AMERICA'S COMPETITIVE CHALLENGE

THE NEED FOR A NATIONAL RESPONSE

THE REPORT IN BRIEF

A Report to
the President
of the United States
from
the Business-Higher
Education Forum

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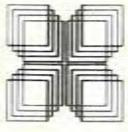

Washington, D.C.
April 1983

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Business-Higher
Education Forum

The President
The White House
Washington, D.C. 20500

Dear Mr. President:

As representatives of America's business and academic communities, we welcomed your invitation last year to prepare a set of recommendations designed to strengthen the ability of this nation to compete more effectively in the world marketplace. On behalf of the Business-Higher Education Forum, we are pleased to present you our report—"America's Competitive Challenge: The Need for a National Response."

We make one central recommendation: our society must develop a consensus that industrial competitiveness on a global scale is crucial to our social and economic well-being.

Unless the United States improves its ability to compete, unless we develop a comprehensive, coherent, long-term approach, and unless we address our problems from a broad perspective—we fear that domestic economic revitalization will remain an elusive goal. And unless we rebuild the American economy and strengthen our educational system, it will be increasingly difficult—if not impossible—to maintain a just society, a high standard of living for all Americans, and a strong national defense.

Many of the causes of our economic problems are deep-rooted and systemic—immune to "quick fixes." In the past, there have been many proposed changes in the areas of technology, innovation, capital investment, education, regulatory reform and international trade. Most have been ignored. As a result, we have lost ground in several key areas of international competitiveness.

We are convinced that previous efforts have failed for two principal reasons—an unwillingness to face the true nature and seriousness of the competitive challenge, and an inability to integrate the multitude of specific, short-term solutions into a multifaceted, long-term response.

Our approach must be comprehensive and based on the new economic realities. Given the emergence of a global marketplace, a turn inward will be self-defeating in the long run. Our mandate must not be to punish or retard the competitive gains made by other nations, but to do a better job of competing ourselves.

Our national competitive effort will require investment in physical capital (plant and equipment) and human capital, as well as a commitment to improved technological innovation. While this effort will require the active participation of all segments of society working individually and together, the leadership for such an initiative can come from only one person: the President of the United States.

We welcomed your recent State of the Union address, the subsequent Economic Report, and many of the budget recommendations you submitted

to Congress. They were positive steps to place the interrelated issues of trade, technology and investment into the proper perspective for the American people.

More must be done, however, to elevate the competitive challenge to the top of the national agenda. We believe the time is right to build on your recent initiatives in this direction. Thus, we recommend that you continue your leadership by taking several key actions to increase understanding of the importance of industrial competitiveness and to create the institutional mechanisms through which other leaders can begin the complex process of developing consensus on short- and long-term goals and solutions.

Our report does not pretend to provide all the answers. Rather, we approached the task with two objectives: to help us—and you—understand our present situation; and to find the missing links that have prevented effective action in the past. Our findings and accompanying recommendations are designed to provide a departure point for future initiatives.

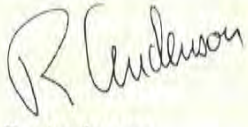
We stand at the hinge of history, with an unprecedented opportunity to combine the lessons of our past with the resources of our future to revitalize the economy, create more jobs, and increase the standard of living.

As a nation, we have the tools: a rich knowledge base; an energetic and creative people; a flexible form of democratic government; and a wealth of scientific advances and technological breakthroughs waiting only to be put to productive use. Indeed, the richness and diversity of our resources imbues us with a special responsibility to utilize them for the good of not only our own citizens, but for all mankind.

The task will not be easy. It will call for institutional change as well as technological innovation. We must operate from a new worldwide perspective. We must find new approaches and forge new partnerships for coordinated action. Above all, we need a focused national commitment. We must start now.

We, and the institutions we represent, are committed to the pursuit of this vital and urgent national goal. We are prepared to assist you in whatever way we can.

