

Agricultural Cost of Production Statistics



Considerations for data collection

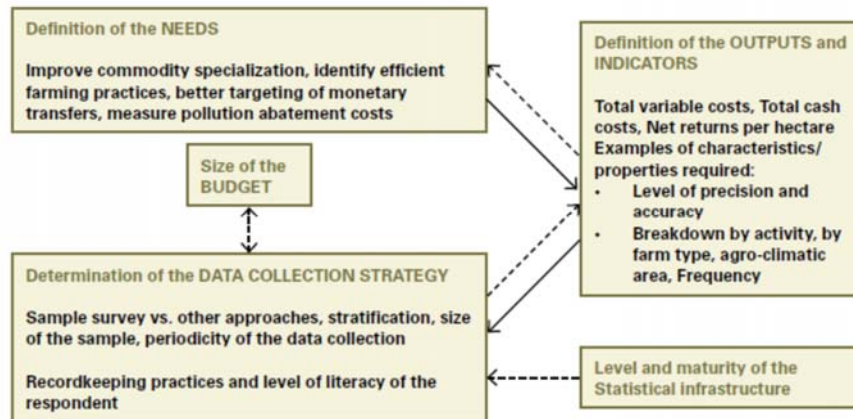
Outline

1. Data collection vehicles
2. Design consideration



Data collection vehicle

Design of the data collection vehicle can only begin after first analysing and taking into account the many factors that will have a bearing on the design. The main influences as illustrated below are user needs, the financial constraints, and the infrastructure of the statistical agency.



Data collection vehicle

Factors to consider when defining needs include:

- A thorough understanding of how the data will be used so that clear specifications can be articulated. This is accomplished in consultation with the client and data users;
- Understanding of the nature of the policy issues to be addressed. The collection strategy will be for data used to simply describe the current situation as compared with data used to analyse relationships; the type of decisions that will be made by using the data and the consequences of error;
- If possible, potential respondents should also be consulted as they can identify issues and concerns that are relevant to them. Their input could affect the questionnaire content and collection strategies;
- User needs affect the collection objectives. If national support policies are the anticipated outcome of the project, then it follows that the precision of the estimates have to be elevated. If regional policies are to be designed, then it follows that the collection vehicle contains a regional dimension. Constraints such as these will have an effect on the chosen collection vehicle.

Data collection vehicle

Factors affecting precision and the data collection vehicle include the following:

- The variability of the characteristic of interest in the population;
- The size of the population;
- The sample design and method of estimation;
- The expected response rate.

Data collection vehicle

Operationally, the following factors also influence the design:

- The size of the sample required and the budgetary implications;
- The possibility of measuring the required variables with the available techniques;
- Will acquiring the desired results be too much of a burden on the respondents?
- The amount of time available for development work;
- The amount of time available to conduct the entire survey;
- How quickly are the results required after collection?
- The number of interviewers required and available;
- Can the collection infrastructure accommodate the chosen design and is there sufficient support staff available?

Data collection vehicle

Survey

Surveys are the most common data collection vehicle used by countries with existing CoP programmes

The main reason for this is that most of the information on CoP is better known by the farmers themselves.

many countries have a long experience in undertaking agricultural surveys in areas such as production and revenue measurement.

Data collection vehicle

National statistical organizations have to decide whether they prefer to carry out single-purpose survey or multipurpose surveys.

Single purpose or stand-alone surveys are surveys entirely designed to address one major purpose

Examples abound of stand-alone surveys in agriculture, such as production surveys or producer price surveys

multipurpose or omnibus surveys are designed to collect data on different (but generally related) topics using a unique data collection vehicle.

Examples of omnibus surveys in agriculture are those that collect at the same time data on production, revenues and inputs.

Data collection vehicle

Factors that favour a stand-alone survey:

Stand-alone surveys can better target the population of interest by allocating the available sample size to that target population, thereby reducing sampling complexity and increasing precision and accuracy (or, for a given level of precision, reducing survey costs). The simplicity also carries forward into data collection, survey processing and estimation activities. Stand-alone surveys can reduce response burden to respondents subject to only one targeted survey, as opposed to an omnibus survey that collects a larger array of variables, and is therefore longer;

Data collection vehicle

Factors that favour a stand-alone survey:

From a data collection point of view, a stand-alone survey can be more easily timed to coincide with farmers' practices. If farm recordkeeping practices are weak or problematic, then it is widely accepted that data collection has to take place as near as possible following the event to be recorded. This would necessarily be compromised with an omnibus survey due to the variety of variables of interest. This advantage diminishes as farm record practices in the country improve;

Data collection vehicle

Factors that favour a stand-alone survey:

a stand-alone survey allows for focused training and teaching of the data collection staff to conduct a survey consisting of complex concepts.

