Business-Campus Ventures Grow

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Research Investment Pleases Both Sides

By CALVIN SIMS

Only four years ago, corporate efforts to enlist university researchers in the drive to make American industry more competitive seemed to face major difficulties. But the problems — which mainly involved fears that these alliances would compromise basic academic freedoms — have proved relatively easy to resolve, and many research projects are not only flourishing but producing tangible results.

The Rensselaer Polytechnic Institute in Troy, N.Y., for instance, has designed a Norelco coffee maker for the North American Philips Corporation that is much simpler and cheaper to manufacture than previous models. The new coffee maker, for which Rensselaer received more than $100,000, has 30 percent fewer parts and requires only half the floor space for assembly.

Scientists at Carnegie-Mellon University in Pittsburgh have developed a fully automated robotics plant that manufactures turbine blades for the Westinghouse Electric Corporation. Westinghouse turned to Carnegie-Mellon because of its highly regarded robotics department, which has made key advances in the basic research needed to design better manufacturing systems.

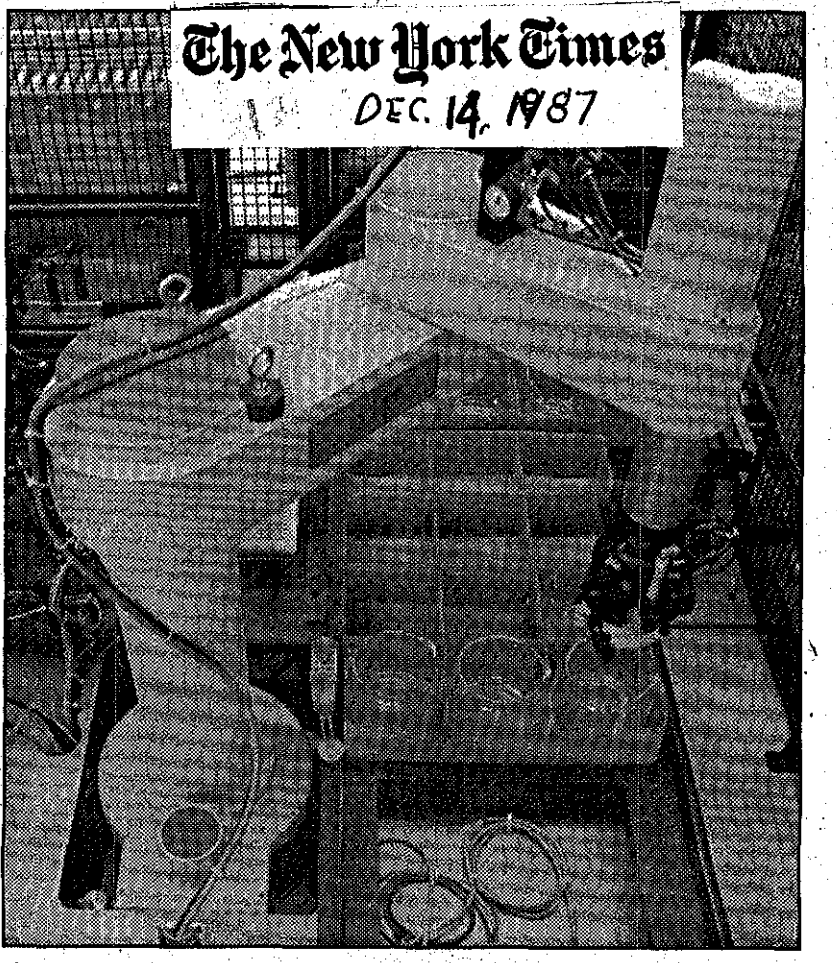
Cornell Center

The Eastman Kodak Company, the General Foods Corporation, and Rhône-Poulenc A.G. Products, a French chemical company, together provided all of the financing, some $1.5 million last year, for a biotechnology research center at Cornell University in return for the right to capitalize on any findings. Cornell has one of the most prestigious biotechnology faculties in the country.

Meanwhile, corporate financing for university research is steadily climbing. The National Science Foundation estimates that corporate expenditures on university research will total $670 million this year, up from $235 million in 1980, and the growth is expected to continue. Indeed, some staff members of the National Science Foundation predict that business will pay for 10 to 12 percent of research at universities by the early 1990's, up from 8 percent now.

"In terms of technology transfer and exposure to some of the brightest scientists in the world, you can't beat an investment in university research," said Edwin P. Przybylowicz, Kodak's director of research.

Casimir Skrzytczak, vice president for science and technology at the Nynex Corporation, the telephone holding company, agrees. "We are finding that going to the university is the most cost-effective way of gaining an edge on technology and access to a wide range of thinkers," he said. Nynex has a research agreement with the Massachusetts Institute of Technology to develop telecommunications products for its network.



A robot assembling carafe portion of coffee maker designed at Rensselaer Polytechnic Institute.

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Even corporate giants like the International Business Machines Corporation, which invests $5.2 billion a year in its own research and development programs, think they do not have all the resources to keep up with rapidly changing technology. "We have a very extensive research organization, but one always runs into a situation where you want to go to the top expert in the field, who is often found at the university," said Dr. Ralph E. Gomory, I.B.M.'s senior vice president for science and technology.

For their part, universities have become more willing to accept corporate money. One reason is that Federal financing for university research, after rising for decades, has leveled off.

Conflicts Were Feared

Many scholars had feared that such commercial alliances would give corporations undue influence over the kinds of research that universities conducted.

