

**Pabna University Of Science And Technology  
Information And Communication Engineering**

# **Presentation On**

**Topic : Mean and variance of estimated Ideas of Efficiency**

**Submitted By:**

**Md.Abu-Bakkar Siddik Zilhaj**

**Roll:220617**

**Session:2021-2022**

**Submitted To:**

**Dr.Md.Sarwar Hosain**

**Associate Professor**

**Dept. of Information and  
Communication Engineering**



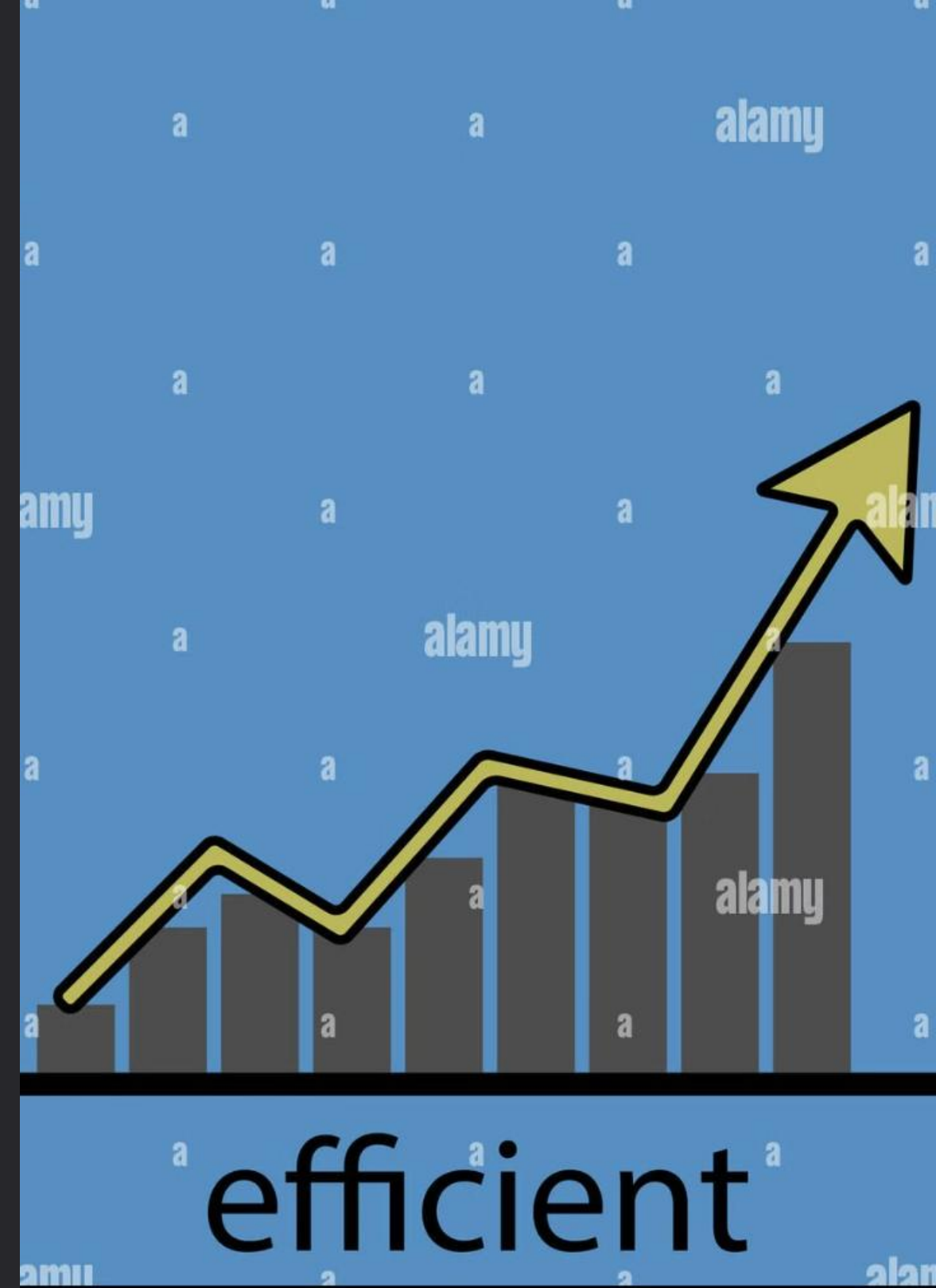


# Mean and Variance of Estimated Ideas of Efficiency

This presentation will explore the theoretical foundations, measurement approaches, and practical applications of understanding the mean and variance of efficiency estimates. By the end, you will have a comprehensive understanding of this crucial topic in performance analysis.