Data collection vehicle

Factors that favour an omnibus survey:

As data collection typically represents the most expensive component of the survey process, by combining the number of variables collected, integrated surveys reduce the average cost of collection. This is particularly true if the other data are normally collected as well. Several countries have adopted this approach for these reasons

In addition to the collection load, integrated surveys allow for a reduction in the average costs of data processing given the high share of fixed costs associated with these operations.

Data collection vehicle

Factors that favour an omnibus survey:

Omnibus surveys can also facilitate whole farm data analysis because, by their nature, the analysis is *de facto* linked to other data collected on the survey. This ranges from other agricultural products, to off-farm and on-farm family income, to social variables, such as owner education.

The total response burden is reduced for respondents that would otherwise be subject to several stand-alone surveys (even if the survey itself is longer than any of the stand-alone surveys), such as large farms and agribusinesses and other farms selected into multiple surveys. This occurs as all variables are collected once and only once, as opposed to some variables collected multiple times across stand-alone surveys. Furthermore, these respondents are contacted fewer times in total.

Typical farm approach

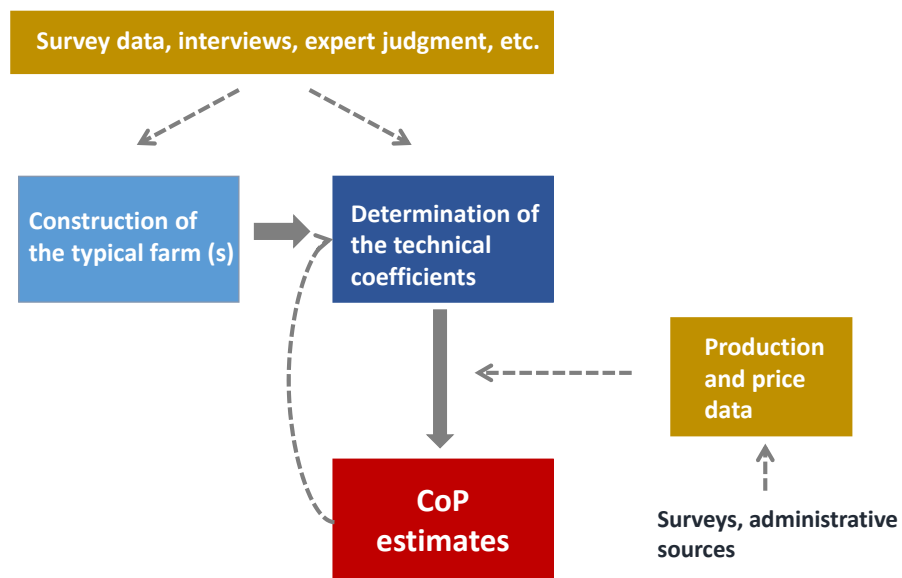
Several national organizations or regional and global networks have adopted a strategy that consists of devising region-specific figures on CoP and other variables on the basis of expert judgment and hard data for a fictive farm.

In Brazil, the Companhia Nacional de Abastecimento (Conab) uses this approach to construct regional and national figures on CoP for the major commodities.

Data collection vehicle

The data refer to a fictive farm which, in the case of Brazil, is defined and selected by a panel of experts as the modal farm in the region of interest. Once the modal farm is defined, technical coefficients are determined by the panel for all the variable and fixed inputs. Combined with information on agricultural output and unit prices for inputs, CoP in absolute terms is determined.

Data collection vehicle



Data collection vehicle

The main steps of the data construction process of the typical farm approach are:

1. Selection of regions and locations
2. Determination of the typical farm
3. Determination of the panel of experts
4. Data determination process

Data collection vehicle

1. Selection of region and locations

For a given commodity, the regions to be included in the data construction process are determined on the basis of their importance in the country's total output. The number of regions selected and the cut-off level depend on the spatial distribution of the production and the end-uses of the data (regional and/or national level information) and on the budget allocated to the programme.

Data collection vehicle

2. Determination of the typical farm

One or more typical farms are determined in each of the regions selected for the programme. The typical farm can be defined in many ways, but it is generally constructed to represent the most common characteristics of the farms in the region, namely the modal farm.

Data collection vehicle

Some of the characteristics used in the construction of the typical farm are the following:

- Type of production (conventional or organic);
- Technology used, such as use of chemical inputs, labour and rate of mechanization;
- Combination of enterprises, namely specialized crop farms or mixed farms;
- Farm size, such as in ha or output value;
- Topography and agro-climatic conditions;
- Land tenure type (owned or rented land);
- End-uses of the output (mainly for self-consumption, for selling on national and/or international markets);
- Any other dimension that reflect local production patterns.

Data collection vehicle

Determination of the panel of expert

The determination of the modal or typical farm and of its economic is chosen by a panel of experts with a wide range of experience in the food and agriculture sector.

