Session 6.0 Identifying Audit Evidence and Methodology

Overview

Audit evidence forms the basis of expressing an audit opinion, including a performance audit. That means the examination phase should be planned from the perspective of acquiring evidence to support observations, findings, conclusions and the opinions that will appear in the final report. To be useful in reaching audit conclusions, the evidence must be *competent, relevant and sufficient*. Although we are discussing evidence in this session, evidence is important during all stages of the audit.

This session will explain the concept of evidence, its importance, characteristics, and also types and sources of evidence necessary to support the results of a performance audit. The discussion will focus on the use of Geo Spatial Technology (GIS and GPS) in collecting audit evidence.

Learning objective

Given the brainstorming, lecture, exercise and group discussion participants will be able to identify types and sources of evidence, and use the GIS for collecting and analyzing audit evidence in auditing forest in reference to audit objective and audit criteria.

The importance and characteristics of audit evidence

Competent

Auditor needs to ensure that the audit evidence collected meeting the characteristics of competence, relevant and sufficient.

Evidence is competent (valid and reliable) if it actually represents what it purports to represent. Considering the following matters can assist when assessments are made of the reliability of evidence:

- Corroboration of evidence is a powerful technique for increasing reliability. This means that the auditor looks for different types of evidence from different sources;
- Sources of evidence from outside the audited entity are – rightly or wrongly – often viewed as more reliable than information generated within the audited entity;
- Documentary evidence is usually considered to be more reliable than oral evidence;
- Evidence generated through direct auditor observation or analysis is more reliable than evidence obtained indirectly;
- The reliability of audited entity-generated information will partly be a function of the reliability of the audited entity's management/internal control systems;
- Oral evidence that is corroborated in writing is more reliable than oral evidence alone; and
- Original documents are more reliable than photocopies.

Relevant

Relevance requires that the evidence bears a clear and logical relationship to the audit objectives and to the criteria. One approach to plan for data collection is to list, for each issue

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and criterion, the nature and location of evidence that is needed, as well as the audit procedure that is to be implemented.

Sufficient

Evidence is sufficient when there is enough relevant and reliable evidence to persuade a reasonable person that the performance audit findings, conclusions and recommendations are warranted and supported. In determining whether documentary evidence is sufficient, the auditor must take into account the status of the document.

The factors dictating the strength of evidence required to support an observation in performance auditing include:

- the level of materiality or significance of the observation;
- the degree of risk associated with arriving at an incorrect conclusion;
- experience gained in previous audit examinations – or other investigations on the degree of reliability of the audited entity's records and representations;
- known audited entity's sensitivity to an issue; and
- cost of obtaining the evidence relative to the benefits in terms of supporting the observation.

When planning the audit, the auditor should identify the probable nature, sources, and availability of audit evidence required. The auditor should consider such factors as the availability of other audit reports or studies and the cost of obtaining the audit evidence.

Types of audit evidence

Auditors should identify the type of evidence that they intend to use in any particular audit work. When planning the audit, the auditor would identify the probable nature, sources and availability of audit evidence required. Before embarking on evidence collection it is important that we 'stop and think'. Each individual involved in evidence collection needs to consider:

- what sort of evidence should be collected;
- will this form of evidence be the most useful;
- how will it support or refute the initial conclusions on the issue under examination; and
- how can this evidence are translated into facts for the final report.

The auditor must be assured of the relevance and usefulness of the evidence before proceeding with the collection. Given the limited resources at the disposal of the auditor, it is not practicable to obtain all types of evidence, though this would be most preferable. The auditor will therefore utilize his limited resources to gather the appropriate evidence that best serves his needs in the given situation. We will now discuss the potential different types of evidence that could be obtained by the auditor to support his conclusions and recommendations. Audit evidence usually falls into four types, they are physical, oral, documentary, and analytical evidence.

Physical evidence

The evidence can take the form of photographs, charts, maps, graphs or other pictorial representations. A photograph of an unsafe condition is far more compelling than a written description. When the observation of a physical condition is critical to achieving the audit objectives, it should be corroborated.

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This may be achieved by having two or more auditors to do the observation, if possible accompanied by representatives of the audited entity.

Oral evidence

Oral evidence takes the form of statements that are usually made in response to inquiries or interviews. These statements can provide important leads not always obtainable through other forms of audit work. They can be made by employees of the audited entity, beneficiaries and clients of the program being audited, experts and consultants contacted to provide corroborating evidence in relation to an audit, and by members of the general public. In assessing the reliability and relevance of oral evidence, the auditor needs to assess the credibility of the interviewee; that is, the position, knowledge, expertise and forthrightness of the person being interviewed.

Documentary evidence

Documentary evidence in physical or electronic form is the most common form of audit evidence. It may be external or internal to the audited entity. External documentary evidence may include letters or memoranda received by the audited entity, suppliers' invoices, lease contracts, external and internal audits and other reports, and third-party confirmations.

Internal documentary evidence originates within the audited entity. It includes items such as accounting records, copies of outgoing correspondence, job descriptions, plans, budgets, internal reports and memoranda, statistics summarizing performance, and internal policies and procedures.

Analytical evidence

Analytical evidence stems from analysis and verification of data. The analysis can involve computations, analysis of ratios, trends, and patterns in data obtained from the audited entity or other relevant sources.

