small area estimation methods for improving agricultural statistics”</li> </ul>	
<b>PRIORITY LEVEL 9</b>	<b>PRIORITY LEVEL 9</b>
<ul style="list-style-type: none"> <li>- “Estimation of informal cross border trade data”;</li> <li>- ”Use of administrative data for improving agricultural statistics”</li> </ul>	

#### 4.2. Additional research topics proposed by stakeholders

As requested in the stakeholder survey, the respondents identified additional topics for research. The following topics were proposed:

- Reconciliation of households survey (user) with farm structure survey (producer);
- Improved sample design for areas with low population densities;
- Estimation des coûts de production des principales filières agricoles;
- Estimation of key environment indicators ;
- Integrated sample surveys for estimation of livestock products;
- Sample survey for estimation of fisheries statistics (both inland and marine);
- Connection between the statistical methods for national statistics, and those for the agricultural research community.
- Automatic data processing;
- Conducting agriculture census with complete enumeration using remote sensing ;
- Management of the sample in the case of annual agricultural surveys in the framework of a permanent system for agricultural statistics
- Livestock sub-sector statistics;
- Methods for estimating agriculture productivity;
- Methods of estimating livestock by number and type;
- Methods of estimating livestock production (meat, milk, etc.);
- Method of estimating horticulture production (fruits and vegetables);
- Crop forecasting methods

Other important areas include issues related to collecting data on agricultural and rural markets, especially factors and product markets that affect agricultural activities.

#### 4.3. How the Research Agenda will contribute to the implementation of the Global Strategy

During the meeting of main Stakeholders in FAO Headquarters held on 13 and 14 September 2010, to review and discuss the first draft proposals of the components of the implementation plan for Africa of the Global Strategy, the following final criteria for selecting and ranking research topics were adopted;

- Contribution of topics to implementation of Global Strategy recommendations
- Thematic grouping of topics using expert knowledge
- Use results of stakeholder surveys

The thematic domains were identified as follow:

**I Reference framework** - The second pillar of the Global Strategy is the integration of agriculture into the national statistical systems in order to meet policy maker and other data user expectations that the data will be comparable across countries and over time.

The integration will be achieved by implementing a set of methodologies which include the development of a Master Sample Frame for Agriculture, the implementation of an Integrated Survey Framework and the availability of the results in a Data Management System.

The guidelines proposed under the Reference framework will assist countries in their efforts to integrate agriculture into national statistical systems by providing adequate guidance on defining key elements for an integrated agricultural statistics programme, mainstreaming agriculture into NSDS and implementing an integrated survey framework.

**II Master frame for integrated survey** - The integration of agriculture into the national statistical systems will begin with the development of a master sample frame for agriculture which will be the foundation for all data collections based on sample surveys or censuses.

The master sample frame allows the use of both households and farms as statistical units and provides a linkage between the census framework and land use. The basic principles are that all data collections will be based on sample units selected from the master sample frame, data collections integrated into the survey framework, and the resulting official statistics residing in the data management system. The master sample frame must provide the basis for the selection of probability based samples of farms and households with the capability to link the farm characteristics with the household and then connect both to the land cover and use dimensions. The area sample frame meets this requirement.

The methodology using the population census recommended for the FAO World Program for the Census of Agriculture 2010 will also meet this requirement if households from the population census are geo referenced and used as the frame for the agricultural census and linked to satellite images of land use. The use of GPS in the production of agricultural statistics guaranties the geo-referencing of data collected, particularly households and plots.

The master frame for integrated survey also includes the use of an area frame in conjunction with one of the list frames which allows taking advantage of the strengths and weaknesses of each. This approach is particularly appropriate where there is a large variation in the sizes and types of agricultural holdings with a subset of large commercial farms. The list of commercial farms can be stratified by size and type, and the area frame ensures the population is completely covered by providing coverage of the small and subsistence farms, for more details see FAO, 1996 and FAO 1998.

In order to create a master frame for integrated survey, remote sensing data can be very useful for:

- creating area frames
- improving integration of data bases
- improving estimates through regression and calibration estimators

Remote sensing data can also be used for producing vegetation indices that show overall crop conditions plus information about changes in land cover and use. Wide literature is available in these fields, for a recent review see Gallego et al., 2010, Gallego and Carfagna, 2005, Doraiswamy et al., 2005, Dorigo et al., 2007, Hannerz and Lotsch, 2008, Carfagna and Marzioletti, 2009 a, b., Gallego, 2004.

**III Data collection methods** - The complete survey framework includes the sample design, questionnaires, data collection methods, analysis, and estimation. It also takes into consideration the data sources in addition to sample surveys that provide input into the survey framework. A fundamental way to evaluate agriculture's affect on the environment is to monitor changes in land cover and use. Land cover does not change rapidly; therefore, the data are not required annually.

