

# Peer Selection

Methodology and Models

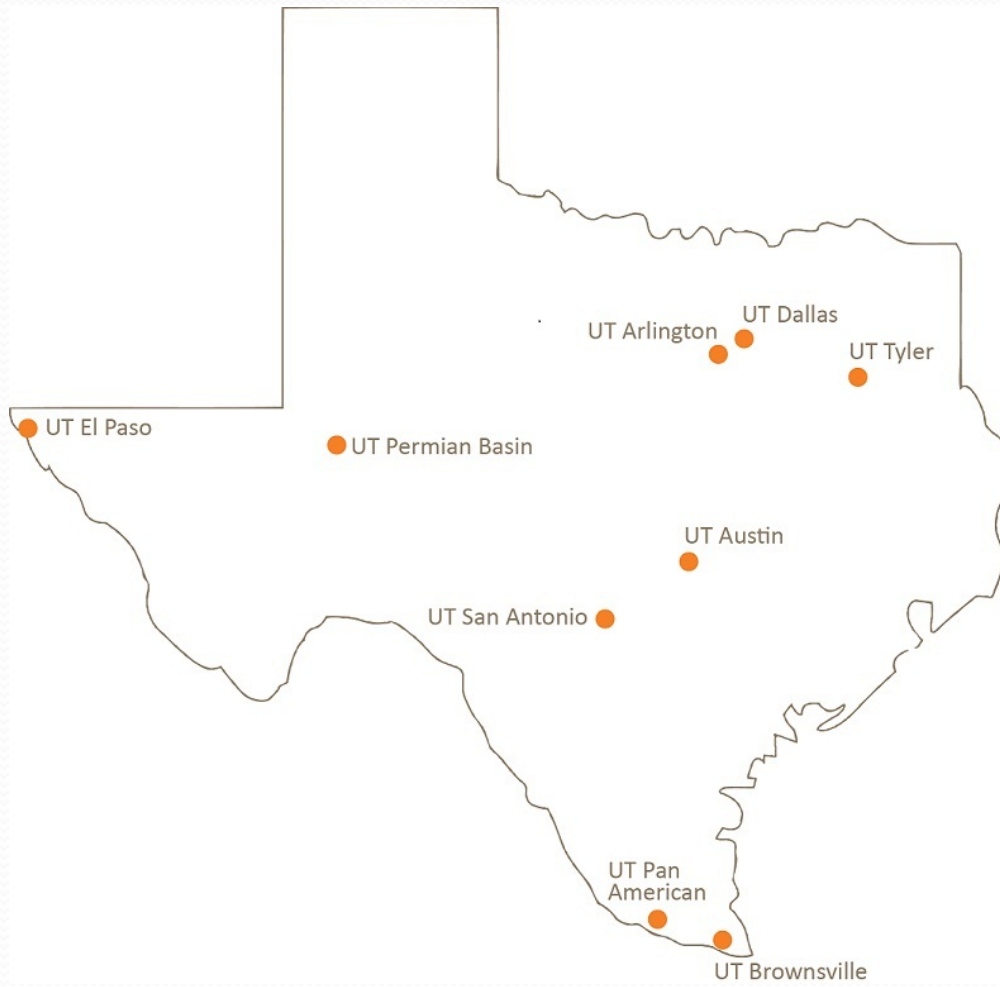
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TAIR

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- **15 institutions**
  - 9 academic institutions
  - 6 health institutions
- **214,861 students (Fall 2011)**
  - 74% undergraduate
  - 40% Hispanic
- **46,094 degrees/certificates awarded (AY 2011)**
  - 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

