Benchmarking the Performance of Tertiary Education Systems

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In questions of mind, there is no medium term:
either we look for the best or we live with the worst.
John Gardner

Introduction

Tertiary education institutions have a critical role to play in supporting knowledge-driven economic growth strategies and in the construction of democratic, socially cohesive societies (World Bank, 2002). Comparisons of tertiary education systems across the world have revealed wide variations in their performance, even between those with similar funding levels and common country characteristics. They have also demonstrated that certain tertiary education systems consistently out-perform the others in many critical areas.

However, attempts to measure and analyze what works at the tertiary education level have tended to emphasize the results of individual institutions as opposed to the tertiary system as a whole. The proliferation of international and national rankings has focused on the relative standings of countries, using the position of their top universities as proxy for the performance of the entire tertiary education system. But these rankings are flawed in their conceptual approach and suffer from serious methodological problems (Salmi and Alenoush, 2007). They fail to measure the overall strength of a country’s tertiary education system and its contribution to economic and social development.

There is, therefore, a need for a reliable and comprehensive benchmarking tool to evaluate tertiary education systems over time and the causal relationships between input and process variables and the outcomes of the system. In this chapter, we propose: (i) an intellectual framework to underpin analysis of the performance of tertiary education systems: (ii) a tool that can be used to analyze sets of data within this framework; and (iii) the relevant indicators to evaluate these systems. Finally, we illustrate the type of comparisons that can be made with this tool using key indicators from East Asian countries.

Analytical Framework

In building our benchmarking tool, we made a fundamental distinction between the outcomes of tertiary education systems (“system performance”) and the drivers of performance that account for these results (“system health”), with the purpose of answering the following two questions:

- How well does the tertiary education system actually produce expected outcomes at the current time (system performance)?
- How well do the key inputs, processes, and enabling factors of the system reflect conditions that are known to bring about favorable outcomes?
Furthermore, we also designed the tool to be used to examine “system evolution”, in other words, the rate of change over time in the main dimensions of performance and in each key driver of this performance.

System Performance

System performance can be measured by looking at the key outcomes of a tertiary education system. Reflecting the various missions of tertiary education, the benchmarking tool includes the following outcomes:

- **Attainment** refers to the stock of qualifications in a given population, measured by calculating the proportion of adults in the working age population who have completed a tertiary degree.
- **Learning achievement** refers to the quality and relevance of the education and training experience of tertiary level graduates. This is one of the most difficult areas to measure in the absence of widely accepted metrics such as PISA or TIMMS.
- **Equity** refers to disparities in the results (attainment and academic trajectories) of disadvantaged groups (such as low-income groups, females, minorities, and people with disabilities).
- **Research outcomes** refer to publications and advanced training, measured by the number of scientific journal citations relative to a country’s population and the capacity of the system to prepare PhD graduates.
- **Knowledge and technology transfer** represent the contribution of tertiary education institutions to the development of the regions that they serve. Some ways to measure this include the number of patents registered by universities or the proportion of doctoral graduates working outside universities.
- **Values, behavior, and attitudes** refer to the effectiveness of tertiary education in equipping graduates with positive values and citizenship skills. This is also a very difficult area to measure, but the methodological challenges do not justify neglecting this important dimension of the role of education.

System Health

System health refers to the enabling conditions required for the tertiary system to produce these outcomes and to improve and sustain its performance over time. As Figure 1 below illustrates, these institutions operate in an environment that includes the following elements:

- **Macro environment**: the overall political and economic situation of a country, together with the rule of law and the enforcement of basic freedoms, which influences the governance of tertiary education institutions (the appointment of university leaders), their level of funding, their academic freedom, and safety in the physical environment.
- **Leadership at the national level**: the existence of a vision and a strategic plan to shape the future of tertiary education and the capacity to implement reforms.
- **Governance and regulatory framework**: the governance structure and processes at the national and institutional levels that determine the degree of autonomy that tertiary
education institutions enjoy and how and to what extent they are held accountable. This is especially important for the human resources policies and management practices that allow tertiary education institutions to attract and keep qualified academics.