Practical handbooks will be prepared on the basis of good practices and empirical studies for use by agricultural statisticians.

Guidelines for more cost-effective data collection methods on a variety of issues specific to developing countries agriculture.

**IV Food security** - The social dimension of the Global Strategy covers the need to reduce risk and vulnerability, including food security and issues related to gender.

Improved methods for producing food security data will be developed.

**V Market information** – Market information affects agricultural activities and farmers' decisions. Adequate methodologies will be developed to produce farm gate prices, data on rural and border markets and data on production factors.

**VI Data analysis** – Basic information has to be carefully analysed in order to understand and monitor the agricultural sector. Reconciliation of census data with survey data, determination of user's information needs for decision making and use of small area estimation methods for improving agricultural statistics are particularly important and will be subject to appropriate methodological research.

**VII Improvement and use of Administrative data** - Governmental interventions such as subsidies, regulation and legislation often require agricultural holders to report production information. Land ownership and cadastral surveys provide useful information for constructing registers. Many references can be given on the use of administrative data for agricultural statistics, see Carfagna and Carfagna, 2010, ESSnet ISAD, 2008, Lavallée, 2005, Selander et al. 1998, Wallgren and Wallgren, 1999, 2007 and 2009.

Then, food inspections, animal health inspections, and trade data provide input to the utilization accounts.

Within each thematic domain, the main issues were identified. Some of such issues correspond to the research topics already included in the list of topics submitted to the stakeholder, some others were suggested by the participants to the meeting in Rome. Within each thematic domain, the rank of the research topics is given according to the replies of the stakeholders.

Table 4 shows the rank of the thematic domains and of the corresponding research topics. The table also shows the pillar of the Global Strategy the research topic contributes to implement. The research topics are classified according to their relevance mainly to Africa or also to other regions of the world.

**Table 4: Rank of the thematic domains and of the corresponding research topics**

Thematic domain	Research topic	Pillar of the Global Strategy	Relevant to Africa mainly	Relevant also to other regions
Reference framework	Framework for development of an integrated agricultural statistics programme	II pillar		X

	Mainstreaming agriculture into NSDS	II pillar		X	
	Implementation of an Integrated Survey Framework	II pillar		X	
Master frame for integrated survey	Use of GPS in the production of agricultural statistics	II pillar		X	
	Linking area frames with list frames	II pillar		X	
	Use of remote sensing	II pillar		X	
Data collection methods	Improvement of estimation of crop area, yield and production	I pillar		X	
	Methods for estimating crop area, yield and production of: <ul style="list-style-type: none"> <li>• mixed crops</li> <li>• repeated cropping</li> <li>• continuous cropping</li> </ul>	I pillar	X X	X	
	Methods for estimating yield of root crops	I pillar		X	
	Cost of production	I pillar	X	X	
	Methodology for: <ul style="list-style-type: none"> <li>• enumerating nomadic livestock</li> <li>• estimating livestock products</li> </ul>	I pillar		X	
	Adoption of new technologies	I pillar		X	
	Forestry and deforestation	I pillar		X	
	Crop forecasting and early warning	I pillar		X	
	Inland fishery, aquaculture	I pillar		X	
	Interaction between climate, environment, global warming and agriculture	II pillar		X	
	Land cover monitoring	II pillar		X	
	Food security	Methodology for the estimation of: <ul style="list-style-type: none"> <li>• supply utilization account</li> <li>• food balance sheets</li> <li>• food stocks</li> <li>• edible forest products</li> </ul>	II pillar		X
		Nutrition indicators	II pillar		X
Use of households surveys / LSMS for food security indicators		II pillar		X	
Market information	Estimation of farm gate prices	I pillar	X		
	Collecting data on agriculture rural and border market prices	I pillar	X		
	Collecting data on factors and product markets affecting agricultural activities	I pillar	X		
Data analysis	Reconciliation of census data with survey data	II pillar		X	
	Determination of user's information needs for decision making	II pillar		X	

	Use of small area estimation methods for improving agricultural statistics	II pillar		X
Improvement and use of administrative data	Improvement of administrative data	II pillar		X
	Use of administrative data for improving agricultural statistics	II pillar	X	
	Estimation of informal cross border trade data	II pillar	X	

Pillar I: establishment of a minimum set of core data

Pillar II: integration of agriculture into the national statistical system

## 5. Impact, outcomes, outputs and activities

The overall objective of the Research component is to support the implementation of the Global Strategy for Agricultural and Rural Statistics in Africa, through:

- establishment of a minimum set of core data to meet current and emerging demands
- integration of agriculture into the national statistical systems
- improved governance of agricultural statistics systems and capacity building.

