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The Cost of R & D Living

Inflation continues to affect all parts of our society. For the R & D community, increasing costs are an especially serious concern. Order-of-magnitude increases in all phases of research, from the price of new instruments to the cost of precommercialization demonstrations, are severely stressing the structural integrity of the nation's research system.

The 18 to 22 percent annual increase in the cost of equipping a modern research facility is twice the national inflation rate. A survey conducted by one of us (M.J.C.) at the National Science Foundation showed that the cost of scientific instruments in the price range above \$5000 within five basic areas—molecular spectroscopy, atomic spectroscopy, chromatography, chemical analysis, and polymer characterization—grew from \$412,000 in 1970 to \$1,767,000 by the end of 1978. This fourfold increase translates into an average annual cost escalation of 20 percent. Part of this increase reflects the growing sophistication of research tools; part is due to the general inflation of the economy.

Few laboratories have had the growth in financial support required to keep pace. The result has been a decline in the availability of modern research instruments in some laboratories, or reduced research growth as funds have been diverted to purchase required tools. Shared use of facilities has been partially successful in reducing total capital requirements, but there is a point at which sharing begins to hinder scientific investigation. At one major research university, the administration has resorted to deficit financing to purchase research equipment. Repayment through user charges will further restrict future research programs. For the federal program managers who fund over 50 percent of the nation's R & D effort, escalating research costs translate into loss of program flexibility and mortgaging of future available monies. More often than not, it has been the higher-risk projects that have been deferred or canceled.

Industrial R & D may be hardest hit by the high rate of inflation. Research has always had to compete for financial resources, with the promise that tomorrow's payoff will exceed today's investment. But with inflation rates exceeding 10 percent, the discounted rate of return from long-term high-risk R & D is substantially reduced. There is growing evidence that the cost of the important precommercialization step has also increased much more rapidly than the general inflation rate. The expense of bringing a new product or process to market has increased fivefold in the past decade. The estimated cost of building a coal gasification plant has grown from \$250 million in 1973 to \$1.5 billion today; that of introducing a new drug is now measured in tens of millions of dollars, and the time is about a decade. That old rule of \$1 for research, \$10 for development, and \$100 for demonstration is breaking down.

Research in times of high inflation may require new types of relations between industry, universities, and government. Additional funds or federal investment tax credits for R & D will be of limited benefit. Enhancing the productivity of our nation's R & D enterprise will require reassessment of the traditional guidelines for public and private investment in research, as well as incentives to encourage industry to undertake long-term research commitments. New strategies for coping with the cost of R & D living will include better sharing of our limited resources, greater access to facilities maintained at public expense, and more adequate protection for the intellectual property rights of those using the facilities. We must realize the mutual benefits of greater industry-university cooperation. Small investments in areas of common research interest can provide significant returns to both the industrial firm and the university researcher. Coping with inflation is the issue before our nation's R & D leadership.—MARTIN BERGER, *President*, and MARTIN J. COOPER, *Manager for Special Studies*, *Occidental Research Corporation*, Irvine, California 92713