

The Ethical Dilemmas of University-Industry Collaborations

Martin Kenney

ABSTRACT. This article examines the ethical dilemmas that can occur due to university and industry cooperative arrangements. The values that Conant (1952) and Merton (1942) ascribed to university science are used as a measure of the evolving university-industry relations in the 1980s. Examples of the types of relations being forged are discussed and possible conflicts of interest are explored. The author argues that the goals of the university are and must remain different from those of industry for the good of the entire society. The transformation of the university into a research institution for industry could result in the university not adequately training the scientists of tomorrow, and simultaneously, not discharging its duty to do basic research as it focuses on the more applied research that industry desires and funds.

Introduction

The economic stagnation accompanied by virulent competition especially in high technology fields has convinced many leaders in the university, industry, and government that accelerating the transfer of technology from university to industry is vital to protect the U.S. competitive edge. The need for enhanced cooperation between university and industry is subscribed to by nearly all observers (for an exception see Noble, 1982). Simultaneously, virtually every call for increased cooperation also recognizes that there are unique features

of the university that need to be protected. (Bok, 1981; David, 1982; Prager and Omenn, 1980) This paper elucidates the ethical dilemmas increased university-industry cooperation pose for the individual scientist, for science as a calling, for the university as an institution, for industry, and the general society.

It is the premise of this article that in U.S. society the moral standard or "proper" action is premised by the social position of the actor. Thus, it is perfectly acceptable for a businessperson to not deal with an obnoxious customer and yet a professor cannot stop teaching a student merely because she finds the student obnoxious. Similarly, a businessperson is considered "smart," if she can fool the competition into pursuing the wrong line of research. Such an action by a professor would be considered reprehensible. These two social roles and the institutional matrix that surrounds these roles have very different ethical systems by which behavior is judged. This is shown in the common sense notion that an industrial employee testifying in Congress on material of interest to industry is assumed to be providing industry's viewpoint. However, a professor is providing an unbiased viewpoint and, if that professor is on an industrial payroll, she is then said to have a potential "conflict of interest." We see these two individuals as operating under different ethical or value systems.

The ethical dilemmas are being most dramatically illustrated in the burgeoning new biotechnology industry. It is in biotechnology where the new models of university-industry relationships are being formed and, simultaneously some of the most serious breaches of normal university etiquette have occurred. A caveat

Martin Kenney is Assistant Professor at the Department of Agricultural Economics and Rural Sociology at the Ohio State University. He is the author of several articles on biotechnology, published in various journals and Biotechnology: The University-Industry Complex (Yale University Press, 1986).

is necessary at the outset, i.e., in the murky area of what is ethical at the university, value judgments are necessarily made. These judgments will be influenced by the social position of the person making the judgment. Further, the case studies examined in this article were chosen to very starkly pose the problems that can occur when business ethics are mixed with those of academe.

The differences between the university and industry relate very closely to their very different roles in society. University scientists must be expected to have very different standards than industry scientists and traditionally this has been expressed by the fact that university faculty have focused on "basic" or "pure" research. Robert Merton (1942), the famous sociologist of science, has described the four imperatives of pure science as universalism, communism, disinterestedness, and organized skepticism. It is to these lofty abstract values that the university and its scientists have been held accountable. In effect, these are values that are supposed to distinguish the "community of science from industry" (Conant, 1952).

It is obvious that Merton's values are not followed by all scientists all the time. In the basic sciences there is presumption that some derivative of these values are the "proper" mode of behavior. Secrecy, greed, and jealousy are evident in academe. However, the majority of university scientists, in large measure, do conform with Merton's values, and, more importantly are expected to conform with these values.

This article evaluates the adherence to these values in the contemporary rush to commercialize university-based scientific research. It is well recognized that there are certain types of interactions or linkages between university and industry that are traditional and provide little grounds for concern. For example, the role of corporate philanthropy is well known and accepted as is the fact that the university provides the education necessary to develop new employees. Similarly, individual professors have regularly consulted for industry. Within certain quite flexible boundaries these linkages have been found acceptable and even desirable and few criticisms or ethical concerns voiced.