Sincerely,



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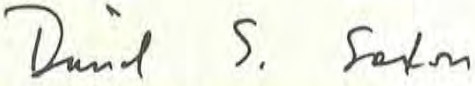

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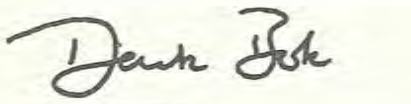

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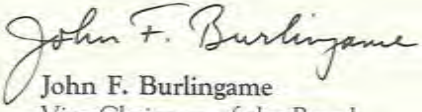

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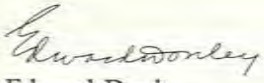

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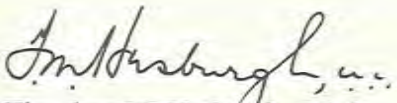

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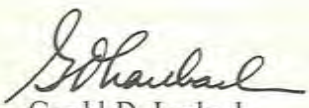

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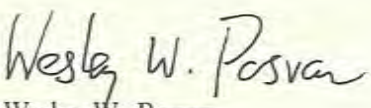

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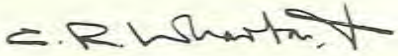

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FOREWORD

The questions of American economic vitality, innovation and industrial competitiveness have reached a level of broad discussion among the nation's leading public and private institutions. Recognition is growing that all sectors of American society have an important stake in economic renewal and important roles to play in bringing about that renewal.

In the spring of 1982, the President of the United States issued an invitation to the Business-Higher Education Forum to explore ways in which our national competitive position could be further strengthened through increased innovation and productivity. The Forum, a group of corporate and university chief executives, accepted the challenge not only to assess America's competitive condition—but to make specific recommendations for its improvement through the instruments of public policy.

A research and study effort, spanning the past year, was conducted by the Forum. A 16-member task force of Forum members met periodically to review the information gleaned from past surveys and contemporary expertise. From these deliberations, the task force developed its report and recommendations.

The task force study project and its final report benefited from contributions and scrutiny from outside the Forum membership. As a special adviser to the project, William O. Baker, the distinguished former Chairman of the Board of Bell Telephone Laboratories, provided important guidance. Thanks are also extended to Pat Choate for his assistance in the preparation of this report. The study was underwritten in part by The Andrew W. Mellon Foundation and the National Science Foundation.

INTRODUCTION

The central objective of the United States for the remainder of the decade must be to improve the ability of American industry and American workers to compete in markets at home and abroad. The new economic realities of global competition demand a broadly based national effort to make this possible.

This effort must be structured to allow both independent and cooperative actions by all sectors. Thus, government's responsibility is not to direct the activities of the private sector, but to streamline its own processes and create an environment in which the individual and collective talents of the private sector can be focused to meet the competitive challenge.

Yet American society remains confused and divided about both the nature of the competitive challenge and the national response it requires. Until citizens recognize that industrial competitiveness on an international scale is the key to economic growth, and until they appreciate that the overall well-being of society itself depends on such economic growth, we fear that little progress will be made.

Developing that understanding will require leadership from all sectors of society—business, education, labor, as well as government. But the essential leadership can come from only one person: the President of the United States.

We are convinced that once the American people are sufficiently informed about the nature and severity of the competitive challenge, they will respond with the same national consensus that allowed the United States to land men on the moon, and with the same national effort that enabled the United States to establish world leadership in such industries as computers and information processing, telecommunications, biotechnology and commercial aircraft.

Fortunately, competitive vitality chiefly depends on precisely those three elements which historically have been America's most powerful economic tools—productive capital investment, pace-setting technological innovation, and a skilled work force. We must restore our strengths in all three areas simultaneously by fostering public policies and private initiatives that strengthen our competitive position in the world economy.

Strengthening America's ability to compete will require exceptional resources, patience, sacrifice and vision. It will require avoiding the twin pitfalls of protectionism and increased government intervention into private sector activities. Indeed, it will require each segment of society to perform those parts of the overall effort for which it is best suited and to enter into new cooperative alliances when necessary.

We are emerging from a period of severe economic difficulty. Renewed growth, more jobs and higher standards of living are well within the capacities of the American people. The requirements are innovation, commitment and leadership.

The following report, findings and recommendations are offered as a departure point for this important national endeavor.