Evidence Gathering Techniques

Evidence gathered during performance audit may be qualitative in nature and requires extensive use of professional judgement. Accordingly, the auditor would ordinarily seek corroborating evidence from different sources or of a different nature in making assessments and forming conclusions. The techniques mentioned below are not the only techniques used in gathering evidence. There are several other methods used by the auditors, but these are the most commonly used: document review, interviews, questionnaires, analysis of data, physical observation, confirmation, benchmarking, focus group discussion, and the use of expert opinion.

Document review

Documentary evidence in physical or electronic form is the most common form of audit evidence. It may be external or internal to the agency. External documentary evidence may include letters or memoranda received by the agency, suppliers' invoices, leases, contracts, external and internal audits and other reports, and third party confirmations. Internal documentary evidence originates within the audited organization. It includes items such as accounting records, copies of outgoing correspondence, job descriptions, plans, budgets, internal reports and memoranda, statistics summarizing performance and internal policies and procedures.

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The reliability and relevance of documentary evidence need to be assessed in relation to the objectives of the audit. For example, the existence of a procedures manual is not evidence that the manual is put into practice. As with oral evidence, the position, knowledge and expertise of the author or approver of the document may need to be assessed.

Documents that are the output of management control systems (e.g. the accounting system) will need to be assessed in the light of the internal controls that operate within that system. Auditors who intend to rely on such evidence should have information about the strength of the internal control system.

A listing of files should be obtained from the entity's registry systems. In addition, file information of relevance to a particular work area may be found in that area. Files which may prove useful for review include those on:

- Strategic and operational planning;
- Management control;
- The minutes of executive meeting;
- Complaints and disputes;
- Reviews and audits;
- Plantation location license;
- Activity's licenses (plantation, mining, etc.)
- Land clearing license;
- Land use certificate and its map (analog and digital);
- Inventory Survey Report from Ministry of Forestry (potential timber in the forest area before it converted into plantation/mining);
- Plantation company pre survey report; and
- Analog and digital map of the forest border.

Reviewing documents is time-intensive, and it is usually not possible to examine all documents. Judgment must be exercised whether to examine a random selection or a selection based on the purpose of the investigation. Usually the latter approach would be adopted but if time permits a random sample of other files should be examined.

Interviews

Individual interviews are used to some degree in all audits. In the planning stage, they can be used to obtain documents, opinions and ideas that help the auditor to understand the entity and to identify potential issues. In the examination phase, they can be used to obtain data or documents that relate to the audit objective; to confirm facts and corroborate data from other sources; or to explore potential recommendations. Interviews are often an essential part of other data collection or analysis techniques such as flowcharting, cost benefit analysis, and surveys. Individual interviews are particularly useful when there is a need to ask "open –ended " questions and obtain detailed explanations, impressions and opinions (that is qualitative information). They cannot provide quantitative evidence, and a number of individual interviews are not a substitute for a survey. Structured interviews are quite different from individual interviews because the data from them can be summed together or quantified.

While individual interviews are used frequently as an introductory data collection instrument, problems in confirming what is said can reduce their evidential value. A single interview by itself provides quite weak evidence. Usually it would have to be

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confirmed by other independent sources such as documents, observations, or other interviews.

The interview process is like a funnel, with a lot of data going in the top and a much smaller amount of information or evidence coming of the bottom. Some of what is lost is useful and sole not. Here are some points to remember if we want to get the most out of the interviews:

- Not everything said by the respondent is heard by the interviewer;
- Not everything heard by the interviewer is understood;
- Not everything understood by the interviewer will be remembered or written down;
- Not everything recorded will be confirmed by the respondent; and
- Not everything the respondent believed can be corroborated by the independent source.

In estimating the cost of the interview, a good rule of thumb to use is to double the actual interview time for the preparation and for recording the results. To estimate any less time would risk losing some of the information values from the interviews. The cost could, however be much more than this, especially when it takes a lot of effort to analyze the results.

Individual interviews are flexible in which it can be used to probe thoughts, perceptions, feelings, and they can be adapted to any situation. They sometimes produce spontaneous responds and unexpected information which can be both an advantage and a disadvantage. A compensating disadvantage is the greater danger of bias or leading questions asked on the spur of the moment. Although individual interviews usually involved less advance preparation than the structured interviews, on the whole they are labor intensive. But the response rate is high and obtained more quickly.

Interviews can be useful, but it is necessary to identify the right people to provide information, and to corroborate oral information. Solid preparation for the topic to be discussed is essential and a pre-prepared list of questions is useful; in some cases, it may be effective to supply this list to the interviewee beforehand. Some general guideline in conducting an interview are as follows:

- be prepared;
- have a clear purpose;
- give advance notice;
- summarize the key points of the interview;
- write back for confirmation (if significant); and
- oral evidence must be corroborated.

Questionnaires

Questionnaires comprise lists of questions designed to obtain information on a specific subject. When the cost of interviewing a large number of people would be prohibitive, questionnaires are a valuable means of gathering information. They are often used to assess quality of service or the scope for improvements in service delivery.

Normally the questionnaires can be sent to organizations for their completion or used by the audit team to get a series of responses, from the same questions, from different sources.

