Strategies for Improving Administrative Data for Use in an Integrated Agricultural Statistics System

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ABSTRACT

One of the key priorities of the Research Plan of the Global Strategy to Improve Agriculture and Rural Statistics is "Improving the methodology for using administrative data in agricultural statistics" (World Bank, 2010).The School of Statistics and Planning of Makerere University, Uganda (SSP) and the Center for Survey Statistics and Methodology of Iowa State University, USA (ISU), were engaged by FAO in a collaborative research effort with the aim of developing strategies and methodologies for improving the collection and management of data from administrative sources and of their use in an integrated agricultural statistics system in developing countries.

Literature shows that statistics agencies in developed countries have done a lot of research in this area especially with regards to uses of administrative records. On the other hand, the review on developing countries shows that despite questionable agricultural administrative data quality, many countries are collecting and using administrative data. Administrative data requires fewer resources and therefore a more sustainable source. These sources also provide high frequency data and can better generate small area statistics and data on rare commodities based on technical and cost considerations. However, while administrative data may be of acceptable quality for executing administrative functions, concerns have been raised regarding performance and infrastructural issues identified in the gap analysis need to be resolved before data its quality for official purposes especially in developing countries. A comprehensive analytical framework using a structure, conduct and performance paradigm was used to review the administrative sources in terms of production, quality and use of this data; to identify strengths, weaknesses and suitability of the existing agricultural data systems and review and analyze gaps. The structural, conduct, performance and infrastructural issues identified in the gap analysis need to be resolved before data from this source can be integrated in the agricultural statistics system. The field tests have made an attempt to address these issues. Findings from the pilot are given.

Keywords: Sources, Quality, Methodology, Experiences

1. Introduction

The Global Strategy to Improve Agriculture and Rural Statistics adopted by the United Nations Statistical Commission in 2010 aims to improve statistics in agriculture, livestock, aquaculture and agro-forestry production in developing countries and ensure sustainability of their maintenance. One of the key components of the Global Action Plan is its Research Plan whose priorities include "Improving the methodology for using administrative data in agricultural statistics" (World Bank, *2010*).

The major objective of the research is to improve the quality and use of administrative data. It aims at developing strategies and methodologies for improving the collection and management of agricultural data from administrative sources and of their use in an integrated agricultural statistics system in developing countries. The expected primary products of this research include (i) a technical report that includes a country-tested and validated methodology to improve and make available administrative data for producing agricultural statistics and (ii) a proposed strategy on how to use administrative data in cost effective agricultural statistics systems.

A number of definitions of administrative data have been made, including Brackstone (1987), Pronab (undated), UN (2011). However, the working definition of administrative data for this research is *"information collected primarily for administrative (not statistical) purposes by government departments and other organisations usually during the delivery of a service or for the purposes of registration, record keeping or documentation of a transaction (Administrative Data Liaison Service UK, 2015).* This involves routine data collected by agricultural extension workers/chiefs and includes data from farm assistance programs, cattle tracing, veterinary visits and farm inspections; farmers' associations; farm transactions; agricultural inputs dealers, parastatals, etc.

A four-step approach was proposed for this research, namely,

(i) a thorough review on the quality and use of administrative data to improve agricultural statistics in developed countries;

(ii) an analysis of the country assessment surveys and other documentation to identify methodological issues in using administrative data in developing countries;

(iii) based on the findings in (i) and (ii) and experiences in developed countries, develop a general methodology for integrating administrative data and other sources of auxiliary information with survey data as part of an integrated national statistical system;

(iv) three developing countries selected for in-country testing to validate and improve the methodology developed in (iii), after which final guidelines for developing countries to integrate administrative data into agricultural statistics would be produced.