However, the explosion of interest in biotechnology has ruptured the aforementioned traditional boundaries of separation between the university and industry and created new mechanisms for interaction. Three cases of different genres of industry-university relationships will be examined to illustrate the ethical dilemmas faced by university administrators and faculty members in cementing closer ties between university and industry. The case studies are: professors consulting for small biotechnology companies in which they hold an important equity stake; the large multiyear, multimillion dollar university-industry partnership as exemplified by the Massachusetts General Hospital-Hoechst Company contract; and the proposed Harvard University biotechnology company. In all three cases values become critical as the university or scientists are placed in morally ambiguous positions by their encounter with industrial ethics.

A short history of university-industry collaborations

There have always been links between U.S. industry and universities. The first and foremost link has been through the fact that U.S. universities have provided industry with employees (Noble, 1977). Professorial consulting for industry dates back to the turn of the century and continues to this day. Similarly, Servos (1980) documents that certain universities have always been willing to perform industrial contract research in university laboratories. For example, in 1927 MIT's Research Laboratory of Applied Chemistry conducted paid contract research worth \$172,000 (Servos, 1980: 541). Concomitantly, at this early date industry was already suppressing publication of university research results (Servos, 1980: 542). Industry has always been more than happy to take advantage of university expertise when it is cost effective to do so. However, it is notable that historically, scientist-consultants dealing with industry were not usually tied to one company, but rather consulted and interacted with a number of companies (Sturchio, 1981).

The importance of scientific research in the war effort in World War II convinced the federal government to increase funding of scientific research. In the postwar period federal funding permitted a massive increase in university-based "basic" research performance. This university research was meant to be undertaken in the interest of and to contribute to the betterment of all citizens (Conant, 1952). In fact, from these federally funded expenditures a "community of science" grew predicated upon peer review and in which stature was measured by publication and the estimation of one's colleagues. This model is best exemplified by U.S. National Science Foundation and National Institutes of Health which provided the environment and funding that formed the scientific base for the development of biotechnology.

The U.S. scientific community responded to the ever increasing federal largesse by becoming the largest scientific research community ever created. Simultaneously, in the post-war period U.S. industry in percentage terms withdrew from basic research and adopted a short-term developmental orientation, while becoming increasingly isolated from the advances in the basic sciences.

The 1970s proved to be a watershed for both industry and university. In the middle of the 1970s U.S. industry became aware that its until then seemingly invincible technological lead over global competitors was being dangerously eroded; thus, imperiling the U.S. position in the international economic arena. Concurrently, the growth in governmental funding of universities (especially research) stagnated, thus encouraging university administrators and professors to search for other sources of funding. In this climate university and industry began to reconsider the attenuation of the closer pre-World War II ties. Industry had money and the university had become a repository of much of society's advanced technical expertise, especially in basic biology. The mechanisms for quickly transferring this knowledge from the university to industry did not exist. Building this transfer mechanism between these two very different institutions is not a simple task.

Industrial ethics versus academic ethics

The primary and overriding duty for an industrial concern is to make profit. If the corporate manager does not fulfill this fiduciary responsibility, then the corporate shareholders are likely (justifiably) to terminate the manager. Within the bounds of legality the corporate manager has a fiduciary responsibility to act to secure the greatest advantage for his/her employer. This concern to secure profits can override ethical (and, in some cases, legal) considerations, especially such intangible ideals such as academic freedom or professorial conflicts of interest. Few are surprised when industry opts for profit, rather than some intangible value. The university and its employees, the professors and administrators, have much more complex ethical and moral standards placed upon them. The first of these admonishes the faculty member to seek and teach the truth. To guarantee this standard very elaborate safeguards in the form of tenure and rules regarding academic freedom have evolved (Hofstadter, 1961; Metzger, 1961). Further, it is generally accepted that the professor must make the results of research freely available to all — this is the Mertonian principle of "communism." The university cannot accept secrecy or the withholding of data without eroding an important justification for its existence. And, in fact, since the university is not a profitmaking enterprise, there is no reason for it to keep secrets.

