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Improving Productivity Through Technology and Innovation

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Thank you, Mr. Chairman.

The term productivity as used in the announcement for this Seminar refers to production efficiency as it applies to manufacturing programs. You decided to attend this Seminar, most likely because you expected to pick up new ideas, both from the morning speakers and the exchange sessions this afternoon, which you could take back and use. And, you should not be disappointed.

There is little evidence of superior performance in my background in productivity as it relates to manufacturing processes. Quite the contrary. I have struggled with new product introductions, low volume, inefficient production methods, long startup periods with cumulative reject rates of 70% for months on end. I have experienced growth of a small company from a level of about 200 to 1,000 people in 18 months, not by plan, but rather by demand from the marketplace. I have witnessed growth in production of 25% per month for 5 consecutive months. Compounded of course, that is three times the original volume. I have agonized over a 50% cutback in direct labor while production continued to increase.

I have prayed for sales enough to avoid financial disaster; suffered the pressures of limited production with explosive market demands; and I must tell you that those problems, in terms of customer pressures, can be equally as traumatic as those involving finances. The one experience I have escaped was that circumstance where the market demand was just enough to challenge production and where everyone was happy and productive.

To avoid sounding like a self-proclaimed economist for the next few minutes, let me try to summarize the consensus of a 100-member Advisory Committee which has been meeting periodically since last October to respond to President Carter's request to identify reasons for our nation's decline in productivity growth and, in particular, recommend what can be done through public policy changes to stimulate technology and industrial innovation.
When asked to participate in this seminar by your program chairman, Thornton Moore, I agreed on the condition that my discussion could address the importance of productivity on our nation's economy and the major components of productivity, that is, technology and industrial innovation.
Among the industrialized nations, the United States now ranks fifth, behind the U.K., in productivity growth. Productivity is the bottom line or the ultimate result of prior use of technology and industrial innovation. Any assessment of our decline in productivity growth must relate to the nation's climate for innovation. Innovation, however, is a commodity that defies precise measurements. Though far from being precise, the following statistics may provide an insight to the scope of the problem.

- The nation's total research and development expenditures (in constant dollars) have declined by about 5% since the late 1960's, while expenditures for basic research are down more than 10%.
- Industrial R&D spending since the late 1960's has risen a little faster than inflation, but expenditures for basic research have declined more than 20%.
- R&D spending has slipped from 3% of the gross national product in 1965 to about 2% in 1975, less than a decade, while Japan and West Germany have made substantial increases, and the Soviet Union is now above 3%.
- Foreign investors now receive about twice as many U.S. patents each year as they did in 1968, while the number of foreign patents issued to American inventors has declined.

Although this is not a perfect measurement of innovation in this country, it does demonstrate that we are headed in the wrong direction. There is evidence that technical resources are being moved away from long-term basic research towards short-term improvements in existing products and processes.

It is no understatement to say the United States has been the outstanding industrial leader in the world in such areas as automobiles, electronics, and aircraft. World leadership today, however, is being challenged with the growing imports of automobiles and consumer electronics and, more recently, our unquestioned leadership in aircraft has been challenged. This past summer, Frank Borman, former astronaut and President of Eastern Airlines, defended his company's decision to purchase a fleet of French-made A-300 passenger jets. Mr. Borman said: "What concerns me most is that U.S. technology that once was the best in the world, has not kept pace. The A-300 is here when we need it".
Following months of intense lobbying by a few concerned leaders of industry, the Carter Administration has ordered a massive 28-agency review of the role of government relative to industrial innovation. The Administration's concern is underscored by the fact that it is organized as a Domestic Policy Review, the highest sort of attention that a problem could receive within the executive branch.

The Secretary of Commerce, Juanita Kreps, was named Chairman of the Cabinet-Level Coordinating Committee. By October, 1978, seven Sub-Committees made up of 100 leading members of industry, with an additional 60 members representing labor, education, and consumer interests, began a comprehensive study.

Each of the five industry Sub-Committees were assigned a separate subject. They were:

1. Patents and information
2. Procurement and direct support of R&D
3. Economic and trade
4. Environmental health and safety
5. Industry structure and competition

Final reports were presented in public hearings lasting through mid-January, with labor and public interest Sub-Committees playing the role of adversary in each hearing. Public Interest challenges the need for new technology as a government priority as opposed to social welfare issues, while Labor expressed fears that stimulating new technology would cost jobs.

Out of the five Sub-Committees came over 150 recommendations which ultimately will be prioritized and condensed to 10 key issues to be presented to the President by May, 1979. A few highlight issues evolving from Sub-Committee studies include the following:

**PATENTS AND INFORMATION POLICY**

Perhaps one of the greatest incentives to developing new technology is the opportunity for an individual to secure a patent in the hope that the protection of an idea would extend to him a monopoly of that technology and allow the inventor to
realize his "great American dream". The study of this Committee, however, revealed that patents are not all that great. The Patent and Trademark Office, a training ground for law graduates in their path to becoming patent attorneys, has been faced with gradual budget reductions, together with an increase in case-loads over the past ten years. The net result is that the reliability of patents which are allowed, has deteriorated. The information system for searching patent files to determine interferences or prior art is antiquated and cumbersome.