Before deciding to use questionnaires for data collection the impact on the audited body

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needs to be given due consideration. It is important to bear in mind that while this method can prove very effective for the auditor, if wrongly used it can provide too much of a burden in both time and resources for the audited entity.

If a questionnaire is chosen as the method of data collection the form and question design is all-important. Unlike normal interviews where the practices of avoiding leading questions and asking open questions are advocated, in the case of questionnaires the questions need to be more disciplined, allowing for limited factual responses in order that at the end of the day all responses can be analyzed in a common way. For this reason it is also essential that all audit staff involved in such procedures be briefed as to the intended way in which the results are to be used. Although examiners need to remain open minded, they should have a clear idea of how the responses are likely to fit into the final report.

Ideally the questionnaires to be used should be pre-tested to evaluate their effectiveness.

Questionnaires completed by interview have an advantage over questionnaires sent out to prospective respondents because the interviewer retains control over the answers and the time taken to respond. This can also ensure crucial responses are forthcoming. The interviewer can also gauge the reaction to the questions; can perceive what lies behind the answer; and thus can probe more deeply. Another advantage is that the interviewer can clarify any possible confusion on the spot although; if the questionnaire has been well designed the need for this should be minimal. The disadvantage is that this can consume significant audit resources as well as the resources of the audited.

Use of questionnaires to collect data can be very time consuming as it is necessary to identify the potential respondent, design the questionnaire, await response and follow up any non-respondents before analysis of data can start. It is therefore important that the number of questions is carefully thought out and a realistic timetable established so that the job can be completed within the time-scale provided. Where the population is large, statistical should be sought to eliminate unnecessary effort and to eliminate any problem in data analysis.

Before using any standardized method of data collection we must be certain about what we require from the results in order to contribute to the objectives of the investigation. Specifically, we should know:

- What are the factors/issues about which information is being sought?
- For what purpose are the answers required? (Each question must have a purpose).
- What type and form of answers are expected?
- From whom and at what level will the data be collected?
- What analysis will be performed on the data and how might the data is included in any report? It is essential that the answer to this question be known before the questionnaire is prepared, not after the data has been gathered, as this is obviously a significant consideration in designing the questionnaire. When analyses are not properly planned we run a greater risk that we will collect the wrong kind of/too much/too little data.

The form in which the information is to be stored should be agreed and a filing system on

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computer analysis program is devised to contain and analyze the data. We should consider whether to use telephone questionnaire, questionnaire/interview, structured interview plus documentation checklist, or questionnaire by post. Consideration should also be given to the need for regular feedback as interviews and questionnaires are completed to ensure that important issues emerging from the investigation are highlighted and notified to the audit team members.

There are 3 basic structures for questions: open, closed, or probes questions. In deciding which type to use, you will need to consider the following factors:

- How much do you know about the range of possible answers?
- How much time do the respondents have, or are they willing to give?
- How many responses will be required to get satisfactory reliability?

Open questions may start with how, why, where, when, and what and are used to collect quantities of new, unanalyzed information. They tend to be broader and allow a wider range of responses than closed questions. Examples:

- How many staff are responsible for a forestry planning function in the forest department?
- What is their function, for example, in managing the permanent forest estate?
- What is their function in mitigating the potential conflict of land use?

However, those questions should be restricted as far as possible in questionnaires because they provide qualitative responses and we therefore have less control over the completeness and accuracy of the answer. With such questions there is a greater tendency not to respond and it is much more difficult and time consuming to process and analyze the responses in a meaningful way.

Closed questions are useful at the end of a line of questioning in order to obtain specific facts. Example:

- Did the entity set a performance target for the activity, for example, to establish the border of forest area in certain km per year?
- Was the performance target set by considering, for example, SMART (Specific, Measurable, Achievable, Realistic, Timelines)?
- Did the forestry planning function communicate its plan to establish forest area to the local community?

Although such questions, requesting specific information, require more thought at the design stage there are pay-off at the analysis stage because they are easier for the respondent to answer and should therefore result in better response rates and they make responses more comparable.

A danger in designing closed questions is a failure to provide a sufficient range of response. Responses could range from “always” through “sometimes” to “never”. Another danger to guard against is that closed questions can drive the line of questioning and produce a result, which fails to reveal what is actually happening.

Probing or evaluative questions – these allow more specific information to be obtained and to check for depth of knowledge and experience. They are also used to fill in gaps in the interviewer’s knowledge about the area or topic and inform much of an auditor’s performance audit work. Example:

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- Was the target for establishing forest area border achieved?
- If not, what may have been the reasons?
- What action was taken to ensure that the target was achieved?
- What difference did the activity make towards preventing potential conflict in the use of land?

Probe questions can also be used to regain control where a series of open questions has resulted in the interview going off at a tangent.

In certain circumstances, where the questions have been designed to collect information on several issues, it may be appropriate to require the interviewer to reach a judgement on the issue and clarify that judgement with the respondent.

Adequate briefing of both interviewers and reviewers of responses is an essential element in the use of the questionnaire technique. Poor briefing will produce poor result. Before any work is done on finalizing questionnaires, making visits, or analyzing response, team members should be given the opportunity to provide input, clarify any questions and consider the purpose of the exercise. They may see inconsistencies or difficulties in the construction of the questionnaire or analysis. Briefing should be done as a group and an indication given of the time to be spent on the interview or completion of the questionnaire.