2. Methodology of analysis

The work so far has involved the analysis of (i) **Country assessments reports** with information on the main sources of core agricultural data (Africa and Asia-Pacific regions); (ii) **Literature review** of research activities, empirical studies and country experiences on the sources, production, quality and use of administrative sources for statistical purposes in developing countries; (iii) **Key informant interviews;** (iv) Responses from a **questionnaire** administered to the National Statistical Offices (NSOs) in Africa during the Africa Symposium for Statistical Development held in January 2015, in Uganda; (v) **further analysis** of the data for Africa and the Asia Pacific region assessments (FAO, 2015c); **gaps**; and **in-country testing** in three selected developing countries.

A review of the analytical framework for assessment of Agricultural Market Information Systems developed by Kizito (2011) showed that it is comprehensive and can be used for review of other systems' structure, conduct and performance. The framework was modified for the purpose of assessing the Administrative Data Systems for Agricultural Statistics (ADSAS) in countries.

3. Findings from the Literature Review and the Gap Analysis

3.1 Benefits of Administrative Data

Administrative data is cheaper to use, reduces response burden and improves public image of the NSOs. They can be collected more frequently, are more timely and up to date, can cover the whole target population. Indeed, in many developing countries; it is the only data available-especially for lower level administrative units and rare commodities. Finally, administrative data can also help the NSOs cope with their mandate despite budget limitations.

3.2 Sources of Agricultural Administrative Data

Sources of administrative data identified which have application to agricultural statistics, include: Regular returns/reports by agricultural field/extension staff, agricultural production and inputs manufacturers and distributors, farmers' associations, private businesses data, meteorological data, parastatals handling the major commercial/cash crops and traceability data (e.g. traceability livestock data). Tax data, land ownership records, farm registers and other registration or licensing systems are potential sources of this data but are rarely used in developing countries because of quality and coverage issues. Most of the institutions producing agricultural administrative data are public/government but there is also a lot of potential for the private sector, farmers' and traders' organizations as well as agricultural research organizations.

3.3 Uses of Administrative Data

Common uses to which administrative data is put in developed and developing countries included: sampling frame construction and sample design; covering data gaps from surveys and censuses; forecasting, planning, provision of small area estimates and administrative uses including policy and decision making. While developed countries tended to use scientific approaches for adjusting or improving administrative data before use, developing countries tended to use simpler subjective methods like expert opinion, screen surveys, eye estimation etc. The experiences of developed countries in the use of administrative data therefore give important lessons for developing countries (FAO, 2015a, b).

3.4 Data Processing and Accessibility to Administrative Data

A lot of data from this source remain in raw form and are not turned into usable information in developing countries. Apart from exports and imports as well as agricultural price information which are often published widely, like data from other sources, a lot of other agricultural administrative data are not widely disseminated for use as it is not fully analysed. Data dissemination is often limited to office reports and workshops.

3.5 Data Quality:

Assessment of the quality of administrative data is subjective in most developing countries and the assessments are not detailed enough to cover the different quality dimensions; yet the appropriate form of quality analysis depends on the intended use of the administrative data. Much of the agricultural administrative data is usually collected and compiled without using standard statistical procedures or personnel with training in statistical methods. Documentation of administrative data collection and processing methodologies as well as agricultural data quality parameters is also poorly done.

3.6 Institutional and Organisational Capacity

As a result of decentralization in most developing countries, there are more lower reporting levels, most of which have limited capacity, leading to delayed information flow. Data is often only collected intermittently. There are also frequent institutional changes in the administrative units. Operational constraints make it difficult for extension staff or chiefs in some cases, to cover their areas of jurisdiction to collect data. They have several other responsibilities and are not, normally, and legally under the statistics authorities. Agricultural returns by agricultural extension staff are

based on non-standard data collection forms which can lead to reporting errors and inconsistencies. Sadly, in some cases there are even no standard reporting formats.

