

**INDUSTRIAL
ADVISORY
SUBCOMMITTEE
REPORT ON
REGULATION OF
INDUSTRY STRUCTURE
AND COMPETITION**

***industrial
innovation***

The Effects of Domestic Policies of the Federal Government upon Innovation by Small Businesses

Innovation is an essential ingredient for economic and social growth. It is the driving force that increases productivity and that results in new products, processes, and services. Innovations create new and better jobs, reduces production costs and prices, increases foreign sales, and increases real personal income so that our citizens can finance major advancements in the qualities of life such as better education, improved health care, increased longevity, and more leisure and recreation.

Without innovation, economic stagnation occurs resulting in rising prices, decreased employment, and increased foreign competition—all symptoms of stagnation including inflation. Inflation, our nation's major problem is, in our opinion, a direct result of a large decline in private sector innovation over the past decade.

To a large extent, the mandates of the U.S. electorate to fulfill basic social and human needs of our citizens requires a rapid rate of economic growth. Such social and economic growth can only occur with vigorous private sector innovation.

SMALL BUSINESSES MAKE A DISPROPORTIONATELY LARGE CONTRIBUTION TO INNOVATION

The economic history of the United States is replete with examples of small innovators making major contributions. From the late 1700's through the 1970's a major source of technological advancement was the result of individual inventors and entrepreneurs working independently of our large industrial corporations, universities, and government laboratories. This is particularly true in situations where radically new concepts have been introduced.

In our early history we had Eli Whitney in 1793 with his cotton gin and Robert Fulton with the steamboat in the 1840's. These two innovations had an enormous impact on young America. Later came the railroads. Next, in telecommunications, we had Morse and Bell, whose contributions greatly accelerated the growth of our economy. Similarly, Edison, Westinghouse, McCormack, the Wright Brothers, Ford, and DeForest made introductions that laid the foundation for further economic advancements. This is only a partial list. All of these innovators were small guys.

The same trend continued after World War II with the success stories of Land at Polarioid and Watson at International Business Machines. During the 1960's we saw the emergence of companies such as Xerox, Digital Equipment, and Hewlett-Packard, each beginning as individuals with their small companies who

were free and able to innovate. In addition to these better known names, there were thousands of small high-technology companies spawned during the 1950's that have created major growth in our economy and have increased the quantity and quality of employment.

A recent study by the National Science Foundation concluded that in the post World War II period, firms with less than 1,000 employees were responsible for half of the "most significant new industrial products and processes." Firms with 100 or fewer employees produced 24 percent of such innovations. In addition, the cost per innovation in a small firm was found to be less than in a large firm since small firms produced 24 times more major innovations per research and development dollar expended as did large firms. Yet small firms conduct only 3 percent of U.S. research and development. While there is much innovation that can only occur in large resourceful companies, small firms are often more adventuresome and have a greater propensity for risk taking, and accordingly are able to move faster and use resources more efficiently than large companies. *We believe that there is something fundamental about the unusual ability of small firms to innovate that must be preserved for the sake of healthy economic and social growth in the United States.*

SMALL INNOVATIVE BUSINESSES CREATE JOBS AND TAX REVENUES AT A RAPID RATE

The role of small innovative businesses in stimulating economic growth can be seen from two recent studies. The first, by the Massachusetts Institute of Technology Development Foundation, shows compounded average annual growth from 1969 to 1974 for the following three groups of companies:

	Sales (percentage)	Jobs (percentage)
Mature companies	11.4	0.6
Innovative companies . . .	13.2	4.3
Young high-technology companies	42.5	40.7

In this study, *mature companies* were Bethlehem Steel, DuPont, General Electric, General Foods, International, Paper and Procter and Gamble. *Innovative companies* were Polaroid, Minnesota Mining and Manufacturing, International Business Machines, Xerox, and Texas Instruments. *Young high-technology companies* included

Data General, National Semiconductor, Compugraphics, Digital Equipment, and Marion Laboratories. The companies selected in each group were, in every case, leaders in their particular industry.

The M.I.T. report states:

It is worth noting that during the 5-year period, the six mature companies with combined sales of \$36 billion in 1974 experienced a net gain of only 25,000 jobs, whereas the five young, high-technology companies with combined sales of only \$857 million had a net increase in employment of almost 35,000 jobs. The five innovative companies with combined sales of \$21 billion during the same period created 106,000 jobs.