The purpose of the Research component is to prepare technical guidelines, and handbooks on advanced methodologies, standards and tools related to the pillars of the Global Strategy to Improve Agriculture and Rural Statistics in the prioritised research topics described above.

*The Outputs of the Research component are:*

- 1. Report with final list of criteria and priority research topics validated by main stakeholders during a regional workshop back-to back with AFCAS**
- 2. For each priority topic, reports on:**
  - a. ongoing or already completed research activities on the selected priority topics
  - b. review of relevant literature (« état des lieux » and « state of the art »)
  - c. gaps analysis and remaining methodological issues identified
  - d. potential partner technical institutions
- 3. Empirical studies designed and field tested by relevant technical partner institutions**
- 4. Technical reports on findings and recommendations for possible solutions to methodological issues prepared, peer reviewed and validated by experts**
- 5. Guidelines and handbooks prepared and disseminated**
- 6. Training material prepared on the basis of guidelines and handbooks**

The following table shows the milestones/ benchmarks by end of year 2015 and the main annual performance indicators

**Table 5: Milestones/benchmarks by the end of year 2015 and annual performance indicators**

<b>Milestones/benchmarks by end of 2015</b>	<b>Annual performance indicators</b>
Final list of priority research topics identified	Report with final list of prioritised topics prepared by October 2011
Status of art concerning selected topics analysed, gaps analysis performed, remaining methodological issues identified	Report, prepared by March 2012, on the survey made by FAO and on the status of art and gaps analysis

Partner technical institutions selected	Partner technical institutions selected by March 2012
Empirical studies designed and field tested by relevant technical partner institutions	Empirical studies carried out by the March 2013
Technical reports on findings and recommendations for possible solutions to methodological issues prepared, peer reviewed and validated by experts	Technical reports on findings and recommendations for possible solutions to methodological issues prepared, peer reviewed and validated by experts by the end of 2013
Guidelines and handbooks prepared and disseminated	Guidelines and handbooks prepared and disseminated by June 2015
Training material prepared on the basis of guidelines and handbooks	Training material prepared on the basis of guidelines and handbooks by the end of 2015

One of the main purposes of the research component is “to know from the existing knowledge”, for this reason existing structures will be used instead of creating parallel structures. Moreover, structures of the African Statistical System and African research institutes will be involved whenever possible in order to increase the prospects of sustainability.

FAO has started the review of the state of the art and countries best practices for some of the research topics identified during the Tunis meeting. Thus, FAO has asked the stakeholders, through the questionnaires, if they have started or completed some research activities concerning the initial list of topics.

The possibilities were:

- YES
- NO

The result is shown in table 6.

**Table 6: Number of senior African agricultural statisticians, institutions, international experts which declare they have experience in the research topics**

Number of African agricultural statistician, institutions, experts which declare they have experience in the research topics	RESEARCH TOPICS
16	Improvement of estimation of crop area, yield and production
15	Estimation of farm gate prices
13	Use of GPS in the production of agricultural statistics
11	Use of remote sensing
11	Methods for estimating crop area, yield and production of mixed and/or repeated cropping
11	Determination of user’s information needs for decision making
10	Estimation of food stocks
10	Use of small area estimation methods for improving agricultural statistics
9	Methodology for the compilation of food security statistics
9	Reconciliation of census data with survey data
9	Development of an integrated survey programme
8	Methods for estimating yield of root crops, edible forest products, etc.
6	Development of master sampling frames
6	Use of administrative data for improving agricultural statistics
5	Linking area frames with list frames
5	Estimation of informal cross border trade data

Comparing the rank of the research topics with the one for experience, we notice that the most important topic proposed for research is also the one in which most respondents have experience. The experience in “Estimation of farm gate prices” and in “Use of remote sensing” are also very widespread, although these topics are not considered very important. “Use of GPS in the production of agricultural statistics” is very important and is very widespread.

In order to build on other experiences, the Research component will take advantage of work done by other institutions.

*An example of collaboration and synergy between FAO and World Bank in the LSMS project:*

FAO and World Bank are planning to collaborate in the following activities in order to take advantage from a synergic approach:

1. Improving productivity estimate
2. Improving measurement of income and its components
3. Linking population and area-based sampling for livestock statistics
4. Climate change

Similar agreements will be put in place with other institutions in order to save resources and get better and faster results in the improvement of agricultural statistics.

## 6. Sustainability

It is crucial that the research topics will provide clear guidelines which can be effectively followed by African National Statistical Systems (NSS) or by Ministries of Agriculture.

Stakeholder ownership of the results of the research activities will be promoted throughout the life cycle of the project, in particular, key African stakeholders. To the extent possible, the existing structures will be used instead of creating parallel structures. Whenever possible, structures of the African Statistical System and African research institutes will be involved. Countries and organizations will be encouraged to implement project activities as part of their current activities in agricultural statistics supported by their respective governments. This will be done through extensive advocacy among high level policy and decision-makers.