The role of the professor as a shaper of future members of society implies a higher ethical standard than the ordinary employee. The relationship between the professor and student is not the same as that between supervisor and worker. Any arrangements tending to change this will profoundly affect the university's ethical duties to students. The student is meant to be free to undertake research unaffected by pecuniary or other noneducational motives — to accomplish this the professor is assumed to be disinterested.

The public has accepted the importance of universities underwriting their activities in the U.S. in two important ways: It provides direct funds not only to public universities, but also

to private universities in the form of loans, grants, and numerous other subventions. The state has also recognized universities as non-profit educational institutions under regulation 501c (3) of the Federal Tax Code. The public has not only placed its confidence in the universities, but has also provided massive financial support. In return, the public has established high ethical standards for the university and expects the university to be able to provide society with dispassionate and disinterested education and research.

In summation, the ethical standards by which industry is – and must be – measured are very different from those applied to the university. It is not possible for either institution to abandon its peculiar ethics without suffering irreparable harm. I assume that industry is much better equipped to protect itself than the rather fragile institution of the university. The logical answer to these contradictions of values and purposes is for agreements between the two institutions to be framed in a manner suited to protecting the university.

Current industry-university relationships

One of the first major attempts to increase the cooperation between university and industry was the initiative undertaken by the National Science Foundation (NSF) in 1973 to develop university/industry cooperative research centers which combine university researchers with a consortium of industry scientists to work on particular applied problems (Senich 1982: 142). This program has been very successful in providing a model of activity and has spawned numerous other centers. Another NSF program was launched in 1978 to increase one university-one company cooperative research and this model has also steadily grown (Peters and Fusfield, 1982). Thus, throughout the 1970s NSF, one of the major federal funding agents, has actively fostered closer cooperation between the university and industry. However, it was not until the late 1970s that the rush by industry to secure access to the university became frenzied.

The perfection of the techniques of genetic

engineering in the late 1970s ignited a rush by entrepreneurs to secure the scientists necessary to launch biotechnology companies. Large multinational chemical and pharmaceutical companies also joined and hastened to purchase access to university scientists. In the meantime university administrators gave serious consideration to launching biotechnology companies that would utilize the skills and patents of their professors. The proliferation of mechanisms for commercializing biotechnology provides numerous situations in which business ethics clash with those of academe.

Faculty consulting

Consulting by faculty for honoraria, lump sum fees, or even retainers has been largely accepted as long as it does not grossly interfere with a faculty member's duties (Linnell, 1982). The potential ethical problems have become much more serious in the biotechnology industry because professors do not merely consult for lump payments, but rather are given stock positions in the small recently launched companies. These professors thus may be placed in positions wherein their role as corporate employee and principal (i.e., paid for services rendered) conflicts with their role as a university professor. So, for example, Nobel Laureate David Baltimore, an MIT professor and owner of shares in a small biotechnology company worth over \$1 million has described his method of ensuring his avoidance of conflicts of interest, "I must, however, make every effort to avoid any suggestion of conflict of interest and have pledged myself to do so" (Baltimore, 1982: 13). And, as Table I suggests, Dr. Baltimore is not the only faculty member who has commercial interests in his/her research area.