This study also observed that the *innovative companies* produced three times the level of tax revenues as a percentage of sales as did the mature firms.

Conclusions similar to those mentioned above emerged from a study of 269 firms by the American Electronic Association. In February 1978, Dr. Edwin V. Zschau of the A.E.A. presented the results of that study to the Senate Select Committee on Small Business. The report showed the following growth of employment for new established firms as contrasted to more mature companies:

Years since founding	Stage of Development	Employment Growth Rates in 1976 (percentage)
20+	Mature	0.5
10-20	Teenage	17.4
5-10	Developing	27.4
15	Startup	57.7

Dr. Zschau also reported that annual benefits to the economy realized in 1976 for each \$100 of equity capital that had been invested in *startup* companies founded between 1971 and 1975 were:

- Foreign sales\$70 per year
- Personal income taxes\$15 per year
- Federal corporate taxes\$15 per year
- State and local taxes\$ 5 per year
- Total taxes\$35 per year

This data shows that the benefits of investment in small innovative ventures are large (e.g., jobs are created and these jobs are kept at home—exports are created instead of imports—a new \$35 per year flow in tax revenues is realized for each \$100 initial investment). This large and powerful flow of benefits starts soon after the investment is made, and the benefits are substantially greater than those of large corporations.

The huge benefits derived from a favorable climate for small business innovation is apparent from this review of the contributions to economic growth made by individual entrepreneurs and their small companies. *If the United States desires to bring inflation under control and to continue to enjoy the economic and social benefits of innovation, individual entrepreneurs and their small companies must be free to engage in innovation.*

THE ENVIRONMENT FOR SMALL BUSINESS INNOVATION IS NOT HEALTHY

It is clear to us that innovation is the keystone of economic and social growth, and that individual entrepreneurs and their small innovative businesses have contributed a disproportionately large share of innovation. It is also clear that the climate for the formation and nurturing of small innovative enterprises in America has suffered a major deterioration over the past 10 years and as a result innovation has withered.

There are no concise indices for innovation, although productivity is one measurable result. From the close of World War II until the mid-1960's, the average annual productivity increase for each manufacturing worker was approximately 4.1 percent. From the late 1960's through the mid 1970's, it averaged 1.6 percent per year. In 1978 it was 1.0 percent, and some economists are predicting a rate of 0.4 percent for 1979. This is a tenfold decline that has occurred steadily over the past 15 years.

Similar trends of a substantial downward nature can be observed in the flow of capital to small firms. In the 7 years from 1969 through 1975, the amount of capital acquired by small firms with less than \$5 million in net worth from public markets declined from approximately \$1,500 million to approximately \$15 million—a hundredfold decrease. No significant improvement has occurred in the past 3 years. However, during this period of catastrophic decline, capital raised by all corporations in the public security markets increased from \$28 billion in 1972 to over \$41 billion in 1975, or an increase of approximately 50 percent. This hundredfold decline in capital flow to small innovative enterprises is indicative of the decline in small business innovation because risk-capital is an essential ingredient of innovation.

Without precise indices for small business innovation, it is impossible for us to quantify this key factor accurately. It is our observation as experienced entrepreneurs in our respective industries however, that the vigor in small business innovation has substantially declined. We would estimate that this decline amounts to a level of 10 percent (or less) of the average innovation from 1950 to 1970—or at least a tenfold decline. We regret that we cannot be more precise in estimating this important factor, but we believe that this estimate, based upon our personal observations, is realistic.

In our opinion, a renaissance in innovation in America is possible, but a basic systemic change must first occur in governmental policies affecting small innovative businesses. The needs of innovators, their incentives to innovate, and obstacles to their creativity are often substantially different for small firms than for large mature corporations. In most cases government policymakers and administrators fail to recognize this critical difference between large and small businesses. As a result, major constraints to innovation unintentionally imposed by government must be modified if a rebirth of vigorous innovation is to occur in the United States.