THE COMPETITIVE CHALLENGE

The United States has experienced a prolonged period of economic difficulty. In the past 12 years, the nation has suffered three major recessions, each worse than the last. In 1982, more Americans were out of work than at any time since the Great Depression. Productivity growth has declined from earlier years. Trade and budget deficits have risen. Most importantly, a growing number of U.S. industries are less competitive than they were in the recent past—a decline that is simultaneously a cause and a consequence of our economic malaise.

Any review of U.S. economic conditions must recognize that the realities of economic competition have changed. While the U.S. economy has remained relatively stagnant in recent years, other countries have made rapid gains. The Japanese and the Europeans already have captured major shares of the world markets for products such as automobiles, steel, machine tools and other manufactured goods. Since 1960, the U.S. balance of trade in these highly visible, older industries has declined from about zero to an annual trade deficit of over $35 billion.

Today, these same countries have targeted and are winning major world market shares in the rapidly growing, high-technology and service industries of the future, such as computers, telecommunications, advanced electronics, biotechnology, aerospace, insurance and financing. In the past decade alone, America's share of world exports in these industries has declined from 25 percent to 20 percent.

The once-insulated American economy has become increasingly part of an international marketplace. As late as 1960, the total value of U.S. imports and exports constituted less than 10 percent of the nation's Gross National Product (GNP); today, trade accounts for more than 25 percent. The world economy has become increasingly interdependent. Thus, the full revitalization of the U.S. economy is dependent upon the ability of American industry and workers to compete in global markets at home and abroad.

Other nations have recognized the new economic imperative and have integrated their domestic and foreign policies into aggressive, coor-

dinated national strategies to meet the challenge of international competition. The United States has not.

Just as the new economic realities must be viewed from a broad perspective, so must the consequences of continuing decline. The repercussions of a stagnant economy go beyond the statistics that document lost market shares, decreased GNP and increased unemployment. A weak economy and an inadequately trained work force intrude upon our social and political well-being, adversely affecting the ability of the United States to deliver essential public services to its citizens, to maintain a strong national defense, and to improve the living standard of all its citizens.

A weak economy is also the breeding ground for rigid and reactive public policy solutions to economic problems. Trade protectionism, national economic planning, income redistribution and plant-closing restrictions are only some of the solutions that become attractive in the absence of jobs and opportunities provided by a dynamic, competitive economy experiencing long-term, non-inflationary growth. Such alternatives are at odds with America's traditions of free trade and a free economy with minimal government intervention. More importantly, they are counterproductive to achieving economic revitalization.

THE COMPETITIVE CLIMATE

A nation's ability to compete depends on the vitality of three primary, interactive and interdependent elements: productive capital investment; technological innovation, ranging from basic research to the commercialization of new products and processes; and development of human resources.

Despite the fact that the United States has the world's largest capital base, the world's most advanced technology, and a highly educated and skilled work force, there is disturbing evidence that the nation is failing to utilize these strengths fully.

Capital investment historically has been a major contributor to U.S. productivity growth and hence to the nation's ability to compete. Yet for more than a decade, production-related capital investment has been declining as a percent of the GNP. Although aggregate capital investment by American business annually exceeded 10 percent of the GNP throughout the 1970s, real productive investment in plant and equipment actually declined. Today, two of our principal competitors—Japan and West Germany—make greater efforts in capital investment as a portion of their GNPs than does the United States.

Technological innovation has long been a major contributor to the nation's productivity growth, too. Yet in the two key stages of technological innovation—the generation of new technology and the commercial introduction and use of new technology—disturbing trends are emerging.

There is growing evidence that the United States is falling behind competitively—not in inventiveness, but in the commercial application of scientific discoveries and technological advances.

A number of factors contribute to this decline: Since 1960 the proportion of industrially funded R&D devoted to basic research fell from 8 percent to 4 percent. Much of that research—which is necessary for major breakthroughs and sustained productivity improvements—was redirected to short-term objectives. In some industries, this shift was in response to health, safety, environmental and other regulatory requirements. At the same time, American universities—which conduct more than half the nation's basic research—have suffered from an accumulated underinvestment in facilities and equipment amounting to an estimated $1-4 billion.

Advances in manufacturing technology have been an important element in the increased competitiveness of Japan and Western Europe in such industries as automobiles, aircraft and agricultural machinery. In the United States, it appears that the level of investment in manufacturing technology has, until recently, been quite low.

