

Status of Farm Data Systems and Farmer Decision Support in Sub-Sahara Africa

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ABSTRACT

Farm data are essential to sound decision making by farmers as well as to organisations that provide support facilities and advisory services to enhance agricultural production. The importance of farm data in appraising farm profitability and in support of sound investments has increased in the recent years with increasing agricultural commercialisation. A synthesis of ten national review papers on the status of farm data systems in sub-Saharan Africa indicates that the importance of farm data has tended to be underrated in the past two decades of participatory development. A declining allocation of human and material resources from the public sector for farm data systems has culminated in low quantity and poor quality data, coupled with ineffective dissemination to the main users.

INTRODUCTION

Commercialisation of the agricultural sector requires producers to have access to the necessary tools to assess competitiveness between different enterprises and technological options for the various farming systems, in order to make informed decisions. Successful and sustainable increased production of the small-scale farming sector also depends on systematic decision support services, and a widespread information system on market opportunities. Lack of information has often led to market failure and exclusion of smallholders from the opportunities presented by globalisation (Kydd 2002).

In the context of agricultural commercialisation, farm data are indispensable as a strategic decision support resource at different levels of policy and management. It is vital to government policy makers, management and analysts, for planning programmes and formulating policies as well as monitoring and evaluation of ongoing activities (Dixon *et al.* 1994). It is used to underpin important government initiatives in modernisation of agriculture, poverty eradication and enhancement of food security.

In the private sector, farm data are essential to traders, farm inputs suppliers and distributors, agro-processors, micro-credit and financial institutions, rural investors and other agri-business service providers, to assess opportunities and prospects in the agricultural sector. Farm data are utilised by universities, colleges and research institutes for teaching purposes and research. The donor community, NGOs, parastatals and farmer associations need a different set of farm data in order to assess the required assistance and their roles in agricultural development initiatives.

Farm producers need farm data for planning and management decision making, such as establishing optimal enterprise combination, setting production targets, allocation of farm resources, determining levels of investments, evaluating technologies and other production decisions as well as for assessing input and output market opportunities.

Ultimately the nature of the farm data sets and the type of analysis required by different data users vary. For instance service providers require different synthesis and interpretation of data to what is required to guide farm investment and production decisions.

This paper is based on a synthesis of studies conducted in 10 countries, covering eastern, western and southern Africa, which appraised the status of farm data systems with respect to their support to farm management decision making, and highlights the limitations of the available data for decision support systems. Data collection involved discussions and interviews with government bodies, universities, NGOs, agricultural field extension officers and farmers.

CURRENT FARM DATA STATUS

Utilisation of statistical information and application in policy formulation, programme planning, monitoring and evaluation at the national level is in principle, an accepted development strategy. Institutions and structures to compile farm data therefore do exist in all sub-Saharan African countries. The Ministry of Food and Agriculture in Ghana, for instance, recognises the need for efficient management of agriculture as a business, through provision of accurate and timely information on all aspects of agricultural production, processing, marketing and utilisation.

However, access to reliable and timely farm information by farm producers, local communities and service providers is limited. It is evident that data aimed at providing farm decision support have been receiving a minimum of effort and attention in the last two decades. Promotion of farm data utilisation and access to farm management information to smallholder producers is not mainstreamed in most agricultural advisory and extension services in the sub-region.

Currently farm data systems in sub-Saharan Africa comprise fragmented and disjointed multi-source systems that display serious data gaps and poor co-ordination in data collection, analysis, utilisation and dissemination. The array of institutions involved in farm data tends to maintain individual data sets and there are very limited efforts to set up common data frames or to harmonise data sets, field methodologies and analysis or data storage facilities. There is poor synthesis and presentation of data in formats that could be easily accessed and utilised by small-scale farmers.

Within the public sector, the central (or national) bureaux of statistics have overall mandates for the compilation, management and dissemination of the

national statistics and are responsible for implementing and managing agricultural census and periodic agricultural surveys. Several departments within ministries of agriculture with mandates to undertake policy formulation, programme planning, implementation, monitoring and evaluation also have systems and do allocate resources that tend to focus on generating recurrent agricultural statistics. A variety of other ministries and institutions that deal with rural development do also generate or compile agricultural related statistics. In all these cases, data presentation and analysis is geared towards national statistics.

Farm data that is available from the public sector include incomplete national statistics from various sources such as periodic agricultural census (5-10 years) and different types of agricultural surveys on crops and livestock, marketing and integrated household surveys. Declining resources and public sector capacity led to the discontinuation of most of these surveys and an overall decline in the production of quality data, resulting in poor data coverage and “ageing” data sets.

Farm management units (or equivalent) are specifically responsible for undertaking the compilation and analysis of farm production data and to provide advisory services that is geared towards ensuring that farm managers make financially and economically rationale decisions. In collaboration with other technical departments, they are expected to assess the economic performance of different enterprises under various socio-economic and biophysical conditions and provide the related farm information and advisory services.

