Peer Selection

Methodology and Models

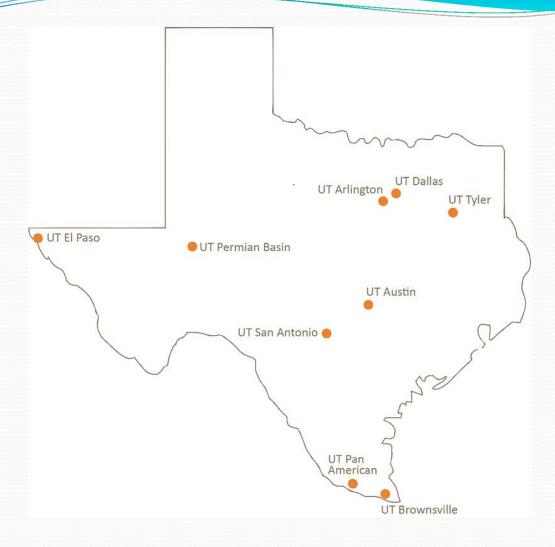
Drs. Alicia Betsinger, Lawrence Redlinger, Steve Wilkerson

AIR

May 2013

- 15 institutions
 - 9 academic institutions
 - 6 health institutions
- 215,606 students (Fall 2012)
 - 75% undergraduate
 - 40% Hispanic
- 48,819 degrees/certificates awarded (AY 2012)
 - 66% undergraduate
 - ~35% of degrees awarded by public universities in Texas
 - ~63% of degrees awarded by public health-related institutions in Texas
- 19,099 faculty, including 7,621 T/TT faculty
- \$2.54 billion in research expenditures (FY 2011)
 - 54% federally funded
 - 65% by the health-related institutions
- \$13.1 billion in budgeted expenses (FY 2012)
- \$17.6 billion in endowments (FY 2011)

University of Texas System



Academic Institutions

• What is Benchmarking?

Benchmarking is the process where policymakers compare the performance, practices, and policies of institutions or groups of institutions to gain insight.

• Why is Benchmarking Important?

So that policymakers can more accurately answer questions such as, "What are the characteristics that allow for superior institutional performance?" "How can we improve institutional performance?" "All else being equal – why do some institutions outperform others?"

The "What" and "Why"

The Benchmarking Model

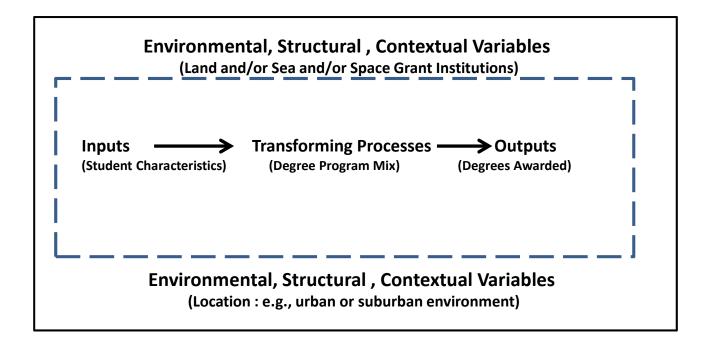


Figure 8.1

From "Taming Multivariate Data: Conceptual and Methodological Issues," *Lawrence J. Redlinger, John J. Wiorkowski, Anna I. Moses, in Levy and Valcik*, *Benchmarking in Institutional Research*,, NDIR, Vol. 156, Winter 2012, Chapter 8, pp. 93-108.

- Transitioned from nine separate approaches to peer/benchmarking analysis to single method that was empirically-based
- Previously, benchmarking carried less policy, and by implication fiscal weight, but began to shift in 2010 and continued to evolve through this most current iteration

Peer Selection: System & Institution

Institutional Size

Student Population

Research Focus

Program Mix

UT System Benchmarking: 2010

2010 Model

			Weights used
lootit. it oool	Size	Total Enrollment	5
Institutional	Stitutional	Full-Time Instructional Faculty	2
		% Pell Eligible	6
		% in 25th percentile SAT	4
		% in 75th percentile SAT	4
Student	Population	Undergraduate Enrollment as % of Total Enrollment	4
		Full-Time Enrollment as % of Total Enrollment	2
		Associate's	0
		Bachelor's	4
Degrees Awarded as % of Total Degrees	Master's	4	
	Degrees	Doctoral	4
		Graduate	4
		First Professional	2