Federal R&D spending also plays an important role. The U.S. government spends substantially less than governments of other industrialized nations on projects to stimulate industrial development and growth. Instead, more than two-thirds of federal R&D monies are allocated to defense and space projects, and thus make a smaller direct contribution to productivity than would expenditures specifically for commercial projects.

Technology transfers—between government and industry and between universities and industry—are weak. More importantly, tax, regulatory and patent policies hamper the ability of industry to commercialize innovations.

Human resources are essential ingredients in the process of technological innovation and economic competitiveness. Yet the American work force may not be prepared for the new competitive challenges. Shortages are developing in critical skills, such as computer science and engineering; some industries are becoming less people-intensive, thus supplying fewer jobs; and one in every five American workers is functionally illiterate, unable to participate in even entry-level training.

In the next decade, 15 million new workers will enter the work

force. They—and many of the 100 million currently employed—will need education, training and retraining to keep abreast of changing job needs. Yet U.S. institutions are inadequately prepared for this important challenge.

Among the many factors contributing to the weakened vitality of America's capital investment, technological innovation and human resources, three are critical: disordered public policy-making; inflexible institutions; and a failure to organize knowledge for action. Thus, the stagnation of the U.S. economy—and with it, the ability of American companies and workers to compete on a global scale—cannot be blamed on any one individual, group or institution. Rather, it is the consequence of years of policy-making based largely on the discrete needs of individual sectors of society rather than on the needs of society as a whole.

Public policy-making affecting U.S. competitiveness is disordered and fragmented—creating a climate of uncertainty, instability, and recurring boomlets and declines for the private sector. The *ad hoc* process by which fiscal, monetary, trade, investment, regulatory, antitrust, human resource and other policies are considered virtually guarantees that their limited objectives will be pursued with little regard either for broader national goals or for their effects on other policy objectives.

Not surprisingly, policies frequently operate at cross-purposes and undermine each other. For example, significant increases in regulatory activities in the 1970s annually diverted tens of billions of dollars of private investment capital into non-productive activities. At the same time, fiscal policies were attempting to stimulate productive capital investment in modernized plant, equipment and technology without achieving the intended benefits.

Significantly, the United States—unlike other nations—does not have a coherent foreign economic policy capable of addressing key issues affecting the nation's ability to compete in the new global marketplace.

Inflexible institutions impair a nation's ability to compete. The new economic realities posed by the competitive challenge require nations not only to keep pace with accelerating technological, economic, social and international change—but to set the pace. America's public and private institutions—government, business, labor and education—have become barriers to the flexible response which is the key to future prosperity.

An administrative gridlock exists within and among federal, state and local governments. Business has too often sacrificed longer-term competitiveness and markets for short-term results. Education has given

insufficient attention to developing the basic skills—math and science—that will be needed by workers in an age governed by high technology. Labor has been slow in recognizing the economic realities of a changing world economy. And citizens themselves have supported, even demanded, programs that shift the nation's wealth from investment to consumption.

Finally, America has yet to capitalize fully on the opportunity to organize **knowledge for action.** U.S. institutions have failed to structure and share information in a way useful in taking steps to enhance America's ability to compete—ranging from the introduction of new products to the development of new laws and regulations. The country's vast resources of knowledge and sophisticated information-processing tools can be the basis for a powerful competitive advantage—if they are focused on that goal.

RECOMMENDATIONS

The central objective of domestic policy for the remainder of the decade must be to improve the ability of American industry and American workers to compete on an international scale. The U.S. economy is now inextricably and deeply linked to the world economy. Thus, unless the United States improves its ability to compete in global markets at home and abroad, the full revitalization of the American economy will not occur. At the same time, without a strong domestic economy, the United States will find it difficult, if not impossible, to achieve other important national goals—from maintaining a strong national defense to improving the quality of life for all American citizens.

The American effort must include: increased capital investment into long-term productive uses; increased technological innovation to help industry transform inventions into competitive commercial products and processes; and increased attention to, and nurturance of, the current and future work force. Because these three areas are strongly interactive and interdependent, benefits will come only through improvements in all three.