3.7 Summary of Potential Limitations in the Use of Administrative Data

Limitations of administrative data in developing countries include: Changes in administrative processes leading to inconsistencies in estimates across time, or reduced data availability; non-standard definitions of variables, units and identifiers making synthesis of multiple sources a challenge; under-coverage; reporting errors; and the challenge of maintaining confidentiality. Other challenges include: The NSOs using administrative data source for a purpose different from the one for which the data was originally collected; limited involvement of the NSOs in data collection and analysis; access problems including legal restrictions, policy considerations, organizational arrangements and technical standards; and diverse sources for the same data with undocumented methods leading to conflicting estimates. Reduced contact of the public with the NSOs, timeliness, missing data, and resistance to change are the other limitations.

3.8 Gap Analysis

A gap analysis was carried out (See Table 1) in order to identify areas of possible methodological improvement and solutions for using administrative data in an integrated agricultural statistics system (FAO, 2015d).

Table 1: Gaps Identified and Proposed Solutions to Fill the Gaps

	COMPONENT	GAPS	PROPOSED SOLUTIONS
1.	Administrative Data Collection and Management	• Divergence in figures from different sources on the same data item – lack of consistency, coherence and comparability. • Missing data. • Poor application of statistical standards and methods. • Limited use of ICT for data collection and management. • Use of non-uniform formats across different administrative units. • Poor data collection tools – questionnaires and manuals. • Subjective reporting of crop area, production, forecasts of production and yield.	• Set up a robust Routine Agricultural Administrative data system linked to other agricultural statistics sub systems. • Produce a comprehensive administrative data systems manual with proper guidelines covering all aspects of the data collection and management system. • Improve specificity of definitions. • Standardize data collection instruments. • Support field supervision on a regular basis. Best practice from India: The Improvement of Crop Statistics (ICS) to supervise data collection and verify the accuracy of the data collected. The Timely Reporting Scheme (ITS) to improve the timeliness of the data (Ministry of Statistics and programme Implementation, India, Undated). • Introduce and enhance use of modern technologies e.g. GPS tools, mobile phones, PDAs, scanners, etc.
2.	Structure of Organisations Collecting Administrative Agricultural Data	• Failure to sustain good data collection systems. • Many & frequent changes in the administrative structure that affect data collection and management.	• Train and equip staff to use modern technologies for data collection and management. • Learning from best practice of other countries. • Developing protocols for metadata documentation and for correcting data inconsistencies. • All Agricultural Administrative units should have at least one statistician as part of their staff team. • Establishment of a Technical Working Group to monitor the process of administrative data production.

	COMPONENT	GAPS	PROPOSED SOLUTIONS
3.	Coordination and Supervision	• Poor coordination or lack of co-ordination between the NSO and the various administrative agricultural data collection and management institutions. • Inadequate statistical infrastructure • Field staff often not well supervised. .	• Establish legal frameworks that support good coordination between the NSO and other players managing administrative agricultural data. • Put in place or improve MoUs to facilitate data sharing. • Best Practice – India: Well established countrywide infrastructure; a permanent village reporting agency (Ministry of Statistics and programme Implementation, India, Undated). .
4.	Human Resource / Incentives to ADSAS staff	• Lack of qualified staff & low staff retention mainly due to poor working conditions. • Poor incentive structures among employees. • High Rate of staff attrition of trained and experienced staff from the government service. • Regular training is not common in most countries. • Extension staff who often collect the administrative agricultural data have many other functions.	• Assess human resource and training needs to identify basic skills requirements. • Improve terms of service. • Incorporate finances required to recruit and train staff into the national budget and those of MDAs, including local governments. • Reduce overlap; streamline activities to clearly make data collection part of the job description. • Training Best Practice: Tanzania Agricultural Routine Data System (ARDS) on: ➤ the common reporting formats, ➤ the Village/Ward data collection format, ➤ data management, ➤ data handling and analysis at district level.
5.	Quality Control Procedures	• Quality assessments for agricultural administrative data systems in developing countries are rarely done. • Most ADSAS in developing countries do not put emphasis on documenting agricultural data quality parameters, and where they exist, they are subjective.	• Set up a Technical Working Group to ensure quality control measures and data validation mechanism/processes are put in place and adhered to. • Determine the data quality dimensions that are more relevant for assessing quality of administrative data. • Develop quantitative indicators of the relevant quality dimensions.
6.	Institutional Capacity	• No interface for dialogue between data producers and users. • Where they exist, channels of communications are not well set up and/or not regularly used as required leading to weak data relevance. • One third (30%) of the African countries for example operate below average of the expected level of the primary institutional infrastructure to produce agricultural statistics (AfDB, 2014).	• The interface for dialogue between data producers and users should be set up where they do not exist and strengthened where they are weak. • Monitoring mechanism should be established to ensure the interface is used on a regular basis. • Institutional infrastructure (physical, statistical, GIS capability, statistical methodologies and classifications) should be strengthened where they are weak. This may require providing technical support to the countries. • Best practices should be drawn from the Asia-Pacific countries of Australia, Japan, Mongolia, and New Zealand (APCAS 2012) that performed well in this dimension.
7.	Adequacy of Resources	• African Countries have inadequate resources to run the agricultural statistics systems effectively and efficiently. This is	The Countries need: • Financial support in terms of greater budgetary allocations for Agricultural Statistics in their national budgets as well as