The donor support will allow producing guidelines which will allow the countries to improve their capability to produce reliable agricultural statistics. The implementation of the guidelines will require decreasing support from the donors with the increase of the experience of the countries in data collection, processing and analysis. Over time, producing the minimum core data will constitute routine activities of NSSs in the countries.

## 7. Risks and assumptions

The risk management will be kept dynamic throughout the whole project life cycle. Possible important risks which could jeopardize the realization of the project outcomes and related mitigating measures that would minimize their impact on the success of the project are presented in table 7 below. The corresponding risk descriptions are also presented in the same table.

The assumptions, however, are basically the conditions needed to achieve results after the risks have been managed.

**Table 7: Risks to project outcomes**

<b>Risk drivers</b>	<b>Description/Discussion</b>	<b>Mitigating measures</b>
<b>1. Donor coalition risks</b>		
1.1 Unsustainable donor commitments	The donor commitment to fund parts of the project may not be sustainable along the whole life of project cycle	- The research component is conceived as a set of topics which can be supported and implemented

		separately and coordinated
1.2 Difficulties in mobilization and securing all funds required to cover project cost	It may not be easy to mobilize timely the total funds required to complete the project	- The research topics are standalone projects which do not need to start at the same time
1.3 Large project size	The research component faces many different methodological problems	- The research topics are prioritized in order to facilitate the choice of a subset of research topics, in case the donors are not able to support the whole research component
<b>2. Project management risks</b>		
2.1 Problems to coordinate the research component	The heterogeneity of the research topics requires the contribution of experts with diversified knowledge and relevant experience	- FAO will coordinate the implementation of all the activities based on its long experience.
2.2 Weak coordination with the other components of the implementation plan	The research component could be weakly coordinated with the technical assistance and training components	- The umbrella framework has been conceived to guarantee coordination and integration of the technical components
2.3 Weak risk management system	If all possible risks are not regularly monitored, evaluated/controlled, and mitigated, they may arise and compromise the success of the project	- To put into place an operational risk management plan. - To ensure that relevant regular reports on the progress made are issued and discussed with the senior management and the mitigating measure executed.
2.4 Inadequate allocation of resources (budget, human and materials) and delay in resource disbursement	The planning may have underestimated some required resources. Or disbursement of some resources may be delayed	- To revise regularly the budget and work plans - To ensure timely disbursement of all required resources

## 8. Implementation and management arrangements

To the extent possible, the existing structures will be used instead of creating parallel structures. Whenever possible, structures of the African Statistical System and African research institutes will be involved.

The research component will be coordinated, supervised and financially managed by a centralized Unit (3 staff) located at FAO. The implementation will be done through decentralised and regional structures and academic institutions with proven expertise. Special attention will be given to the following points:

- supervision and coordination on how resources are used;
- transparency at the level of management;
- assignment of subcontracts on tender basis or on comparative advantage basis (whenever possible to African institutions) depending on the topic, once a coordinating structure for research has been established.

A system for monitoring and reporting on implementation at every level will be established. Performance indicators, targets and milestones will be used to know if implementation is on course. One important part of the monitoring and reporting system will be to learn and adjust during implementation.

Consistency between the research and the other technical components will be ensured by the Global Strategy Coordinating Office at FAO, which will also allow the integration of the regional implementation plan with the global implementation plan.

## 9. Communication and visibility

Communication and sharing of the results of the research component with all stakeholders will allow them meet their requirements as well as strengthen sustainability of actions and results. As experience and best

practices will be gained and lessons learned, this information will be shared with other countries and partner organizations to strengthen overall statistical development.

The mechanism for a transparent and timely flow of data and information will need to be established. This type of communication network will still be reinforced along the whole project life cycle so that the visibility of the Strategy is kept enhanced at national, regional and global levels.

## **10. Concluding remarks**

The research component of the implementation plan has ambitious goals, since it aims at having a significant impact on the methods and the processes used for producing agricultural statistics in order to improve their reliability.

The improvement of agricultural statistics will be particularly evident in developing countries which generally have specific challenges and difficulties to put in place cost efficient, updated and reliable surveys, as well as processing and analysis methods.

The main results of the research will be the preparation of updated and peer reviewed guidelines and handbooks which will be disseminated and used in training and technical assistance and will serve as reference material.

This goal can be achieved only if the various institutions, donors, countries and users strongly collaborate and believe that improving agricultural statistics is important and possible and therefore will provide adequate support.