The composition of the panels generally include:

- Selected number of farmers;
- Representatives from cooperatives and farm associations;
- Extension service workers and employees from other technical assistance bodies;
- Government and non-government employees and employees from organizations related to agriculture;
- Producers of agricultural inputs, machines and equipment;
- Researchers from agricultural research organizations.

Data collection vehicle

Determination of the panel of expert

The number of participants in a panel is generally limited (3-5 in the agri benchmark network, 10-15 in the case of Brazil) in order to ensure effective discussions and the emergence of consensus estimates.

The organization in charge of the programme will coordinate and facilitate the discussions, provide required information (data, publication, etc,) before, during and after the discussions.

The organization in charge also responsible for consolidating the result.

Data collection vehicle

Data determination process

The basic parameters and technical coefficients used to construct data on CoP are determined by the consensus of the group of experts.

If available, hard farm-level data is used as the starting point for the discussions.

These parameters are then combined with data on prices and output levels to construct CoP statistics.

The outcome of the cost computations is presented to the panel for cross-checking, may lead to a revision and a new round of calculations.

Several iterations may be needed until a consensus on the final results is reached.

Data collection vehicle

Advantages of typical farm approach

The outcome of this approach is a complete and consistent data set of all major technical and economic parameters of a farm, which allows a reliable estimation of CoP for the defined typical farms.

As all major technical parameters are documented, it is possible to analyze all kinds of productivity figures, such as labor and capital.

It is also possible to identify options to boost production or productivity because, for example, it is known to what degree operations are mechanized and how much labour or inputs are used.

Data collection vehicle

Disadvantages of typical farm approach

Data constructed on the basis of typical farm approaches do not take into account the full diversity of the production systems and conditions in which farms operate.

The results derived from these approaches cannot be interpreted as national or even regional averages without a significant loss of precision, except in the specific cases in which the production is highly dominated by farms of a single type.

The determination of typical farms is in itself a complicated exercise, given the multiplicity of characteristics to consider and the data requirements on which to base this determination.

Data collection vehicle

Choosing among the data collection approaches

Each approach has its advantages and disadvantages

For statistically sound survey approach, many of its advantages will be eroded if, for example:

- Fail to use a comprehensive and reliable survey frame
- Weak techniques to counter known survey error
- Poorly trained or insufficient data collection staff.

For typical farm approach: It doesn't take into account full array of variability

Data collection vehicle

Hybrid strategy :

- Undertaking, at regular intervals, structural surveys in order to assess with precision and with sufficient statistical soundness the production costs of given commodities. The periodicity of these surveys should be adapted to the pace of change of the production technologies;
- Statistically sound techniques, such as cluster analysis, can be used to construct homogenous groups of farms (farm types) on the basis of the data produced by the structural surveys;
- A reduced number of farms can be selected from these homogenous groups on the basis of which data on cost of production will be established, updated and cross-checked with the data compiled from the structural surveys.

Other examples of hybrid strategies include using CoP estimates derived from surveys as a historical benchmark and the use of current indicators to bring the benchmark estimates to the current time reference period. This approach is used in the United States and in the Philippines.

Data collection vehicle

Other sources of data

Administrative sources:

These refer to data and information collected by governments or by public agencies mandated by the government. Examples include:

- Fiscal and business registries, from which a range of information can be found on agricultural holdings;
- Cadastral or land registries, which can provide reliable information on land ownership and characteristics in the region of interest;
- Regulated prices for labour (minimum or regulated wages for agricultural activities);
- Input prices which, combined with survey-based information, can be used to compile cost estimates.

Data limitations, such as lack of timeliness or issues related to confidentiality, may limit the usability of the data.

Data collection vehicle

Other sources of data

Useful data may be gathered from public or private organizations that are involved in agriculture. These include:

- Financial institutions that can provide information on credits allocated to agriculture;
- Research organizations with experience in analysing agricultural production;
- Farmers' unions;
- Industry organizations, such as input and machinery suppliers;
- Farm extension services.

Design consideration

Additional design consideration

1. Unit observation
2. Data collection mode
3. Commodity scope
4. Geographical scope
5. Frequency and timing

Design consideration

1. Unit Observation

In the field of agriculture statistics, data can be collected at:

- Farm (holding) level
- Farm enterprise (activity or crop) level
- Plot level (generally a subset of the former)
- Household level

Design consideration

Farm (or holding) level:

This is the level that is the closest to the recordkeeping practices of the farm and to the interviewee's ability to report. This is especially on costs related to inputs that are jointly used to carry out different activities of the farm (difficult to separate).

However, data are also needed at the commodity or activity level to measure the relative profitability of different commodities. If this is the case, farm-level estimates need to be broken down at the activity level using allocation keys. This will lead to less precise activity-level estimates.

