Cost-Quality Efficiencies: An Illustration of Data Envelopment Analysis for Mental Health Delivery

Presented to
The 19th Annual Research Conference–A System of Care for Children's Mental Health: Expanding the Research Base
Tampa Marriott Waterside, Tampa, Florida
February 23, 2006

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Our Mission

- *Happy Children*
- *Healthy Families*
- *Helpful Communities*

The Challenge

DEA

Cost Indicators

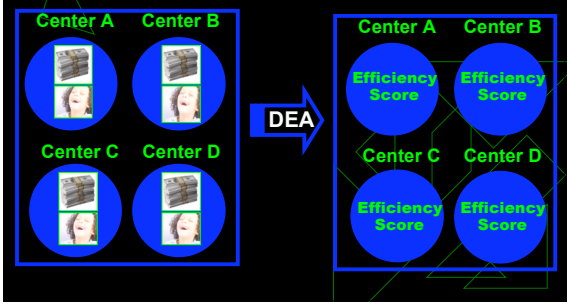
Quality Indicators

The DEA: An Efficiency Measure

Provides the relative efficiency of comparable business units as they convert

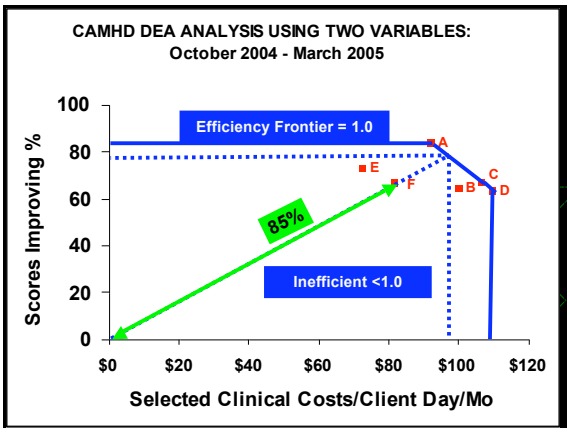
To

The DEA Quantifies Inputs : Outputs



The DEA Process

- A linear programming technique
- Compares the EXTREMES of inputs and outputs



DEA in Healthcare Administration Literature

Examples of Management Questions That the DEA has Helped Answer

DEA in Healthcare Administration Literature

Dental Services

What are the relative cost efficiencies of the Public Dental Services?
(Widstrom, Linna, & Niskanen, 2004)

DEA in Healthcare Administration Literature

Hemodialysis Units

What are the relative efficiencies of the public verses private sector hemodialysis units?
(Kontodimopoulos & Niakas, 2005)

DEA in Healthcare Administration Literature

Hospital Operating Room

What is the growth potential for hospital operating room services?
(O'Neill & Dexter, 2005)

DEA in Healthcare Administration Literature

Physician Practice Administration

What are the best practices of an efficient group practice office?
(Andes et al., 2002).

DEA in Healthcare Administration Literature

Long-Term Care

Is there an association between quality of care and technical efficiency in the long-term care units?
(Laine et al., 2005)

DEA in Healthcare Administration Literature

Hospital-to-Hospital Comparisons

What are the opportunities for realignment of resources within the Veterans Health Administration Hospitals?
(Harrison & Ogniewski, 2005)

What would happen if hospital budgets were based on expected efficiencies?
(Biorn, Hagen, Iversen, & Magnussen, 2003).

DEA in Healthcare Administration Literature

Mental Health Services

What are the cost inefficiencies in the residential care services for the mentally disabled?
(Blank & Valdmanis, 2005)

DEA in Healthcare Administration Literature

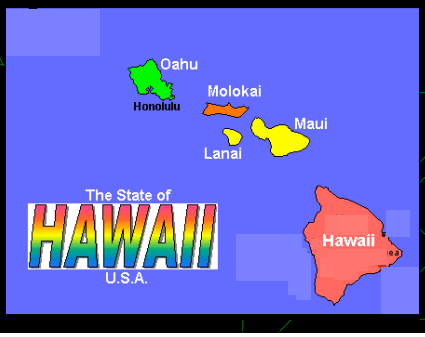
Health System Evaluation

Which federal hospital system is more efficient? The Department of Defense hospitals or the Veterans' Affairs hospitals?
(Bannick & Ozcan, 1995)

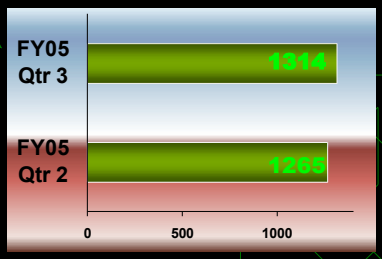
SELECTED DEMOGRAPHICS of CAMHD DEA:

OCTOBER 2004 through MARCH 2005

Location of Population



Number of Youth in the Study



CAMHD Selected Demographics

- Average age: About 14 (Range 3 – 20)
- Gender:
  - About one third female
  - About two thirds male
- Approximate race distribution
  - 64% multiracial
  - 17% White
  - 6-8% Asian
  - 10% Native Hawaiian/Pacific Islander
  - 1% Black
  - 1% Other

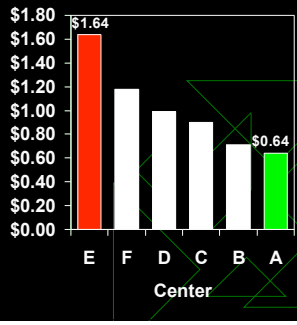
CAMHD Selected Demographics: Disorders

- 71 – 73% Comorbid
- 44 – 45% Disruptive Behavior
- 44 – 45% Attentional
- 36% Mood
- 19% Anxiety
- 15 – 16% Substance-related
- 12% Adjustment
- 2% Mental Retardation
- 2% Pervasive Developmental

CAMHD DEA VARIABLES

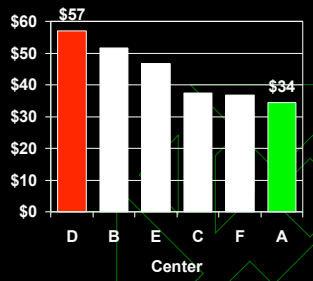
Input Variables

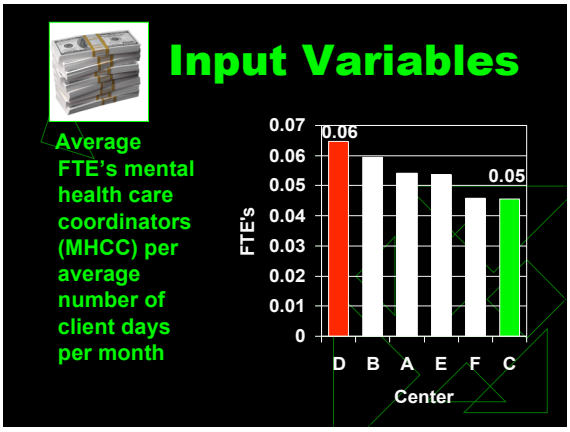
Average office expenses per client day

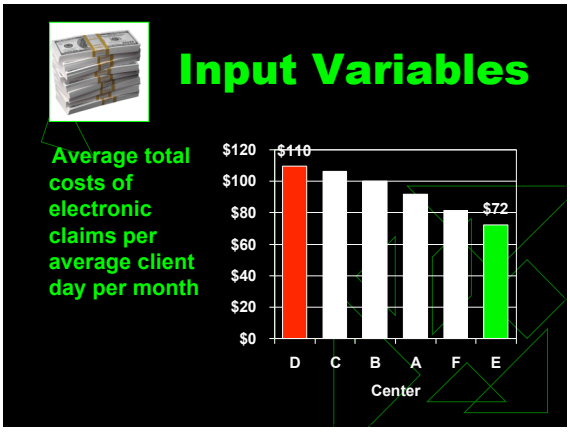


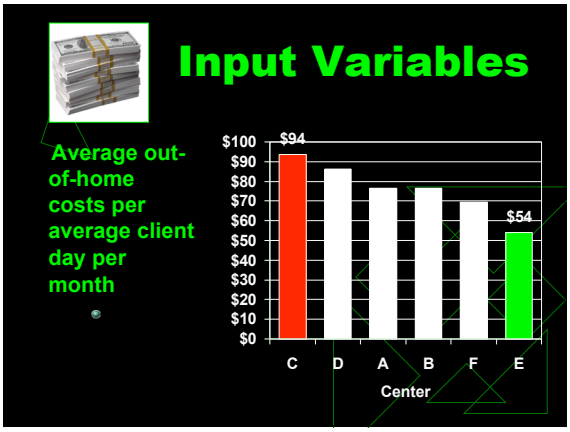
Input Variables

Average personnel costs per average client day per month

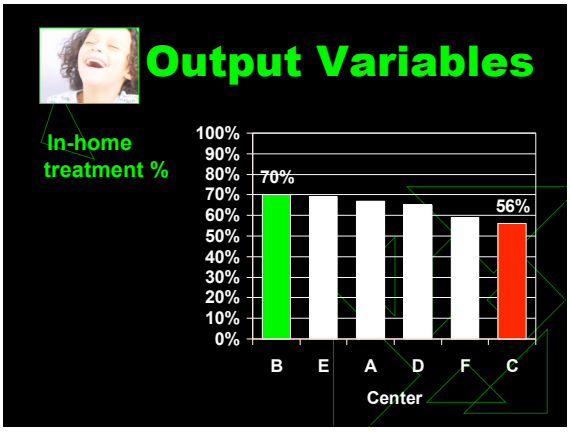


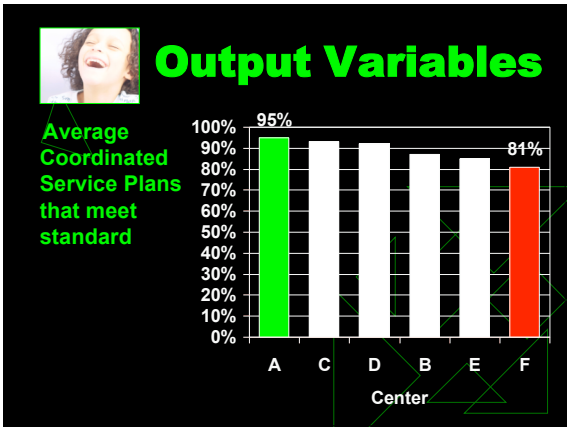

Input Variables
Average FTE's mental health care coordinators (MHCC) per average number of client days per month
FTE's
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0.06
0.05
D B A E F C
Center


Input Variables
Average total costs of electronic claims per average client day per month
$120
$100
$80
$60
$40
$20
$0
$110
$72
D C B A F E
Center


Input Variables
Average out-of-home costs per average client day per month
$100
$90
$80
$70
$60
$50
$40
$30
$20
$10
$0
$94
$54
C D A B F E
Center

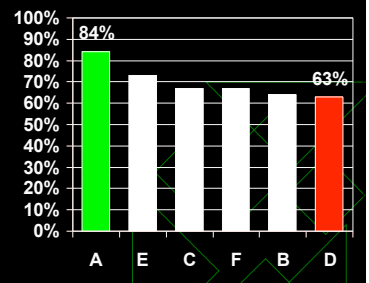

OUTPUT VARIABLES