A great number of problems can be solved and consequently time is saved in using questionnaires if they are pre-tested. The pre-test should be aimed at testing the collection process and the questionnaire itself. Testing the collection procedures involves consideration of whether the prospective respondents possess the information desired, the number of responses required and the impact on the respondents. Was the question understood? Did it yield the information in a usable form? Is there a need for any additional questions? Is it possible to do with less?

Testing the questionnaire involves testing design including layout complexity and layout spacing, and also the applicability, viability and validity of the individual questions. The completion time should be considered since if it is too long this could be detrimental to the study.

Using the questionnaires under the same conditions as will be operated in the actual study should do ideally pre-testing. Where a mailed questionnaire is to be used this should be pre-tested by presenting it to sample of recipients.

Consultants can be used to establish whether the questions and the types of answers, which would be received, would allow the team to reach a judgement on the issues under investigation and allow the audit report to include statements about the 3E achieved in the area under investigation.

Depending upon the number of respondents it should be considered at an early stage whether computer analysis is the best option: the questionnaire would need to be designed to facilitate computer input. Layout of the questionnaire in “ISSUE” order aids analysis and report drafting. Ideally the person conducting the analysis should also have played a part in its design so that inconsistencies in responses can be put into a proper perspective in any analysis.

If analysis is undertaken during a series of structured interviews it might be appropriate to consider feeding lessons learned into

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subsequent interviews. Later analysis will need to take account of any change made.

The decision to use this technique should not be taken lightly. The impact on the resources of both the audit office and the audited body should be one of the prime considerations. Well designed questionnaires can do much to enhance the evidence collected to support the Audit Report; badly constructed questionnaires can result in a paucity of defensible evidence as well as souring the relationship with the audited body.

Analysis of data

Analytical evidence stems from analysis and verification of data. The analysis can involve computations, analysis of ratios, trends and patterns in data obtained from the agency or other relevant sources. Comparisons can also be drawn with prescribed standards or industry benchmarks. Analysis is usually numerical, for example ratios of output to resources, or proportion of the budget that is spent. It can also be non-numerical in nature; for example observing a consistent trend in the nature of complaints made about an organization.

Auditors should:

- examine the characteristics of data required;
- collect data relevant to achievement of the explicit audit objectives;
- collect data based on researchable questions and the audit criteria outlined in the audit design matrix;
- collect data which is sufficient and persuasive to logically support the analysis, observations, conclusions and recommendations.

Physical Observation

One of the best ways of following and understanding what is actually going on is by direct observation of activities. Techniques such as these help the auditor to obtain evidence about physical assets and can be helpful in gathering evidence about whether people are following the proper procedures. By observing carefully, auditors try to formulate their first-hand opinion about the activity or behavior under study. Inspection of processes while they are in operation will give the auditor sufficient understanding and credibility when discussing issues with the audited entity. It should be remembered, however, that a single observation could not be used to draw conclusions about matters that have occurred over a period of time.

Recording the results of field observation in photos or videos is an efficient way of capturing first hand evidence for later analysis. Finally, photos and observed examples may also have a powerful impact on the reader of the audit report. In both the planning and the examination phases of audits, observation is perhaps the most useful and most used, of all techniques.

In the overview or survey, observation of government work in progress helps the auditor understand what is actually happening. Firsthand knowledge makes it easier to workout important issues, and the choices will be more credible to management.

In the examination, direct observation is the best way to establish the existence or condition of physical assets; Was something actually purchased with public money? Is it still working? Is it doing what it is supposed to do?

Direct observation can also record the variety of situations and the details of activities that staff perform, as a way of determining whether the activities comply with the

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authorities and are efficient and effective. Observation can also help the auditor analyze what and how serious the consequences are if the criteria are not met, or perhaps that there are no serious consequences.

Observation usually involves several steps. The first thing is selecting, watching and recording objects, events or activities that play a significant part in the administration of government programs. The observed conditions can then be compared with criteria and the consequences analyzed.

There are many examples of how this technique has been used. Direct observation is essential to an understanding of the implementation of rehabilitation programs in the field. For example, when auditors indicates a potential finding of a failed rehabilitation program in a large area from satellite image, they should conduct a ground check to confirm its finding.

When to use observation/photos/videos

- To help gain an understanding of the audit entity, particularly when service to the public or inspection/enforcement are major activities.
- In the examination phase, to verify the existence of physical assets, tangible results of government programs.

Strength and weaknesses

Observation provides only anecdotal evidence unless it is combined with a planned program of data collection. A random walk provides no basis for generalization. Some first hand observation can be justified in almost every audit, but planning and carrying out field trips to collect representative. As with an interview, the observer of an activity must be trained first to know what to look for, and must approach it with an open mind.

Often the best observation of activities is made when the auditors fit unobtrusively into the environment. This may take time and effort for the auditor and others affected, such as program staff and clients. Beware of the effect your presence may have on the activity. On the other hand, there may be limits to the usefulness of the evidence obtained without the knowledge of those affected. Like using an audio tape recorder to tape an interview, it is essential to ask permission before recording an observation on video or film.