	COMPONENT	GAPS	PROPOSED SOLUTIONS
		in terms of ➤ Finances ➤ Human resource and ➤ Physical infrastructure including technology. • These result into late or irregular collection of information, inability to hire and retain well trained staff, failure to ensure sustainability and production of poor quality data. • Lack of information on cost effectiveness of agricultural routine data collection systems.	external funding where possible. • Capacity building in human resources for their agricultural activities. • Technical assistance or share technical expertise through staff exchange programmes and study tours. • To use more cost-effective methods. • Lobby governments to provide more financial support for the system (worked well in Asia Pacific to gain access to the national budget for the routine data collection systems (Maligalig, 2015).
8.	Data Use	• Limited use of the agricultural administrative data (especially due to quality concerns). • Limited use for: ➤ Improving frame construction and sampling designs. ➤ Improving efficiency of survey based estimators. ➤ As covariates in constructing model based small area estimates and forecasts. ➤ Crop forecasting	• Use of cross checks and corrections made through survey data. • Combining multiple data sources with complementary strengths and weaknesses. • Use calibration and construct area frames. • Develop methodology for record linkage and evaluation of measurement errors. • Develop good identifying variables. • Make the agricultural statistics production process more objective and transparent through digitisation and automation. • Review and revise the legal framework to cover administrative sources.

3.9 Approach to In-Country Testing

Two types of pilot testing were done – one field-based and another, desk-top. The School of Statistics and Planning (SSP), Makerere University, Uganda led the field piloting in Tanzania and Côte d'Ivoire, while the Center for Survey Statistics and Methodology (CSSM), Iowa State University (ISU), USA led the desk-top data analysis in Namibia. This paper refers to the field-testing. (FAO, 2016e).

3.9.1 Strategy Adopted in the Pilot

The Agricultural Routine Data System (ARDS) in Tanzania identified as one of the best agricultural administrative data collection systems in Africa, due to consistency and coverage, was used as basis for the pilot. The strategy adopted was to identify what improvements were required and then pilot these. For example, there was no primary source of data from the agricultural households. Therefore a household level questionnaire was designed and piloted. In Côte d'Ivoire, there was no routine reporting system. Therefore, a similar system was set up in four villages in Cote d'Ivoire on a pilot basis.

The routine reporting system of Tanzania and the data collected by administrative agencies in Côte d'Ivoire were evaluated, reviewed, and strengthened with respect to a number of dimensions corresponding to different issues as identified in the gap analysis. These included: coordination and supervision; skills and knowledge in agricultural data management and analysis; usage of comprehensive methodologies and technologies in data collection and management; conversion factors for agriculture (crops and livestock); presence of an agricultural statistics dissemination strategy; quality control; linkages between data from administrative sources with surveys and censuses; and cost of the administrative data.