In addition, both universities and

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Largest Corporate Recipients

Corporations provided an estimated $600 million to universities for research and development in 1986. The largest recipients:

Recipient	Amount, in millions
M.I.T.	$34.8
Georgia Institute of Technology	21.9
Carnegie-Mellon	17.6
Penn. State	16.9
University of Washington	16.5
Cornell	14.3
U.C.L.A.	12.7
University of Michigan	12.5
Washington University	11.4
University of Arizona	11.2

Source: National Science Foundation

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companies had worried about conflicts over publishing the findings of such research. The companies wanted to make sure that competitors did not end up reaping the benefits of research they had financed. But many in the academic community feared that for just that reason, corporations would force them to compromise their treasured right to disseminate the results of their research freely.

"The big joke in the early days was that 'publish or perish' was being replaced with 'profit or perish,' " recalled Daryl E. Chubin, a senior analyst with the Office of Technology Assessment, a Government agency that advises Congress on science and technology issues.

But as Dr. D. Allan Bromley, a Yale physics professor, notes, companies and universities have been able to work out compromises. "We learned very quickly that we could reach agreements more easily if we protected the industrialist from competitors and the rights of the academic to publish," said Dr. Bromley, who is a member of the White House Science Council, which advises the President on science and technology matters.

The Company's Advantages

In most industry-university projects the company supplying the bulk of the financing automatically receives a license to market the resulting products and technologies. The company may also get the right to place its scientists in the university laboratory.

Some universities will agree not to publish certain proprietary information, such as formulas and software codes, when disclosing the results of corporate-financed research. But most schools turn down classified research projects that ban them from publishing findings.

For example, M.I.T., the largest recipient of corporate money, has one major rule on industry support, according to its president, Dr. Paul Gray: "Any research work done on this campus must be openly publishable."

Scholars acknowledge that the presence of corporations in their laboratories has reshaped the way they present and disseminate some research data and added a new dimension to what once were purely scholarly pursuits. But rather than seeing this as a compromise, they look upon such projects as a supplement to their traditional pursuits.

The research ranges from biotechnology to building a better coffee pot.

Some scholars think it is good that American universities are playing a more constructive role in society by expanding beyond basic research into applied research activities that can help preserve or create jobs.

"The research university is redefining itself and becoming more involved with its environment," said Henry Etzkowitz, a researcher at the Center for Science and Technology Policy, an affliate of Rensselaer Polytechnic.

Dr. Etzkowitz noted that many cooperative research projects were tied to local industry. For example, many of Columbia University's business relationships involve health care, a big industry in New York, while the University of Michigan conducts research with the auto industry.

"These relationships accelerate the translation of basic research into technology," said Angel Jordan, provost of Carnegie-Mellon. "Our role is to create and disseminate knowledge and this is just another way of doing that."

Corporate financing at Rensselaer has increased by 60 percent, to $16.2 million, from about $9.6 million in the 1981-82 school year.

Students Found to Benefit

Leo Hanifin, director of Rensselaer's Center for Manufacturing and Productivity, said that such projects as the coffee maker provide faculty members with material they can use in the classroom. In addition, such projects often give students a valuable first-hand glimpse of the real world of business. "The project provided some great educational experiences for many of our students who thought manufacturing was the last place they wanted to work," Mr. Hanifin said.

Occasionally, university-industry alliances do not jell. For instance, Carnegie-Mellon's Institute of Technology withdrew from a research project to develop a metal powder process for a metal producer. James C. Williams, dean of the institute, said the metal company had "unrealistic" deadlines that were impossible for university researchers and graduate students to meet, given their other responsibilities.

Foreign Companies Active

Much to the chagrin of their American competitors, dozens of foreign companies, many of them Japanese, are also financing projects at American universities and other research institutions.

For example, Hoechst A.G., a West German chemical company, provides about $6 million a year in financing for the molecular biology department of Massachusetts General Hospital in Boston. In return, Hoechst has the right to market any findings.

In return for similar rights, the Toshiba Corporation of Japan has contributed $5.5 million to the University of Arizona for the study of digital radiography, which allows physicians to look inside a patient's body on a video screen without using X-rays.

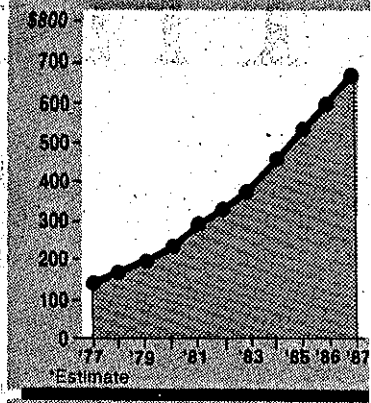
Some industry executives argue that the United States is subsidizing their foreign competitors by allowing such arrangements. American taxpayers and university alumni have often helped to pay for the research facilities, libraries and faculty training, they note.

In addition, some American companies maintain that it is not fair to allow foreign companies, especially the Japanese, to have access to laboratories in the United States wh American companies do not enjoy t same access in their countries, whe the top research often is conducted Government or corporate labs.

The exact amount of foreign inve ments in American universities is n known. A concerned Congress, ho ever, passed a law last year that quires universities to inform the Fe eral Government of foreign inve ment in research projects. The sults are to be released in June.

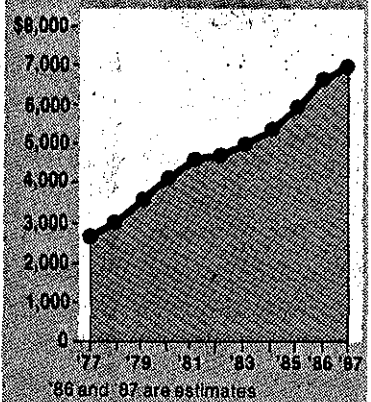
Corporate Financing Gains Momentum . . .

Funding by corporations of research done by universities, in millions of dollars.



. . . While Federal Financing Levels Off

Funding by the Government of research done by universities, in millions of dollars.



Source: National Science Foundation