Domestic Policy Review of Industrial Innovation

Report of the Industrial Subcommittee on Regulation of Industry Structure and Competition

This subcommittee report was prepared based on contributions of the following members (M) and their supporting staff:

J.W. Hanley, Subcommittee Chairman	Monsanto Company	CHMM
M. C. Throdahl		EXEC. V.P. →
J. C. Masson		V.P.
E. S. Brower (M)	Allied Chemical	V.P. EXEC. V.P.
Gary Luick		V.P.
J. E. Steiner (M)	Boeing Co.	V.P. VICE PRES
Robert George		V.P.
M. Sokol (M)	Bristol Myers Co.	VP-DIR. R&D.
Frank Sprole		(CHMM)
Ike Jarkovsky		VP
J. A. Stephens (M)	Excel-Mineral Co.	CHMM
Amor Gosfield		UNIV OF CALIF.
J. B. Boatwright (M)	Exxon Co. USA	EXEC. V.P.
R. B. Shapiro (M)	General Instrument Corp.	VP-LEGAL LEGAL COUNSEL
V. H. Kramer (M)	Georgetown University Law Center	PROF.
L. H. Harlan (M)	Harlan, Betke & Meyers Inc.	PRES.
Richard Foxen (M)	Rockwell International	V.P.
E. M. Owen		V.P.
Paula Cooper		P.R.
Duane Pearsall (M)	Small Business Development Corp.	
F. J. Blee (M)	Smith Kline Corp.	V.P.
R. J. Schoerner (M)	Southwire Co.	V.P.
Herbert Browne		V.P.
Glen Travis (M)	Wentzway Corp.	PRES.

ADVISORY COMMITTEE ON INDUSTRIAL INNOVATION

Report of the Industrial Subcommittee on Regulation of Industry Structure and Competition

BACKGROUND

The Domestic Policy Review of government impact upon innovation and its effect upon industry structure and competition comes at a critical stage in the evolution of America's worldwide economic role.

In the 200 years of this country's existence, the world has witnessed a small agrarian economy grow to become, in the post-World War II era, the dominant economic force in the world.

But America's role has changed, in many ways dramatically. Yet the laws and policies governing an economy of one era—that of U.S. dominance—have not adjusted to the reality that the United States is now but one of several major economic powers whose combined strength well exceeds our own.

It is the recognition of that new economic reality, that prompts a series of precise recommendations aimed at redressing the growing diminution of America's economic strength.

Importantly, the President, through his initiation of a serious policy review of innovation in America, implicitly recognizes innovation's key role in ensuring the long-term well-being of our nation's economy.

In so doing, he has helped lay the groundwork for an important bridge between industry and Government. Too often in the past, the interaction between business and Government could only be characterized as adversarial. By drawing representatives of business into the policy processes of the Administration, attitudinal barriers that have separated business and Government can be breached.

THE CRITICAL ISSUE

At the center of this Subcommittee's examinations was the certainty that economic growth and long-term economic health and stability is dependent upon innovation. It is the essential force that generates new products and processes, creates productivity advancement and stimulates constructive competitive activity.

In its study of the innovation climate in the United States and Government's effect upon industry structure and competition, the Subcommittee reached one overriding conclusion. That is that the policies as well as the philosophy that today guide antitrust and regu-

latory practice must be rethought in light of a variety of new worldwide economic forces that now prevail and the less dominant role this country occupies on the economic stage.

It is in these two important areas of government interaction with business—regulation and antitrust—where the most profound effects are present in the structural and competitive nature of American business and industry.

A REVISED CHARTER FOR REGULATION

The principle animating regulatory authority, as in the case of antitrust policy, has been accepted by society at large as a necessary and proper function of government. When regulatory practice is conducted with prudence and consistency, it can improve the climate for innovation.

In recent years, however, inconsistent and sometimes unreasonable regulatory actions have caused, in the Subcommittee's judgment, an unproductive diversion of resources.

In part, this diversion is from resources that would otherwise contribute to innovation: funds for R. & D. are diverted to testing programs for environmental and health effects, greater than prudence dictates, reducing the funds available for new product or process innovation.

Pollution control resources are diverted to mandated process changes rather than allowing industry to reach its own innovative solutions that achieve the desired, legal end result. This added expense reduces capital that would normally go to innovative productivity gains. The risks of innovative actions, too, have been inhibited by the uncertainty of regulatory policy and the frequent lack of consistency between and within regulatory bodies.

This uncertainty may be the greatest inhibitor to the innovation process and requires serious attention and response from the regulatory bodies and, in the Subcommittee's judgment, the Administration.

In all of these areas and more, the Subcommittee has focused on what it sees as the critical regulatory issues and proposes constructive solutions that can

accelerate the innovation process—while preserving the principle of appropriate regulatory oversight of the Nation's economic machinery.