Measures of Quality


Output Variables
In-home treatment %
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
70%
56%
B E A D F C
Center


Output Variables
Average Coordinated Service Plans that meet standard
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
95%
81%
A C D B E F
Center

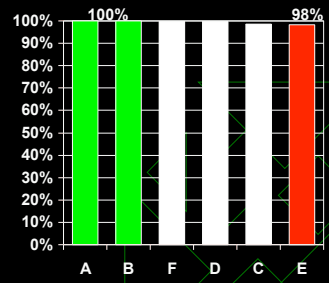
Output Variables

The average percentage of treated youth showing improvement (ASEBA or CAFAS)



Output Variables

Percentage of treated youth with no documented complaint or grievance



Data Summary

Center	In-Hm Tx %	CSP @ Std %	Scores Improving %	No Complaint or Grievance %	Ave Off Exp/Ave Client Day/Mo	Ave Salary/ Ave CI Day/Mo	Average MHCC FTE's/Ave CI Days/Mo	Ave Costs for Clinical Services/ Ave CI days/ Mo (Elec Inv's)	Average Out-of Home Costs/ Ave CI Day /Mo (Elec Inv's)
A		94.6	84.0	100.0	$0.64	$34.40	0.0541	$91.88	76.52
		87.3	64.3	100.0	$0.71	$51.65	0.0593	$100.01	76.37
		92.8	67.0	98.5	$0.90	$37.39	0.0457	$106.36	93.73
D		91.8	63.4	99.7	$0.99	$57.09	0.0647	$109.50	86.23
		85.0	72.9	98.4	$1.64	$46.72	0.0536	$72.35	53.98
F		58.8	80.7	66.7	99.8	$1.18	$36.85	0.0459	$81.53	69.35

QUALITY OUTPUTS | RESOURCE INPUTS

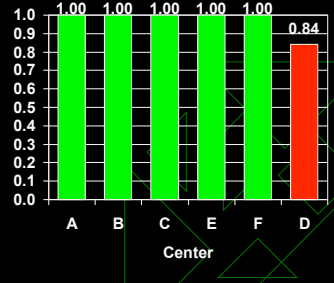
A

D

= Highest/Variable = Lowest/Variable

Results of DEA

Five of the six Centers were deemed EFFICIENT by the DEA



Comment

In an age of spiraling healthcare costs and limited resources, healthcare administrators are challenged to evaluate the efficient use of resources.

Comment

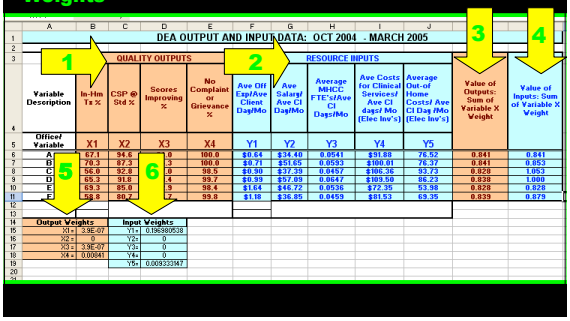
The DEA helps to evaluate both resource inputs and quality outputs – simultaneously.

