HIGHER EDUCATION, COMPETITIVENESS, AND INNOVATION CAPABILITY, IN SOUTH AND EAST ASIA

A BENCHMARKING EXERCISE

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**Introduction**

The purpose of this benchmarking note is to compare the performances of a sample of South and East Asia countries in areas of global competitiveness, knowledge economy achievement, export structure, and education, particularly higher education. The goal is to (i) measure each country’s progress in promoting sustainable economic development and poverty reduction; (ii) to pinpoint areas of strength as well as areas where further improvements may be needed; and (iii) to show how higher education reforms (along with complementary reforms in primary, secondary, technical and vocational education) can promote sustainable growth, poverty reduction, global competitiveness and rising standards of living, especially for the poorest strata of society.

The countries discussed in this note are Bangladesh, Cambodia, Fiji, India, Indonesia, Malaysia, Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Timor-Leste, Thailand, and Vietnam. Singapore and Korea are included as comparator countries.

**Part 1**

**Innovation and Competitiveness-The role of Higher Education**

*Universities, Competitiveness and National Innovation System: What is their goal?*

The national goals are to accelerate growth, reduce poverty, achieve the MDGs, and improve the competitiveness of local industry, thereby creating higher wage, higher-skilled jobs that generate rising standards of living for all. In today’s global economy, tertiary education and innovation are indispensable tools for achieving those goals.

To support these national goals, higher education must be well aligned with the private sector development strategies and with innovation strategies—i.e. the pieces must fit together.

![Fig 1 Pieces must fit together](image)

Innovation capacity is closely linked to the quality of workforce, and hence to the quality of higher education system. It is also closely linked to enterprises because it gives them the tools to be productive and competitive: hence the interrelationship between education, innovation, and competitiveness.
**Dimensions of Science, Technology, and Innovation (STI) Capacity**

A well-rounded STI capacity means capacity building at four levels of the economy:

- National policy organizations
- S&T organizations such as universities and R&D institutes
- Enterprises—these are both users of knowledge and creators of knowledge
- The pool of human capital

Building STI capacity requires making judicious choices on what capacity to invest in. STI capacity is quite often equated with the capacity to create knowledge in R&D labs. However, lessons of experience suggest that developing countries—especially in the early stages of growth—would do well to focus more on their capacity to absorb and adapt knowledge for productive uses.

![Dimensions of STI Capacity Building]
Part 2
Benchmarking Exercise

Different benchmarking indices measure different dimensions of innovation capacity, competitiveness and higher education:

- World Economic Forum’s Global Competitive Index—to see how institutions, innovation, and education (among others) contribute to competitiveness

- World Bank’s Knowledge Economy Index (KEI)—for knowledge economy readiness with focus on innovation and education

- UNCTAD’s Innovation Capability Index—for underlying technological capacity with a focus on inputs to innovation (education and R&D)

- UNIDO’s Competitive Industrial Performance Index—for revealed technological capacity in industry with a focus on manufacturing competitiveness

- World Bank’s Doing Business Indicators—for how conducive the business environment is for enterprises

In addition to the above five benchmarks, we also illustrate the export structure of countries by i) technology category and by ii) commodity type. This is to understand how education and innovation can contribute to value-addition and diversification of exports.
1. Global Competitiveness Index

This chart presents the overall ranking of a select group of countries. The rankings are out of a total of 131 countries.

Source: WEF Global Competitiveness Report (2007-2008); data unavailable for Fiji and Lao-PDR

Pillars of Competitiveness

The scorecards below benchmark countries along eight pillars of competitiveness¹:

- Higher education and training
- Ability to absorb technology
- Ability to innovate
- Infrastructure
- Institutions
- Financial market sophistication
- Business Sophistication
- Macroeconomic Stability

¹ The latest WCR spells out twelve pillars of competitiveness. This paper uses eight of the twelve. The remaining four are: size of the market, primary education and health, goods market efficiency, and labor market efficiency.
Most countries score relatively well on macroeconomic stability. This is a very positive achievement. But it is not sufficient, as evidenced by the fact that many countries which do well on the macroeconomic stability dimension still perform poorly in terms of overall competitiveness. Their macroeconomic performance must be matched by complementary strides in higher education and training, business sophistication, the capacity to innovate, and the capacity to absorb technology produced elsewhere.

It is important to note the distinction between the capacity to innovate and the capacity to absorb technology. The ability to innovate measures the ability to invent new technologies and expand the frontiers of knowledge via R&D, patenting, etc. The ability to absorb technology measures the ability to acquire existing technologies that were invented elsewhere and to use them to reduce poverty, achieve the MDGs, and promote sustainable economic development.

In most countries, SMEs will be the ones who will be using this technology and know-how to create jobs and produce competitive goods and services. This is why a good business environment is so important. However, research institutes and universities, which have the human resource capacity to help SMEs find and adapt existing technology, also have an important role to play in this whole process. This means that universities will always be playing two critical roles in society – (i) education and training and (ii) economic development and technology diffusion.