A NEW VIEW OF ANTITRUST POLICY

Standing as a cornerstone of American economic policy is its body of antitrust law. The principle underlying that body of law is the support and protection of true competition. Where innovation has been stimulated by antitrust policy, the country has richly benefited.

Where it has not, particularly at this critical juncture in economic history, antitrust policy must be recast to accommodate a whole new set of worldwide and domestic realities.

In specific terms, the Subcommittee concluded that Government must carefully reexamine foreign competitors' actions within the domestic economy—re-examine them against the same standards applying to U.S. companies. Joint research activities and acquisitions in the domestic market by ex-U.S. firms, each demand study and change.

Likewise, new thinking is in order that would reward not penalize competitive advantage achieved through innovative actions—rewarding growth through the creation of new technology as opposed to growth by financial or economic force.

A wholly new scale of antitrust values must be placed upon achieving significant technological breakthroughs by joint efforts and aiding small advanced technology businesses reach their greatest economic potential through merger with larger units.

Each of these issues within a proposed new framework for antitrust policy is examined and illustrated in detail in the accompanying report.

RECOMMENDATIONS FOR ACTION

In the body of the accompanying report will be found seven specific issues relating to the impact regulatory and antitrust actions have upon industry structure and competition.

Each is followed by detailed courses of action recommended and is illustrated with examples and references to actual experiences, for the most part witnessed by Subcommittee members.

In advancing these findings for consideration within the Administration's total Domestic Policy Review, the Subcommittee expresses its joint commitment with the President and his Administration to do all within its power to help restore the appropriate climate for heightened innovation. And it further joins with the Administration in its efforts to ensure the long-term economic strength and viability of America, at home and abroad.

Issue No. 1.—Inconsistency of Regulation Reduces Innovation

Changing objectives or uncertain standards of regulation, as well as uncertainty in the methods for measuring compliance, act to slow innovation. When regulation by the same or different regulatory agencies is contradictory or when standards or methods of meas-

uring compliance are not stabilized for an appropriate time period, many firms are not willing or able to accept the risk of committing resources to potential innovations. The net effect is to reduce competition.

RECOMMENDED ACTION

1. Each regulatory agency should issue a long range statement of regulatory intent that could serve as guidelines for both the agency and the regulated. This statement of intent should require appropriate notice prior to any changes to accommodate the long-range planning of the regulated.

2. Whenever two or more agencies are developing regulations or policy on a single issue or interdependent issues, an interagency coordinating committee should be formed to assure consistency.

3. Where a single industry or company within that industry has related compliance requirements controlled by more than a single law, interagency and intra-agency consultation must occur to ensure consistency between and within agencies.

Illustrations of "Inconsistency of Regulation Reduces Innovation"

Example No. 1.—Based on years of research, a chemical company developed a plastic beverage container suitable for soft drinks. The plastic was a copolymer of styrene and acrylonitrile. The advantages of the container were its light weight, convenience, safety, and recycleability. In the development stage, extensive data was submitted to the Food and Drug Administration showing that under intended conditions of use, no acrylonitrile could be detected migrating into the bottle contents. In February 1975, FDA issued a Final Regulation setting forth the conditions under which acrylonitrile "may safely be used in soft drink bottles."

Following FDA approval, the manufacturer and a major soft drink firm committed considerable resources and effort to the introduction of this wholly new packaging concept. Consumer tests quickly endorsed the lightweight, shatter-resistant plastic bottle by a 3 to 1 margin. New manufacturing capacity was added to keep pace with consumer demand.

An interim technical report on chronic toxicity tests on rats showed an excess of tumors in rats fed acrylonitrile. Concurrently FDA tested the plastic bottles under exaggerated conditions and concluded that acrylonitrile could migrate into the contents. Based on these data, FDA suspended the approval of the bottle as a soft drink container. Despite several legal challenges, the ban is still in effect.

As a result of the action, approximately 1,000 people were laid off and the company incurred a loss of approximately \$100 million.

Example No. 2.—Capital formation is also adversely affected by the uncertainty about the future of regulations governing the introduction of new processes and products. Take this example from the energy area.¹ A

¹ Synfuels Interagency Task Force, *Recommendations for a Synthetic Fuels Commercialization Program*, Report submitted to the President's Energy Resources Council, vol. 1, Washington, Government Printing Office, 1975, p. 134.

task force of the President's Energy Resources Council, in evaluating the requirement for environmental impact statements, claims that the major uncertainty was not whether a project would be allowed to proceed, but rather the length of time that it would be delayed pending the issuance of an environmental impact statement that would stand up in court. In assessing the overall impact of Government regulatory activity on the establishment of a new energy industry, the task force concluded ". . . some of these requirements could easily hold up or permanently postpone any attempt to build and operate a synthetic fuels plant."

