

AD-A161 398

ANALYSIS OF THE DATA DEVELOPMENT ANALYSIS (DDA) AND
CONSTRAINED FACET ANA. (U) AIR FORCE INST OF TECH
WRIGHT-PATTERSON AFB OH SCHOOL OF SYST. . C S GLAUBACH
SEP 85 AFIT/GLM/LSM/855-28 F/G 13/8

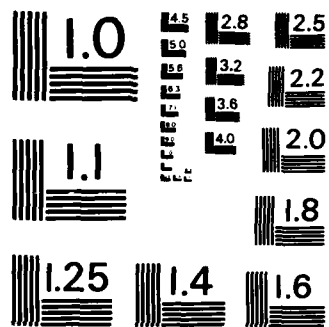
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

TABLE C.5

Inflation Discount Factors		
Input Measure	FY83	FY84
Labor Dollars	5.0%	5.0%
Material Dollars	12.8%	9.3%
Other Dollars	6.1%	5.3%

The following examples show how the inflation discounting was performed on FY83 and FY84 inputs to reduce them to equivalent FY82 values. Fiscal year 1982 was established as the base year for this study.

Single Year Discounting (FY83 to FY82)

Labor Dollars (Qtr 5): \$143,386
 FY83 Inflation factor: 5.0%
 Adjustment to FY82 : $\$143,386 / 105\% = \$136,558$

Multiple Year Discounting (FY84 to FY83 to FY82)

Material Dollars (Qtr 9): \$102,701
 FY84 Inflation factor: 9.3%
 FY83 Inflation factor: 12.8%
 Adjustment to FY83 : $\$102,701 / 109.3\% = \93962
 Adjustment to FY82 : $\$93962 / 112.8\% = \83800

The procedure described above was carried out for each dollar input measure for FY83 and FY84. This yielded a data base for all eleven quarters in terms of equivalent FY82 dollars. Tables C.6 through C.9 list the discounted dollar input values for each RCC and the Section.

TABLE C.6

Inputs Discounted for Inflation
Resource Cost Center: MACPKA

FY	Qtr	Labor Dollars	Material Dollars	Other Dollars
82	1	144,357	70,200	74,262
82	2	140,620	82,787	73,755
82	3	153,438	73,271	80,194
82	4	-	-	-
83	5	136,558	77,296	90,858
83	6	144,229	70,912	81,725
83	7	157,039	96,366	91,352
83	8	165,307	78,127	90,437
84	9	141,330	83,300	108,441
84	10	145,654	79,819	75,794
84	11	134,215	57,822	84,920
84	12	132,376	78,304	64,203

TABLE C.7

Inputs Discounted for Inflation
Resource Cost Center: MACPKB

FY	Qtr	Labor Dollars	Material Dollars	Other Dollars
82	1	138,414	106,275	72,157
82	2	120,515	100,134	61,947
82	3	133,634	97,828	68,594
82	4	-	-	-
83	5	125,844	62,206	71,584
83	6	169,869	107,178	97,647
83	7	153,432	134,443	94,961
83	8	146,830	109,208	79,198
84	9	128,005	82,053	94,126
84	10	125,740	49,514	62,823
84	11	91,379	47,185	61,374
84	12	108,127	80,084	55,603

TABLE C.8

Inputs Discounted for Inflation
Resource Cost Center: MACPKC

FY	Qtr	Labor Dollars	Material Dollars	Other Dollars
82	1	193,066	205,018	97,998
82	2	206,503	272,968	107,159
82	3	180,978	189,595	95,567
82	4	-	-	-
83	5	133,556	152,775	76,750
83	6	172,169	194,307	98,870
83	7	171,305	179,921	103,288
83	8	189,313	185,056	100,689
84	9	172,156	164,450	139,368
84	10	175,119	156,470	96,823
84	11	185,642	158,454	114,770
84	12	170,552	157,450	74,489

TABLE C.9

Inputs Discounted for Inflation
Section

FY	Qtr	Labor Dollars	Material Dollars	Other Dollars
82	1	457,837	381,493	244,417
82	2	467,638	455,889	242,861
82	3	468,050	360,694	244,355
82	4	-	-	-
83	5	395,958	292,277	239,192
83	6	486,267	372,397	278,242
83	7	481,776	410,730	289,601
83	8	501,450	372,391	270,324
84	9	441,491	329,803	341,935
84	10	446,513	285,803	235,440
84	11	411,236	263,461	261,064
84	12	411,055	315,848	194,295

Data Scaling. After the input values were discounted for inflation, the input and output values were divided by the output value for ease of computation on the Burroughs BTOS system. Tables C.10 through C.13 list the input data for the DEA/CFA program used in this study.