Ideally these units should field multi-disciplinary teams to identify the main enterprises and farming systems, taking account of agro-ecological and socio-economic characteristics. Input–output data for the different systems, in both physical and monetary terms, should then be collected by farm management units in order to conduct comparative analysis using partial budgets, gross margins, cash flow and other analysis to assess and compare different production systems, technologies and enterprises. Farm management specialists are also expected to provide advisory services on how to manage farming as a business by setting up and maintaining farm records and accounts and assessing the profitability of different enterprises in different situations. They are also expected to provide advice on how to access market information, input and credit facilities and capital markets.

The studies indicated that while structures to collect data to support farm management decision making and related investment decisions in countries like Kenya, Namibia, Swaziland, Tanzania and Zambia have been set up, these systems lack adequate human and material resources to sustain quality farm data generation. The agricultural ministries lack adequate resources including qualified human and institutional capacity to maintain effective mechanisms for systematic compilation of timely and reliable farm data information.

It is evident that the main sources of farm data reflecting longitudinal and cross-sectional performance of different enterprises is from data that is compiled routinely by technical departments in extension services, crops and livestock

production within the ministries of agriculture as they undertake their normal work. Related fields in rural development, marketing, co-operatives, irrigation, natural resources, forestry and fisheries also routinely collate and produce specialised agricultural information pertaining to their mandates and activities. Overall the data from these routine reports are based on administrative boundaries and are rarely disaggregated to reflect different categories of farmers, farming systems, ecological zones, enterprises or technological levels.

Specialised studies to characterise and describe performance of different farming systems, initiated by Farming Systems Research and Extension Units (or Adaptive Research Teams) established in the early 80s seem to have lost steam. In theory, their mandates have been “mainstreamed” and most of the teams have been disbanded. Farm data targeted to specific land use or enterprises are therefore currently scanty (Dixon and Minae 2001).

As noted, there is a whole array of stakeholders in data collection and use including research institutes, universities, farmer organisations, NGOs, statutory bodies and externally funded projects which compile data and conduct studies pertaining to their specialised areas of interest. It was noted that these studies tended to be localised, focused on specific issues and used field methodologies and sampling frames that are not amenable to extrapolation beyond the study areas or for incorporation into national analysis or synthesis in terms of information support systems. Lack of co-ordination and harmonisation of field approaches limits the effective integration of these data into farmer decision support services.

There have been efforts to provide synthesised information on farm management decision support and advisory services for the main crops such as coffee, cotton, tea, maize and wheat. However, information that has been made available in the past has not been updated regularly enough in response to price and other macro economic changes.

In terms of mapping the production potential or performance of different agro-ecological zones, farm information support services partly rely on specialised institutions or projects. These include institutions that forecast climatic changes, conduct crop estimates, assess livestock movements and natural resource stocks and other on-ground agro-ecological status, through facilities such as remote sensing, satellite imagery and other GIS facilities. Several countries have facilities or structures to facilitate this mapping, for instance, Kenya has produced agro-ecological zone maps indicating main potential crops. Malawi has in the past conducted national crop estimates with information on crop areas, cropping patterns and yields for 21 crops, and used this information to establish national accounts including food balance and to prepare food insecurity vulnerability mapping.

Notwithstanding the fact that lack of public funding has led to a decline in the quality and quantity data, there is limited evidence of this type of data being used as feed back to farmers in farm planning and management. The consolidation of farm information by advisory services on different production systems or

farmer categories is uncommon. A good example of what can be done was documented in Malawi where national fertiliser application trials were conducted and were then subjected to GIS analysis to provide different recommendation rates based on agro-ecological zones. Overall there is limited effort to compile data that differentiate various production conditions, which could be tapped by ministries of agriculture to advice farmers on opportunities and comparative advantage of producing certain crops for inter-regional intra country markets.

Information pertaining to agricultural marketing, farm inputs, micro-credit, farm mechanisation and other capital investment related data was in the past compiled by parastatals responsible for the specific commodity development and marketing. Due to decentralisation and market liberalisation, most of these bodies have been privatised or disfranchised in countries like Kenya, Uganda, Malawi and Zambia. Consequently this information which is also critical for the assessment of market opportunities and investment decisions by farm managers is currently scattered in different private agri-dealers.

Market information on the input-output flow from the informal sector scarcely exists except where agribusiness has successfully entered into out-grower or contract arrangement such as farmer associations and producer co-operatives, of which examples can be found in Zambia, Uganda, Malawi, Kenya and Mozambique. In any case, there are no established mechanisms for feeding back this information for synthesis as part of information support services.