2010 Model (cont.)

			Weights used
	Human/SS	% of Total Bachelor's	2
	Hullidil/33	% of Total Graduate	2
	Education	% of Total Bachelor's	2
	Education	% of Total Graduate	2
	Ag-Sci-Eng-Arch Bus-PubAdmin	% of Total Bachelor's	4
		% of Total Graduate	4
Drogram Miss		% of Total Bachelor's	2
Program Mix		% of Total Graduate	2
	Comm Arto	% of Total Bachelor's	2
	Comm-Arts	% of Total Graduate	2
	Health Drefessions	% of Total Bachelor's	4
	Health Professions	% of Total Graduate	4
	Miscellaneous	% of Total Bachelor's	1
		% of Total Graduate	1

2010 Model (cont.)

			Weights used
First Professional Degrees	Health	Health as % of Total Degrees	3
First Professional Degrees	Law	Law as % of Total Degrees	3
		Research Expenditures as % of Total Expenditures	4
		Research Expenditures	2
Research	Focus	Ratio of Research to Instructional Expenditures	2
		Federally Funded Research	2
		Doctoral Degrees Awarded	2
		Federally Funded Research/FTE	2
		Doctor's Degrees / FTE	2

Graduation Rates	Research Expenditures	
4-year	Total	
6-year	Federal	

]	Degrees:	Other:
	Degree Production Ratio: Baccalaureate	Endowment
	Degree Production Gap: Baccalaureate	Operational Revenue per FTE

Performance Metrics

- Included nearly 40 variables, many of which were highly related
 - Strong relationships between variables may lead one to conclude that the relationship – similarity in this case – is stronger than it actually is
- Certain critical variables were missing:
 - Percent Hispanic
 - Percent Minority
 - Percent Part-time

Challenges to 2010 Model

- First, Factor analysis was used to reduce the number of variables
- Second, created a composite variable of various outcome measures:
 - Graduation rates: 4-year and 6-year
 - Research Expenditures: Total and Federal
 - Degree Production Ratio
 - Endowments
 - Doctoral Degrees awarded (UT Austin and Emerging Research Universities only)

Approach #1: Multiple Regression

- Finally, used reduced set of variables to understand where the institution stood on composite outcome:
 - 1. Operational revenue per FTE (proxy for program mix)
 - 2. Total UG enrollment
 - 3. SAT 75th percentile
 - 4. Undergraduate Enrollment as % of Total Enrollment
 - 5. Full-Time Enrollment as % of Total Enrollment
 - 6. Undergraduate percent minority

Approach #1: Multiple Regression (cont.)

- Decided to return to Factor Analysis model using distance scores on factors
- Pulled in "cost" variables:
 - High cost fields
 - Average faculty salaries

Approach #2: Principal Components Analysis (PCA)

• New variables added:

- Average professor salary (3-year avg)
 - Virtually no difference when used Associate or Assistant if Professors were paid well, so were the other ranks
- Percent of high cost programs (3-year avg)
 - Computer & Information Sciences (CIP 11)
 - Engineering (CIP 14)
 - Engineering Technologies and Engineering-related Fields (CIP 15)
 - Biological and Biomedical Sciences (CIP 26)
 - Physical Sciences (CIP 40)
 - Health Professions and Related Programs (CIP 51)
 - Business, Management, Marketing, and Related Support Services (CIP 52)

Approach #2: PCA (cont.)

- First, reduced the number of variables
 - Created correlation matrix of data set
 - Selected subset of inputs correlated with outputs of interest
 - Removed input variables that were strongly correlated with other input variables
- Second, normalized data to z-scores so the unit of measure doesn't influence the results
- Next, calculated the distance between all institutions to create proximity score matrix
- Finally, based on other analysis, chose 10 institutions from among nearest 25 institutions

Approach #3: Z-scores

UTD Historical Approach to Benchmarking

- Applied Contextual Filters (e.g., no-medical school) first
- Created groups of "peers" based on a small set of variables measuring specific objectives.
- Methods used were based on benchmarking a single institution (UTD) against others with reference to a specific set of variables (e.g., funding per student outcome; student characteristics)
- The new process was to create a single model for nine diverse campuses using a set of weights. The received model was based on work done in Arizona.
 - Worked with the Provost's Office on reframing benchmarking processes. The first
 questions focused what the variables measured, how interrelated were they and which
 had the most impact?
 - We decided to use PCA; to reduce the variable pool; to remove up front filters and weighting.
 - Initial modeling results for UTD were checked against additional data; as were results for selected other campuses.
 - The variables that might be best for UTD might not be best for the other components or for the UT System benchmarking process.

