

## **Public Science under Siege: Challenge or Opportunity?**

*An Introduction to Science Governance, Freedom of Research,  
and Pluralist Democracy*

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While the complex relationship between science and other social institutions has been a perplexing subject for many, it is often assumed that science, at least in its modern form institutionalized since the 17th century, is independent of and ought to be insulated from the influences of other social institutions. By demarcating the intransgressible boundary between facts and values, scientists have preserved the privilege of defining their own problems, setting their own research agenda and deriving the facts therefrom. It is up to others to make the value judgments with regard to the application and the implications of those facts in other social institutions. The dichotomy and the linear relationship between knowledge production and knowledge application have enshrined the autonomy of science in the former and placed most of the regulation of sciences in the latter.

The claim to autonomy is, however, not only based in theory on the privileged relationship of science to Truth, but also relies upon the public nature of knowledge production meant to ensure science's objectivity. As sociologist Robert Morton's 1942 conceptualization of science laid bare, that science is an independent institution entails the norms in terms of

which scientific knowledge is “publicly” produced. According to him, the institution of science requires that the results of scientific investigations be displayed and witnessed in public, that new knowledge claims be open to criticism under organized skepticism, and that they all be subject to disinterested judgment by impersonal and universal criteria. Science depends on having a public, although consisting primarily of other specialists within the scientific community. Nevertheless, science is public in another sense. When scientific knowledge eventually becomes available in the public domain, science is not only considered a public good but also expected to serve the public good of the whole society. Through this later dimension, science exerts increasing impacts on public policy formation and liberal democracy.

At present, both the public nature and the autonomy of science are undergoing sea change in two respects. First, while science and technology are now regarded as the new driving forces of wealth creation and economic growth, the governing principles of market economy, such as private ownership and propertization, are also deemed the most efficient form of operating new knowledge economy. For example, the Bayh-Dole Act of the United States allows universities, small businesses and nonprofit organizations to obtain exclusive patent rights on their inventions arising from publicly funded researches. This has fueled post-1980 collaborations between universities and industries. Although the Bayh-Dole Act intended to overcome the “tragedy of the commons” in the stage of knowledge application by encouraging faster and more extensive utilization of publicly funded research results through privatization, closer ties between university and industry resulted in the break from the “linear model” of knowledge production and encroached on the autonomy of science. Publicly funded research is now

open to commercial influences that shape the direction and guide the selection of research priorities. Faculty become more willing or even eager to adopt an entrepreneurial role identity and may reduce their on-campus commitments for company-related tasks. Free access and free exchange of claimed new knowledge is shrinking because public science is threatened to be replaced entirely with proprietary considerations. All in all, the privatization of research results and the commodification of knowledge are a mixed blessing for science. They may unwittingly cast a negative effect in the upstream on the production of scientific knowledge, cause a shift from science as vocation to job, and, worse, retard future development.

Similarly, higher education and public research institutions in Taiwan have experienced the pressure of commercialization in the past 10 years. As science and technology are painted as major vehicles for the pursuit of national economic growth, universities and research institutions funded mainly by governmental budgets are expected to generate more substantial returns on public investment. Both the Fundamental Act for Science and Technology (FAST) and the Act for the Development of Biotech and New Pharmaceuticals Industry (ADBNPI) were entrusted with the mission to translate more efficiently the results of scientific research into economic gains. FAST, which was modeled after the Bayh-Dole Act, set the tone for proprietization of science and entailed closer collaboration between universities and industries; ADBNPI, at the same time, opened the door for faculty spinoffs. However, as the nation's highest academic organization eagerly seeks to establish a national biotech "research park" on its campus, the debate over whether industrialization of the academy would distort its original mission and jeopardize the public nature of the science is just underway.

The second respect in which the public nature and the autonomy of science are challenged is projected in, seemingly, the opposite direction. With the image of science transformed from the ivory tower disconnected from practical concerns of the society to a social institution so integrated with the life world that science can hardly be insulated from external influences anymore, it is natural and legitimate to demand greater accountability of and more extensive public participation in scientific enterprises. In other words, science in modern society is deemed not public enough, even to shun the trendy fashion of privatization. Two causes account for the change. First, science and technology, although claiming to offer rational means and ways to calculate, predict and control uncertainties in human life, now become the root of risk society. With the potential to yield both good and evil, science and technology in high modernity bring about a host of new issues on the policy agenda, ranging from genetically modified organisms and stem cell research to the electromagnetic waves of cell phones and global warming. All demand more accountability of science's agenda setting. Democratization of "policy for science" thus becomes the new focus of liberal democracies. Second, despite the fact that science and its applications generate new and thorny public issues, more often, society relies upon science in making public policy. The increasing involvement of science in political life and public policy formation has made democratization of "science (or the scientific expertise) in policy" ever more urgent. To incorporate expert knowledge into democratic institutions that place ultimate decisions in the hands of ordinary people is an inexorable challenge to both liberal democracies and the traditional understanding of science as an autonomous social institution.