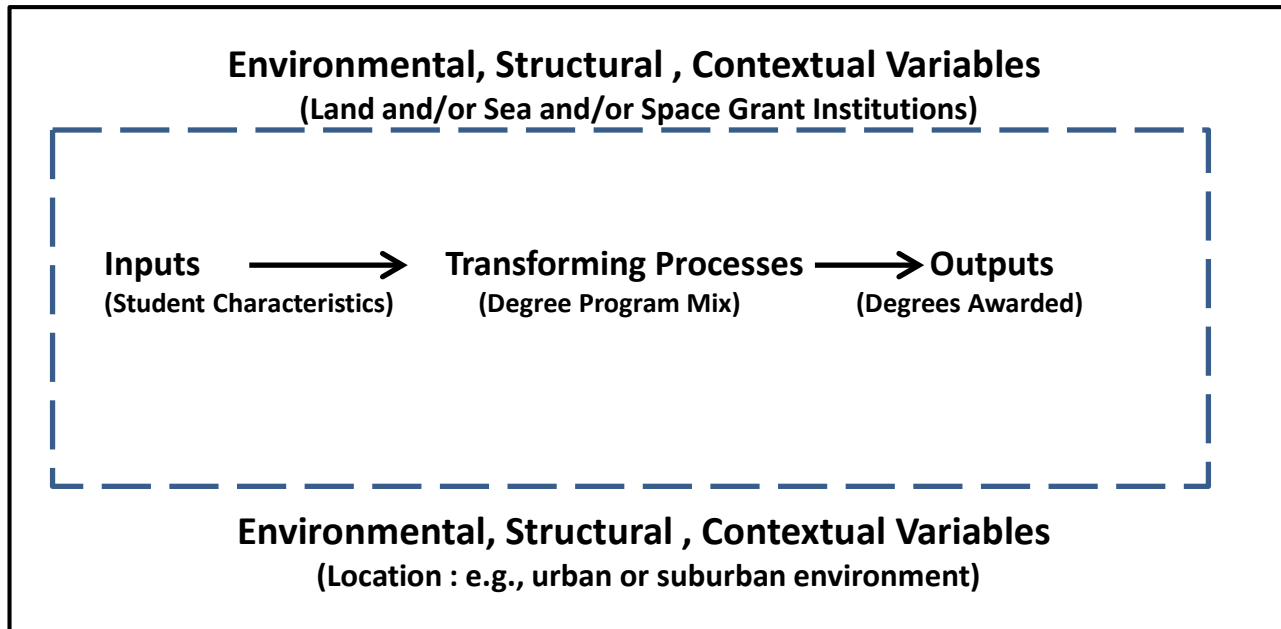


Figure 8.1

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

## Graduation Rates

4-year

6-year

## Research Expenditures

Total

Federal

## Degrees:

Degree Production Ratio:  
Baccalaureate

Degree Production Gap:  
Baccalaureate

## Other:

Endowment

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

# Peer data is used to assess progress, target setting, and strategy development

We use peer groups with similar input characteristics to assess progress and for target setting

- The challenge is in finding peer institutions whose missions match UTEP, emphasizing both access and excellence
- Another challenge is finding institutions with similar characteristics: location, size, student demographics
- We use peer group data to identify effective strategy
  - Need large number of peers in broad categories (e.g., public baccalaureate awarding institutions, research institutions)
  - Focus on institutions with significant change in outcomes
  - Difficultly is in identifying factors that explain change – change in input, environmental factors, or innovation

## UTEP Process on campus



Primary concern – **Can we develop an reasonable “statistical” approach to identify peers** for all academic institutions in the UT System, which has a mix of research, emerging research, and doctoral institutions?

- Discussed possible approaches with campus administrators
- Conducted extensive literature search
- Consulted with other IR colleagues, including Larry and Alicia
- Consensus was that we should only include input variables and use hybrid peer selection approach; the distinction between input peers and output peers also became apparent

**Explored several different approaches** using different combinations of “input” elements – 42 unique models

- General conclusion that that most models produced a core of institutions that could be acceptable peers

**Assessed 10 to 20 potential peers carefully**

- Are they similar enough to be considered peers?
- Are they stable – have the input variables changed dramatically over last five years?
- Shared analysis and recommended 10 institutions to senior administrators

# UTEP Process on campus (cont.)

## Institutional Size

Total Enrollment

Number of Full-time Instructional Faculty

## Cost

Average Professor Salary

Percent High Cost Degrees

Operational Revenue per FTE

## Student Population:

75<sup>th</sup> Percentile SAT

Percent Pell eligible

Undergraduate Enrollment as % of Total Enrollment

Full-Time Enrollment as % of Total Enrollment

Undergraduate Percent Minority

## Degrees:

Bachelor's Degrees Awarded as % of Total Degrees

Graduate Degrees Awarded as % of Total Degrees

# 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

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## Questions

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