

Rising Above the Gathering Storm, Revisited

By Members of the 2005 “Rising Above the Gathering Storm” Committee



Ed. Note: The 2005 report “Rising Above the Gathering Storm”, issued by the National Academies, was enormously influential in stimulating debate and action with respect to the science and technology enterprise in the US. In 2010, many of the original committee members collaborated on a second report (of which what follows is an excerpt) designed to update the global context and events.

During the five years since the *Gathering Storm* study was published, a new research university was established with a “day-one” endowment of \$10 billion, equal to what it took MIT 142 years to accumulate. Next year over 200,000 students will study abroad, a large fraction in the fields of science, engineering, and technology. A new “innovation city” is being constructed, patterned after Silicon Valley, that will house 40,000 people. A multi-year initiative is underway to make the country a global nanotechnology hub, including constructing 14 new “world-class” universities. A new facility was opened to collect, store and analyze biological samples and serve as an international hub for biomedical research. A high-level commission with the objective of creating jobs at home has developed a long-term strategy for science and technology patterned after the National Academies study.

These actions were taken by Saudi Arabia, China, Russia, India, Luxembourg, and the United Kingdom, respectively.

Meanwhile, in the United States, six million more youths dropped out of high school to join a cadre of similarly situated youths—over half of whom under 25 years of age are currently without jobs. During the abovementioned interval, another \$2 trillion was spent on K-12 public education while K-12 students remained mired near the bottom of the developed-world class. Labor costs in the United States continue to eclipse those in developing nations, although in some cases by narrowing margins. Over 8.4 million jobs were lost in America . . . and the dollar dropped 9 percent against the Euro. The United States’ share of global high-tech exports dropped from 21 percent to 14 percent while China’s share grew from 7 percent to 20 percent. China continued to graduate more English-trained engineers than the United States.

Three new factors have evidenced themselves during the half-decade that has elapsed since the *Gathering Storm* report was prepared that are particularly significant.

(1) Decreased Financial Wherewithal to Address the Competitiveness Challenge. While the *Gathering Storm* report warned of an impending financial crisis, it was not addressing the type of crisis that subsequently occurred. It is not the long-term crisis of which the *Gathering Storm* committee sought to warn and avert: a far more serious and much more enduring financial reversal attributable to fundamental flaws in the nation’s process of generating quality jobs for which its citizens can be competitive. This failure includes such practices as tolerating a K-12 educational system that functions poorly in many areas, prolonged underinvestment in basic research, and discouraging talented individuals from other parts of the world, particularly, in science and technology, from remaining in America after having successfully completed their education here.

During the years since the *Gathering Storm* report was produced there has been another change in the character of job creation in America that presumably cannot sustain itself over the longer term. In particular, during this period the private sector eliminated 4,755,000 jobs while government (at all levels) added 676,000 jobs. The difficulty of reversing this trend is exacerbated by yet another development wherein, according to the Bureau of Labor Statistics, federal jobs now pay wages and benefits that on average exceed those in the private sector by 55 percent for similar occupations.

(2) Progress . . . Abroad. While all nations have suffered from the recent financial meltdown, not all have suffered equally. China's GDP grew at an average annual rate of 11 percent between 2005 and 2008; India's by 8.6 percent; Brazil's by 4.5 percent. In contrast, the United States growth rate has averaged 2 percent, albeit from a much larger base but with a much higher standard of living to support.

The above circumstance permitted China to increase its R&D investment as a fraction of GDP at an annual rate of 5.7 percent between 2001 and 2007, while the United States investment declined at an annual rate of 0.5 percent. Similarly, the number of first university degrees received in the natural sciences and engineering in China increased at a rate of 42 percent per year, whereas the production of such degrees in the United States has increased just 3 percent per year—with part of the increase attributable to growth in the number of non-citizen students receiving degrees.

During the most recent decade China increased its number of higher education institutions from 1,022 to 2,263. Tsinghua University, Peking University and Shanghai Jiao Tong University in China and the Indian Institutes of Technology are now considered to be among the world's foremost academic institutions. Perhaps the most innovative of the newly created institutions is KAUST, in Saudi Arabia. KAUST has no departments, no tenure, no undergraduates, no tuition, and a broadly international faculty and student body, heavily focused on research . . . and a very large endowment. It is led by an individual born in Singapore and educated in the United States.

The Information Technology and Innovation Foundation recently analyzed 16 innovation competitiveness indicators and found that the United States now ranks 40th out of the 40 countries and regions considered in "making progress on innovation and competitiveness."

(3) The United States Higher Education Outlook. America is still blessed with a disproportionate share of the world's finest universities—particularly research universities. Today, however, two forces are at work that could modify that circumstance. The first of these is that a number of other nations are placing extraordinary priority on higher education, particularly in science and engineering. The second is that as a result of the recent financial reversal, many United States universities are in greater jeopardy than at any time in nearly a century. As tax revenues have declined, state support of public higher education has been curtailed—in some cases severely. Simultaneously, the endowments of public and private institutions in the United States declined during the recession, suffering an average loss of 18.7 percent during 2008 and 2009.