Design consideration

Farm enterprise (activity or crop) level:

Crop or activity-level data are necessary to compile crop-level estimates of farm profitability, which are needed to evaluate the relative competitiveness of the different commodities within the country and the same commodities produced abroad.

Collecting cost data at this level can be challenging because many cost items, especially fixed costs, are used jointly by different activities of the farm. For example, it is difficult, if not impossible, to estimate the energy consumed by the different buildings and electric appliances and equipment for production processes of each commodity of the farm. Furthermore, even for inputs that are separable in theory, purchases are often recorded by the farmer at the level of the economic unit (farm) and not for the activity or crop.

Costs can be allocated using technical factors, such as application rates for fertilizers and pesticides, at the risk of reducing accuracy and introducing bias into the results.

Design consideration

Plot level:

Data on costs and returns for crops are often collected for a specific plot. However, as with crop-level data collection, the question remains on how to allocate non-separable inputs to the specific plot (or crop) for which data are gathered.

Design consideration

Household level:

Collecting data at the household level allows for the compilation of indicators that measure food security of households and other variables associated with family composition, such as its size and location, and other variables of the household that may be of interest for food security analysis.

If the household is the unit of observation chosen, the list frames, samples and data used and produced within national household surveys could be leveraged to the benefit of the CoP programme.

This will certainly alleviate pressure on the budget of the programme and improve the quality of the data by enhancing its consistency with other variables and facilitating cross-checking and validation, such as declared household income and farm revenues.

One drawback of relying exclusively on this data collection method is the lack of exhaustiveness of the information on costs, as family farming constitutes only one of the segments of the universe of farms.

Design consideration

The main considerations in the selection of the unit of observation therefore include:

- The objectives of the programme, such as the necessity to produce food security indicators for households, to measure the profitability of the production of different commodities and carry out comparisons with other commodities within the country and abroad;
- The nature of farming in the country, such as the importance of family farming;
- The nature and sophistication of recordkeeping practices in the sector. In most developing countries, recordkeeping is non-existent for most small and medium farms, which represent the great majority of the universe of farms;
- The respondent's literacy and ability to report the required data;
- The enumerator's capacity to collect the required data;
- The choice of geographic scale.

Design consideration

Data Collection Mode

CoP surveys are quite complex with regards to the subject matter

From data collection perspective, determining the unit of observation, accounting for the costs, with survey respondents that do not have the capacity nor complete records, makes this survey difficult to conduct.

There is no perfect solution to this challenge because each countries has different circumstances.

Design consideration

Data Collection Mode

Basic principle is that data collection should be tailored as best as possible to the survey respondent.

In countries where detailed farm recordkeeping is common, and approach that leans more heavily on self-enumeration can be implemented → Reduce cost.

When the target population is less educated and perhaps even illiterate, an approach that relies on skilled interviewers becomes necessary.

Interviewer training is an important aspect of the survey process, as well as support of adequate manuals.

Design consideration

Commodity Scope

The selection of the products or commodities to include is based on the needs and intended uses of the data. In making this decision, statistical organizations must consider such factors as:

- Relative importance of the product, measured in quantities or value terms;
- Any legislative or statutory requirement attached to specific commodities, such as price support policies, which require up-to-date information on costs and returns;
- The existence of strategic commodities for food security in the country;
- The existence of (or intention to develop) economic accounts for agriculture, which require data on input costs to measure intermediate consumption, value-added and construct input-output matrices;
- The distribution of the commodity across the country (it is easier and less costly to collect data for a commodity that is produced in a well-identified and circumscribed area than for a production more uniformly distributed across the country or area of interest);
- The budget to be allocated to the programme.

Design consideration

Geographical Scope

If data are intended to be used for the compilation of national accounts for agriculture, it is essential to ensure that the data collected are representative for the country as a whole.

CoP data are often required at subnational level given the influence of agro-climatic conditions on farming practices and the need to produce data that can be used to assess regional commodity specialization and relative profitability.

The geographical coverage of the data collection also depends on the geographical distribution of the commodity. For example, if the production of a given commodity is concentrated in a limited number of regions, it is recommended that the data collection efforts be focused on those areas. Data for the residual areas can be either estimated or collected using less comprehensive and less expensive means.

Design consideration

Frequency and timing

The frequency of CoP surveys depends on several considerations, which include the following:

- Policy use and priority relative to other statistical programmes, such as the need to produce annual estimates to be used in the compilation of annual economic accounts;
- Level of statistical infrastructure and ability to accommodate frequent and infrequent surveys;
- Respondent burden, which imposes a trade-off between frequent surveys and respondent fatigue;
- Factors that affect CoP estimates and the frequency with which these factors change, such as adoption of new agricultural technologies, changes in environment/climactic conditions and growth in industrial demand for crops, such as in biofuels;
- National or international statistical obligations that require a specific survey frequency;
- The budget.

Thank you