## Annex I - Questionnaire of the survey



**BILL & MELINDA  
GATES foundation**

### IMPLEMENTATION PLAN FOR AFRICA OF THE GLOBAL STRATEGY TO IMPROVE AGRICULTURAL AND RURAL STATISTICS

### RESEARCH COMPONENT

The Conference of Development Partners on the Implementation Plan for Africa of Global Strategy to Improve Agricultural Statistics, organised in Tunis by African Development Bank, Bill and Melinda Gates Foundation and FAO, (3-4 February 2010), proposed the criteria for selecting the main areas of research and an initial list of topics for the research component of the implementation plan for African.

FAO, as leader of the research component, would appreciate your opinion on the criteria and would like you to rank the initial list of topics to be included in the research component of the implementation plan for Africa in order to prioritize them.

#### Part 1: Criteria

1	CRITERIA FOR PRIORITIZATION	Fully Agree	Agree	Disagree	Comment or Proposal
1a	Responding to explicit country data needs				
1b	Concerning the core set of variables in the Global Strategy				
1c	Producing economic and social benefit				
1d	Ensuring the integration of agricultural statistics with other domain (e.g. household data integrated with area frame data)				
1e	Adding value to existing or planned operational programs				

#### Part 2: Ranking of the research topics

2	RANK	I (Very important)	II	III	IV (Not important)
TOPICS					
2a	Use of remote sensing				
2b	Use of GPS in the production of agricultural statistics				
2c	Linking area frames with list frames				
2d	Methodology for the compilation of food security statistics				
2e	Estimation of informal cross border trade data				
2f	Estimation of food stocks				
2g	Estimation of farm gate prices				
2h	Reconciliation of census data with survey data				
2i	Development of master sampling frames				
2j	Development of an integrated survey programme				
2k	Use of administrative data for improving agricultural statistics				
2l	Use of small area estimation methods for improving agricultural statistics				
2m	Improvement of estimation of crop area, yield and production				
2n	Methods for estimating crop area, yield and production of mixed and/or repeated cropping				
2o	Methods for estimating yield of root crops, edible forest products, etc.				

2p	Determination of user's information needs for decision making				
<b>In case you think that one or two VERY IMPORTANT research topics are missing, please suggest their inclusion:</b> ..... .....					

Moreover, FAO has started the review of the state of the art and countries best practices for some of the research topics identified during the Tunis meeting and would like to know if, in your country or institution, research activities are going on or have been already completed in the following topics:

**Part 3: Experience in the research topics**

	TOPICS	YES	NO
3a	Use of remote sensing		
3b	Use of GPS in the production of agricultural statistics		
3c	Linking area frames with list frames		
3d	Methodology for the compilation of food security statistics		
3e	Estimation of informal cross border trade data		
3f	Estimation of food stocks		
3g	Estimation of farm gate prices		
3h	Reconciliation of census data with survey data		
3i	Development of master sampling frames		
3j	Development of an integrated survey programme		
3k	Use of administrative data for improving agricultural statistics		
3l	Use of small area estimation methods for improving agricultural statistics		
3m	Improvement of estimation of crop area, yield and production		
3n	Methods for estimating crop area, yield and production of mixed and/or repeated cropping		
3o	Methods for estimating yield of root crops, edible forest products, etc.		
3p	Determination of user's information needs for decision making		

If yes, please provide a brief overview of work done and contact (e-mail and telephone) of the focal person for more information:

.....



**Annex II - Draft Logical Framework for the RESEARCH Component of the Global Strategy for Agricultural and Rural Statistics – Africa Implementation Plan**