Several countries – Malaysia, Thailand, Indonesia, and India—score relatively better on higher education than on their ability to absorb technology. This suggests that these countries may not be fully exploiting their higher education and training systems to promote innovation and productivity.

**Pillars of competitiveness**

![Chart showing Pillars of competitiveness for Malaysia, Korea, Singapore and Thailand, Korea, Singapore]
Source: WEF Global Competitiveness Report (2007-2008); data unavailable for Fiji and Lao-PDR
2. World Bank Knowledge Economy Index (KEI)

This index benchmarks countries along four dimensions:

- **Education**, measured by overall literacy and secondary and tertiary enrollment
- **Innovation**, measured by researchers in R&D, patents, and scientific publications
- **Institutions and Incentives**, measured by tariff barriers, regulatory quality and rule of law
- **ICT**, measured by telephone, computer, and internet use per thousand population

Source: World Bank KAM Database (2007); data unavailable on Fiji, Timor-Leste, Cambodia

Countries below the 45 degree line are losing ground. They ranked higher in 1996 than they do in the most recent survey. Conversely, countries above the 45 degree line – including Vietnam, Mongolia, Sri Lanka, Malaysia, Lao PDR, India, Indonesia, and Bangladesh – have improved their performance since 1996.
Four Pillars of Knowledge Economy

Why are some countries doing better while others are falling behind? The charts below provide some preliminary answers to these questions. On the education pillar, several countries—Korea, Pakistan, India, Indonesia, Philippines, Sri Lanka, and Nepal—have fallen behind. This is because although their secondary enrollment and adult literacy has registered good progress, their tertiary enrollment has improved slower than the rest of the world. This gap is further illustrated in the scorecards on human capital.

Source: World Bank KAM Database (2007); data unavailable on Fiji, Timor-Leste, Cambodia
Pillars of Knowledge Economy: A country by country view

Korea (1995, Recent)

Malaysia (1995, Recent)

Thailand (1995, Recent)

Philippines (1995, Recent)

Indonesia (1995, Recent)

Indonesia-weighted by population (1995, Recent)

Mongolia (1995, Recent)

Vietnam (1995, Recent)

India (1995, Recent)
Source: World Bank KAM Database (2007); data unavailable on Fiji, Timor-Leste, Cambodia
3. Human Capital for Knowledge Economy

Most of the countries have made good progress in secondary education and adult literacy. This is a welcome achievement. But tertiary enrollment and professional and technical training comes across as the two weak areas for most countries—and hence deserves more attention in higher education policies and programs.
Source: World Bank KAM Database (2007); data unavailable on Fiji, Timor-Leste, Cambodia
4. A Closer Look at Innovation: What to invest in and when?

The Knowledge Economy Index measures innovation in terms of R&D investments, patents, researchers, and scientific publications. Are these relevant indices for countries at an early stage of development? Should countries strive to improve their R&D and patenting performance or should they focus on something else instead?

History can be an interesting guide on the “what” and “when” of innovation. Although most countries lag behind Korea in such innovation indicators as R&D spending, patents, publications, and researchers, Korea’s indicators in the early decades of growth (1960-1980) show that Korea did not focus on these variables during its early stage of development. It was only relatively recently that Korea made large investments in knowledge creation. The early decades were spent on building the capacity to absorb and use foreign technologies and to train a technically proficient workforce of engineers and technical experts.

Using this lesson of experience, developing countries especially in the early years of growth would do well to focus their higher education programs on nurturing a well-trained technical workforce that aids absorption and use of knowledge.

Patents, publications, and researchers in R&D

Source: World Bank KAM Database (2007); data unavailable on Fiji, Timor-Leste, Cambodia
Innovation in Korea: Early stages of development vs. now

Source: World Development Indicators (2007)
Korea, Patents (1965-2006)

Source: USPTO, 2007
5. UNCTAD Innovation Capability Index

The Index is a combination of two components:

<table>
<thead>
<tr>
<th>1. Human capital Index</th>
<th>2. Technological Activity index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacy rate as % of population X 1</td>
<td>R&amp;D personnel per million population</td>
</tr>
<tr>
<td>Secondary school enrolment as % of age group X 2</td>
<td>US patents granted per million population</td>
</tr>
<tr>
<td>Tertiary enrolment as % of age group X 3</td>
<td>Scientific publications per million population</td>
</tr>
</tbody>
</table>

Source: UNCTAD World Investment Report 2005; Rankings out of 117 countries; Data unavailable for Nepal, Timor-Leste, Fiji
6. UNIDO Competitive Industrial Performance Index:

The Index is a combination of four variables:

1. Manufacturing value added (MVA) per capita
2. Manufactured exports per capita
3. Share of medium and high-tech activities in MVA
4. Share of medium and high-tech products in manufactured exports

Source: UNIDO Industrial Development Report 2004; Rankings out of 93 countries; data unavailable on Cambodia, Timor-Leste, Mongolia
7. Export Structure Based on Technology Categories

The export diagrams, together with the value-added charts immediately below, show that how a country produces is more important than what it produces—i.e. how much value it can add to products irrespective of the sector they belong to.

