

THE CENTER OF THE COMPETITIVE UNIVERSE

A CHOICE OF

SCIENCE-DRIVEN ECONOMY

via

The Research University

or

MARKET/TECHNOLOGY-DRIVEN ECONOMY

via

A World Class Technology Delivery System

**Allen B. Rosenstein, Ph. D.
Pioneer Magnetics, Incorporated
CEO, chairman Board of Directors
UCLA Professor of Engineering Emeritus**

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PROLOGUE

“America’s Last Chance Action Plan” lists legislative actions the U.S. must address to restore the American Dream. Included in this list but not properly emphasized is the nations need for a viable internationally competitive Technology Delivery System. Its urgency has prompted the writing of this separate monologue. Harvard’s competitiveness guru, professor Michael E. Porter stated in Business Week, Nov. 10, 2008:

“America Needs An Economic Strategy” and added

“America’s Political System... almost guarantees an absence of strategic thinking”

Both statements are quite true. It is when one attempts to build an **Economic Strategy** that a series of questions arise. Let us postulate, for modeling purposes, a competitive economic universe. To project its behavior an acceptable realistic functional center of that universe must be formulated. It is almost impossible to construct a useful, competitive Economic Strategy from an obsolete economic model. Historically, for the past one hundred and fifty years two economic models based upon different centers have been dominant. The first may be called the Science Driven Economy and the second Market/Technology Driven Economy.

SCIENCE DRIVEN ECONOMY

Current U.S. academic and political thinking is heavily committed to the Science Driven Economy. This paradigm offers a linear progression of scientific research providing the innovations that lead to development, and ultimately manufacturing and economic leadership (R&D). The gradually deteriorating American Economy of the past 50 years has finally given way to a roaring recession (perhaps depression). National response has generated an increasing concern expressed in articles that would describe the affliction and possible remedies. Critiques are offered for three seminal competitiveness reports.* All three references favored the Science Driven Economy

Ref 100, yr. 2005 National Academies: “Rising Above The Gathering Storm-Energizing and Employing America For Brighter Economic Future

Ref 101, yr. 2006 Council on Competitiveness:-Correspondence

Ref 102, yr. 2007 We Are Still Losing The Competitiveness Advantage

“Rising Above The Gathering Storm” was written under the auspices of the U.S. National Academies by three Nobel Science Winners, five leading U.S. University presidents and a gaggle of respected industry, academic and government leaders.

“The Gathering Storm” message has been widely recognized and contributed to the “America Competes Act of 2007”. The act became law with a large bi-partisan congressional majority. Significant financing would be provided to advance a Science Driven Economy. Funding has not been allocated as yet.

* References – See “The Rise and Fall of the United States of America”

Questioning a popular widely acclaimed concept is never risk free. At the risk of challenging the foundations of American Academic culture we would respectfully suggest the basic tenants of the Science Driven Economy should carefully be reexamined. There is significant data, including 150 years of international experience that would link part of America's post WWII economic decline to the concurrent weakness of the national economic model and strategy.

Technology Policy International (TPK) in its May 2008 paper – “ New Pathways in the U.S. Innovation Policy” questions the dominant U.S. mainstream science, technology and innovation policy consensus. TPK concerns are well taken.

Forty years ago a study by Harvey Brooks documented the general fallacy of the basic Science Driven economic premise of R&D i.e. Research Leading Development.

Brooks wrote “. . . the big stimulus to research in an area follows rather than precedes invention . . . we must note that, in almost every case, a technological invention precedes much of the expansive growth of the sub-fields of physics.”
Science, pages 396-400, April 26, 1968.

The economics of the Science Driven Paradigm are questionable. Scientific knowledge is a universal free good readily available at little cost to all nations. Technology, ever changing, is the fuel that ultimately governs a nation's growth and prosperity. History back to ancient Rome shows that it is a wise acquisition of superior technology that determines national prosperity and life quality.

MARKET/TECHNOLOGY DRIVEN ECONOMY

The Market/Technology Driven Economy depends upon invention and/or recognition of a market need initiating the development cycle to produce a desired product. Research is only instituted when additional knowledge is required. In other words, D&R instead of R&D. Development typically includes funding, engineering, design, prototypes, refinement, sometimes research, production and distribution.

A successful Market/Technology Driven economy also requires a comprehensive world-class Technology Delivery system to seek out and disperse to domestic industry, the best international technology. Concurrent extensive cooperation among industry, government and academia is necessary to insure highly competitive market products.

Historical comparisons of competing economies can offer some measure of relative effectivity.

Two time periods are considered in the appended, very brief, mildly biased and somewhat repetitious recount of science and technology economic history after 1850 and the more recent post WWII eras.

TECHNOLOGY AND SCIENCE ECONOMIC HISTORY

ENGLAND & CONTINENTAL EUROPE (Ref. 5)

Circa 1850's Clever craftsmen, mechanics and artisans, created the English Industrial Revolution completely outside the English University. Britain's economy and industry took off.

