

# Performance Indicators: Accountability and Incentives

**Sanford Berg**  
Director of Water Studies, PURC

[www.purc.ufl.edu](http://www.purc.ufl.edu)



Public Utility Research Center  
UNIVERSITY *of* FLORIDA

# Symbolic and Substantive Importance

Water and Wastewater have come to symbolize the huge gap between promise and performance.

Domestically, huge “investment gaps” have been identified in various reports.

The political economy of infrastructure is such that those who make tough decisions will not receive credit during their terms in office.

# CEPAL Study: Best Practice (Berg, 2013)

- Regulation less effective (ineffective?) without supporting institutions
- Governance Structure (rules of the game)
- Substantive Actions (play of the game)
- Regulatory System—many stakeholders (is the regulatory agency an “umpire” or “player”?)
- System requires coherence, creativity, communication, consultation, & credibility

<http://www.eclac.org/publicaciones/xml/1/49891/Bestpracticesinregulating.pdf>

# Scope of “Solutions”

## “Inside game” approaches

- “Independent” Boards of Directors
- Improving management/commercial practices
- Benchmarking Operating Divisions (Internal Performance Comparisons)
- Introducing strong economic incentives

## “Outside game” approaches

- Improving governance system (accountability & role clarity)
- Reviews of Business Plans & Benchmarking
- Prioritization of & Coherence among Objectives

# Inside Game

## Commercial Practices

Managerial focus on...

- Financial performance

- Staff incentives

- Strategic business plan

- Coherence of objectives

- Best practices in technical efficiency

...within bounds of regulatory rules

## Adaptive Organization

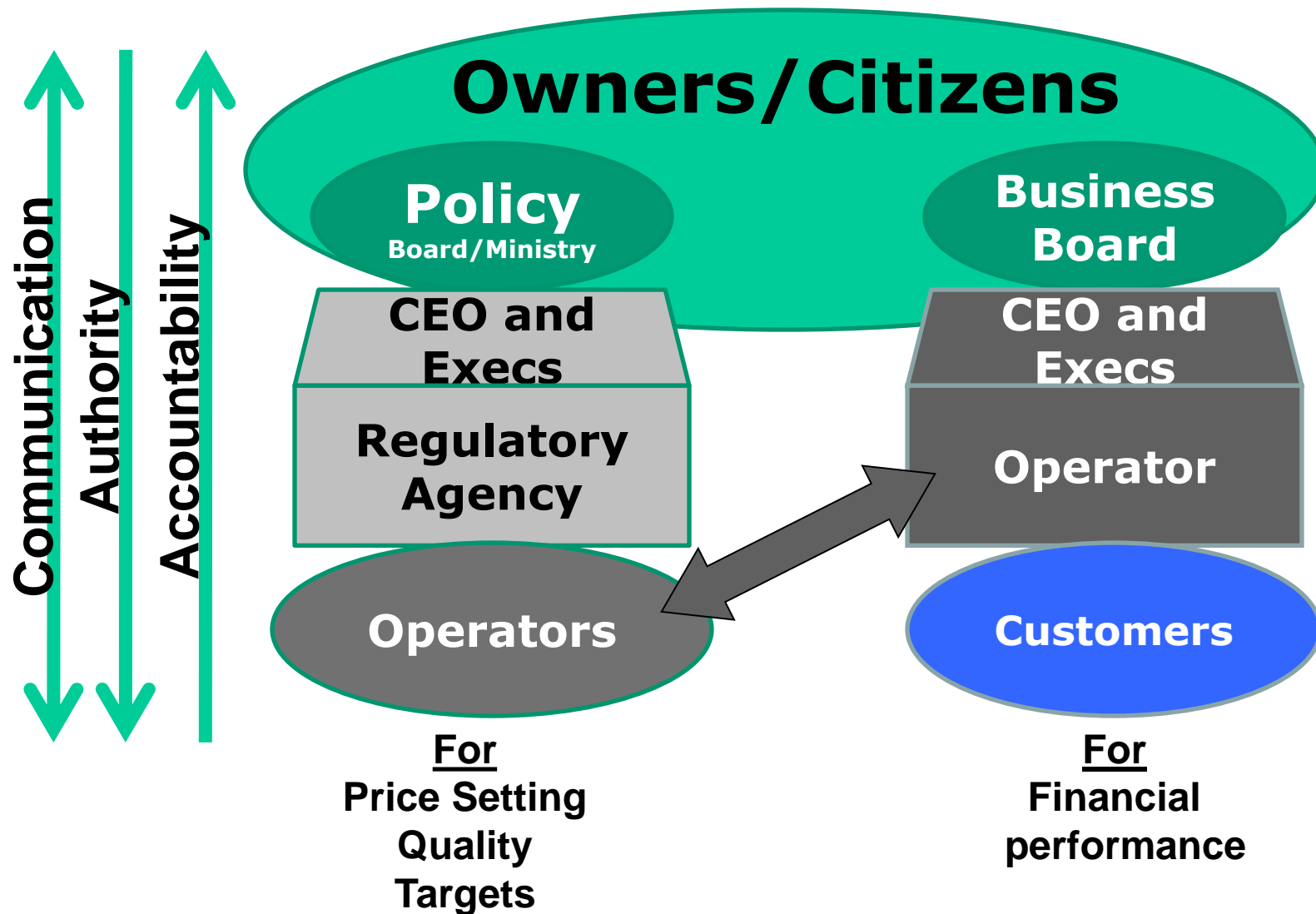
**Challenging Culture** (open debates, distributed authority, **SMART goals** (**S**pecific, **M**easureable, **A**ttainable, **R**elevant, **T**ime-bound