If value-added is high, even resource based exports can translate into higher revenues and well-paid jobs and high standards of living. This is true for USA, Singapore, and Finland. Hence a high percentage of natural-resource based exports from Indonesia, Nepal, India, Thailand, or Sri Lanka should not be seen as a weakness in the export structure.

But if the value-added is low, even a high percentage of hi-tech does not translate into high income. This is true for Philippines. Countries that add high value specialize in knowledge intensive design and engineering functions, whereas countries that add less value specialize in low wage, assembly operations. From a statistical point of view, they are both engaged in high tech activities, but the value added and standard of living generated by these “similar” activities are quite different.

Competing on the basis of value-addition requires a highly skilled workforce and a high quality secondary and tertiary education system.
Source: Calculated from UN COMTRADE database using SITC-2 latest available data (2004)
Value Addition: Agriculture and Manufacturing

Countries at the bottom of value-added charts do need to invent new knowledge. To catch up on the value chain, they need to acquire, adapt, and use knowledge already existing and widely used elsewhere. Universities and government research institutes must play a major role in this process of technological learning needed for value-addition.

Source: WDI, 2007; UNIDO, 2005
If Value Addition is Low, Hi-tech May not Translate to High Income

The chart below further strengthens the observation that hi-tech is not an automatic route to prosperity. If the knowledge intensity of the activity is low then the resultant job quality and income levels will be low as well, even if the activity falls into hi-tech category.

Source: WDI, 2007
9. Export Structure by Types of Commodities

The diagrams below show that the advanced economies have a more diversified export structure than the less advanced economies. However, they have followed different patterns of diversification. Hence a critical challenge for the higher education will be to nurture the right skills to help a country meet its unique diversification needs. Also, whatever be the pattern of diversification, the level of value-addition in each export category will determine the quality of jobs created in that sector and the level of income generated in that sector.
Source: WTO, 2007 (Latest data available is for the year 2005)
10. Business Climate: Necessary but not Sufficient for Innovation and Growth

A country needs a well-functioning business environment to attract FDI and support local businesses. This is a necessary step to encourage entrepreneurship and commerce. However, a good business climate will automatically not result in good performance in innovation and competitiveness. A high-quality workforce and a proactive public policy for technological learning would have to be coupled with doing business reforms. This can be argued from the relatively poor doing business score for China or India, and even Korea does not figure in the top 20 business environments. But these countries have made, or are making, good strides in innovation and growth.

Source: Doing Business Report (2007); Rankings out of 175 Countries; Data unavailable on Fiji
Unbundling the Doing Business Indicators (2007)

Thailand (18), Singapore (1)

Korea (23), Singapore (1)

Malaysia (25), Singapore (1)

Mongolia (45), Singapore (1)

Pakistan (74), Singapore (1)

Bangladesh (88), Singapore (1)
Learning Good Business Practices from Neighbors

The South and East Asian countries show a mix of good and bad scores on the ten indicators of doing business. This provides a good opportunity to learn from high-performing neighbors on various aspects of business environment.

**Best and Worst Performers on business environment indicators**

<table>
<thead>
<tr>
<th>Doing Business Indicator</th>
<th>Best Performer in the Group</th>
<th>Worst Performer in the Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting a Business</td>
<td>Sri Lanka (Rank 44)</td>
<td>Cambodia (159)</td>
</tr>
<tr>
<td>Dealing with license</td>
<td>Vietnam (Rank 25)</td>
<td>Cambodia (Rank 159)</td>
</tr>
<tr>
<td>Employing Workers</td>
<td>Malaysia (38)</td>
<td>Nepal (150)</td>
</tr>
<tr>
<td>Registering Property</td>
<td>Mongolia (Rank 16)</td>
<td>Bangladesh (Rank 167)</td>
</tr>
<tr>
<td>Getting Credit</td>
<td>Malaysia (Rank 3)</td>
<td>Cambodia (174)</td>
</tr>
<tr>
<td>Protecting Investors</td>
<td>Malaysia (Rank 4)</td>
<td>Vietnam (Rank 170)</td>
</tr>
<tr>
<td>Paying Taxes</td>
<td>Cambodia (Rank 16)</td>
<td>India (Rank 158)</td>
</tr>
<tr>
<td>Trading Across Border</td>
<td>Malaysia (Rank 46)</td>
<td>Mongolia (Rank 162)</td>
</tr>
<tr>
<td>Enforcing Contracts</td>
<td>Mongolia (Rank 41)</td>
<td>Bangladesh (Rank 174)</td>
</tr>
<tr>
<td>Closing a Business</td>
<td>Pakistan (Rank 46)</td>
<td>Indonesia (Rank 136)</td>
</tr>
</tbody>
</table>

Group excludes Korea and Singapore
References


3. World Bank, World Development Indicators, 2007, Washington, DC