There have been numerous allegations of conflicts of interests as these professor/businessmen split their attentions between their university and corporate laboratories. These problems are bound to be recurring because the dominant mode of action in industry is necessarily secrecy, while that of the university is predicated upon openness. However, with the linkages of so

TABLE I
Founding professors and equity interests

Professor	Univeristy	Company	Shares (thousands)	Percent ^a of total	Value ^b
D. Housman	MIT	Integrated Genetics	300	3.6	1.2
I. Royston	UCSD	Hybritech	425	3.8	10.0
J. Hansen	Univ. of Washington	Genetic Systems	215	1.6	1.5
D. Baltimore	MIT	Collaborative Research	317	3.9	1.2
F. Pass	Univ. of Minnesota	Molecular Genetics	400	10.4	2.8
A. Faras	Univ. of Minnesota	Molecular Genetics	400	10.4	2.8

^a percent before public offering.

^b value in millions of dollars as of July 1985.

(Source: Kenney, 1986)

many professors with companies any discussion of results with colleagues could provide information to a competing firm. As increasing numbers of faculty affiliate with companies there have been reports that departmental information flow has been interrupted (Meyerhoff quoting Epstein, 1982; King, 1981).

The student-teacher relationship can also suffer when a professor's corporate involvement is such that it interferes with his academic duties. There are three common ways in which the student-teacher relationship may be violated: First, in many cases the professor will be so actively involved in his company that he no longer properly supervises his students (Stetten, 1981); Yamamoto, 1982). Secondly, a professor could very easily direct a student into topic areas that are useful for his firm, thereby using the student as a low-paid employee. Notice it is perfectly acceptable for a supervisor to direct an employee to engage in activities useful for the firm, on the other hand, this is an entirely unacceptable act for a university professor. Thirdly, a professor is in an ideal position to transfer the unpublished results of a student's work or ideas to his company (Boly, 1982). Each of these activities are normal practice in industry. The question is whether the professor/businessman can remain true to these two separate ethical imperatives.

The increasing privatization of intellectual property and biological materials is being

accompanied by both secrecy and forms to be signed recognizing ownership and commercial rights. For example, the University of California files suit against Hoffman-LaRoche for secretly misappropriating a cell line that produced interferon (Culliton, 1983). In other cases, post-doctoral associates have removed potentially valuable cell lines with which they had worked when they moved to another university (Boly, 1982). This formerly accepted practice is now curtailed, because of the potential value of the cell lines (Rowland, 1982). At scholarly conferences university scientists are increasingly declining to answer questions because of proprietary concerns (Kennedy, 1982). The ethics of the university are giving way to the profit-oriented ethics of the marketplace.

Massachusetts General Hospital and Hoechst Company

The 1981 ten-year, \$70 million agreement between Massachusetts General Hospital (MGH), the teaching hospital for the Harvard Medical School, and Hoechst, the giant German chemical manufacturer clearly signaled that university-industry partnerships at any level were fully acceptable. With this agreement Hoechst secured the services of Howard Goodman and his newly created department of molecular biology of MGH. The contract at MGH and Hoechst

signed specifically excluded any outside funding for the department which might inhibit Hoechst's proprietary position; in essence, Hoechst funded the entire department and forbids non-Hoechst funds to be used in the department (Culliton, 1982: 1202). In fact, the previous concerns regarding the private use of U.S. government funds for private purposes was then replaced by an entirely different concern – Hoechst had purchased an unprecedented near total control of an entire university department.

Scientists involved in MGH-Hoechst can consult for nonprofit organizations only if it does not interfere with their Hoechst research. This implies that a scientist might be prevented from doing federally funded research on some important public problem, if it did not suit Hoechst. This attitude is entirely understandable for a corporate employee. However MGH scientists are university employees. Similarly, the clauses permitting Hoechst employees in the laboratory and the requirement of special reports and seminars prepared for Hoechst is understandable in a corporate environment. The university, however, is meant to be an unbiased producer of information for the entire society not for a single entity. Burke Zimmerman, formerly an assistant to the president of Cetus Corporation, a biotechnology firm, has charged with some hyperbole that “essentially, everyone in that lab is an indentured servant to Hoechst” (quoted in Sanger, 1982: A18).

