

As auditors and evaluators of government programs and functions, we must constantly find ways to identify, isolate, and evaluate problems. This requires us to learn and use appropriate analytical approaches and methods to increase the quality and efficiency of our work and the credibility and usefulness of our evidence and findings. This section of the Methodology introduces the basic steps involved in the analytical process: planning the project, identifying and collecting data, and analyzing and interpreting data. [Return to Table of Contents](#)

### **RATIONALE FOR USING ANALYTICAL METHODS**

Analytical methods are the keys to obtaining the evidence needed to support audit findings. Analytical evidence is among the four types of evidence discussed in the Yellow Book, the other three being physical, documentary, and testimonial evidence. GAO defines analytical evidence as "computations, comparisons, reasoning, and separation of information into components" (United States General Accounting Office, pp. 6-16, 6-17).

Analytical evidence can often complete or corroborate testimonial or documentary evidence. This may be especially true of testimonial evidence given that analytical evidence has stature above that of testimonial evidence gathered via interview or other response to inquiry (Texas State Auditor's Office, SAO Project Manual System - The Hub, p. 2-B-5). (SAS statements 48 and 56 and the AICPA manual contain further information on audit evidence.)

### **RELIABILITY AND VALIDITY OF AUDIT EVIDENCE**

The Yellow Book also notes that evidence must be ". . . sufficient, competent and relevant . . . to afford a reasonable basis for auditors' judgements and conclusions . . ." While *sufficient* refers to the quantity of evidence, *competent* and *relevant* directly relate to reliability and validity, two concepts of critical importance in obtaining and analyzing audit evidence.

- **Reliable** (competent) evidence can be trusted as accurate. Regardless of its interpretation, audit evidence must be factual and correct. Note that evidence can be reliable without being valid, as occurs when data are themselves correct but have little to do with a given audit finding. Reliability of evidence often depends on the circumstances under which it is obtained. For example, evidence from independent external sources is considered more reliable than evidence provided by the client.
- **Valid** (relevant) evidence logically supports audit findings. Note that since validity depends on the interpretation of data, before evidence can be valid, it must be established as reliable.

Reliability and validity are enhanced when evidence is obtained from multiple sources. This is sometimes referred to as "*triangulation*." The preferred strategy is to triangulate among unrelated, independent sources outside the entity being audited.

### **IMPORTANCE OF MULTIPLE ANALYSES OF AUDIT EVIDENCE**

Just as using multiple sources can corroborate audit evidence, using multiple data analysis methods can offset the weaknesses inherent in analyzing audit evidence in only one way. Thus, reliability and validity can be increased by the careful selection and use of the variety of available data analysis methods.

For example, evidence obtained through interviews often relies on the subject's incomplete memory of events. Application of content analysis or further sampling and data retrieval can make such evidence more compelling.

Therefore, the credibility and usefulness of both audit evidence and audit findings can be enhanced by appropriate and judicious use of data analysis methods. Such methods can complete or corroborate information obtained in fieldwork and increase the validity of the audit finding by systematically indicating how the finding was determined.

### USING THIS SECTION OF THE METHODOLOGY

This section of the Methodology introduces and summarizes various approaches and methods auditors can use in gathering and analyzing quantitative and qualitative evidence. While the topical modules in other sections of the Methodology are organized according to *what* auditors examine, the data analysis section addresses *how* auditors conduct such examinations.

The methods discussed here are often used in the public sector management environment. As such, these methods for collecting and analyzing information are also an important component of strong management controls. An auditor can reasonably expect to find such analytical methods in use in the well-managed entity, and an auditor who is well-versed in these methods can test whether the entity uses the methods appropriately and makes decision based on analysis. (See the module on [Problem-Solving and Decision-Making](#) for more information on entity decision-making practices.)

The Data Analysis section of the Methodology Manual has five parts:

- **Choosing a Method** is a table of questions and answers immediately following this introduction. This table refers the auditor to the module(s) which best meet(s) a particular data gathering or data analysis need.
- **Designing the Evaluation** summarizes the GAO publication of the same name. This module discusses the different types of audit/evaluation questions and offers corresponding strategies. It can help both to identify the best approach to a given accountability project and to tailor research and evaluation methods to a given entity or audit issue. Also included are a table and flowchart to assist in determining which strategy is best suited to answering particular types of audit/evaluation questions.
- **Method Modules** provide summary information on the nature and use of specific data analysis methods. These modules are generally organized according to the normal sequence of events encountered when gathering evidence -- gathering data, describing data, displaying data, and analyzing data. Each module defines and gives background information on the method, lists general steps for its preparation and use, and summarizes advantages and disadvantages. Also listed are sources of additional information and technical support.

This section is divided as follows:

- *Gathering Data* covers common methods for identifying and obtaining quantitative and qualitative audit evidence.
- *Describing Data* summarizes the most broadly useful techniques of descriptive statistics, the first step in data reporting.
- *Displaying Data* provides numerous ways auditors can graphically or otherwise display information obtained during the data gathering stage.
- *Analyzing Data* summarizes a wide variety of methods which can be applied when comparing or drawing conclusions from audit evidence methods.

This section further includes a module entitled "Other Audit Techniques" which introduces other theories and techniques. Though less commonly used, such methods may be useful for some projects. This information may also help auditors upgrade their technical skills or begin exploring innovative solutions to audit problems.

- **Available Analysis Tools** summarizes the use and attributes of available in-house computer software auditors can use when performing data analyses.

## CAVEAT

These modules are not intended as a complete reference. No one is likely to learn a sophisticated analytical method from the summary information presented here. Whole books have been devoted to each topic, as the extensive references indicate. Rather, the data analysis modules are intended to act as:

- an index to additional information sources
- a glossary of selected relevant terms
- a memory aid which prompts auditors to consider particular methods

Finally, methods not listed here may be required for some accountability projects. As these needs are identified, additional modules and related resources will be developed. In the interim, please use and evaluate these modules, and let the Methodology Team know how this information can better meet your data analysis needs.