<b>HIERARCHY OF OBJECTIVES</b>	<b>EXPECTED RESULTS</b>	<b>REACH</b>	<b>PERFORMANCE INDICATORS</b>	<b>INDICATIVE TARGETS TIMEFRAME</b>	<b>ASSUMPTIONS / RISKS</b>
<p><b>Goal:</b> To support the implementation of the Global Strategy for Agricultural and Rural Statistics in Africa, through: (i) the establishment of a minimum set of core data to meet current and emerging demands; (ii) the integration of agriculture into the national statistical systems; and (iii) improved governance of agricultural statistics systems and capacity building</p>	<p><b>Impact:</b> improvements in the coverage and quality of the minimum core data set, focusing on both national and regional priority data needs; greater integration of agricultural statistics with national statistical systems and the increased and sustained capacity of the systems to meet the needs of users in the future</p>	<p><b>Beneficiaries:</b> The main stakeholders in agricultural statistics in Africa, especially current and new users of the data and the personnel and institutions involved in data collection, compilation and dissemination.</p>	<p><b>Impact Indicators:</b> 1. Overall capacity of agricultural statistics systems, for all African countries. 2. The quality of key minimum core data sets, for all African countries. 3. The number of countries that have implemented a master sample frame for agricultural statistics. 4. The number of countries that have implemented an integrated survey framework. 5. The number of countries that have implemented an integrated database. 6. The number of countries where the governance frameworks for agricultural statistics in countries are in line with the Global Strategy. <b>Sources:</b> Project Progress Report and Baseline Information Report.</p>	<p><b>Progress anticipated during phase 1:</b> Reduce the number of countries whose systems are classified as low capacity by 25%. Increase the number of countries reporting key data of adequate quality to FAO by 25%. 50% of countries to have a master sample frame for agricultural statistics 50% of countries to have implemented an integrated survey framework. 50% of countries to have implemented an integrated database. 50% of countries to have an integrated governance framework in line with the Global Strategy <b>Timeframe:</b> By 2015</p>	<p><b>Assumption statement:</b> Statistical systems are provided with adequate resources. Methodological guidelines and handbooks are easily accessible and widely disseminated. Trained personnel are retained and are able to apply their new knowledge, skills and competencies. National agricultural statistical systems get access to other aid. Governance structures of statistics are developed in line with the Fundamental Principles of Official Statistics <b>Mitigation strategies:</b> Continued advocacy for agricultural statistics Effective coordination of national statistical systems Continued aid for statistics generally</p>
<p><b>Project purpose:</b> Prepare technical guidelines, and handbooks on advanced methodologies, standards and tools related to the pillars of the Global Strategy to Improve Agriculture and Rural Statistics in the following priority areas:</p>	<p><b>Outcomes:</b> Technical guidelines, and handbooks on advanced methodologies, standards and tools for reliable and cost effective agriculture</p>	<p><b>Beneficiaries:</b> Agricultural and rural data users and producers</p>	<p><b>Outcome indicators:</b> % of countries using the guidelines and handbook for data collection</p>	<p><b>Progress anticipated during phase 1:</b> The guidelines and handbooks are used for data collection in at least 50% of African</p>	<p><b>Assumption statement:</b> Advanced and cost effective methodologies, standards and tools are used by data producers to produce better statistics</p>

HIERARCHY OF OBJECTIVES	EXPECTED RESULTS	REACH	PERFORMANCE INDICATORS	INDICATIVE TARGETS TIMEFRAME	ASSUMPTIONS / RISKS
<p><b>Reference framework:</b> Framework for development of an integrated agricultural statistics programme; Mainstreaming agriculture into NSDS; Implementation of an Integrated Survey Framework</p> <p><b>Master frame for integrated survey:</b> Use of GPS in the production of agricultural statistics; Linking area frames with list frames; Use of remote sensing.</p> <p><b>Data collection methods:</b> Improvement of estimation of crop area, yield and production; Methods for estimating crop area, yield and production of mixed crops, repeated cropping, continuous cropping; Methods for estimating yield of root crops; Cost of production; Methodology for enumerating nomadic livestock, estimating livestock products; Adoption of new technologies; Forestry and deforestation; Crop forecasting and early warning; Inland fishery, aquaculture; Interaction between climate, environment, global warming and agriculture; Land use/Land cover monitoring</p>	<p>and rural data collection adopted and used</p>		<p>Reduction of the average cost of data collection per statistical unit</p> <p>Level of accuracy of estimates of statistics for major crops at national level</p> <p><b>Sources:</b> Project Progress Report and Baseline Information Report.</p>	<p>countries</p> <p>The average cost of data collection per statistical unit is reduced by at least 50% with the use of new methodologies</p> <p>The level of accuracy of estimates of statistics for major crops at national level is increased by 30 % with the use of the new methodologies and tools</p> <p><b>Timeframe:</b> By 2015</p>	<p><b>Mitigation strategies:</b> Improve access to guidelines and handbooks and methodologies and translate them into training curricula and programmes</p>

HIERARCHY OF OBJECTIVES	EXPECTED RESULTS	REACH	PERFORMANCE INDICATORS	INDICATIVE TARGETS TIMEFRAME	ASSUMPTIONS / RISKS
<p><b>Food security:</b> Methodology for the estimation of supply utilization account, food balance sheets, food stocks, edible forest products; Nutrition indicators; Use of households surveys / LSMS for food security indicators</p> <p><b>Market information:</b> Estimation of farm gate prices; Collecting data on agriculture rural and border market prices; Collecting data on factors and product markets affecting agricultural activities</p> <p><b>Data analysis:</b> Reconciliation of census data with survey data; Determination of user's information needs for decision making; Use of small area estimation methods for improving agricultural statistics.</p> <p><b>Administrative data:</b> Improvement of administrative data; Use of administrative data for improving agricultural statistics; Estimation of informal cross border trade data</p>					