The HMS-Hoechst arrangement, though it is the largest, is not so different from the other arrangements listed in Table II. In most cases the funding company is provided the right of prepublication review of all articles with further delays for patenting if necessary. The importance attached to patent rights by these contracts conflicts with Merton's principles of communism and disinterestedness. Patent rights are part of an industrial ethic and the very introduction of the pecuniary motive into science is potentially very corrosive. The spirit and ethics of basic science can suffer when results belong not to the entire scientific community, but rather to a private company.

Harvard contemplates going into business

The gold rush atmosphere in biotechnology in 1980 convinced President Derek Bok of Harvard University that launching a biotechnology company using university professors and patents would be a profitable proposition. In this particular case Harvard University administrators proposed launching a company to commercialize the biological research and patents of Professor Mark Ptashne. University administrators envisioned Harvard as supplying patents, professors, and facilities, while venture capital investors would supply money and marketing experience (Solbrig, 1982: 4). This proposal seemed to provide the university with a method of securing a financial return from the discoveries of its scientists and circumventing the loss of scientists and money as these professors were enticed to join small biotechnology companies. In June and July 1980 the university began to circulate its plan to the faculty in the form of a memorandum written by Harvard's general counsel, Daniel Steiner (1980). The reaction from students, faculty, alumni, the press, and society at large, was nearly uniformly negative. President Bok in the *1981 President's Report* concluded that the university should not seek participation in commercial joint ventures with its faculty.

Otto Solbrig, a Harvard professor, expressed very well the same deep ethical issues that would have accompanied a decision by Harvard to take an active role in a for-profit company:

The last area of concern is the one that worries me most. It has to do with the position of the University as an institution in society. We all recognize that the University is not as detached and impartial as we would like it to be, or as some people would prefer it to be . . . we all become dependent on the sources of funding . . . Nevertheless, we should strive to maintain certain values, and in my opinion, there are some that should not be compromised.

A very fundamental value is the freedom to speak to the issues that are of concern to society as impartial experts. . . . I fear that the credibility of the University could be seriously hurt if we were to seem not as impartial experts, but as interested parties likely to

TABLE II
Summary of large university-industry research grants in chronological order^a

Year	University	Company	Amount (millions)	Duration (years)	Investigator	Areas of Research
1974	Harvard Medical School	Monsanto	\$23.5	12	M. Folkman B. Vallee	Cancer tumors
1980	MIT	Exxon	8	10	J. Longwell R. Sarofim	Combustion
1981	Mass. General Hospital	Hoechst	70	10	H. Goodman	Genetics
1981	Harvard Medical School	Dupont	6	5	P. Leder	Genetics
1981	Washington Univ.	Mallinkrodt	3.8	5	J. Davis	Hybridomas
1982	Rockefeller Univ.	Monsanto	4	5	N. Chua	Photosynthesis
1982	Washington Univ.	Monsanto	23.5	5	N.A.	Biomedical
1982	MIT	W. R. Grace	8	5	P. Thilly	Amino Acids

^a The author has made an attempt to be exhaustive, but because of the secretive nature of many universities these data are tentative and not complete. Also, numerous smaller grants are omitted.
(Source: Kenney, 1986)

benefit financially from the exploitation of new technologies.

The university's ethical standards are different from those expected from industry and society reacted very quickly to the threat to completely blur those differences. With the Harvard biotechnology company, it was agreed that there are activities that the university should not undertake.