The DEA methodology can be a helpful decision support tool for the administration of an evidence-based mental health delivery system.

How To Use The Excel Solver Tool for Data Envelopment Analysis

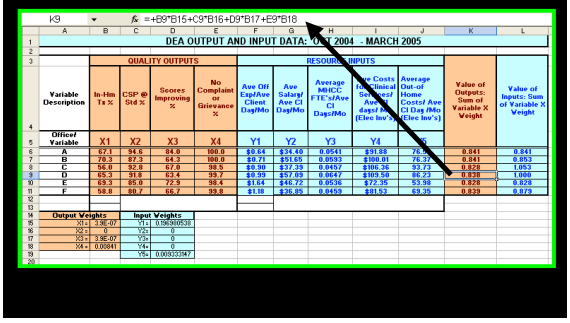
How To Use The Excel Solver Tool for Data Envelopment Analysis

Step 1: Set Up The Excel Worksheet with Cells for 1) Output Data, 2) Input Data, 3) Output Values, 4) Input Values, 5) Output Weights and 6) Input Weights

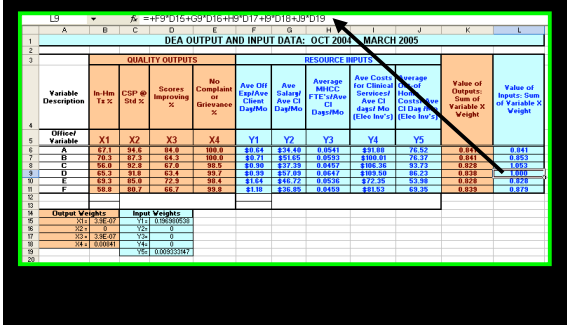


How To Use The Excel Solver Tool for Data Envelopment Analysis

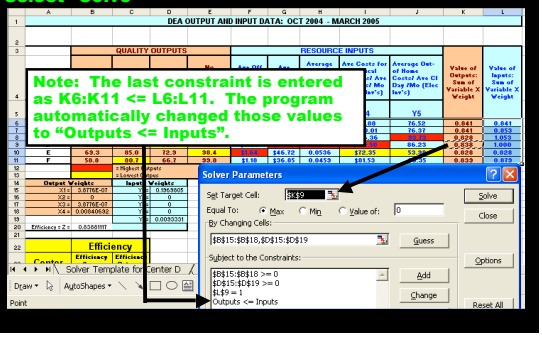
Step 2: Define the Output Values Using the Formula Pattern Below



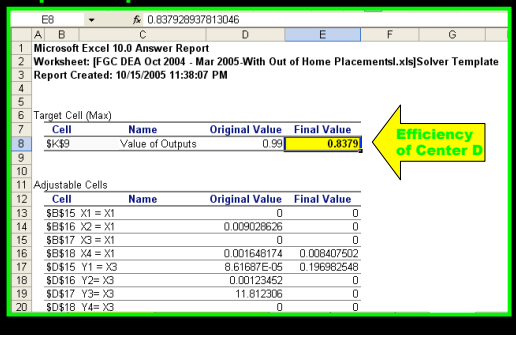
Step 3: Define the Input Values Using the Formula Pattern Below



Step 4. 1) Place cursor on an Output Values cell, K9 in this example. 2) Open Tools/Solver. 3) Set up the Solver Parameters Using the Following Pattern and 4) Select "Solve"



Step 5. Read the Relative Efficiency Value From the "Final Value" Field as identified below. Repeat Steps 2 – 5 for Other Centers



This Table Illustrates the Calculation of the Relative Efficiency of Center D Using Solver-Generated Outputs and Weights

OUTPUT VARIABLES	OUTPUTS	WEIGHTS	PRODUCT
X1 = In Hm Tx %	65.3	0.0000	0.0000
X2 = CSP at Std %	91.8	0.0000	0.0000
X3 = Scores Imp %	63.4	0.0000	0.0000
X4 = No Complaint %	99.7	0.0084	0.8379
	The DEA for Center D		SUM 0.8379
INPUT VARIABLES	**INPUTS**	**WEIGHTS**	**PRODUCT**
Y1 = Off Exp	0.99	0.1970	0.1952
Y2 = Sal Exp	57.09	0.0000	0.0000
Y3 = MHCC FTE's	0.0647	0.0000	0.0000
Y4 = Clinical Exp	109.50	0.0000	0.0000
Y5 = OOH Exp	86.23	0.0093	0.8048
			SUM 1.0000