Field program staff relish the chance to explain their particular problems firsthand, especially if they have had some difficulty in explaining them to other visitors. In such situation, staff may be quite pleased to provide documentation or to be photographed in action.

Confirmation

An external confirmation represents audit evidence obtained by the auditor as a direct written response to the auditor from a third party (the confirming party), in paper form, or by electronic or other medium. External confirmation procedures frequently are relevant when addressing matters related to the audit objective. The confirmation request may be designed to ask if any modifications have been made to the agreement and, if so, what the relevant details are.

Responses to confirmation requests provide more relevant and reliable audit evidence when confirmation requests are sent to a confirming party the auditor believes is knowledgeable about the information to be confirmed. For example: base on forest map that given by ministry of forestry, the auditor conduct use GIS to select the sample area for ground check. After the auditor done the

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ground check, the result of ground check need to be confirmed to representative of ministry of forestry to assure that the area visited is on the forest area.

Benchmarking

Benchmarking is a process for measuring an organization's performance or process against similar organizations that consistently distinguish themselves in the same categories of performance. In the context of performance audits, benchmarking helps identify opportunities of achieving better economy, efficiency and effectiveness. Benchmarking can be done with other external organizations or with internal units of the same organization having different levels of performance. For example, processes and performances of a province/district in a project can be benchmarked against a high performing province/district to efficiently highlight problems and their causes.

Benchmarking can be used both during the planning and execution phase of performance audit. In the planning phase, benchmarking can be an important tool while setting the audit criteria. In the execution phase, comparing detailed processes of the auditee with its benchmarking partner will reveal the gaps and areas of mismatch. It would help the performance audit team in substantiating audit findings and conclusion.

The benchmarking process will involve the following stages:

- Deciding the aspects of performance or process that will be benchmarked;
- Deciding the type of comparison and benchmarking partners;
- Collecting data;
- Determining the performance gap;
- Framing conclusions and recommendations for betterment.

Benchmarking requires high degree of skill and the acceptability of findings of benchmarking with the audited entity is an area which needs attention.

Focus Group Discussion

A focus group usually comprises between 8-12 people that are judgmentally selected as representatives of a larger population, for example members of the public, senior officials of the audited entity, decision makers, experts, beneficiaries, etc. A facilitator is used to direct the group discussion and to focus attention on the specific aims of the session (which may involve developing practical recommendations). The evidence produced through focus groups is qualitative in nature and has the major advantage that it gives depth and understanding to a given topic. Focus groups are particularly useful in identifying issues, understanding the reason behind taking decisions, testing emerging findings to generate survey questions and to develop practical recommendations. A typical focus group session can last from 90 to 180 minutes.

Focus groups provide a means to obtain a broad understanding of the issues with which performance audit is concerned like attempts to assess the impact of the programs on people and understanding causes and effects of problems to achievement of economy, efficiency and effectiveness by obtaining the opinion, perception of individuals actually associated with the activity being examined.

Focus groups can be used both during the planning and execution stages of performance audit. Focus groups can be useful in determining the quality of service provided in a program. Focus group of beneficiaries of a

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program will give an insight into its effectiveness.

Evidence obtained from focus groups alone is rarely sufficient. It is used in combination/ collaboration with other evidence.

The advantages of focus groups are quickly and reliably obtain common impressions, can be efficient way to get range and depth of information in short time, and can convey key information about programs. But it can be hard to analyze responses, need a good facilitator for security and closure, difficult to schedule 6-8 people together.

Expert Opinion

ISA 620, *Using the Work of an Auditor's Expert* defines an auditor's expert as: 'An individual or organization possessing expertise in a field other than accounting or auditing, whose work in that field is used by the auditor to assist the auditor in obtaining sufficient appropriate audit evidence. An auditor's expert may be either an auditor's internal expert (who is a partner or staff, including temporary staff, of the auditor's firm or a network firm), or an auditor's external expert.'

If information to be used as audit evidence has been prepared using the work of a management's expert, the auditor shall, to the extent necessary, having regard to the significance of that expert's work for the auditor's purposes:

- Evaluate the competence, capabilities and objectivity of that expert;
- Obtain an understanding of the work of that expert; and
- Evaluate the appropriateness of that expert's work as audit evidence for the relevant assertion.

Evidence Analysis Techniques

After collecting data from different sources, by conducting interviews, review of accounts, management reports and other documents, site visits, etc, the task of the auditor is to analyze the gathered evidence.

The main objective of analysis is to reduce and convert a mass of information into findings and conclusions that are simple and comprehensible i.e. easy to understand, meaningful, and credible.

Evidence analysis consists of the methods of validation of evidence used by the auditor. There are various techniques of evidence analysis with their own objective. Analysis helps to develop findings relating to audit criteria and based on audit objective.

The INTOSAI Auditing Standards state "Auditors should have a sound understanding of techniques and procedures such as inspection, observation, enquiry and confirmation, to collect audit evidence. The SAI should ensure that the techniques employed are sufficient to reasonably detect all quantitatively material errors and irregularities."

Following is the more information about each technique that can be used by a performance auditor.

Program Logic Models (PLM)

The Program Logic Model (PLM) is an analytic tool best used in the audit overview and survey. PLMs are particularly useful in results-oriented auditing, as they focus attention on program outcomes in relation to mandate and objectives. They serve the auditor's need to achieve program understanding efficiently and to communicate that understanding to an audit advisory committee.

