



B.Com Honours

Semester IV

Calicut University

BUSINESS STATISTICS

Course Code: COM4CJ205 • Module 1 Notes

Module I: Introduction to Business Statistics & Analytical Methods

Business statistics provides quantitative analytical tools for collecting, summarizing, interpreting, and modeling corporate data to guide managerial decision-making under operational uncertainty.

Unit 1: Business Statistics – Concept, Definition, & Core Functions

- 1. Definition:** Science of collecting, organizing, presenting, analyzing, and interpreting numerical business data (Croxtan & Cowden).
- 2. Core Functions:** Simplifies complex data sets, facilitates comparative analysis, enables quantitative forecasting, evaluates operational performance, and establishes empirical corporate policies.
- 3. Limitations of Statistics:** Deals only with aggregates (not individual items), applicable solely to quantitative data, statistical laws are true only on average, and statistics can be prone to misuse if bad sampling methods are used.

Unit 2: Statistical Methods – Descriptive vs. Inferential Techniques

- 1. Descriptive Statistics:** Methods used to summarize and describe sample data features.
- Univariate Analysis:* Examining single variables individually (Mean, Median, Standard Deviation, Skewness).
- Bivariate & Multivariate Analysis:* Studying structural relationships among 2 or more variables simultaneously (Correlation, Regression, Multiple Discriminant Analysis).
- 2. Inferential Statistics:** Drawing general inferences regarding unknown population parameters based on sample statistics.
- Estimation:* Point Estimates ($\hat{\mu}$ approx μ) and Confidence Interval Estimates ((95%) Interval ($\hat{\mu} \pm Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$)).
- Hypothesis Testing Procedure:* Formulate Null (H_0) and Alternative (H_1) Hypotheses → Select Significance Level ($\alpha = 0.05$) → Compute Test Statistic (t, Z, F, χ^2) → Compare Test Statistic with Critical Value → Reject or Fail to Reject (H_0).

Practical Case Framework (Statistical Analytical Methods Classification Matrix): Map business analytical methods across descriptive and inferential horizons.

Business Statistical Analytical Methods Matrix:

Methodology Branch	Analytical Technique	Core Statistical Measure	Business Application Scenario
Descriptive (Univariate)	Central Tendency & Dispersion	Mean ($\bar{X}$), Standard Deviation (σ), Coefficient of Variation (CV)	Evaluating monthly retail store sales performance & consistency
Descriptive (Bivariate)	Correlation & Regression	Pearson (r), Regression Slope Coefficient (b_{yx})	Measuring relationship between Advertising Spend & Revenue
Inferential (Estimation)	Confidence Intervals	95% Margin of Error ($E = Z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$)	Estimating mean customer transaction value range
Inferential (Hypothesis Testing)	Parametric / Non-Parametric Tests	(p)-value, (t)-statistic, (χ^2)-statistic	Testing if new product packaging significantly boosts sales

Practical Problem 1 (Univariate Summary Measures Solved Computation): A retail store records daily sales (in thousands Rs.) over 5 days: 10, 12, 16, 18, 24 ($\sum X = 80$). Calculate (a) Sample Mean ($\bar{X}$), (b) Sample Variance (s^2), (c) Standard Deviation (s), and (d) Coefficient of Variation ($CV = \frac{s}{\bar{X}} \times 100$).

Step-by-Step Solved Summary Calculations:

- **1. Sample Mean ($\bar{X}$):** ($\bar{X} = 80 / 5 = \text{16.0 Thousand Rs.}$)
- **2. Deviations & Squared Sum:**
 $((10-16)^2 = 36), ((12-16)^2 = 16), ((16-16)^2 = 0), ((18-16)^2 = 4), ((24-16)^2 = 64).$
 $(\sum (X - \bar{X})^2 = 36 + 16 + 0 + 4 + 64 = 120).$
- **3. Sample Variance (s^2) & Standard Deviation (s):**
 $(s^2 = 120 / (5 - 1) = 120 / 4 = \text{30.0});$ Standard Deviation ($s = \sqrt{30.0} = \text{5.477 Thousand Rs.}$)
- **4. Coefficient of Variation (CV):**
 $(CV = \frac{5.477}{16.0} \times 100 = \text{34.23\%})$

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