Issue No. 2.—Innovation is Negatively Impacted by Regulating the Means Rather than the Ends

In the last 10 years, the United States has instituted a large number of social laws and regulations that have a major impact on the economy's rate of growth, the rate of inflation and the degree of competition within the industrial sector of the economy. If the laws and regulations had controlled only the output, innovation within firms and within industries to achieve the goals would have been stimulated and the type of competition and resulting industry structure would have been similar to that which would be expected to result from the competitive market system.

However, the regulations resulting from the adoption of new social regulations have not been goal oriented. Rather than requiring a specific output such as accidents per 1,000 hours worked or parts per million of a substance in a plant's effluents, the regulations control the industrial processes themselves. Such process regulations (sometimes referred to as input as opposed to output regulations) prohibit innovation as a means of achieving the required goals. Frequently, they have severe financial impacts on individual firms or plants; the nonproductive expense has a multiplier impact on innovation related to product or process improvements. Importantly, the input regulations inhibit competition and dictate, although not directly, industry structure. Thereby such regulation negatively impacts capital investment and aggravates the Nation's inflation problems.

The problems associated with such process regulation are increased by both the adversary atmosphere that exists between the regulatory agencies and industry and the lack of stability in the regulations or the reasonableness of the timing parameters required to achieve compliance.

* * * * *

RECOMMENDED ACTION

1. Regulations promulgated to achieve desired social goals should be limited to standards of performance. They should not dictate the processes used by industry to achieve the standards. Such a refocusing of regulations would foster innovation both in meeting the standards and, because such regulations would allow compliance at lower cost than the current process regulation, industry could devote more resources to product and process innovation.

The benefits to the Nation that could reasonably be expected from such a reorientation of the regulatory approach are clearly great although an exact quantification of the benefits is not possible. Example 1, which discusses the impact of mandating coal use in industrial boilers and requiring "best available control technology" (BACT) to meet environmental goals, results in about two-thirds of the 1977 to 1990 incremental coal consumption in industrial boilers becoming uneconomic at an estimated cost to the Nation of \$1 to 2 billion/yr. If similar cost estimates were available for all of the process dictating regulations, the total cost to the Nation would be many times greater.

2. A nonadversary approach should be encouraged via directives to the regulatory agencies to increase industry participation in regulation development. The achievement of social goals can be most efficiently achieved if both business and Government work together. The adversary approach to regulating industry needlessly complicates the achievement of the standards, may increase the costs of both business and Government of regulation implementation and can inhibit competition and adversely impact industry structure. The second example relates a case involving the implementation of the Toxic Substances Control Act which is being done in a nonadversary manner that will save both industry and Government expense. Regrettably, this type of example is scarce. The various trade presses are replete with examples of adversary governmental regulators' relations with business.

3. Time schedules for regulatory compliance should take into account new technology required and current plant investment. Unrealistically short times and the requirements for utilization of the best available control technology often dictate utilization of a single technology and should be avoided. Technological innovation is frequently time consuming. Short compliance schedules can severely limit competition among firms in both meeting the regulatory standard and in the design of the process or product.

Illustration of "Innovation is Negatively Impacted by Regulating the Means Rather than the Ends"

Example No. 1.—The Mandatory Coal Conversion Act requires that, after 1985, coal be consumed in all new and replacement industrial boilers larger than 100 million BTU/hour. An examination of the economics of industrial energy consumption and pre-1977 environmental regulations indicated that low sulfur western coal would have been economic in much of the Midwest and Gulf Coast regions of the country. The Clean Air Act Amendments of 1977, however, require the adoption of the "best available control technology" (BACT) to both meet emission limitations and a percentage reduction in pollution from untreated fuel. With current technology, BACT will probably require the installation of flue gas scrubbers on all industrial coal burning boilers above 100 million BTU/hour and significantly limit the flexibility of companies to purchase lower sulfur coal to meet environmental standards.

The BACT requirement increases the costs of industrial process steam in the range of 10 to 12 percent for those plants that could have met environmental