## Regulatory Practices

- Managerial audits
  - Overcome information asymmetries
  - Monitor Business Plans
    - Consistency
    - Feasibility
- Benchmarking
  - Quantitative and qualitative
  - Transparency
  - Ongoing dialogue with multiple viewpoints and outside views

# Outside Game (Mark Jamison)

## Clarifying Roles with SOEs



# Outside Game

## Board Roles...

**Reflect on outcomes**

**Refine vision and strategic plans**

LR goals while staying in the game

Holding regulator or operator accountable

... outside the political arena

Political Patronage? Constraints “not put in writing”? Union work rules? Professional orientation of managers

■ **Decision-makers manage what they measure.**



# Importance of Making Comparisons

Performance comparisons are necessary but not sufficient for sound policy

Benchmarking represents an important tool for

- Documenting past performance,
- Establishing baselines for gauging improvements,
- Making comparisons across service providers and over time,
- Designing staff incentives, and
- Providing Civil Society with Facts,

# Uses of Benchmarking

- “Benchmarking is a tool for performance improvement through systematic search and adaptation of leading practices.” (Enrique Cabrera, Jr. et. al. 2011, p. 2)
- “Without proper arrangements to make sure that the service provider delivers efficient services, the ultimate loser is the consumer and those entrusted with oversight responsibility carry most of the blame.” (Silver Mugisha, 2011, p. 13)

# Defining / Evaluating Sector Performance

- ❖ Defining Sector Performance: what matters?
- ❖ Quantifying Sector Performance: what metrics?
- ❖ Sources of Conflict: the role of quantitative evidence in resolving (and creating) conflict

# Data are necessary to address the following questions:

- ❖ What are the key inputs affecting output and cost?
- ❖ How do input prices translate into costs?
- ❖ What are the basic outputs?
- ❖ What are the best measures of water quality?
- ❖ How are inputs related to outputs?
- ❖ Can specific ratios be used to rank utilities?

“There are three kinds of lies: lies, damned lies, and statistics.” (Mark Twain)

## Focus on Performance Metrics

- **measure** water utility **operations** (costs, physical inputs and outputs)
- **to perform company comparisons**
- in the **context of infrastructure reform.**

Key Performance Indicators, and ultimately, Performance Scores and Rankings based on quantitative production and cost studies.

S. Berg, *Water Utility Benchmarking: Measurement, Methodologies, & Performance Incentives*  
(International Water Association, 2010)

# Types of Benchmarking

- In practice, both metric and process benchmarking are required, as metric benchmarking identifies areas of poor performance where improvements need to be made, and process benchmarking is a management tool for achieving the necessary change.” (Michael Rouse, 2007, p. 104)
- The IWA Specialist Group on Benchmarking strongly recommends abandoning the use of the terms “metric benchmarking” and “process benchmarking”. Instead “performance assessment” and “performance improvement” should be considered consecutive components of benchmarking. (Cabrera, et. al. p. 5)

# Elements of Metric Benchmarking

- Collect Data and Establish baselines (past performance) as a starting point.
- Prepare quantitative comparisons using cross-sectional and time-series analysis.
- Identify Relative Performance (ensure that firms face comparable conditions).
- Devise incentives so cost-savings are ultimately passed on to customers.
- Promote managerial strategies to achieve best practice.

# Data Collection: Global and National

- Water/sewerage system operations,
- Network capacity,
- Financial flows, Inputs, and Outputs.

Consistent data are essential for good management and for public policy oversight.

Data facilitating cross-country comparisons: *Water & Sanitation International Benchmarking Network* (IBNET, funded by the UK Department for International Development and the World Bank).



# Can an Index Capture Complexity?

A single index of utility performance will be neither comprehensive nor fully diagnostic.

- Physician can have information on a patient's temperature, pulse, height and weight.
- Patient is in trouble: dangerous fever and/or is significantly overweight.
- Blood tests provide more detailed information
- Diagnosing and treating mental health issues would require other diagnostics and treatments . . . Still, temperature and weight provide useful information.

# Five Benchmarking Methodologies

- Core Indicators and a Summary or Overall Performance Indicator (partial metric method),
- Performance Scores based on Production or Cost Estimates (“total” methods),
- Performance Relative to a Model Company (engineering approach),
- Process Benchmarking (involving detailed analysis of operating characteristics), and
- Customer Survey Benchmarking (identifying customer perceptions).

# Overall Performance Indicators

- *Specific Core Indices*, such as water delivered per worker, quality of service (continuity, water quality, complaints), unaccounted for water, coverage, and key financial data (operating expenses relative to total revenues, collections).
  - partial measures provide the simplest way to perform comparisons: trends direct attention to potential problem areas, with data generally available from company annual reports.
- *Overall Performance Indicator (OPI)* combines the specific core indices into a summary index
  - OPI used by SUNASS (the Peruvian water regulator) is the sum of nine specific indices.

# Performance Scores Based on Production or Cost Estimates

Rankings can be based on the analysis of production patterns and/or cost structures.