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Making comparisons using rates and ratios

There are three main "ratio expressions", each of which communicates essentially the same information: proportions [6:12], percentages [50%], and decimals [0.5]. Their purpose is to compare one quantity with another. Such comparisons include parts compared with a whole, two items compared, or changes in an item compared with an original state.

Ratios should be used to:

- Compare actual with expected values;
- Place a finding in context;
- Observe a change over time; and
- Note the degree to which a criterion is met.

Numerical comparisons are common in all phases of audit work. As both an analytical and a communication tool, ratios are a simple and powerful way to compare actual states with what is expected. The basic concept of ratios is universally understood, and they are used frequently in many contexts. However, their power should not be underestimated with familiarity. Often a sophisticated audit analysis can be summed up in a simple ratio.

When a ratio is cited, the following criteria generally should be satisfied:

- The ratio should make or support a point;
- The base (original number or amount) should be noted;
- The percentage increase or proportion should be calculated correctly;
- The "population at risk" should be properly identified;
- The size of the base should be adequate to support the comparison;
- The base should be anchored at zero;
- Relevant changes in the base over time should be taken into account;
- The units of the numerator and denominator should be the same; and
- It should be clear whether changes are annual, cumulative, or other.

Interpreting Data Distribution

A data distribution is generally expressed by a graph (bar-chart or curve) that shows all the values of a variable. The statistics that describe data distributions can be powerful tools for audit analysis and reporting.

There are three basic dimensions of a data distribution that may be important to an audit observation:

- The level of the data (mode, median, mean, quartile levels, etc.);
- The spread of the data (minimum and maximum values, etc); and
- The shape of the data (normal distribution, flat distribution, bi-modal distribution, etc.)

Auditor can examine data distributions:

- To identify the level, spread or shape of the data when this is more important than a single "average" number;
- To decide whether a variable performance meets an audit criterion or not;
- To interpret probability distributions to assess risk; and
- To assess whether sample data one representative of the population.

Regression Analysis

Regression analysis is a technique for assessing the degree to which variables are

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associated (correlated). It is a common and important analytical technique, underlying several types of analysis in finance, management and public policy. The auditor may encounter it by different names for essentially similar techniques

Regression analysis may be used to:

- Test a relationship that is supposed to hold true;
- Identify unusual values or "outliers" that do not fit the regular relationship between two things;
- Make predictions or projections for the future based on an observed relationship that has held in the past; and
- Build models of entity operations.

Benefit-Cost Analysis

The purpose of benefit-cost analysis is to determine whether the benefits of an entity, program or project exceed its costs. For auditors, this is a central value-for-money issue, which should guide the enquiry in both the survey and examination phases. There are two components to benefit-cost analysis: the benefit-cost analysis framework which was developed mainly in a financial context, and the measurement of some benefits and costs that are inputs into that framework, many of which have been developed in the non-financial social sciences.

Auditor can use the cost-benefit analysis to:

- Obtain assurance that an analysis done by the audit entity meets professional standards;
- Compare costs and benefits when both are know or can reasonably be estimated; and
- Compare costs of alternatives when benefits can be assumed constant.

Simulation and Modeling

Simulation uses a mathematical model, together with input data, to "mimic" a "real life" system and to predict the response of that system to changes. Occasionally, the auditor will construct a simulation model (when doing risk analysis, for example); but more often the auditor encounters simulations that the audit entity has conducted, and has to assess their validity and reliability in the examination phase.

Auditor might use the simulation and modeling to:

- assess the adequacy of models the audit entity uses to make important decisions; and
- answer “what if?” questions about the impact of audit issues, observations or recommendations.

Content Analysis of Qualitative Data

Content analysis is a systematic approach to collecting and organizing information in a standardized format. It allows analysts to arrive at general conclusions and general observations, based on detailed data in a variety of written and other recorded material. Content analysis can be very useful during the planning and re-examination phases to summarize provide audit evidence and even transform it into significant audit findings.

Content analysis is used during the planning phase to:

- Help identify the program objectives: To do this the auditor may gather information on the program’s legislative history; and

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- Described program activities: Content analysis can be used to provide an objective description of the program's activities by analyzing departmental documentation.

Therefore, it is suggested that auditors intending to use content analysis follow these steps:

- Deciding to use content analysis (when to stop the case-by-case review of new material and start to analyze it systematically);
- Determining what material should be included in content analysis. For example, to help identify program objectives it could include legislation, regulations)
- Selecting units of analysis;
- Developing coding categories;
- Coding the material; and
- Analyzing and interpreting the results.

Work Flow and Communications Flow Analysis

One way to analyze the activities of an organization is to chart where, when or how decisions are made or information or materials are sent from one unit or person to another. Complex procedures or heavy "traffic" can often be modeled or depicted graphically in a way that will help in the analysis of why the work is done the way it is. Flow charts are like models. They come in all shapes and sizes, depending on the purpose and the level of detail needed. Typically, the auditor takes information from interviews, personal observation or existing documentation and creates a chart using symbols to represent the various decision points or activities being analyzed.