- **Quality assurance framework**: the institutional setup and the instruments for assessing and enhancing the quality of research, teaching, and learning
- **Financial resources and incentives**: the absolute volume of resources available to finance tertiary education (mobilization of both public and private resources) and the way in which these resources are allocated to various institutions.
- **Articulation and information mechanisms**: the linkages and bridges between high schools and tertiary education and among the various types of tertiary education institutions, all of which affect the academic characteristics of incoming students and their academic results within the tertiary education system.
- **Location**: the infrastructure and the economic, social, and cultural characteristics of the geographical location of the institution, which determine its ability to attract outstanding scholars and talented students.
- **Digital and telecommunications infrastructure**: the availability of broadband connectivity and end user devices to enable tertiary education institutions to deliver educational, research, and administrative services in an efficient, reliable, and affordable way.
This analytical framework translates into specific inputs and process indicators that measure “system health” in the following way:

- **Inputs.** To what extent do the resources invested in a tertiary system (such as its funding, the number and qualifications of its academics, the academic preparation of its incoming students, its curriculum, and its learning infrastructure) lead to positive outcomes?
- **Processes.** How effective are a system’s processes or policies (such as its governance arrangements, resource allocation mechanisms, and accountability instruments) in producing positive outcomes?
Comparing East Asian Countries on the Basis of Leading Indicators

Leading indicators are key indicators used to detect or predict important changes that are likely to occur in a tertiary education system. Table 1 below lists the 10 leading indicators that we chose for our summary analysis of the system performance and system health of tertiary education in East Asia.

Table 1: Leading Indicators of Tertiary Education Systems

<table>
<thead>
<tr>
<th>System Performance</th>
<th>Attainment: Proportion of the population (25+) with a tertiary degree</th>
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<td>Equity: Tertiary education attainment of females over attainment of males among the population (25+)</td>
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<td></td>
<td>Research Output: Number of citations per 100,000 inhabitants</td>
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<th>System Health (Drivers of Performance)</th>
<th>Expansion: Tertiary education enrollment rate</th>
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<tbody>
<tr>
<td></td>
<td>Equity: Female / male tertiary enrollment rate</td>
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<td>Quality: Proportion of accredited programs</td>
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<td>Financing: Total spending on tertiary education as a percentage of GDP</td>
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<td></td>
<td>Investment in research: Public funding on research as a percentage of GDP</td>
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<td>Governance: Degree of autonomy of public universities</td>
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<td></td>
<td>Preparation of incoming students: Composite index of mean math, science and reading PISA scores</td>
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We took the following approach in using these leading indicators to assess the performance and health of East Asian tertiary education systems. First, we analyzed the data for each leading indicator in 1960, 1980, 2000, 2005, and latest available year. We then graphed the data for each country to show the rate of change over time and relative to other countries. Where relevant, we calculated an East Asia average in order to give the reader a baseline comparison.

In order to analyze the short-run and long-run growth rates of the various indicators and to understand trends in each country, we prepared figures and tables by calculating the growth rate between 1980 and the most recent year for which data were available. We then grouped countries according to whether their growth rate on a particular indicator placed them in the top 25
percent, the middle 50 percent, or the bottom 25 percent. Within each percentage group, we listed the countries alphabetically.

Analysis of System Performance Indicators

For the purpose of the analysis of performance, we selected two leading indicators, attainment and research citations.

Attainment

Figure 2 shows increasing levels of tertiary attainment in the adult population in all countries in the region. In 1960, in all countries in East Asia, fewer than 5 percent of the population had obtained a tertiary degree. By 2010, the spread has become much wider, with five (out of 14) countries continuing under the 5 percent attainment range but with Japan and the Philippines at the other end of the scale having an almost 25 percent attainment rate. There was rapid growth in tertiary degrees between 1980 and 2000 in South Korea, the Philippines, and Japan, but this growth has leveled off in the past 10 years. It would be useful to study what policies these countries had in place that effectively quadrupled their attainment rates within the span of 20 years. What type of growth can be expected in Malaysia, China, Lao PDR, Vietnam, and Cambodia in the next 20 years?