1851 International juries awarded British products most of the prizes for the hundred categories of manufacturers at the International Exhibit.

1850-1860 With export of English "know-how" prohibited by law and English technicians denied passports, the continent turned to higher education for leadership and training to emulate the British Industrial Revolution. * But, science and the pursuit of knowledge so dominated the classical university that although law, medicine and theology were long established, the other professions were unable to gain acceptance. The continent responded by creating the Technische Hochschule and the Polytechniques to produce a new species of professions the manager – technologist. National leaders such as Bismarck and the Kaiser lent their prestige to the establishment of the Technische Hochschule for the professions outside the traditional university.

Early success of the Technische Hochschule led to a three-way separation of higher education into Kunst – Art, Wissenschaft – the scientific approach to all formally expressed knowledge, and Technik – the useful. Today, Technik is generally taught in Europe in separate technical universities quite apart from the classical universities that teach Wissenschaft. Kunst, the Fine Arts, has been taught in a number of separate schools and universities.

1867 16 years later the job was done. British products received a bare dozen awards in the International Exhibit.

Post 1868 Parliament belatedly realized Britain needed, but did not possess the equivalent of the Technische Hochschule. However, the segregation of technological education into separate institutions was opposed. The traditional English University was to provide education in the arts, sciences and professions. The marriage did not come easily. There was a subtle bias toward the arts and sciences that would reject technology.

Post WWII The English "red brick" universities were created to bridge the gap.

*The United States textile industry was established by stealing the construction details of the English Spinning Jenny and combining its machinery with Southern cotton.

UNITED STATES

1850's The United States produced a new form of higher education, the Land Grant College, which laid the foundation for American higher education. The great State Universities were basically professional schools turning out the practitioners of Agriculture, Teaching, Engineering, Manufacturing, Management, etc. needed to build a nation. Their contributions to American growth and prosperity cannot be questioned. American agriculture and higher education system became a world model.

Before WWI, the U.S. imported much of its scientific knowledge and technology. As a result of WWI, the American industrial plant was established, but the U.S. continued as a substantial importer of science. With the advent of WWII, the U.S. industrial plant was extended and a new science era began.

1950 The National Science Foundation was established mainly to improve the quality of the nation's science and mathematics. This admirable institution has conducted its affairs with vision and an awareness of the long-term interest of the country. Unfortunately, the prestige and financial power of the NSF, together with public preoccupation with science have severely warped the very fabric of the university.

Post 1950 At a time when U.S. technology and professional management was being recognized throughout the world, a counter trend was developing in U.S. universities. The visible signs of achievement and national recognition afforded by National Science Grants became irresistible on the campus. The warming flow of prestige, graduate students and promotions that accompanied the flood of the Science Foundation money found no natural enemy to maintain the normal balance in the academic jungle. One hundred fifty years of land grant tradition was slowly but surely replaced by the basic research orientation of the English and classical German universities. Without the balance of the continental Technische Hochschule, we are now repeating English history to, once again, demonstrate that possession of scientific knowledge does not translate easily into economic strength or improved life quality.

The redirection of the America University has had rather uniform effects upon the U.S. Professions Delivery Systems. As but one example, the U.S. wins over 50% of the Nobel awards in physiology and medicine. Yet, when measured by any reasonable criteria such as cost, infant mortality, life expectancy, population coverage, etc. the American health-delivery system is probably one of the most ineffective in the world.

Today, the United States still has nothing in place to compete with the world class Technology Delivery Systems of our trade competitors.

JAPAN (Ref. 10) GERMANY (Ref. 79)

Post WWII Both nations were devastated, industry destroyed, their economies shattered and research institutions dispersed. There was no time or resources to build a *research-driven economy*. Instead, with stunning success, both nations invented new ***comprehensive technology delivery systems***. These delivery systems, which operate on a worldwide basis, duplicated and dramatically improved many of the proven attributes of the United States Land Grant Agriculture system. The new technology delivery systems, constantly monitor and identify the most desirable future technologies. Following technology identification the delivery systems proceed to purchase, license, occasionally steal, design, fund, and develop, etc. the identified technology.

The process does not stop here. Financing and deployment follows technology development. The economic success of the market-driven technology is easy to verify. Japan and Germany possess two of the three largest world's greatest current account surplus. Only sixteen years after Japan created the Ministry International Trade and Industry (MITI,) that nation had realized the world's second largest economy.

THE UNITED STATES REVISITED (Ref. 26)

2008 The time is late. Our nation must recover from an over fifty-year decline and partially abetted by the attractive, but inefficient, Science R&D paradigm.

The National Policy and Technology Foundation Act HR 2165 was originally introduced with 55 co-sponsors, including Nancy Pelosi, Henry Waxman, Charles Rangel, David Bonior, George E. Brown, Bill Nelson, etc.

The Bill should be reintroduced to provide a 21st Century National Vision-creating Process to set competitiveness goals and policies and economic strategies for life quality, prosperity and the modern market/technology driven delivery systems essential to recapture the American dream.