The trend towards lesser government funding for public universities in most fields is not new . . . only the magnitude of the decline is new. The innovation that is so critical to our economic vitality is in jeopardy when our universities are in jeopardy. In 1975 private firms accounted for more than 70 percent of the "R&D 100" (R&D magazine's annual list of the 100 most significant, newly introduced research and development advances in multiple disciplines), but by 2006, more than 70 percent of the top 100 innovations came from "public or mixed" sources, including academia and federally-supported startups.

Given this demanding environment, a number of other countries are seizing the opportunity to attract United States-educated faculty "superstars" from United States universities where they are now employed. Attracting such individuals to other nations is made easier by political and economic developments in the past two decades that have enabled many more countries to offer reasonable lifestyles along with extraordinary research facilities (e.g., CERN in Switzerland, Biopolis in Singapore, the nuclear-fusion research facilities in China, and the high-energy particle research program in Japan). Further, in the case of engineering, over 35 percent of the faculty of United States institutions was born abroad, considerably easing the disruption of returning home.

United States universities, for the first time since World War II, are thus faced with a serious—and increasing—competition for talent from abroad. Perhaps the most disconcerting assessment comes from a United States Conference of State Legislatures report: *Transforming Higher Education*, which concludes that "The American higher education system (overall) is no longer the best in the world. Other countries outrank and outperform us."

It is instructive to ask which of the following two job candidates one would hire:

Candidate "A," ranks in the lower quartile of the high school class, expects to be paid a wage of \$17 per hour (the lifetime average wage of a United States high school graduate) with an additional one-third of that amount in benefits. Candidate "B" speaks two languages fluently, ranks near the top of the class and is eager to work for \$1.50 per hour.

This scenario, although oversimplified, is nonetheless a reasonable representation of the challenge faced by the average United States high school graduate seeking a job in the global job market—setting aside altogether the one-quarter of United States youths who have not received a high school diploma by the time their class graduates.

The Gathering Storm report concluded that, "Market forces are already at work moving jobs to countries with less

costly, often better-educated and highly motivated workforces, and more friendly tax policies.” From a shareholder’s perspective, a solution to America’s competitiveness shortfall has already been found—but it is at the expense of those seeking employment here at home. This represents a major dislocation of interests and loyalties that has as yet not been widely addressed or in many cases even recognized.

From America’s perspective, events that have occurred over the past five years have both positively and negatively impacted the nation’s competitiveness stature. On the positive side, there is a much greater awareness of the peril implicit in continuing in the direction the nation has been drifting for several decades. This is a non-trivial development, given that the basic nature of the competitiveness challenge does not lend itself to any sudden “wake-up call”—such as was provided by Pearl Harbor, Sputnik or 9/11. Also on the positive side of the ledger are past actions that have been taken by the federal government, particularly as part of the American Recovery and Reinvestment Act of 2009.

Gathering Storm assessments with findings that echo those from the study conducted by the National Academies—and in some cases the states have followed their findings with concrete actions. Unfortunately, a number of adverse developments with regard to the nation’s competitiveness have also occurred. Prominent among these has been the economic collapse triggered by the proliferation of sub-prime mortgages. Although not rooted in the same fundamental practices as the economic reversal described in the *Gathering Storm* report, the fallout from this relapse has further weakened America’s ability to respond to the long-term challenges it faces—including those addressed in the *Gathering Storm* report.

Further, for the first time in many decades the nation’s higher education system is being seriously challenged. This is a consequence of the decline in operating funds attributable to reduced endowments and declining tax revenues. Finally, although no nation has escaped the recent financial crisis unscathed, some have fared better than others and have focused additional sums on competitiveness. For example, last year China sustained an annual real GDP growth rate of 9.1 percent while India and Vietnam achieved 7.4 and 5.3 percent, respectively. The United States real growth rate was a minus 2.6 percent. The abovementioned three foreign countries of course have smaller GDP’s than the United States (India, for example, by a factor of four in purchasing power terms). But they also have a lower standard of living to maintain—and new funding sources are being generated, the fruits of which can be relatively quickly allocated as the nation’s leadership deems appropriate.

In balance, it would appear that overall the United States long-term competitiveness outlook (read jobs) has further deteriorated since the publication of the *Gathering Storm* report five years ago.

Today, for the first time in history, America’s younger generation is less well-educated than its parents. For the first time in the nation’s history, the health of the younger generation has the potential to be inferior to that of its parents. And only a minority of American adults believes that the standard of living of their children will be higher than what they themselves have enjoyed. To reverse this foreboding outlook will require a sustained commitment by both individual citizens and by the nation’s government...at all levels.

The Gathering Storm is looking ominously like a Category 5...and, as the nation has so vividly observed, rebuilding from such an event is far more difficult than preparing in advance to withstand it.

Copies of the report *Rising Above the Gathering Storm, Revisited* are available from the National Academies Press.
► [*Rising Above the Gathering Storm, Revisited: Rapidly Approaching Category 5*](#)

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