HIERARCHY OF OBJECTIVES	EXPECTED RESULTS	REACH	PERFORMANCE INDICATORS	INDICATIVE TARGETS TIMEFRAME	ASSUMPTIONS / RISKS
<p><b>Inputs and activities:</b></p> <p>1.1. Prepare the report with final list of prioritised topics following various consultations, (Tunis meeting, Rome meeting, Kampala meeting, meeting with Donors etc.)</p> <p>2.1 Collect information concerning the on-going or already completed research activities on the selected topics</p> <p>2.2. Identify the relevant literature concerning the priority topics</p> <p>2.3. Review of the literature concerning the priority topics</p> <p>2.4. Identify and analyse the gaps and remaining methodological issues within the Global Strategy Implementation Office and in close consultation with the leaders of the training and technical assistance components, the Friends of the Chair, relevant research centres, other stakeholders and the donors</p> <p>2.5. Prepare a draft report on the on-going or already completed research activities and the gaps on the selected topics and literature review</p> <p>2.6. Organise workshops concerning the on-going or already completed research activities on the selected topics and literature review</p> <p>2.7. Identify potential institutions for leading the research on the topic</p>	<p><b>Outputs:</b></p> <p>1. Report with final list of priority research topics discussed with main stakeholders during a regional workshop back-to back with AFCAS</p> <p>2. Reports on:</p> <ul style="list-style-type: none"> <li>• on-going or already completed research activities on the selected priority topics</li> <li>• review of relevant literature (« état des lieux » and « state of the art »)</li> <li>• gaps analysis and remaining methodological issues identified</li> <li>• potential partner technical institutions</li> </ul>	<p><b>Beneficiaries:</b></p> <p>Personnel and institutions involved in agricultural statistics in Africa</p>	<p><b>Output indicator:</b></p> <p>Technical quality of Methodological guidelines and handbooks</p> <p>Relevance to major agricultural data collection issues in African countries</p> <p>Cost-effectiveness of methodologies recommended in the guidelines and handbooks</p> <p><b>Sources:</b> Project Progress Report and Baseline Information Report.</p>	<p><b>Progress anticipated during phase 1:</b></p> <p>Guidelines and handbooks rated with high quality by experts of the field and quoted in relevant scientific publications</p> <p>At least 50% of African countries adopt the guidelines and handbooks</p> <p>At least 30% reduction of data collection cost in countries using recommendations in the guidelines and handbooks</p>	<p><b>Assumption statement:</b></p> <p>Statistical systems have qualified staff and adequate resources to adopt and apply advanced and cost effective methodologies, standards and tools</p> <p><b>Mitigation strategies:</b></p> <p>Guidelines and handbooks are translated into training material and reference documents for Technical Assistance and are widely disseminated and easily accessible</p>

HIERARCHY OF OBJECTIVES	EXPECTED RESULTS	REACH	PERFORMANCE INDICATORS	INDICATIVE TARGETS TIMEFRAME	ASSUMPTIONS / RISKS
<p>3.1. Design studies for the field tests</p> <p>3.2. Set up the methodology and the instruments (questionnaires, manuals etc.)</p> <p>3.3. Select the countries and the sample for the experiments</p> <p>3.4. Conduct the field tests</p> <p>4.1. Process and analyse the results</p> <p>4.2 Prepare a report on the findings and recommend possible solutions to issues</p> <p>4.3. Select the experts for the peer review and expert validation</p> <p>4.4. Submit the reports prepared to the experts</p> <p>4.5. Peer review and expert validation through a technical workshop</p> <p>5.1. Analysis of the results of the peer review and the expert validation</p> <p>5.2. Prepare relevant guidelines and handbooks</p> <p>5.3. Discuss the guidelines with the leaders of the training and technical assistance components, the Friends of the Chair, relevant research centres and other stakeholders within the umbrella component and finalise the guidelines</p> <p>5.4 Publication of handbooks and the guidelines</p> <p>5.5. Organise of dissemination workshop with countries and other stakeholders</p> <p>5.6. Disseminate the publications on the web</p> <p>6.1. Close interaction between the research component and the training component in order to take into account the results of the research and the guidelines when preparing the most advanced training material</p>	<p>3. Empirical studies designed, and field tested by relevant technical partner institutions</p> <p>4. Technical reports on findings and recommendations for possible solutions to methodological issues prepared, peer reviewed and validated by experts</p> <p>5. Guidelines and handbooks prepared and disseminated</p> <p>6. Training material prepared on the basis of guidelines and handbooks</p>				