One potentially important source of farm data is farm record keeping. While farm record keeping is prevalent in the large-scale commercial farms, it is almost non-existent under small-scale production. Where attempts to introduce farm records under small holder production have been made, this has been isolated and has tended to focus on cash oriented production aimed at conducting simple financial analysis on specific enterprises. There is currently a need for a systematic farm record keeping that would capture farm dynamics reflecting complex resource allocation and production structures and inter-linked flows between enterprises needs to be developed.

Most efforts in record keeping have been facilitated by donors, NGOs, farmer associations/co-operatives and in isolated cases, by the private sector. Generally, enumerators visit farmers regularly (e.g. weekly/monthly) to record input-output flows and related activities, or to assist and train farmers to maintain records as individuals or through groups. Unfortunately, the majority of these efforts have not been sustainable due to limited capacity at farm and institutional level. For instance attempts in countries like Kenya to establish farm level monitoring systems on recurrent data including crop yield, labour and other farm inputs, marketing, agro-processing, farm mechanisation and capital investments could not be maintained. Some of the reasons for lack of farm record keeping by small-scale farmers include:

- Cumbersome nature of record keeping. This is more pronounced due to the high levels of illiteracy and low numeracy levels in most low resource African farming communities.
- Complex farming systems. Most small-scale farmers engage in several enterprises and mixed cropping systems, and thus record keeping requires much time. The combined management objectives from social and economic products and services of these subsistence systems make their valuation and assessment very difficult. Disaggregating data on allocation of resources and production from intercropped systems and traditional livestock management systems is quite problematic while diffuse management structures such as piece-meal harvesting complicate the estimation of yields.
- Few small-scale farmers manage farming as a business and hence lack the necessary business aptitude. The majority do not appreciate the importance of farm data and thus have minimal incentives to keep farm records.
- Incompatibility between conventional data systems and subsistent management systems. Local units used in measuring/reporting inputs and outputs vary between regions, products and producers. Substantial effort is required to convert these local units into conventional measurements. Also some of the formats used in data collection are not designed or adapted to small-scale subsistence production systems.

DATA DISSEMINATION

Dissemination of farm data is mainly in form of reports. Other published documents such as newsletters, pamphlets, bulletins, workshop papers, radio programmes may occasionally contain relevant farm data such as price announcements or information on demand as supply for inputs and produce in different outlets. There have been attempts to produce simple bulletins and pamphlets on market information. Also, some market information is disseminated through the mass media, often local market prices of the main commodities (e.g. radio and newspapers in Uganda through FOOD NET). Nevertheless, access to farm management decision support and advisory services in most sub-Saharan countries can at best be described as dismal.

Since farm management units only have officers posted up to the district level, at best, they rely on the general extension field staff to disseminate, farm management advisory services. Individual farmer contacts and more recently group methods are utilised as main mechanisms to facilitate information flow. Where farmers are organised in to groups, contacts with lead/contact farmers and group leaders are used. There are a few countries, such as Uganda and Zambia which have made attempts to establish agricultural information centres for the local communities. Limitations on electronic communication facilities nevertheless curtail the effectiveness of this media.

It was noted though that there are poor linkages and information flow systems to facilitate feed back from extension field staff and farmers to those who collate data. The extension advisory services are more heavily oriented towards

technical husbandry information as opposed to advisory services on economic analysis. Demand for timely and relevant farm data has been increasing especially among emerging and commercial farmers and service providers. But there is concern that the advisory services in farm management are not incorporated in the mainstream extension services. The same applies to information support services in agri-business linkages and marketing.

There is overall a low utilisation of farm data by small-scale farmers partly due to the fact that, data are not synthesised into simplified formats and languages that are user friendly to farmers and local communities. The current manner in which farm data are presented is more applicable in management and decision making at the policy formulation level and programme development. The few reports that have been produced in the past on farm level advisory services, including farm management handbooks (or agricultural facts and figures) are currently outdated.

INNOVATIVE PARTICIPATORY FARM DATA COMPILATION AND UTILISATION

Resurgence of concerted efforts to promote business oriented small-scale agricultural production and the manifestation of an 'emerging farmer' category has re-emphasised the need for farm records. Farmer associations and co-operatives have been taking initiative to encourage their members to keep farm records for enterprises or activities that are handled through organised production and marketing systems, notably Uganda, Tanzania, Ghana, Swaziland, Kenya, Malawi and Zambia.

Development projects with farmer managed demonstration plots component or on farm research trials including Farmer Field Schools have also been encouraging farmers to maintain records on the trial/demonstration plots, as an illustration and encouragement to maintain farm record.

Farm data record keeping based on groups have been found to be an effective mechanism to counter illiteracy and to make record keeping less cumbersome. For example, participatory farm management approaches have been used in Zimbabwe and appear to hold promise (Shepherd, 1999). Farmer study/focus groups are used as mechanisms for facilitating farm record keeping and dissemination. Zambia, Uganda, Namibia, Ghana and Kenya have examples of contact/lead farmers being used to assist fellow members to maintain individual farm records or to support group record keeping.