UTD Process on campus

Narrowed set of peers through contextual filters

Primary Filters

- Public universities
- No medical school
- Not a land-grant university
- Large urban location
- 20,000 40,000 students
 - 12% 18% graduate students
- \$30 million \$75 million research

Secondary Filters

- Minority serving
- More than 50% of students qualify for need-based aid
- 35% 65% freshmen are top high school rank quartile
- Universities with professional colleges in Education,
 Business, Engineering

UTSA Process on campus

- Identified seven recommended peers and a list of six "reasonable" peers to complete the list of ten peers needed
- Prepared a simplified set of inputs data, color coded by where UTSA ranked in comparison
- Presented the recommendations and data to senior leadership, who approved the final list of peers selected

UTSA Process on campus (cont.)

Institutional Size	Cost
Total Enrollment	Average Professor Salary
Number of Full-time Instructional Faculty	Percent High Cost Degrees
	Operational Revenue per FTE

Student Population:	Degrees:
75 th Percentile SAT	Bachelor's Degrees Awarded as % of Total Degrees
Percent Pell eligible	Graduate Degrees Awarded as % of Total Degrees
Undergraduate Enrollment as % of Total Enrollment	
Full-Time Enrollment as % of Total Enrollment	
Undergraduate Percent Minority	

Final Set of Variables

- The peers list changes whenever new variables are added or removed
 - Filter before-or-after the fact changes it as well
- It is worth looking at different approaches exercise identified institutions that we wouldn't have considered
- Need to minimize the reputational impact of selecting peers
- Don't fall into trap of the fallacy of exactness are differences in outcome based on inputs, environmental changes, productivity, or strategy?

Final Thoughts

- Alicia Betsinger, PhD
 Assistant Director, Office of Strategic Initiatives

 abetsinger@utsystem.edu
- Lawrence Redlinger, PhD
 Professor & Executive Director, Strategic Planning and Analysis

 redling@utdallas.edu
- Steve Wilkerson, PhD
 Associate Vice Provost, Institutional Research
 steve.wilkerson@utsa.edu

Questions

- Borden V. M. H. (2005) "Identifying and Analyzing Group Differences." In M. A. Coughlin (ed.) Applications of Intermediate/Advanced Statistics in Institutional Research Tallahassee, Fl. Association for Institutional Research. 132-168.
- Merrill T and Stanley, J. (2010) "An Evidence-Based Strategy for Selecting Peer Institutions," presentation at the PacAIR Annual Meeting November 19, 2010.
- Teeter, D. J., and Brinkman, P. T. (1987)"Peer Institutional Studies/Institutional Comparisons." In J.A. Muffo and G. W. McLaughlin (eds.) A Primer on Institutional Research. Tallahassee, Fl. Association for Institutional Research. 89-100.
- Teeter, D. J., and Brinkman, P. T. (1992)"Peer Institutions." In M. A. Whiteley, J. D. Porter and R. H. Fenske (eds.) The Primer on Institutional Research. Tallahassee, Fl. Association for Institutional Research. Resources for Institutional Research no. 7 63-72.
- Teeter, D.J. & Christal, M.E.(1984). A Comparison of Procedures for Establishing Peer Groups. Paper presented at the Annual Meeting of the Southern Association for Institutional Research.
- Terenzini, P.T., Hartmark, L., Lorang, W.G. & Shirley, R.C. (1980). A conceptual and methodological approach to the identification of peer institutions. Research in Higher Education, 12, 4, 347-364.
- Trainer, J. (2008). The role of institutional research in conducting comparative analysis of peers. New Directions for Higher Education, 141, 21-30.
- Weeks, S. F., Puckett, D., & Daron, R. (2000). Developing peer groups for the Oregon University System: From politics to analysis (and back). Research in Higher Education, 41, 1, 1-20.

Selected References