## References

- Carfagna E. and Carfagna A. (2010) Alternative sampling frames and administrative data; which is the best data source for agricultural statistics?" in Benedetti, Bee, Espa, Piersimoni (Editors), *Agricultural Survey Methods*, Wiley, New York, April 2010, ISBN: 978-0-470-74371-3, 434 pages  
<http://eu.wiley.com/WileyCDA/WileyTitle/productCd-0470743719.html>
- Carfagna E. and Marzialetti J. (2009 b) Continuous innovation of the quality control of remote sensing data for territory management, in *Statistics for Innovation*, Erto P. (ed), Springer Verlag, ch 8, pp. 172-188.
- Carfagna E. and Marzialetti J. (2009 a) Sequential Design in Quality Control and Validation of Land Cover Data Bases, *Journal of Applied Stochastic Models in Business and Industry* 25, (2) 195-205.
- Casley D J. and Lury DA. (1981) Data collection in developing countries
- Doraiswamy, P. C., Sinclair, T. R., Hollinger, S., Akhmedov, B., Stern, A., Prueger, J. (2005). Application of MODIS derived parameters for regional crop yield assessment. *Remote Sensing of Environment*, 97(2), 192-202.
- Dorigo, W. A., Zurita-Milla, R., de Wit, A. J. W., Brazile, J., Singh, R., Schaepman, M. E. (2007). A review on reflective remote sensing and data assimilation techniques for enhanced agroecosystem modeling. *International Journal of Applied Earth Observation and Geoinformation*, 9(2), 165-193.
- ESSnet ISAD (2008) Report of WP1. State of the art on statistical methodologies for integration of surveys and administrative data.
- European commission (2003), Council regulation (EC) No 1782/2003 of 29 September 2003, Official Journal of the European Union, <http://eur-ex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:270:0001:0069:EN:PDF>
- FAO (1982), Estimation of crop areas and yields in agricultural statistics
- FAO (1988). Report of the eleventh international training course on applications of remote sensing to agricultural statistics
- FAO (1992) Collecting data on livestock
- FAO (1996) Multiple Frame Agricultural Surveys, vol. I Current surveys based on area and list sampling methods, "FAO statistical development series", n. 7, 119 pp., FAO, Rome, 1996
- FAO (1998) Multiple Frame Agricultural Surveys, vol. II Agricultural survey programmes based on area frame or dual frame sample designs "FAO statistical development series", n. 10, 242 pp., FAO, Rome, 1998
- Gallego F.J., Carfagna E. (2005) Using Remote Sensing for Agricultural Statistics", *International Statistical Review*, volume 73, number 3, December 2005, pp. 389-404, ISSN 0306-7734
- Gallego F. J. (2004) Remote sensing and land cover area estimation. *International Journal of Remote Sensing*, 25 (15), 3019-3047
- Gallego F. J. (2004) Remote sensing and land cover area estimation. *International Journal of Remote Sensing*, 25(15), 3019-3047
- Hannerz F., Lotsch A. (2008) Assessment of remotely sensed and statistical inventories of African agricultural fields. *International Journal of Remote Sensing*, 29(13), 3787-3804
- Keita N., Carfagna E. (2009) Use of modern geo-positioning devices in agricultural censuses and surveys, *Bulletin of the International Statistical Institute*, the 57th Session, 2009, Proceedings, Special Topics Contributed Paper Meetings (STCPM22) organised by Naman Keita (FAO) "Using advanced data collection methods and modern tools to improve agricultural statistics data quality", Durban, August 16-22, 2009
- Keita N., Carfagna E., Mu' Ammar G. (2010) Issues and guidelines for the emerging use of GPS and PDAs in agricultural statistics in developing countries, *The Fifth International Conference on Agricultural Statistics (ICAS V)*, Kampala, Uganda, 12-15 October 2010
- Lavallée P. (2005) Quality indicators when combining survey data and administrative data, *Proceedings of Statistics Canada Symposium 2005, Methodological Challenges for Future Information Needs*, <http://www.statcan.gc.ca/pub/11-522-x/11-522-x2005001-eng.htm>
- Kish, L. (1989). Sampling methods for agricultural surveys. *FAO Statistical Development Series* No. 3, Rome: FAO
- Mahalanobis, P.C. (1946) Recent experiments in statistical sampling in the Indian Statistical Institute
- Narain R.D. (1955) Methods of collecting current Agricultural Statistics
- Panse V.G (1964) Estimation of crop yields
- Selander R., Svensson J., Wallgren A., Wallgren B. (1998), How should we use IACS data?, *Statistics Sweden*.
- Sukhatme, P.V. (1970) Sampling theory of surveys with applications
- Wallgren A., Wallgren B. (1999), How can we use multiple administrative sources?, *Statistics Sweden*.
- Wallgren, A., Wallgren B. (2007) Register-based Statistics – Administrative Data for Statistical Purposes. John Wiley & Sons Ltd.
- Wallgren A., Wallgren B. (2009) Using Administrative Registers for Agricultural Statistics in Benedetti, Bee, Espa, Piersimoni (Editors), *Agricultural Survey Methods*.
- Zarkovich S.S. (1963) Quality of statistical data