The results of these problems has caused the "pendency period" (that period of time from application to patent allowance) to extend to approximately 19 months. With further proposed budget cuts, some estimate an increase of this pendency period to as much as four years by 1984. Obviously, in today's fast moving technology, such delays might well destroy the patent system.

With the decrease in the reliability of patents, the result is that more patents are challenged. Corporate patent policies are seen to be shifting from reliance on patents to reliance on "know-how". If a new product might ultimately interfere with a prior art patent, the rationale becomes that it is cheaper to challenge the patent under the assumption that no patent is entirely defensible.

The Committee study found that the present court system of adjudicating patent suits was inconsistent and unreliable. One District Court System was reported to have "not allowed a patent defense in the past 20 years". Forcing the system, in many cases to be less reliable, is the attorney who builds his reputation, and his estate, by accepting patent litigation on a contingency fee basis. Although this may be the only way a small company can afford the high costs of patent litigation, harassment, endless interrogatories, and horrendous legal costs are the usual result.

Recommendations of the Committee, therefore, were to shore up our patent system and prevent further deterioration through the budget process. Recommendations also included establishing a special appellate court where judges are qualified to rule with more consistency on highly technical matters; overhaul the present patent search system through the establishment of a data bank and computerized technical reference system to incorporate both U.S. as well as foreign patents and make the entire system accessible to the small business and the inventor as well as the large company.
Because of the growing agency delays in securing product approvals, a recommendation was made to extend the life of patents beyond 17 years to compensate for the government-caused delays in getting products to the market. Government-supported research and development contracts, particularly in the area of defense R&D, have resulted historically in hundreds of patents remaining on the shelf gathering dust for one basic reason. Government policy does not allow independent contractors the exclusive rights to patents, and therefore, companies cannot risk the high costs of development on a non-exclusive patent.

REGULATION OF INDUSTRY STRUCTURE AND COMPETITION

The federal regulatory process which has spawned countless new social regulations over the past 10 years created a diversion of resources normally assigned to research and development, instead, to be spent on costs of compliance. The research budgets for private industry have universally been diluted in favor of defensive costs of compliance with regulations. Economist Murray Weidenbaum, Director of Washington University Center for the Study of American Business, calculates that regulatory compliance will cost business almost $100.0 billion in 1979 alone.

Regulations have caused industry concentration, have raised the cost of market entry, and have, in effect, forced big business to become bigger. Regulations have been adopted without regard for the smaller companies. As a result, the costs of compliance, and particularly the paperwork associated with such compliance, has created a disproportionately heavy burden on the smaller businesses.

The more drastic example is the effect of EPA on the cast metal industry. In the six years following the enactment of the 1968 EPA regulations, there were 350 verified foundry closings. Approximately half of these closings were directly or indirectly related to EPA requirements. In the battery industry which is made up of 143 firms, because of OSHA lead regulations, resulting in a much larger per unit production cost for smaller plants, the dilution of the plant's profitability would cause 113 single-plant battery firms to close, eliminating half of the productive capacity not generated by the five major battery companies.
The result is that not only has the cost of entry to these industries become prohibitive, but large businesses, in order to maintain their source of supply for cast metal, have been forced to integrate vertically. Of course, the large volume battery manufacturers will absorb the market formerly supplied by the smaller battery manufacturers and thus become larger.

What then is the role of small business in regard to our country's ability to innovate?

Studies have shown that, prior to 1968, over half of all significant new technology came out of small business. Government studies have also shown that the cost of R&D in small businesses was less than one-half the cost in large business. It is therefore not surprising that in the past 20 years, the invested capital in businesses under $50.0 million in gross revenues, as compared with invested capital in businesses over $1.0 billion, has eroded in a ratio of four to one.

Recommendaions of this Sub-Committee focused on regulatory reform. For instance, regulations should not specifically dictate the procedure of compliance, but should only outline performance standards.

Each regulatory agency, to reduce the uncertainty of regulatory change resulting in major costs to industry, should prepare a five-year plan allowing feedback from industry through advisory committees in a comprehensive review process.

Regulations should be constructed with a consideration of three levels of business size with respect to costs of compliance.

Each agency should, prior to initiating any regulation, prepare an economic impact analysis with a review process using industry advisory committees, to prevent serious economic distortions within any industry. Tax incentives should allow small companies to attract venture capital through liberalization of the Sub-chapter S corporation rules and a flow-through of losses to investors within the year incurred.

These are but a few of the 150 recommendations which will be condensed to perhaps 10 of the more critical changes necessary to stimulate innovation and technology. We have not discussed anti-trust issues nor the cooperative environment that foreign governments exercise with their industrial partners. We have not made a case
for what appears obvious; that the United States government acts as an adversary to business rather than as a partner.

From all this, I hope you feel the need for major reforms both in regulations and in public attitudes. The American Institute of Industrial Engineers represents a technological strength within our country to enhance productivity and help re-establish our country as the industrial and economic leader.

I submit that, as an industrial engineering society, you cannot successfully function without a creative environment for the development of new technology and also a regulatory environment that will allow the cost of U.S. produced products to be competitive and technologically superior in the world market.

You must, therefore, begin to give as much attention to the politics of innovation as you do to the technology of productivity, because this will determine our ability to achieve national objectives. Our country has always enjoyed the reputation of being the most technically advanced society in the world. Now is not the time to relinquish that title.

Thank you.