For example, spending more on R&D than any other nation in the world will have little impact on economic growth unless American industry can successfully commercialize the results of that R&D. And a massive investment in new factories and state-of-the-art equipment will accomplish little unless a corresponding investment is made to develop a newly skilled and competitive labor pool.

Just as no single group or institution is responsible for the decline in America's capacity to compete, no single group can solve the problem alone. Orchestrating the multitude of specific public and private initiatives into an internally consistent long-term approach will require

the collaboration of all segments of society—government, business, education and labor—as well as individual citizens.

In the past, a large number of specific recommendations have been made, each designed to solve a specific problem. The missing link has been an agreed-upon framework for the many actions, in the public and private sectors, that will constitute the American response. In appendices to the full report, the Business-Higher Education Forum has inventoried more than 200 relevant policy proposals that have been made in the past two decades. Most have been ignored. They stand as a monument to the well-intentioned failure of the nation to come to grips with the international economic challenge.

The Forum believes additional, specific recommendations are not the primary requirement at this point. Rather, changes are needed that will elevate the competitive challenge to the top of the national agenda.

Thus, the Forum makes only one overall recommendation: as a nation, we must develop a consensus that industrial competitiveness is crucial to our social and economic well-being. Such a consensus will require a shift in public attitudes about national priorities, as well as changes in public perceptions about the nature of our economic malaise.

We believe the process of developing a consensus should begin with a major public address by the President of the United States.

In his speech, the President should outline the nature and severity of the competitive challenge; explain why the new international economic circumstances demand a response from us that is both effective and compatible with the realities of our political and economic system; and point out that proposals for protectionism on the one hand, and centralized government direction of the economy on the other, are not solutions—but merely the same type of "quick fixes" that have failed in the past.

Further, the President should explain that reducing budget deficits, interest rates and unemployment—all important national goals—will lead to the full revitalization of the American economy only if those improvements simultaneously contribute to increasing the capacity of American industry and American workers to compete successfully.

In short, the President should raise the issue of our industrial competitiveness to such a level of importance that the need to reassess many of the nation's contradictory attitudes becomes widely accepted. Such acceptance would set the stage for subsequent initiatives by the public and private sectors to develop consensus on the specific short- and long-term changes needed.

As opposed to those who stress our current economic problems, the President should offer insight into the industrial potential of the new technologies. They are powerful tools with which the United States can inject new life into its industrial structure. The President should point out that as long as we fail to exploit the enormous pool of unused new technologies, other nations will gain a further competitive advantage. Therefore, the private sector—industry, higher education and labor—should strive to exploit, and should be encouraged to exploit, this new technology.

To emphasize further the importance of industrial competitiveness to the achievement of all other national goals, we also urge the President to take the following actions:

- **Presidential Adviser on Economic Competitiveness**
  The Forum recommends that the President appoint an Adviser on Economic Competitiveness. The Adviser's task would be to help the President and other policy-makers focus on the diverse concerns—such as trade and investment, regulatory reform, technological innovation and the development of human resources—that are basic to an effective competitive effort.

- **The National Commission on Industrial Competitiveness**
  The Forum strongly supports the President's stated intention of establishing such a group. The Forum recommends that a private sector commission, composed of business, education and labor leaders, be charged with developing consensus on issues of competitiveness and conveying those views to government.

- **An Information Center on International Competitiveness**
  The Forum recommends that the U.S. Department of Commerce establish a bureau with the responsibility, funds and staff to operate an information center on international competitiveness. The purpose of this bureau would be to collect the substantial data, research and analyses of both U.S. and foreign economic competitiveness that are now scattered among numerous public and private agencies; prepare short- and long-term assessments of the competitiveness of specific sectors; prepare and maintain indices on U.S. competitiveness; assist other research organizations; and serve as a clearinghouse for information.

THE NEXT STEPS

The preceding recommendations are only a beginning. A series of more specific public and private initiatives will be needed to enhance America's ability to compete worldwide.

It is vitally important to narrow the agenda of possible actions so that critical initiatives can be debated, evaluated and implemented. The Forum believes, based on its year-long investigation and the combined experience of its members, that specific actions in the areas of trade, capital investment, technological innovation and human resources should be considered as a means of improving our national competitiveness.