**Figure 2: The Proportion of the Population (aged 25+) with a Tertiary Degree**

*Source: Barro and Lee (2010)*
Table 2 below shows that Thailand, Indonesia, and Lao PDR have the fastest growing attainment rates, even though their current attainment rates are low relative to other countries such as Japan and the Philippines.

**Table 2: The Growth Rate in Adult Tertiary Attainment between 1960 and 2010**

<table>
<thead>
<tr>
<th>Top 25%</th>
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<tr>
<td>Indonesia</td>
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<tr>
<td>Lao</td>
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<tr>
<td>Thailand</td>
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<table>
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<th>Middle 50%</th>
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<tbody>
<tr>
<td>Cambodia</td>
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<tr>
<td>China</td>
</tr>
<tr>
<td>Hong Kong</td>
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<tr>
<td>Japan</td>
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<tr>
<td>Korea (South)</td>
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<tr>
<td>Malaysia</td>
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<tr>
<td>Singapore</td>
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<tr>
<td>Vietnam</td>
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<table>
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<tr>
<th>Bottom 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mongolia</td>
</tr>
<tr>
<td>Philippines</td>
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<tr>
<td>Taiwan</td>
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Research Citations per 100,000 Inhabitants

Figure 3 shows the research performance of countries in East Asia. Three countries stand out as high achievers in this area: Singapore, Japan, and Korea. All other countries continue to be in the initial (or emerging) phase of development in terms of research capacity with fewer than 10 citations per 100,000 inhabitants.
When grouped according to growth in research output between 1980 and 2005 (the latest year for which data are available), China, Korea, and Singapore are in the top 25 percent, Indonesia, Japan, Malaysia, the Philippines, Thailand, and Vietnam are in the middle 50 percent, and Cambodia, Hong Kong, Lao PDR, and Mongolia are in the bottom 25 percent.

**Analysis of System Health Indicators**

We use three lead indicators to look at the drivers of outcomes: spending on tertiary education, spending on research, and degree of autonomy.

**Total Spending on Tertiary Education as a Share of GDP**

In those East Asian countries where data were available, average public and private expenditure on tertiary education grew from 1.33 percent of GDP in 2000 and to 1.92 percent in 2010. As shown in Figure 4, Mongolia was the leading spender on tertiary education in 2010, while Vietnam spent the least as a percentage of GDP.
Public Funding for Research as a Share of GDP

Investment in research grew slowly between 2000 and 2007 (the latest available year of data). In 2007, the average expenditure on research and development (R&D) in the region was 2.2 percent of GDP. The countries with the highest levels of R&D expenditure were Japan, Korea, and Singapore, while Indonesia (0.05 percent), Philippines (0.12 percent) and Lao PDR (0.04 percent) were at the low end of the expenditure spectrum.
Governance – Degree of Autonomy

This indicator measures the level of management autonomy enjoyed by tertiary institutions. We scored countries on a four-point scale based on how many of the four characteristics of a fully autonomous system they exhibited according to key legal and regulatory documents (higher education laws, ministry of higher education regulations, etc.). The four characteristics of a fully autonomous system are: (1) independent management of finances; (2) independent appointment of leaders; (3) autonomy in recruitment of students/staff; and (4) academic freedom, meaning autonomy over the formulation of academic content.

Therefore, if a country had no formal policies on the governance and management of tertiary institutions, we would give it a score of one and would categorize it as having “very low” policies on governance. We would give a country a score of two (defined as “low”) if its public institutions had one or two features of a completely autonomous system. A country would be
scored as three or “high” if public institutions had three features of a completely autonomous governing system. Finally, countries whose public institutions had all four features of a completely autonomous governing system as defined would be categorized as “very high” and given a score of four.

For example, we categorized Malaysia as having “low” policies in the area of governance and gave it only two points out of four) because Malaysian institutions still lack autonomy over such key areas as the independent appointment of leaders, and the Government of Malaysia continues to maintain significant central control of public institutions (Raza, 2010).

Figure 6: Governance – Degree of Autonomy

Source: Raza (2010)
References