Production function studies (requiring data on inputs and outputs) show how inputs affect utility outputs (such as volume of water delivered, number of customers, and service quality). Utilities that produce far less output than other utilities (who are using the same input levels) are deemed to be relatively inefficient.

Cost functions show how outputs, inputs and input prices affect costs; such models have heavy data requirements. Excessively high costs would trigger more in-depth studies to determine the source of poor performance.

# Engineering/Model Company

- Requires the development of an optimized economic and engineering model
- Idealized benchmark specific to each utility—incorporating the topology, customer demand patterns, and density of the service territory.
- “Artificial” firm has optimized its network design and minimized its operating costs
- Production relationships can be obscured through a set of assumed coefficients used in the optimization process.
- Chile and Argentina used this approach to establish infrastructure performance targets.
- US telecom interconnection pricing and battles of “models”

# Process Benchmarking

- Focuses on individual production processes
- Detailed examination of facilities and their operations
  - Identifies stages of the **production process** needing attention: pumping up, intake, transport, clarification and filtration, purification and treatment.
  - Studies of **distribution processes** (network design, pipeline construction and maintenance), **sales processes** (meter reading, data processing, billing, collections, and customer relations), and **general processes** (planning, staff recruitment and retention, and public relations).
- Provides a mechanism for identifying potential benchmarking partners, undertaking benchmarking visits, and implementing best practices

Mats Larsson, et al (2002). *Process Benchmarking in the Water Industry: Towards a Worldwide Approach*, IWA

# Customer Survey Benchmarking

- Customer Complaints: one indicator
- SERVQUAL identifies five dimensions of service quality as perceived by customers:
  - **External characteristics** (tidy workplace, employee appearances),
  - **Reliability** (meeting deadlines, consistency in interactions),
  - **Responsiveness** (providing service promptly),
  - **Consideration** (personnel who are courteous, friendly, and helpful),
  - **Empathy** (giving individual care and attention).

Parasuraman et. al. (1985) *Journal of Marketing*

R. Parena (1999). *The IWSA Benchmarking Initiatives:*

# Identify Objectives, Select Methodology and Gather Data

- Decide issues to be addressed, time period to be analyzed, and types of comparisons
- Choices will reflect capabilities, initial understanding of data availability, and preliminary methodological choices.
- The objectives of any benchmarking study will depend on most important policy issues under consideration.
- Staff requirements can be substantial

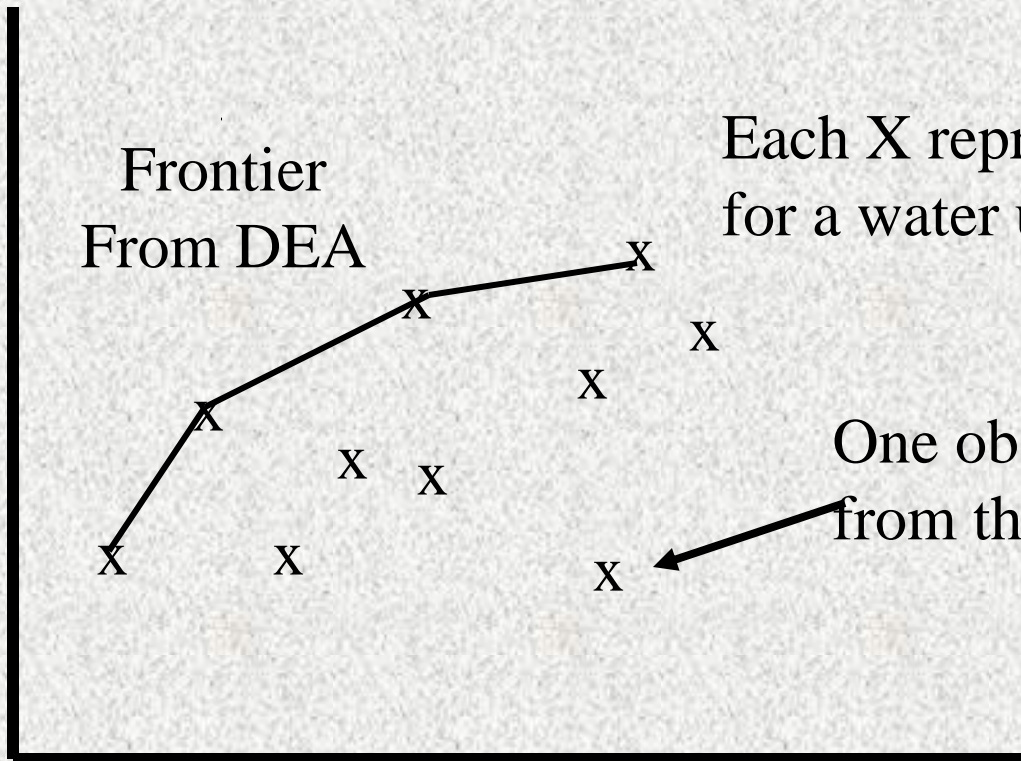


# Screen and Analyze Data

- Screen data
  - timeframe,
  - sample size, and
  - statistical techniques.
- Check data quality
  - inconsistent definitions,
  - missing data or
  - extreme data values
- Analysis is an iterative process  
(understand the strengths & limitations of alternative methodologies)