TABLE C.10

Scaled Input/Output Data
Resource Cost Center: MACPKA

FY	Qtr	INPUTS			OUTPUT	
		Labor Dollars	Material Dollars	Other Dollars	DPAH	DPEH
82	1	17.252	8.389	8.875	1.020	1
82	2	17.866	10.518	9.371	1.045	1
82	3	16.876	8.059	8.820	0.956	1
82	4	-	-	-	-	-
83	5	13.816	7.820	9.192	0.871	1
83	6	16.290	8.010	9.230	0.990	1
83	7	14.556	8.932	8.467	0.847	1
83	8	18.439	8.715	10.088	1.081	1
84	9	15.492	9.131	11.887	0.907	1
84	10	17.408	9.540	9.059	1.011	1
84	11	16.197	6.978	10.248	0.964	1
84	12	17.038	10.079	8.264	0.953	1

TABLE C.11

Scaled Input/Output Data
Resource Cost Center: MACPKB

		INPUTS			OUTPUT	
FY	Qtr	Labor Dollars	Material Dollars	Other Dollars	DPAH	DPEH
82	1	18.880	14.496	9.842	1.104	1
82	2	17.581	14.608	9.037	1.012	1
82	3	18.796	13.760	9.648	1.039	1
82	4	-	-	-	-	-
83	5	16.882	8.345	9.603	0.998	1
83	6	16.526	10.427	9.499	1.016	1
83	7	17.370	15.220	10.750	1.040	1
83	8	18.826	14.002	10.155	1.075	1
84	9	17.078	10.947	12.558	0.935	1
84	10	16.666	6.563	8.327	0.913	1
84	11	17.029	8.793	11.437	1.004	1
84	12	17.353	12.854	8.924	1.005	1

TABLE C.12

Scaled Input/Output Data
Resource Cost Center: MACPKC

		INPUTS			OUTPUT	
FY	Qtr	Labor Dollars	Material Dollars	Other Dollars	DPAH	DPEH
82	1	18.637	19.790	9.459	1.090	1
82	2	18.003	23.798	9.342	1.082	1
82	3	16.822	17.623	8.883	1.188	1
82	4	-	-	-	-	-
83	5	17.122	19.586	9.839	1.053	1
83	6	17.352	19.583	9.964	1.062	1
83	7	16.782	17.627	10.119	1.001	1
83	8	18.140	17.732	9.648	1.039	1
84	9	16.332	15.601	13.222	0.985	1
84	10	17.235	15.399	9.529	1.036	1
84	11	17.376	14.831	10.742	1.079	1
84	12	19.562	18.060	8.544	1.131	1

TABLE C.13

Scaled Input/Output Data
Section

		INPUTS			OUTPUT	
FY	Qtr	Labor Dollars	Material Dollars	Other Dollars	DPAH	DPEH
82	1	18.260	14.640	9.379	1.071	1
82	2	17.851	17.403	9.271	1.052	1
82	3	17.361	13.378	9.063	1.070	1
82	4	-	-	-	-	-
83	5	15.750	11.626	9.514	0.965	1
83	6	16.736	12.817	9.576	1.024	1
83	7	16.151	13.769	9.708	0.957	1
83	8	18.435	13.690	9.938	1.063	1
84	9	16.256	12.143	12.590	0.945	1
84	10	17.126	10.962	9.030	0.992	1
84	11	16.897	10.826	10.727	1.023	1
84	12	18.094	13.903	8.552	1.034	1

Appendix D: Correlation Analysis Results

TABLE D.1

Input/Output Correlation Results

Test	Correlation Coefficient
All Inputs vs DPEH	.951988
Labor Dollars vs DPEH	.907631
Material Dollars vs DPEH	.684980
Other Dollars vs DPEH	.820920
DPAH vs DPEH	.916978
Labor Dollars vs Material Dollars	.824119
Labor Dollars vs Other Dollars	.732540
Labor Dollars vs DPAH	.968048
Material Dollars vs Other Dollars	.595757
Material Dollars vs DPAH	.748767
Other Dollars vs DPAH	.737558

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Captain Charles S. Glaubach was born on 23 March 1951 in Santa Monica, California. He graduated from high school and attended Santa Monica College, the University of California at Los Angeles and graduated from the University of Texas at Austin, with a Bachelor of Science degree in Mechanical Engineering in August 1975. Upon graduation he received a commission in the USAF through the ROTC program. He was employed as a mechanical engineer for Phillips Chemical Company, Pasadena, Texas, until called to active duty in November 1976. His first assignment was as a Civil Engineering Staff Officer with HQ 10th AF(R). He attended navigator training and received his wings in November 1977. He completed advanced training in Electronic Warfare in April 1978 and served as an Electronic Warfare Officer and Instructor, Electronic Warfare Officer with the 2nd Bomb Squadron, March AFB, California, until 1981. He then served as an Emergency Actions Officer Controller with the 22nd Bomb Wing, March AFB, California, until October 1982. He was then assigned to the 43 Strategic Wing, Andersen AFB, Guam, as an Emergency Actions Officer Controller until entering the School of Systems and Logistics, Air Force Institute of Technology, in June 1984.

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This research developed from a recommendation by an earlier research effort, sponsored by HQ AFLC, to expand the application of Data Envelopment Analysis (DEA) and Constrained Facet Analysis (CFA) to measure technical productivity in a depot level maintenance environment. Two levels of productivity within an Air Logistics Center, the Resource Cost Center (RCC) and the Section, which is composed of several RCCs, were analyzed to support management decisions for improving the efficiency of production. Each organization was analyzed over a time period of twelve quarters. This research proved the DEA/CFA model is an effective tool for total productivity measurement and demonstrated the need for careful selection of input/output measures. The use of the DEA/CFA model and results of this research were accepted by management as a useful method for analyzing the productive efficiency of an organization and determining the impact of sub-units (RCCs) on the overall productive efficiency on the next level up (Section) in the organization.

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