Auditor can us the flow and communications flow analysis to gain an understanding of how an organization or system works, particularly when the subject of the audit involves many departments, units, or complicated steps.

Geographic Information System (GIS) in Forestry Audit

Geographical data is the data or information that identifies the geographic location of features and boundaries on earth, usually stored as coordinate and topology. The data can be mapped. Geographic position refers to the fact that each feature has a location that must be specified in a unique way. To specify the position in an absolute way a coordinate system is used.

Geographical data are organized in a geographic database. This database can be considered as a collection of spatially referenced data that acts as a model of reality. The technology that commonly used for processing the geographical or spatial information called geo-spatial technology. Geospatial technology includes three different technologies that are all related to mapping features on the surface of the earth. These three technology systems are geographical information system, global positioning system and remote sensing.

Geospatial technologies have become an integral part of almost every aspect of our life that can associate itself with a coordinate.

Geographic Information System (GIS)

A Geographic Information System (GIS) integrates hardware, software, and data to capture, manage, analyze, and display all forms of geographically referenced information. GIS can be defined as information systems used to input, store,

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retrieve, process, analyze, and produce data in geographical or geospatial form, to support decision making in planning and managing field utilization, natural resources, transportation, public utilities, and other public services.

GIS allows the users to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts. The users of GIS usually are those who need spatial information. Each user has their needs on how to utilize GIS. GIS is used commonly in forestry.

In forest auditing, GIS is an essential tool for auditors, because a forest can be vast and sometimes barely accessible. Conventional methods cannot be used by auditors when dealing with land on this scale and remoteness. GIS is very helpful in these situations. Using GIS we can gather a huge range of information that can be used when undertaking a forest audit. This information includes data about land coverage, the boundary of a Licensed Forest Company (hereinafter called concessionaires), and the physical forest boundary of a forest estate. This information enables auditors to determine, for instance, whether or not an industrial plantation forest company activity is complying with its license.

Global Positioning System (GPS)

The Global Positioning System (GPS) is an U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth which has an unobstructed view of four or more GPS satellites. GPS has become a widely used aid to navigation worldwide, and a useful tool for map-making, land surveying, commerce, scientific uses, tracking and surveillance, and hobbies such as geo-catching and way marking. A GPS receiver calculates its position by carefully timing the signals sent by the constellation of GPS satellites high above the Earth. Each satellite continually transmits messages containing the time the message was sent, a precise orbit for the satellite sending the message, and the general system health and rough orbits of all GPS satellites. These signals travel at the speed of light through outer space, and slightly slower through the atmosphere. The receiver uses the arrival time of each message to measure the distance to each satellite thereby establishing that the GPS receiver is approximately on the surfaces of spheres centered at each satellite. The GPS receiver also uses, when appropriate, the knowledge that the GPS receiver is on (if vehicle altitude is known) or near the surface of a sphere centered at the earth center. This information is then used to estimate the position of the GPS receiver as the intersection of sphere surfaces. The resulting coordinates are converted to a more convenient form for the user such as latitude and longitude, or location on a map, and then displayed. (www.gps.gov)

Remote Sensing (RS)

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The Use of Geo-Spatial Technology in Auditing Forest

The main phases in forestry audits are planning, execution, and reporting. Auditor usually employs GIS in planning stage of an audit whereas GPS is during the execution phase as a supporting tool. On audit planning

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stage, auditor can use GIS to help selecting samples to be audited, and to select the most relevant object to the audit objective among the various objects that are on the site. For example, with GIS layers and remote sensing images (such as Landsat and ALOS) auditor can identify whether concessionaries cutting down the trees inside allowed area (annual working plan) or outside. GIS can identify the precise location on where the auditor can do physical observation. During the execution phase, GPS can provide evidence on the results of planning from using GIS analysis, and it enables us to locate the precise point where there is a problem.

Operating GIS

Though GIS is very powerful in helping auditor with their work, there are several preconditions that have to be made available. When an organization plans to use technology, it has to prepare the availability of hardware, software, brainware. This condition is also applied when SAI decides to use GIS-GPS in their audit. SAI has to develop or procure hardware, software, data, people and method.

Hardware

Hardware needed is the computer system (including computer, GPS, scanners, digitizers, printers, and plotters) on which software operates. In the past, GIS has only been accessible to those with high end computer systems, but with the advent of affordable desktop GIS packages, GIS is becoming accessible to more and more users.

Software

GIS software includes the tools used to store, analyze, and display geographic information. All major GIS packages have a data structure with a spatial representation of the data and links to attributes that are stored in a database. Many desktop packages also provide an easy-to-use interface for data query and spatial manipulation tools such as panning and zooming.

Data

A fundamental component of a GIS is the data. Geographic data are available through private companies, universities, government agencies, and non-profit organizations. Data can often be obtained free over the Internet or for a fee through commercial providers. It is important to note the source of all data sets and keep in mind issues such as scale, resolution, map projection, and date. These elements should be recorded in a metadata record, which documents different aspects of a data set, including source, projection, and contact information.

People

GIS technology is of limited value without the people who understand GIS concepts and how to apply the technology to real world problems. GIS is a tool that allows users to make maps for visualization purposes. The greatest benefits are realized through GIS analytical capabilities. Organizations with successful GIS groups have well trained personnel with a variety of applied backgrounds.