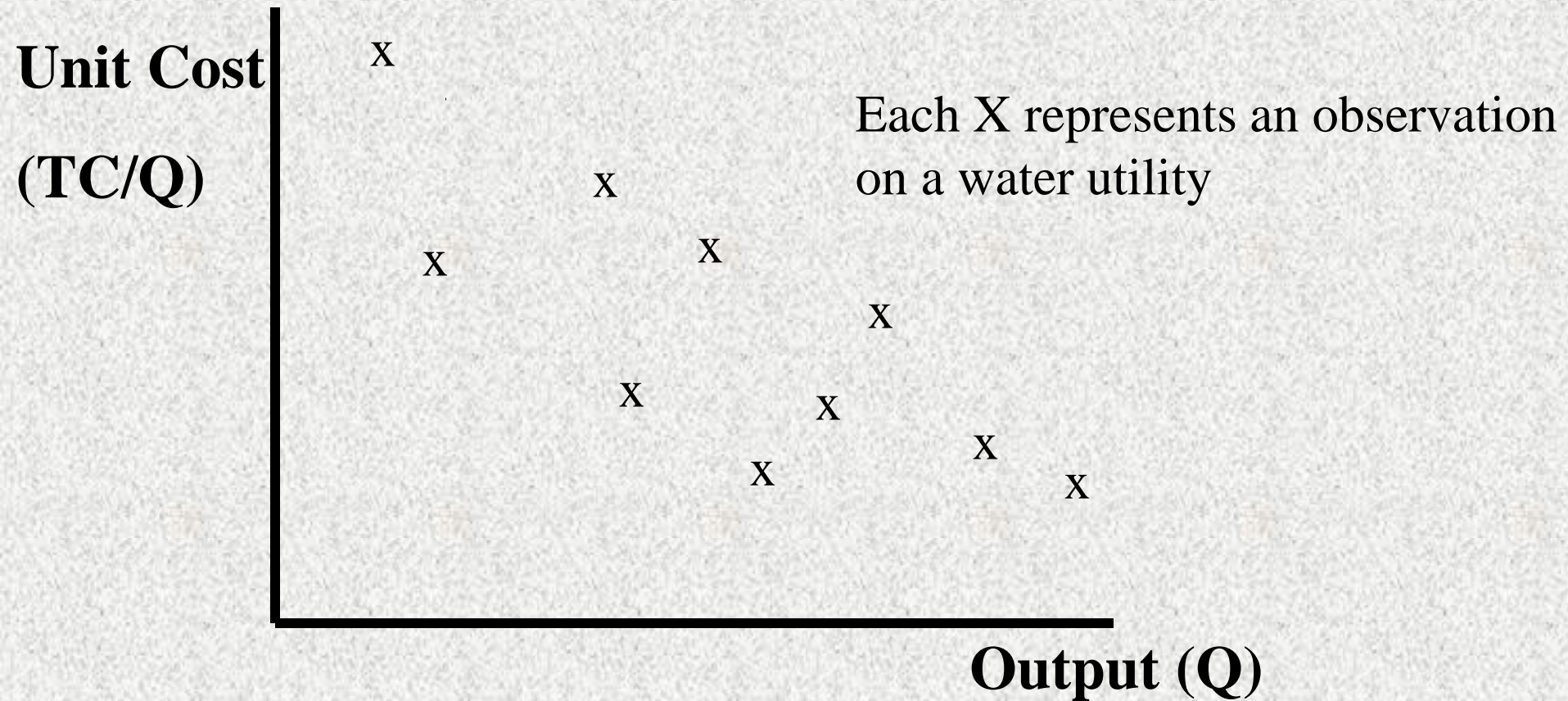
# Production Observations

Output  
(Q)