The State of Ethical Debate on the New University/Industry Relationships

The single most important attempt to discuss the ethical issues of the privatization of university research was a conference held at Pajaro Dunes for the purpose of "seeing if agreement can be found on a set of principles that might guide the growth of biotechnology as that industry interacts with universities" (Robert Rosenzweig (1981: 1), then Stanford vice-president for public affairs and currently president of the American Association of Universities). The Pajaro Dunes Biotechnology Conference organized by Stanford President Donald

Kennedy included the presidents of Harvard, MIT, the University of California, the California Institute of Technology, and Stanford. Other participants included representatives of Cetus, Genentech, Damon, DuPont, Colgate, Syntex, and Beckman Instruments. The Pajaro Dunes Conference Statement is a typical document based on a desire for consensus. The sole substantive agreement was that universities should not launch private companies with their faculty (Pajaro Dunes Biotechnology Conference Statement, 1982). The Pajaro Dunes Conference was followed by another conference in Philadelphia attended by other research university presidents who adopted similar calls for vigilance regarding the maintenance of academic propriety. However, in no case did the conference documents explicitly criticize nor call for curtailment of any activity.

Increasing concern regarding the commercialization of academic research prompted House of Representatives subcommittee hearings in 1981 and 1982 that provided information on some of the more questionable relationships being formed between universities and industry. The National Science Foundation also issued a report in 1982 that could discover few prob-

lems in the burgeoning new relationships (Peters and Fusfield, 1982). In 1984 the Twentieth Century Fund (1984) issued yet another report that recognized the potential pitfalls of these relations and urged the university to remain true to its values. However, the Twentieth Century Fund also commissioned a background paper by Nicholas Wade, the respected science editor for the *New York Times*. His contribution clearly outlined the problematic activities underway and recommended actions to be taken to ameliorate problems.

In many ways the level of ethical debate is very underdeveloped because in the U.S. the professors and the university are not held in as high regard as in the rest of the world. Thus, the values of the university are not as vigorously defended and as the boundaries between the university and industry are blurred less public controversy is engendered. The problem of maintaining the ethics is made more difficult, because the university must interact with industry, while remaining separated from industry and above reproach — a difficult task even in the best of circumstances.

Summation — some observations on the clash between two ethical systems

The very decentralized nature of the U.S. education system and economy makes it very difficult for the university to adhere to any uncompromising set of ethical values. The bitter competition between universities for corporate funding makes it almost inevitable that the outcome of the classical prisoner's dilemma will occur as each university underbids the other in the rush to secure industrial support. In the rush to secure sources of funding both university administrators and professors have proven ever more willing to adopt the ethical values of industry such as secrecy, privatization, and hierarchy. However, industrial ethics when transplanted to the university cannot nurture the traditional nonmonetary values that separate the university from everyday life, i.e., the ivory tower.

The most important issue is whether U.S. universities, the world's leaders in basic research,

can maintain their leadership position if academia's rules of behavior increasingly resemble those of industry. Should the university and its faculty be held to a different, more stringent set of criteria or are faculty agents free to market their expertise to the highest bidder while remaining university employees? Similarly, is it ethically acceptable for university administrators to endorse long-term contracts between a single company and a professor or even department? What aspect of the sovereignty of the university and the faculty can be sold or leased? Is there a point at which the good of the university as an institution can be invoked to control excesses? It is possible the U.S. university is losing a very special ethos and the largely unwritten rules of conduct that have until recently insured the obedience to generally accepted standards.

Can industry itself reap a long-term benefit as an institution by presiding over the demise of the "altruistic" professor? Will the message to young scientists be to shun basic research and only do commercially applicable research? If so, should it not be expected that further generations of technological innovations will be slowed as increasing numbers of scientists remain in their university chairs and yet devote their energies to commercial activities. Business ethics cannot become replacements for those of the university.

The inability of U.S. industry to develop a coherent set of ethics to govern its relationship to the university and the inability of university administrators to develop national guidelines on acceptable relationships between the two institutions means that both are participating in a destruction of the values of the university. The immediate losers will be students, but the image of the university will become increasingly tarnished and public funding will be at risk. The eventual loser will be industry which, by not respecting the fragile values of the university, will have killed the goose that lays the golden eggs.

Note

* Many of the arguments in this paper are taken from Kenney (1986).

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*Department of Agricultural Economics and
Rural Sociology,
2120 Fyffe Rd.,
Ohio State University,
Columbus, OH 43210, U.S.A.*