Due to the limitations imposed on farm record keeping imposed by illiteracy and low numeracy, efforts have been made in some instance to develop and introduce simple data notebooks and data sheets based on pictorial or diagrammatic illustrations. However the participating household or group might still need a literate family member to help with record keeping. Pictorial designs and interpretations tend to be cultural/location specific, making the scaling up and use of such materials difficult and expensive.

Majority of the group methods and hinged on participatory approaches, however the emphasis on qualitative and quasi-quantitative data tools such as resource mapping, transect walks and matrix ranking limits their applicability in farm management decision support since group based data collection is not compatible with conventional statistical analytical tools. Overall the few examples of innovative data compilation and utilisation reported displayed low area coverage and questionable potential for scaling up.

CONSTRAINTS IN DATA COLLECTION, MANAGEMENT AND DISSEMINATION

The different sets of constraints in farm data management and dissemination highlighted are directly linked to low and declining investments of the public sector in data collection, analysis, dissemination and storage. Nevertheless, it should be noted that there are many projects and institutions currently involved in different aspects of farm data. In general though, the quality and quantity of data that is available hardly reflects the efforts and resources that are allocated to this effort. As noted there is minimal effort to synthesise and present the available data in a manner that can be used for decision support at the farm or community level. A concerted effort to harness and co-ordinate the various efforts would contribute significantly to the compilation and dissemination of farm data. The main constraints can be summarised as follows:

- Poor institutional capacity in data collection and management. Institutions mandated with farm management related advisory services lack adequate resources and human capacity to sustain systems and structures set up for farm data compilation and dissemination.
- Lack of the necessary skills and computer software in data management and analysis as well as limited financial resources for data production and reproduction. Compounding the problem further is the limited application of the data due to low accessibility to smallholder producers and inappropriate packaging into simple user-friendly formats.
- Inadequate logistical and technical support for enumerators and supervisors to facilitate accurate and timely data collection and monitoring field activities coupled with poor supervision is a serious problem in terms of ensuring data quality. This is compounded by the long distances enumerators have to cover to collect data, (e.g. in Namibia, Zambia, Mozambique and Tanzania) making data collection very costly and cumbersome and resulting in delays in data collection and analysis.
- Low numeracy and literacy rates, as well as a lack of aptitude for managing farming as a business, do not lead to adequate incentives for farmers to maintain farm records.
- Absence of a central database or reference point for farm information to provide some form of harmonisation and co-ordination in data collection methodologies, indicators, variables and analysis limits harnessing of data from different sources to build up a strong data base that can be used for supporting farm information systems.

- Costs of production, reproduction and dissemination of reports and pamphlets result in limited access of farm information to end-users. Most of the information is generated and disseminated in English, which further limits its use due to language barriers beyond the more general problem of illiteracy and poor numeracy.

One of the major problems of the available farm data is that its quality is low because of the complex subsistence production systems, with multiple products and services and potential hidden costs and by-products data collection is difficult and tends to end up on underestimation or over-estimation of data. For instance, it has been estimated that household livelihoods for some rural areas in Zimbabwe may be under-reported by as much as 50% because environmental services have been overlooked.

CONCLUSIONS and RECOMMENDATIONS

Based on the findings, it is clear that under the current conditions, the public sectors' capacity to establish sustainable farm data systems is a distant mirage for most African countries. This is aggravated by the views in some quarters that trends and policy impacts at the farm level are well known, and thus significant investment in data collection are not warranted.

Nevertheless there are several on-going efforts by governments, donor funded projects, NGOs and farmer associations and service providers to support farm data systems. While they have been able to demonstrate the potential of setting up farm data systems, sustainability seems to be illusive. Thus the need to set up viable and functional data systems by building on the strengths of existing systems and addressing the gaps is crucial. There is general recognition that progress can be made in improving farm data systems by better utilisation of existing resources. For instance:

- Co-ordination and networking between all the stakeholders would mean that the currently available resources allocated to farm data could be utilised more efficiently.
- Re-orientation and re-balancing data systems to focus on user needs, rather than the current supply driven orientation, would ensure higher collaboration in collection and dissemination of information.
- Tapping of local resources, for instance, piggybacking on farmer organisations and NGOs can complement public efforts.
- Use of typology groups/clusters/farming systems information rather than individual farms could reduce costs of data collection and enhance the usefulness of the data and its dissemination.
- Effort to harness and synthesise the prevailing farm data would go a long way in filling the current data gaps for advisory services in farm decision support systems.

Innovative farm data monitoring and information networking through farmer study groups, farmer associations, participatory farm management and

learning groups used by different member countries need to be assessed and if possible replicated and scaled up.

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