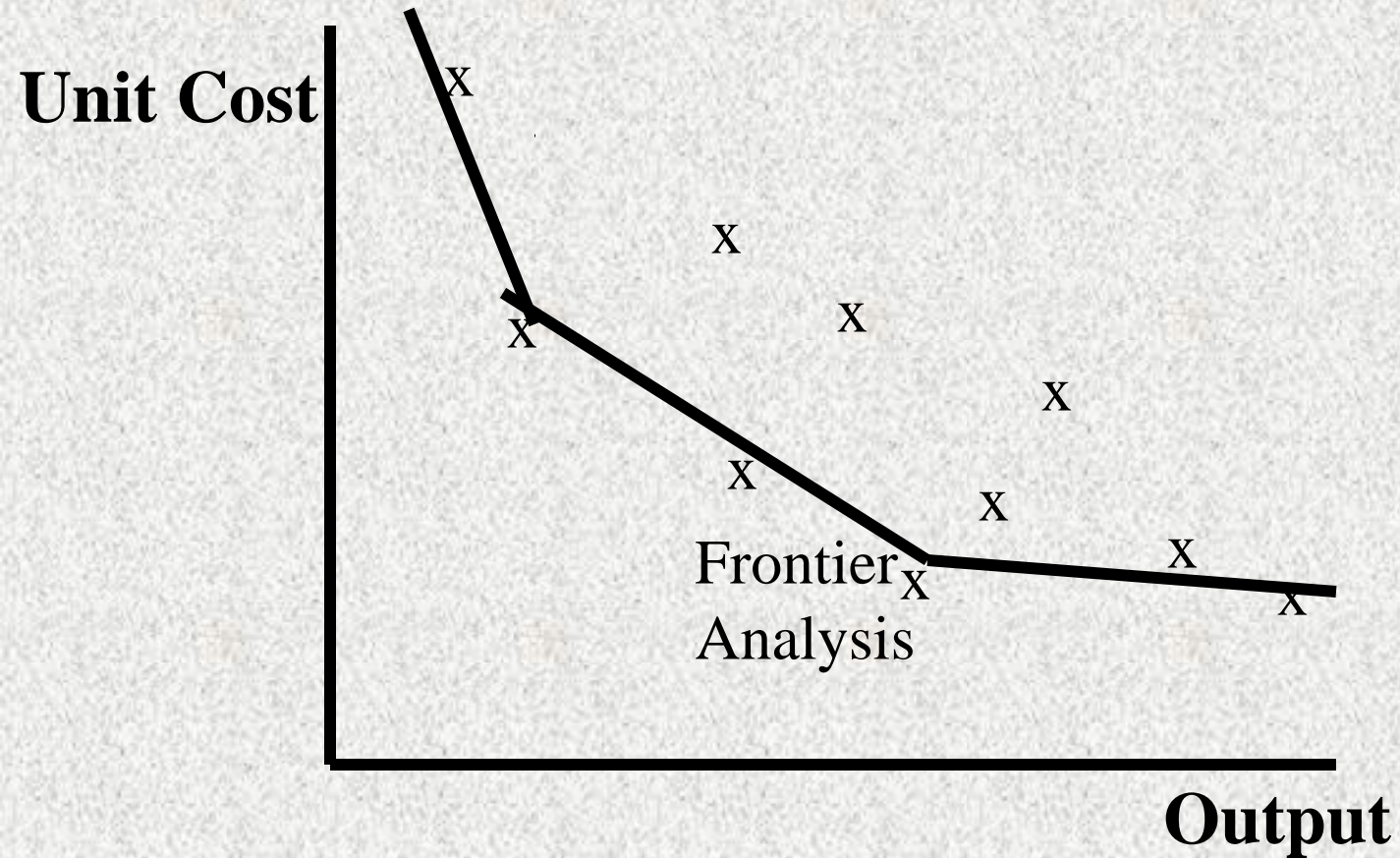


Input

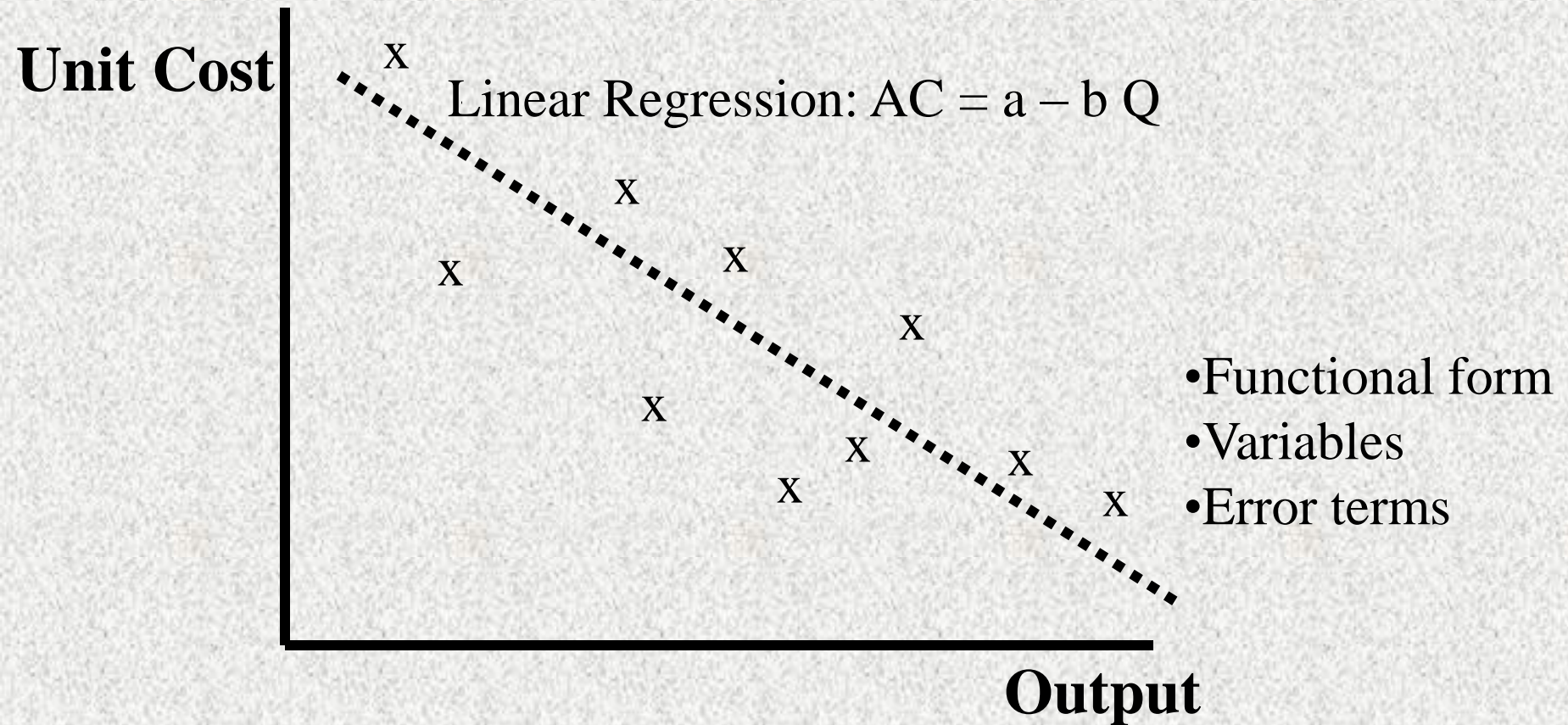
# Unit Cost Observations



# Frontier Analysis



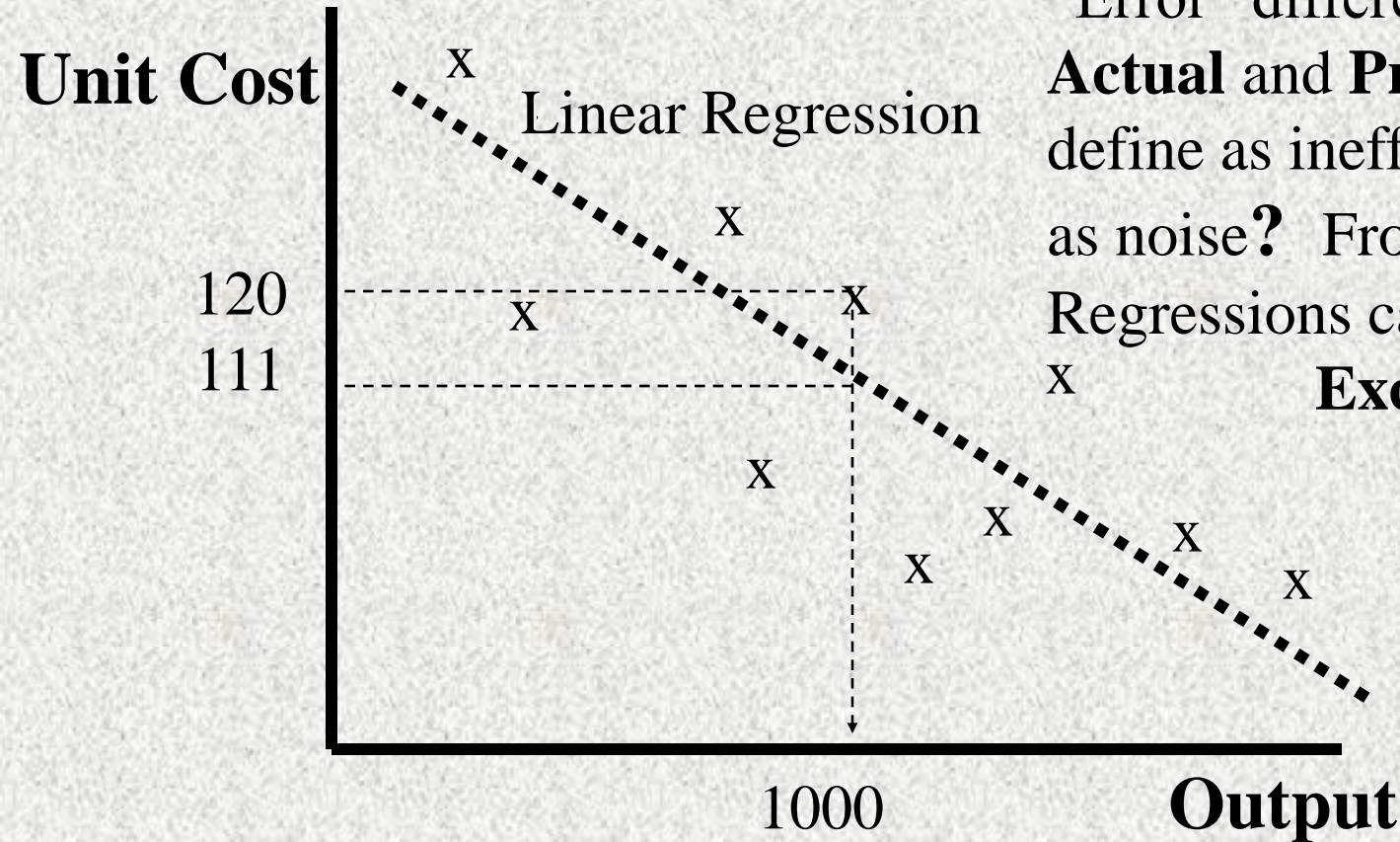
# Statistical Analysis



# Relative Inefficiency (OLS?)

“Error” difference between **Actual** and **Predicted** Cost: define as inefficiency or as noise? Frontier Regressions can address.