A mini-survey to come up with conversion factors in the pilot areas was also carried out in Cote d'Ivoire as there were no conversion factors. The pilot also included introduction of new

technologies like data collection using Tablets, area measurement using the GPS tools and collection of crop production using crop cards.

3.9.2 Visits to the Pilot Countries

There were a total of four visits to each of the pilot countries by the SSP Team. Each visit had a checklist of issues. A pre-pilot (first) visit was made to Tanzania and Côte d'Ivoire by an SSP team of two; to better understand the agricultural administrative data systems of these two countries.

A second visit by the SSP team was at the beginning of the pilot where a number activities were conducted including: Confirming the current coordination structure of the agricultural statistics system and the mandates of partners (NSO and Ministries) in collecting agricultural-related information; finding out current supervision arrangements; launching the pilot including briefings to all concerned; designation and training of respective staff to participate in the pilot; and agreeing on the dates for the third and fourth visits by the SSP team with stakeholders.

During the third (pilot mid-term) supervision visit, it was established whether the study countries had conversion factors; discussions were also held on the adequacy of funding, a review of data returns and flow at various levels was also done and other potential sources of administrative data identified. The fourth and final visit to wind up the field tests was also used to ensure that the issues identified in the gap analysis were all responded to. Measurements were compared: farmers' estimates of area against measurements obtained using GPS equipment; farmers' estimates of production versus actual record keeping through the crop card. The uses of modern technologies in data collection, in this case the tablets, was explored to speed up data collection and transmission at the local level and contribute to generation of real time data.

3.9.3   Findings

The introduction of a questionnaire, the crop card and the respective instructions' manuals as well as the tablet were considered to be very good innovations in both countries. The farmers themselves noted that the benefits were two-way in that the enumerators got the information they wanted while the farmers got extension advice and also got to know the exact size of their fields.

The main challenges included the fact that most of the plots were far away from the villages and scattered and not easily accessible; continuous harvesting especially where the crop card was not administered; farmers who did not want to be identified because they are squatters; synchronization of the data and sometimes lack of internet and; provision of area and production estimates by illiterate farmers. There were clear over-estimates of areas by the farmers when compared to the GPS estimates. Farmers production estimates were also over-estimates compared to the crop card. The facilitation given to field staff and supervisors was also greatly appreciated. The challenge is whether it is sustainable.

It was proposed to have intensive sensitization of the farmers before the pilot, to give more time for the training of field staff, to program the Crop Card on the mobile phone so that farmers can report regularly and electronically and, to geo-reference the plots as well since they are quite far from the homesteads. The collaboration between the NSO and MoA in Tanzania, in administering, coordinating and supervising the ARDS is a best practice that can be replicated in other countries including Cote d'Ivoire.

The existence and adherence to quality control measures and data validation mechanism/processes were examined; which data quality dimensions are more relevant for assessing quality of administrative data and their quantitative indicators (measurement of dimensions); and find out whether performance assessments of the system are done, review them and make recommendations.

As far as cost of administrative data is concerned, it is well known that establishing costs is a difficult but important task. With costs diffused throughout the data collection process, the goal was to estimate respective costs at each level of the process and make the process more cost-effective.

4.'Conclusions

The Literature Review clearly shows that statistics agencies in the developed counties have done a lot of research in this area especially with regards to the several uses of administrative records. On the other hand, the Literature Review on Developing Countries shows that despite questionable administrative data quality, many countries are already collecting and using administrative data in a number of situations. In fact, administrative data are the major source of data in many developing countries, especially for agricultural statistics. There are also new potential sources of data, especially from the private sector. This is partly due to the privatization of formerly official functions and the growth of the private sector. The major problems are mostly data quality and infrastructural issues. Increased use of administrative data will therefore require these issues to be addressed. The field tests, whose analysis has started, have attempted to address these issues and tested strategies and methodologies that would improve the generation and use of administrative data.

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