The following suggestions for public policy-makers are neither exhaustive nor entirely original. They are not recommendations, but are offered as a starting point for discussion by members of the proposed National Commission on Industrial Competitiveness.

TRADE

- Review the effects of domestic economic policies (e.g., tax, antitrust, monetary, regulatory) and trade policies on U.S. trade flows, including comparative analyses with policies of other nations.
- Develop an annual executive branch report on U.S. foreign economic policy for submission to Congress.
- Correct the exchange rate disparities that reduce U.S. competitiveness (especially the yen/dollar imbalances) and develop alternatives for achieving a balanced exchange rate system.

CAPITAL INVESTMENT

- Further reduce the capital gains tax on long-term investments and increase tax incentives for investment in productive plant, equipment and technology.
- Amend regulatory statutes (e.g., the Clean Water Act and the Clean Air Act) to ensure that they are compatible with the needs of our economy to remain competitive.
- Strengthen current regulatory reform efforts (e.g., incentive-based regulations, performance standards and cost-benefit analyses).
- Increase interactions between regulators and affected private sector parties through revisions in the Administrative Procedures Act and the Federal Advisory Committee Act.

- Revise the Freedom of Information Act to protect proprietary information submitted to government agencies.
- Develop integrated, consistent permit requirements at the federal, state and local levels.

TECHNOLOGICAL INNOVATION

- Provide a refundable tax credit and/or increase the incremental tax credit for use by firms conducting long-term research.
- Eliminate Treasury Regulation 1.861-8, which may reduce the incentive of U.S. multinational companies to conduct R&D in the United States.
- Develop any "technology-forcing" regulations in cooperation with industry to ensure that sufficient time is allowed for the development of cost-effective technology.
- Streamline regulatory processes, especially the product-approval process of the Food and Drug Administration and the licensing process of the Environmental Protection Agency.
- Improve the patent system by reintroduction and passage of the Patent Term Restoration Act of 1981 or a similar bill, and negotiation of better protection of the intellectual property of U.S. firms conducting business in less-developed countries.
- Make better use of information in patent documents to monitor foreign technology.
- Extend the Patents and Trademarks Act of 1980 to allow large companies the option of retaining title to inventions developed with federal R&D funds.
- Revise the Freedom of Information Act to prevent its use by foreign competitors to obtain access to U.S. industrial technology.
- Remove antitrust constraints on cooperative research, and reduce constraints on projects involving joint technology development.
- Encourage limited R&D partnerships through publicity and the clarification of current antitrust and tax policies.
- Expand government funding programs for university-industry cooperation to encourage participation by universities and companies that have little experience with cooperation.
- Modify the Economic Recovery Tax Act of 1981 to expand eligibility and clarify the allowable tax deductions companies can take for donations of equipment to universities.

- Increase Independent Research and Development (IRAD) funding for company-sponsored projects at universities.
- Support the proposed 10 percent increase in federal funding for basic research in the President's budget for FY84.
- Increase federal funding to upgrade and replace universities' obsolete equipment and facilities.
- Identify new methods of transferring technology developed with government R&D to private industry.
- Develop a system for collecting information on foreign technology developments and disseminating it to U.S. industry.

HUMAN RESOURCES

- Develop a coherent, comprehensive national displaced worker program modeled after the G.I. Bill with its educational "vouchers." The program would be financed jointly by employers, employees and the federal government.
- Provide tax incentives to stimulate additional investment by industry in the education, training and retraining of workers, including apprenticeship programs.
- Create an Individual Training Account (ITA), similar to the Individual Retirement Account (IRA), to provide incentives for individuals to save for their own training and retraining needs.
- Provide special loans to U.S. graduate engineering students who agree to teach. The loans would be forgiven at a specified amount for each teaching year.
- Provide additional support from the public and private sectors to train secondary school science and math teachers.

PRIVATE SECTOR INITIATIVES

While changes in public policy are essential, they only establish the climate for private sector activities. The revitalization of the U.S. economy through competition ultimately depends on the degree to which private sector institutions capitalize on available opportunities.