# Introduction to Efficiency Measurement

Efficiency is a core metric for evaluating the performance of organizations, processes, and systems. Measuring efficiency requires analyzing inputs, outputs, and the relationships between them. This introduction lays the groundwork for understanding the statistical properties of efficiency estimates.



# Theoretical Foundations: Mean and Variance Concepts

## Mean

The mean represents the average or central tendency of a set of efficiency estimates. It provides an overall measure of the typical or expected level of efficiency.

## Variance

The variance quantifies the dispersion or spread of efficiency estimates around the mean. It indicates the degree of consistency or variability in the efficiency values.

# Estimating Efficiency: Parametric and Non-Parametric Approaches

## Parametric Methods

Parametric approaches, such as Stochastic Frontier Analysis, model efficiency as a function of inputs and outputs using statistical regression techniques.

## Non-Parametric Methods

Non-parametric methods, like Data Envelopment Analysis, use mathematical programming to construct a production frontier and measure efficiency relative to this frontier.



# Factors Affecting Mean and Variance of Efficiency Estimates



## Data Quality

Accuracy, completeness, and reliability of data greatly impact efficiency estimates. High-quality data improves reliability, while poor data introduces bias and increases variance.



## Environmental Factors

External variables like market conditions and regulations can affect efficiency levels, creating heterogeneity and influencing operating conditions, leading to higher variance.



## Methodological Choices

Efficiency measurement techniques, model specifications, and assumptions influence estimates. Different methods yield different results, impacting both mean and variance. Parametric methods rely on distributions, while non-parametric methods are sensitive to outliers.

# Interpreting Mean and Variance of Efficiency Estimates

## Mean Efficiency

The mean efficiency provides an overall indication of the typical or average level of performance. It can be used to benchmark against industry standards or past performance.

## Variance of Efficiency

The variance of efficiency estimates reveals the consistency or heterogeneity of performance within the sample. A higher variance suggests greater variability in efficiency levels.



# Practical Applications: Decision-Making with Efficiency Measures

## Resource Allocation

Efficiency measures can inform the optimal distribution of resources, such as budget, personnel, or capital, to maximize overall performance.

## Process Improvement

Understanding the mean and variance of efficiency can identify areas for targeted improvement efforts, leading to more consistent and higher-performing operations.

## Benchmarking and Goal Setting

Efficiency metrics can be used to set performance targets, track progress, and benchmark against industry peers or best-in-class practices.



# Sensitivity Analysis and Robustness of Efficiency Estimates

## 1 Assess Variability

Conduct sensitivity analyses to understand how changes in inputs, assumptions, or methodological choices affect the mean and variance of efficiency estimates.

## 2 Ensure Robustness

Employ various efficiency measurement techniques and compare the results to validate the consistency and reliability of the efficiency estimates.

## 3 Communicate Uncertainty

Clearly communicate the statistical properties of efficiency estimates, including the level of confidence and potential sources of uncertainty.

### Sensitivity analysis

NPV, \$ million

		Variable one				
		-20%	-10%	Base case	+10%	+20%
Variable two	-20%	60	70	80	90	100
	-10%	70	80	90	100	110
	Base case	80	90	100	110	120
	+10%	90	100	110	120	130
	+20%	100	110	120	130	140

# Case Studies: Efficiency Analysis in Different Industries



## Manufacturing

Analyze the mean and variance of efficiency estimates to identify opportunities for process optimization and cost reduction.



## Healthcare

Utilize efficiency measures to assess the performance of healthcare providers and allocate resources more effectively.



## Financial Services

Apply efficiency analysis to benchmark the performance of financial institutions and inform strategic decision-making.



## Agriculture

Explore the mean and variance of efficiency in agricultural production to enhance productivity and sustainability.

### How to organize a case study

1



Show first.

Start in the middle of things with the desk-pounding moment — the moment of pain that made the client pound on the desk and say, "We need to fix this problem now."

2



Tell second.

Summarize the problem/challenge/opportunity in a sentence or two in the nut paragraph.

3



Describe the client.

Save the blah blah blah for the background section, aka the third paragraph.

4



Outline problem, solution, results.

Be specific: Name names, number numbers in the body.

5



Transition to the end.

Now that the problem is solved, move toward the bright future in the wrap up.

6



End with a bang.

Finish with a look ahead to the happy, post-problem future — most likely in a quote — in the kicker.

# Conclusion and Future Directions in Efficiency Research