**Excluded Variables?**



# OFWat Trade-offs: Performance Benchmarking (X Factors)

Change in Price Cap:  $CPI - X + K + Q$

<b>OPEX Analysis</b>	<b>A</b>			<b>Lower than Expected</b>		<b>AA: clearly outstanding</b>  <b>CPI: Consumer Price Index</b> <b>X: Productivity Adj.</b> <b>K: Capacity Adjustment</b> <b>Q: Environmental Adj.</b>	
	<b>B</b>						
	<b>C</b>		<b>As Expected</b>				
	<b>D</b>	<b>Higher than Expected</b>					
	<b>E</b>	<b>Expected</b>					
		<b>E</b>	<b>D</b>	<b>C</b>	<b>B</b>	<b>A</b>	
		<b>Capital Expenditure Analysis</b>					
	<b>A: excellent</b>						
	<b>E: very weak</b>						

# Example: NVE Benchmarking

Cross-Sectional Comparisons(200utilities)  
Changes over Time

- Physical Quantities (kWh delivered, wires, share low voltage, # customers)
- Cost Structure (endogenous/exogenous, cost components' shares)
- Cost per physical unit

League Tables--public information/caps

Jan Moen: **Norwegian Hydro Resources and Energy Admin.**



# Creating Appropriate Yardsticks

Regulators want to induce outcomes comparable to those achieved under competition.

Pass-Fail Standards?

Reward outstanding performance

Penalize weak performance

*Benchmarking provides Yardsticks*

## Some Basic Data

Operating expenditures (OPEX)

Number of full time staff "equivalent"

Quantity billed; also, Number of customers

Non-Revenue Water (Technical + Non-technical losses)

Hours of service per day and Water Pressure

Coverage ratio (% of population)

Reliability of service (interruptions per customer)

Bulk Quantity Purchased (or Abstracted) & Treated

Also, Population density, Topology, System Age

# Improving Health: “Do No Harm”

Benchmarking specialists produce and critique studies that utilize various methodologies.

Rankings can be manipulated by choice of variables, model specification, sample size, time frame, and treatment of outliers.

Results can be misinterpreted and misused.

The stakes are high, since affected parties have an interest in the relative and absolute performance comparisons prepared by analysts.

# Benchmarking is Part of the Regulatory Tool-kit

The application of the techniques summarized here can improve service quality, expand networks, and optimize operations.

Any benchmarking study will have limitations, but sound studies can be used to place the burden of proof on other parties who might argue that the analysis is incomplete or incorrect.

Over time, data availability will improve and studies will be strengthened as professionals gain experience with these quantitative techniques.

# **Exercise: Non-Revenue Water (Using Benchmarking)**

**Design an Internal incentive plan for the team dealing with NRW.**

**Current NRW is 35%**

**Three years ago, NRW was 31%**

**Neighboring countries are currently at 25%**

**The best comparable utility has NRW of 20%**

- 1. What is the appropriate Target?**
- 2. How many years to reach the Target?**
- 3. What is your proposed internal reward for managers—design a formula.**
- 4. Is there anything an External Regulator can do to promote reduction of NRW?**

# Presenting Results

- ❖ Who is the audience?
- ❖ How colorful and complex?
- ❖ What kinds of Groupings/Categories
  - Grades
  - Scores
  - Rankings
- ❖ Include Trend Information?  
(arrows indicate direction)

# Where do you Draw the Line?

**Example:** scores for 20 utilities

- ❖ Top 4 and Bottom 4?
- ❖ Give Grades? (A, A-, B+, etc.)
- ❖ Absolute numbers or Look for gaps?
- ❖ Take Trends into account?
- ❖ Are the situations truly comparable?