Methods

Methods of geographic information to real world problem solving are the crux of any GIS. Whether the method is simple data tracking and storage or complex multidimensional analysis, a GIS should be designed with the potential methods in mind. This technology can be an important tool for forestry auditors. Methods could include forest fire, deforestation, illegal use of land and also illegal logging.

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Example of the use of GIS

This section provides an example of the use of the GIS for forest audit. The example is for analyse haversting activity.

How to utilize geo-spatial technology in forestry audits depends on the research question we ask. The following examples show how GIS and GPS can be used to answer a range of research questions.

Haversting

GIS can facilitate the auditor to collect relevant information regarding haversting, such as detection whether concessionaire cutting down the trees inside permitted area (annual harvesting area) or outside. Auditor uses this information generated by the GIS to narrow down its sample selection.

Research question: Has the concessionaire harvested timber within permitted areas?

Minimum data required:

- Concessionaire spatial data.
- Block map of company's Annual Harvesting Areas (in JPEG format, however, it would be better in .shp file).
- Time series land coverage image.

Data processing:

- Intersect time series data of land coverage to obtain information about the difference in condition of specific areas for the beginning of the year and for the end of the year.
- Then, this spatial data is filtered according to data attributes. Since we are interested in deforestation data, we would seek to identify land coverage data in the form of primary forest in the beginning of the year, and compare that with the amount underbrush present at the end of the year. This would be a measure of the deforestation that has occurred.
- We then intersect this data with spatial data from concessionaires; this will help us to find out in which concessionaires' deforestation has occurred.
- We then calculate the area of deforestation for each concessionaire. After deciding which concessionaires have the largest deforestation area, we identify the fell outside block annual harvesting areas.
- If the block map of company annual harvesting areas is in JPEG format, this file needs to be processed first (this is called geo-referencing). (This process provides coordinate data for every pixel in the JPEG file)
- The output of geo-referencing is a JPEG file with coordinates. This new data could be overlaid with deforestation spatial data.
- Overlay deforestation spatial data with geo-referenced JPEG annual harvesting data.
- Determine whether the deforestation area is inside or outside the annual cutting block. Select area with deforestation outside the annual cutting block

The following are examples of the output:

Figure 1

Deforestation Outside Annual Working Plan

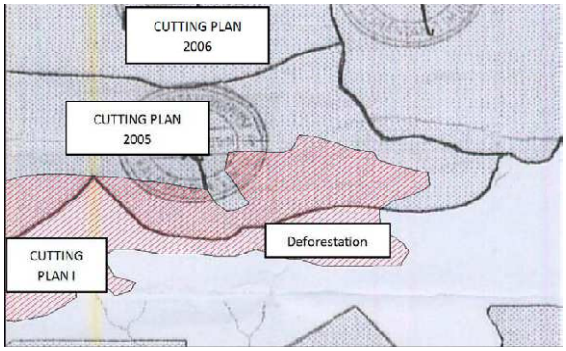

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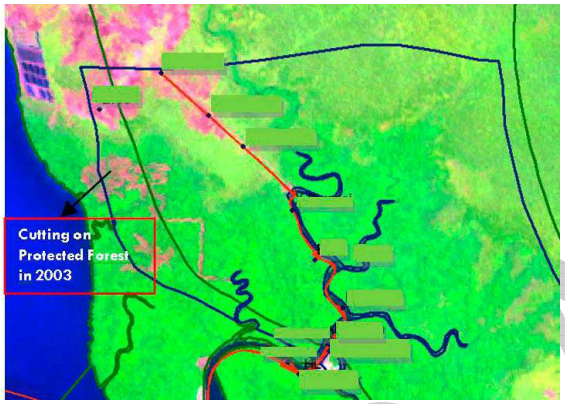
Figure 2

Deforestation Outside Annual Working Plan



Ground check:

- To validate our analysis, we use GPS.
- Enter the deforestation area coordinates we would like to visit into the GPS.
- Use GPS to navigate us to the area of deforestation
- Once we arrive at the area, prepare the observation report.

Summary

Audit observations, conclusions and recommendations must be able to withstand critical examination. They must, therefore, be supported by sufficient appropriate evidence. In addition, audit evidence is often persuasive rather than conclusive. The risk significance, and sensitivity of the matter to be reported, will determine the nature and amount of evidence to be collected. In controversial areas, the persuasiveness of evidence should be high. The reliability of the source and types of evidence influence the degree of its persuasiveness and, therefore, the amount of evidence that will be needed. When based on sufficient, relevant and competent evidence auditors can advance opinions with the confidence that they are valid and will withstand critical examination.

Techniques used in analyzing evidence during performance audit course is done in order to create a stronger product in the end. Even though time is usually short at the end of the survey phase of audits, there are some clear advantages in refining the purpose of the project and considering a broad range of possible techniques to achieve it before beginning the examination.

GIS and GPS are powerful tools that can ease auditor's work in selecting, selecting and analyzing audit evidence. Though it is very useful, it required some preconditions. SAI has to make investment related to hardware, software, brain ware, data and method.

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3. INTOSAI, *ISSAI 3000E:-Standards and guidelines for performance auditing based on INTOSAI's Auditing Standards and practical experience*.
4. www.gps.gov

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