Analytical procedures consist of the analysis of significant ratios and trends including the resulting investigation of fluctuations and relationships that are inconsistent with other relevant information or deviate from predicted amounts.
Analytical Procedures

A basic premise of using analytical procedures is that there exist plausible relationships among data and these relationships can reasonably be expected to continue.
General Analytical Procedures

*Trend analysis* is the analysis of changes in an account balance over time.

*Ratio analysis* is the comparison of relationships between financial statement accounts, the comparison of an account with non-financial data, or the comparison of relationships between firms in an industry.
General Analytical Procedures

Reasonableness testing is the analysis of account balances or changes in account balances within an accounting period in terms of their “reasonableness” in light of expected relationships between accounts.

Statistical analysis is the analysis of data using statistical methods.
Data mining is a set of computer-assisted techniques that use sophisticated statistical analysis, including artificial intelligence techniques, to examine large volumes of data with the objective of indicating hidden or unexpected information or patterns. For these tests auditors generally use computer aided audit software (CAATs).
Required Analytical Procedures

Analytical procedures are performed at least twice in an audit - in **planning** and in **completion** procedures.
CAAT

- CAAT - Computer-assisted audit techniques—Applications of auditing procedures using the computer as an audit tool.

- CAATs can be used to select sample transactions from key electronic files, to sort transactions with specific characteristics, or to test an entire population.

- CAATs generally include data manipulation, calculation, data selection, data analysis, identification of unusual transactions, regression analysis, and statistical analysis.
Performing analytical procedures may be thought of as a four-phase process:

1. Phase One – formulate expectations (expectations),
2. Phase Two – compare the expected value to the recorded amount (identification),
3. Phase Three – investigate possible explanations for a difference between expected and recorded values (investigation),
4. Phase Four – evaluate the impact of the differences between expectation and recorded amounts on the audit and the financial statements (evaluation).
Formulating Expectations

Expectations are developed by identifying plausible relationships that are reasonably expected to exist based on the auditor’s understanding of the client and of his industry. These relationships may be determined by comparisons with the following sources:

- comparable information for prior periods,
- anticipated results (such as budgets and forecasts, or auditor expectations),
- similar industry information, and
- non-financial information
The effectiveness of an analytical procedure is a function of the **nature of the account** and the reliability and other **characteristics of the data**.

- **nature of the account**
  - balance based on estimates or accumulations of transactions
  - the number of transactions represented by the balance
  - the control environment.

- **characteristic of the account**
  - number of transactions
  - fixed vs. variable
  - level of detail (aggregation)
  - reliability of the data
Trend Analysis

✱ It works best when the account or relationship is fairly predictable

✱ The number of years used in the trend analysis is a function of the stability of operations.

✱ The most precise trend analysis would be on disaggregated data (for example, by segment, product, or location, and monthly or quarterly rather than on an annual basis).

– At an aggregate level it is relatively imprecise because a material misstatement is often small relative to the aggregate account balance.
Ratio Analysis

- It’s most appropriate when the relationship between accounts is fairly predictable and stable.
- It’s more effective than trend analysis because comparisons between the balance sheet and income statement can often reveal unusual fluctuations that an analysis of the individual accounts would not.
- Like trend analysis, ratio analysis at an aggregate level is relatively imprecise.
There are five types of ratio analysis analytical procedures:

- Ratios that compare client and industry data;
- Ratios that compare client data with similar prior period data;
- Ratios that compare client data with client-determined expected results;
- Ratios that compare client data with auditor-determined expected results; and
- Ratios that compare client data with expected results using non-financial data.
Ratios

- **Liquidity:**
  - Current Ratio
  - Quick Ratio

- **Solvency:**
  - Debt to Equity
  - Times Interest Earned
  - Debt to Service Coverage

- **Profitability:**
  - Net profit margin
  - Gross Margin
  - Asset Turnover
  - Return on investment

- **Activity:**
  - Receivable Turnover
  - Inventory Turnover
Reasonableness Testing

• analysis of account balances or changes in account balances in light of expected relationships between accounts.

