# Chapter 94
# Benchmarking Competitiveness of Top 100 U.S. Universities

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## ABSTRACT

*This chapter presents a comprehensive benchmarking study of the top 100 U.S. universities. The methodologies used to come up with insights into the domain are Data Envelopment Analysis (DEA) and information visualization. Various approaches to evaluating academic institutions have appeared in the literature, including a DEA literature dealing with the ranking of universities. This study contributes to this literature by the extensive incorporation of information visualization and subsequently the discovery of new insights. The main purpose of the study is to create an objective basis of assessment for the candidate students to use for university preferences. Meanwhile, the actionable insights obtained for the domain can guide university managers, as well as candidate students.*

## INTRODUCTION

University education is not only about learning theoretical or technical information on a particular profession, but it also comprises of gaining a different perspective on life and leads to human development. In today's world, university education is not a privilege but rather almost a standard expectation for a successful professional career. Choosing a university and planning one's future upon this decision is thus a significant decision. This chapter presents a detailed benchmarking analysis of the top 100 US universities, as would be viewed from a high school student's perspective. The goal of our study is two-folds: Assisting students for their university selection as well as assisting university managers in improving their universities. Whichever the target audience, the results obtained in the study and the analysis performed can be packaged as an interactive decision support system (DSS) for the target audience.

Our study aims at offering an objective approach to assist prospective students in the in the complicated choice of a higher education institution and assist policy makers for their decision on institutional

priorities. Prospective students face a large variety of institutional characteristics: acceptance rate, faculty member per student ratio, percentage of smaller classes, the average freshman retention rate, student evaluations of faculty, the average SAT score, public vs. private ownership, religious affiliations, high admission standards, minimal admission standards, Nobel Prize winning faculty, commuter school with adjunct faculty, single gender, coeducational, urban, suburban, pastoral campus, major sports powers, and many others (Black & Smith, 2004; Eff, Klein, & Kyle, 2010). In addition, each institution exhibits not only materialistic characters such as value of buildings, dorm capacity, average faculty salary, technology expenses, and expenses for other facilities, but also the student applicant's individual characteristics such as SAT score, GPA at high school, academic credentials, family income, student body characteristics, and other qualities (Black & Smith, 2004; Eff et al., 2010). Institutions select their outputs as quality attributes that best meet their mission as perceived by the administration and governing body. Higher education institutions can be modeled as competing, differentiated product producers as profit maximizers (Rosen, 1974), but this is problematic for non-profit higher education institutions, since non-profit institutions are assumed to maximize a value function over a vector of qualities (Eff et al., 2010).

There exist a multitude of rankings for colleges and universities on the bases of many different criteria. Rankings by U.S. news media include those by Consumer Digest (Consumer Digest), Forbes (Forbes), US News & World Review (US News), Washington Monthly (Washington Monthly), and Princeton Review (Princeton Review). International rankings include The Academic Rankings of World Universities by Shanghai Jiao Tong University (Shangai Ranking), Webometrics (Webometrics), and the Good University Guide by The Times of London (Good University Guide). However, all of the mentioned rankings are based on a weighted sum calculation.

Our study compares U.S. academic institutions with the Data Envelopment Analysis (DEA) methodology using 2010-2011 data for the top 100 four-year institutions of higher education as ranked by US News (US News). While we respect the US News ranking in selecting the group of universities to benchmark, we compute and present a new ranking based on the DEA methodology. The input is tuition. Outputs are acceptance rate, instructor per student ratio, and numbers of small classes (with fewer than 20 students). The DEA efficiency score provides an objective means of ranking institutions, not being biased with subjective weights used in other rankings.

The next section gives a background on the study, as well as a review of the related literature. The motivation for the study is presented from an educational perspective is presented. Later, analysis and results are presented, with a discussion of the insights gained into the domain. Finally, the chapter concludes with a summary of findings and prospects for future research.

## BACKGROUND

### Benchmarking

Benchmarking is the process of comparing an organization's business processes and performance with other organizations of its kind, to identify and implement improvements (Andersen & Jordan, 1998). Robert Camp (1989) developed a 12-stage approach for benchmarking, which consists of the following:

1. Select subject,
2. Define the process,

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