The following list of private sector initiatives is intended primarily to provide examples of the kinds of efforts that can be undertaken by businesses and institutions of higher education—working individually and together—to stimulate a renewal of American economic vitality, innovation and competitiveness.

INDUSTRY INITIATIVES

Encouraging Innovation and Competition. The American business community must bear a large portion of the burden of revitalizing industrial competitiveness. Actions are required in a number of areas to improve operations:

- American industry should critically reexamine the long-term competitive viability of the time horizon used for planning investments and evaluating pay-backs.
- Regional financial institutions should either develop an internal capability for supporting exports or create effective referral procedures to help local industry.
- Industry should give more emphasis to manufacturing technologies, and upgrade the incentives for specializing in this area.
- The career-long professional development of industrial scientific and engineering personnel should receive greater emphasis from both employees and companies.

Supporting Education. Industry can be of assistance to the educational system and, more importantly, to its own long-term interests by increasing its support of education. Key areas include:

- Support for sophisticated equipment.
- Greater use of academicians as consultants.
- Greater support for university research, especially in neglected nonproprietary areas.
- Assistance in improving precollege education, particularly in science and mathematics.

UNIVERSITY INITIATIVES

Teaching and Research. Universities can contribute by increasing their emphasis on teaching and research in the following areas:

- The extent and impact of trade barriers on U.S. competitiveness.
- Foreign management practices and comparisons to the United States.
- Expanded study programs and curriculum requirements in the fields of foreign language, culture and sociopolitical institutions.

A number of suggested teaching emphases apply specifically to professional schools:

- Business schools should expand their teaching and research on the elements of management that are fundamental to effective industrial R&D, technological innovation, high productivity and high product quality.
- Centers for international study should strengthen programs and data bases in the areas of industrial, commercial, legal and financial practices and institutions.
- Graduate schools in public administration, government, law and the social sciences should expand teaching and research on the importance of innovation and international trade to economic vitality.
- Engineering schools should reemphasize manufacturing engineering.

Administrative. In addition to specific changes in teaching and research, universities can revise certain general administrative practices to enhance the contribution of university research and teaching to industrial competitiveness. Some actions are:

- Alleviate equipment problems through such means as specialization by institution, shared facilities and arrangements with local industries.
- Adjust academic schedules to accommodate mid-career science and engineering students.
- Make engineering faculty salaries more competitive with market salaries by establishing separate wage scales independent of the campus-wide standard.

INDUSTRY-UNIVERSITY INITIATIVES

Cooperative Relationships. Working together, businesses and universities can pool talents and resources to accomplish what they could not achieve working independently. Potential benefits include the more expeditious transfer of research results to commercialization and the education of students on subjects relevant to industrial needs. Key areas include:

- Collaborative problem-oriented research should be encouraged.
- Industrial firms and universities should develop methods of accelerating commercialization, including the creation of new institutions and forms of cooperative relationships.
- Business and higher education should work with government to develop better data on trends in technological change and competitiveness for use in business and government policy-making.

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ABOUT THE BUSINESS-HIGHER EDUCATION FORUM

The Business-Higher Education Forum was created for the express purpose of promoting discourse and acting on issues shared jointly by American business and the nation's higher education institutions.

Founded in 1978, in affiliation with the American Council on Education, the Forum is an organization of leading corporate and academic chief executives. The Forum's major objective is to provide an opportunity for interchange among its members on matters pertaining to their respective interests and, hence, to the common aspirations and needs of the business and academic communities. Within that framework, the Forum has three major goals:

- to identify, review and act on selected issues and topics that relate to the current and future requirements of business and higher education;
- to enhance public awareness of the concerns shared by business and academic leaders and to serve as a positive contributor in helping shape public policy thinking as it affects those concerns; and
- to help guide the evolution of future relationships between corporate America and institutions of higher learning, while preserving their separate historical and traditional functions.

Social and economic progress in the United States owes much to the vital contributions business and higher education have made to each other—and to the larger society. Today, prosperity in both sectors faces unprecedented challenges. But there are also unlimited opportunities. The Forum is a unique expression of the leadership and thinking so essential to continuing and achieving that quest.

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