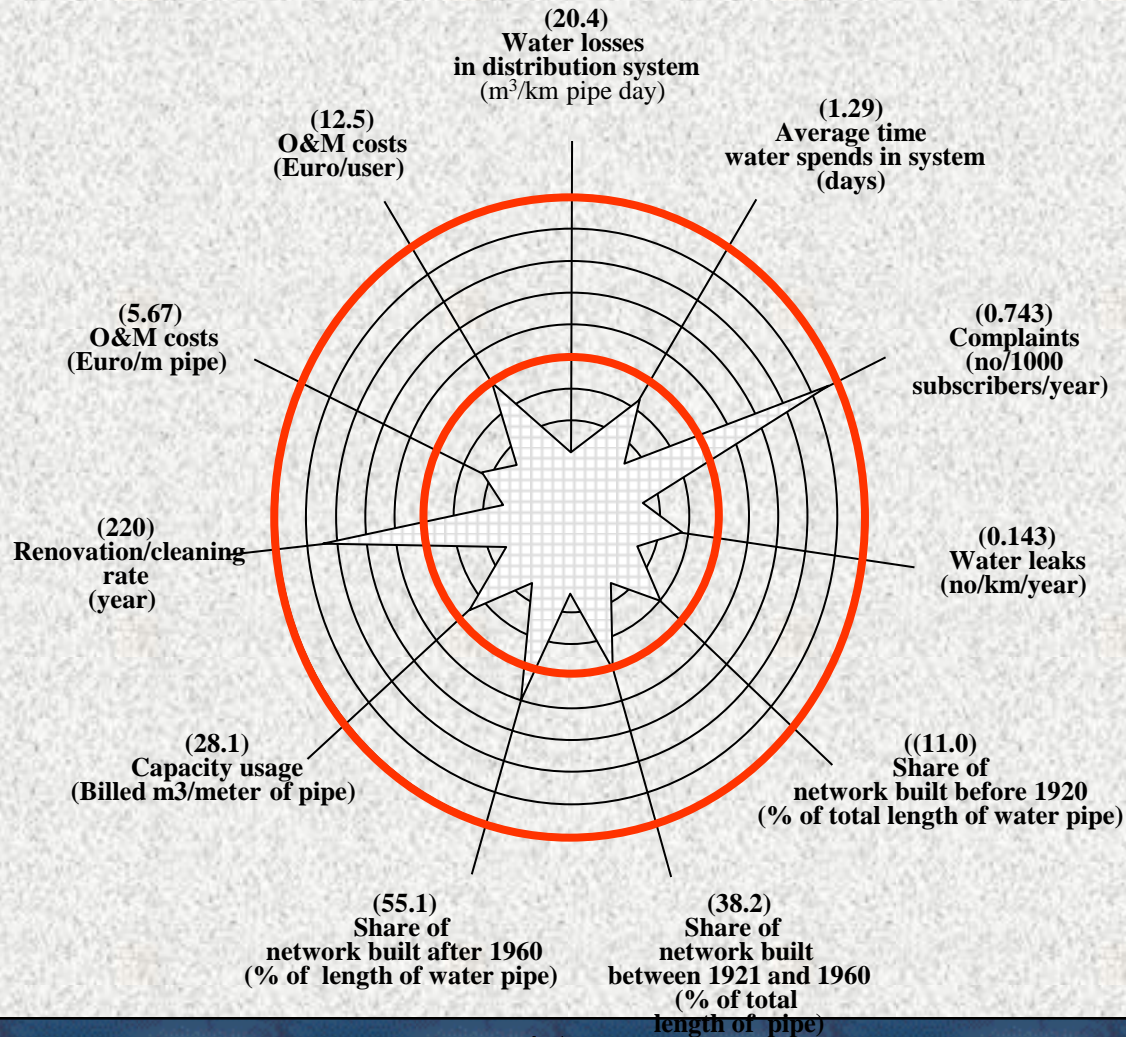
# Rankings vs. Scores

<b>Firm \</b>	<b>A</b>	<b>B</b>	<b>C</b>
<b>U1</b>	98	85	55
<b>U2</b>	96	83	77
<b>U3</b>	94	82	82

- ❖ If equal weights to the three performance dimensions (A, B, C, which utility is BEST?
- ❖ Use rankings? Scores? Relative Scores?
- ❖ How do you decide the weights?



# Finger-print of Malmo water distribution network in relation to the average in the 6-cities group



Firm Number	OPEX Per Unit	% of Water Accounted For	Quality Test Pass Rate (chlorine)	Q/OPEX	Q/Labor	Overall Rank	Quartile Rank
1	2.419	50%	52%	0.413	3.100	15	15
2	2.44	52%	84%	0.410	3.048	10	15
3	2.73	54%	55%	0.367	2.538	20	20
4	2.05	78%	58%	0.487	3.174	6	5
5	2.47	67%	60%	0.405	2.957	16	19
6	2.424	65%	65%	0.413	3.000	13	13
7	2.72	70%	63%	0.368	2.667	18	15
8	2.416	72%	65%	0.414	2.969	9	10
9	2.59	58%	66%	0.385	2.467	19	14
10	2.34	64%	62%	0.427	3.037	11	7
11	2.04	80%	76%	0.489	3.538	3	2
12	2.32	68%	76%	0.431	3.034	8	6
13	2.50	70%	73%	0.400	2.800	14	7
14	2.64	56%	78%	0.379	3.555	12	11
15	2.29	65%	76%	0.437	3.045	7	11
16	2.275	70%	75%	0.440	3.050	5	7
17	1.96	85%	80%	0.510	3.367	2	3
18	2.272	70%	78%	0.440	3.029	4	4
19	2.59	60%	69%	0.386	2.700	17	18
20	1.97	90%	81%	0.508	3.474	1	1

Color Keys

1st Quartile (Best)
2nd Quartile
3rd Quartile
4th Quartile (Worst)

Top 3
Bottom 3

## Summing Up

Rankings can serve as catalysts for better stewardship of water and other resources.

If regulators cannot identify historical trends, determine today's baseline performance, and quantify relative performance across utilities, then as an Indian regulator said, they may as well be writing "pretty poetry".

[www.purc.ufl.edu](http://www.purc.ufl.edu)

# Elements for Successful Reform

1. Build ownership within the Utility regarding the water reform through a participatory process
2. Build support among stakeholders and consumers
3. Appreciate the knowledge, attitude, and perceptions of consumers around delivery, private sector participation, and the role of government
4. Provide input into reform projects so that consumer needs and interests are represented and taken into account
5. Increase utility responsiveness when facing opposition to the reform

# Reform, continued

6. Minimize political risk to avoid delays when anticipating reactions
7. Help strengthen credibility of process by keeping all stakeholders informed
8. Improve client capacity coordination when communication is also used as a facilitation tool
9. Improve internal communication within an organization by keeping people informed about the process of the reform

from **World Bank Institute, eLearning Water Utility Reform**

# Key Lessons

## ❖ **Technical Lessons**

- What new skills or concepts have you become familiar with?

## ❖ **Organizational Lessons**

- Is your organization ready to commit to data collection and analysis?

## ❖ **Strategic Lessons**

- How will you utilize and communicate the results of studies?

# Quotes

- It is difficult to remove by logic an idea not placed there by logic in the first place.
- The most secure prisons are those we construct for ourselves.
- “Believing is Seeing.”
- “Don’t believe all you believe.”)
- “If you haven’t got all the things you want, be grateful for all the things you don’t have that you don’t want.”