• involves the development of an expectation based on financial data, non-financial data, or both.
Comparison of the five methods

- **number of independent predictive variables considered**
  - Trend analysis: single, financial predictor
  - Ratio analysis: two or more financial or non-financial
  - Reasonableness tests, statistical analysis, data mining: many variables

- **use of external data** (reasonableness tests)

- **statistical precision** (most precise with statistics and data mining analysis)
Going Concern Problem Indications

- **Financial Indications**
  - Net liability, borrowings near maturity, adverse ratios, losses, late payments, change to cash on delivery

- **Operating Indications**
  - Management turnover, loss of market or license or supplier, shortages and labor problems

- **Other indications**
  - Non-compliance with statutory requirements, legal proceedings, changes in legislation
Analytical Procedures Are Used

- to assist the auditor in **planning** the nature, timing and extent of audit procedures
- as **substantive procedures**;
- as an **overall review** of the financial statements in the final stage of the audit
Substantive Analytical Procedures

Advantages and Disadvantages

• **Advantages:**
  – understanding of the client’s business obtained during planning procedures.
  – enable auditors to focus on a few key factors that affect the account balance.
  – more efficient in performing understatement tests.

• **Disadvantages:**
  – time consuming to design and require greater organization
  – less effective when applied to the entity as a whole
  – will not necessarily deliver the desired results every year.
  – in periods of instability and rapid change, difficult to develop a sufficiently precise expectation
  – Require corroboration
CAATs generally include tools for

- data manipulation,
- calculation,
- data selection,
- data analysis,
- identification of exceptions and unusual transactions (e.g., Benford’s law),
- regression analysis,
- statistical analysis.
Generalized audit software (GAS) is a computer software package (e.g., ACL, Idea) that performs automated routines on electronic data files based on auditor expectations.

GAS functions generally include reformatting, file manipulation, calculation, data selection, data analysis, file processing, statistics and reporting on the data.

It may also include statistical sampling for detailed tests, and generating confirmation letters.
File Interrogation Procedures Using GAS

- Convert client data into common format
- Analyse data
- Compare data on separate files
- Confirm the accuracy of calculations and make computations
- Sample statistically
- Test for gaps or duplicates in a sequence.
Structured GAS Approach to Analytical Procedures – 4 Phases

• **Before** analysis may begin
  – Format the data so that it might be read with the software.

• **Phase One** in performing analytical procedures - expectations
  – Determine appropriate base data and an appropriate level of disaggregation.
  – Use regression analysis techniques to develop from the base data a plausible relationship between the amounts to be tested and one or more independent sets of data.
  – Based on this relationship, use GAS software to calculate the expectations based on the current-period values of the predicting variables.
Structured GAS Approach

• **Phase Two** in performing analytical procedures - identification
  – Use GAS’s statistical techniques to assist in identifying significant differences for investigation based on the regression model, audit judgments as to monetary precision (MP), required audit assurance (R factor), and the direction of the test.

• **Phase Three** in performing analytical procedures - investigation
  – Investigate and corroborate explanations for significant differences between the expectations and the recorded amounts

• **Phase Four** in performing analytical procedures - evaluation
  – Evaluate findings and determine the level of assurance, if any, to be drawn from the analytical procedures.
Data Mining Analytical Procedures

• GAS has been criticized because it cannot complete any data analysis by itself. Data mining, on the other hand, analyzes data automatically.

• Data mining methods include data description, dependency analysis, classification and prediction, cluster analysis, outlier analysis and evolution analysis.

• The most frequently used algorithms are decision trees, apriori algorithms, and neural networks.
The objective of **data description** is to provide an overall description of data, either in itself or in each class or concept.

- main approaches in obtaining data description – data characterization and data discrimination.

The purpose of **dependency analysis** is to search for the most significant relationship across large number of variables or attributes.

**Classification** is the process of finding models, also known as classifiers, or functions that map records into one of several discrete prescribed classes.
cluster analysis, outlier analysis and evolution analysis

• The objective of cluster analysis is to separate data with similar characteristics from the dissimilar ones.

• Outliers are data items that are distinctly dissimilar to others and can be viewed as noises or errors.

• Objective of evolution analysis is to determine the most significant changes in data sets over time.
Data mining most frequently uses three algorithms.

A decision tree is a predictive model that classifies data with a hierarchical structure.

The apriori algorithm attempts to discover frequent item sets using rules to find associations between the presence or absence of items.

A neural network is a computer model based on the architecture of the brain.
Thank You for Your Attention

Any Questions?