It is against the above backdrop that the primary concern of the Second Conference on Law, Science, and Technology of Academia Sinica--Science Governance, Freedom of Research, and Pluralist Democracy--was formulated. Delivered as the keynote address for the conference, Professor Michael Malinowski's article "*A Discourse on the Public Nature of Research in Contemporary Life Science: A Law-Policy Proposal to Promote the Public Nature of Science in an Era of Academia-Industry Integration*" provides a detailed account of the evolution of knowledge production in the United States from the linear model to the current research establishment with close relationships among government, academia, and industry. Malinowski investigates the extent to which the current research establishment has intruded upon the public nature of science and identifies the shortcomings of the current regulatory scheme. For him, "failure to sufficiently preserve the public nature of science and democratic principles in science is responsible for the poor integrity of" most of the harmful products and also has eclipsed the time-honored principle of open access in science. He advocates instead strengthening the public nature, integrity and reliability of the science enterprise through appropriately meaningful law-policy complements to police conflicts of interest and to preserve core features of academic science. While nicely suggesting that an "overarching law-policy objective [be] interventionist to protect and enhance the dual existence of those in the academic science community as members of a public enterprise and collaborators in commercial application," he provides relatively few and limited clues to answer the question of how exactly such a law-policy would work. Yet, Malinowski has helped chart the once unfamiliar territory in which further explorations can be undertaken.

The remaining essays in this volume, which includes seven out of the eight papers presented at the conference, address three key cross-cutting issues. First, the chapters tackled issues regarding whether it is plausible and desirable to exclusively reserve for science a specific sphere of human concerns to produce objective knowledge. By questioning the dichotomy of knowledge production and knowledge application and the distinction between fact and value, the chapters pose exquisite challenges to the notion that science can ever retain and should enjoy the privileged status of being autonomous and objective in a liberal democracy. Second, the chapters examine specifically the impacts of commercialization on scientific activities and the society. As current regulatory schemes set up the legal background against which commercialization of science is implemented and realized, whether the regulatory schemes concurrently provide adequate safeguards to manage and prevent the potential harms is also discussed. Third, if it is no longer possible to insulate science completely from commercial influences and shareholder values, the question of how to preserve the public nature of science through the priority-setting of the research agenda becomes a pressing issue.

The first issue draws the attention of three chapters. In “*Separating Research from Therapy: An Indeterminacy in the Past or a Simple Task?*,” Chien-Chang Wu studies 464 therapy reports in a leading medical journal between 1946 and 1965 in colonial Taiwan to answer the question of whether certain activities were actually medical research rather than treatment. Drawing on philosopher Ian Hacking’s concept of indeterminacy, Wu argues that the meaning of past experience is always contingent on the contemporary standard of valuation, which is always changing. The retroactive description and reexperiencing of human

actions has made it impossible to determine definitely what people actually did in the past. With this hermeneutic attitude, Wu warns us of the danger of relying on the distinction of research (knowledge production) and therapy (knowledge application) to evaluate the nature of medical activities or to formulate regulatory policies thereby. As excessive faith in the safety of activities characterized as therapy would be unnecessarily credulous, the name of research very often constitutes the hegemonic obstacle for those who wish to make new knowledge claims but did not produce them in the formal name of research especially in its industrialized, capitalized, and specialized form.

Wen-Tsong Chiou's article "Freedom of Scientific Inquiry and the Challenge of the Third-Wave Democratization of Science: A Critical Examination of the Division between "Constitution of Knowledge" and "Constitution of Politics" again challenges the paradigm of knowledge production adopted by modern science that hinges on the strict distinction between facts and values. In answering the question of whether the freedom of scientific inquiry promised by the constitution of most liberal democracies can be available to scientists to resist the demand of democratization of science for ordinary people to partake in producing facts, Chiou investigates the notions of academic freedom and the freedom of philosophy and traces their genealogy back to the 14th and 15th centuries. He finds that although both notions were used to safeguard the prevailing paradigm of knowledge production of each time and that constitutional democracies since the 18<sup>th</sup> century have deftly adhered to the fact/value dichotomy of scientific paradigm by delegating to the scientific community the sole prerogative to decide on legitimate knowledge, it is entirely a matter of power allocation that was made and could be remade by human choices. Following French philosopher

Bruno Latour's suggestion that the question of political legitimacy (social orders) and that of legitimate knowledge (natural orders) are actually two facets of the same human concern and that we should replace the fact/value dualism with the function of taking into consideration and that of arranging in rank order in producing legitimate knowledge and making political legitimacy, Chiou imagines a compatible notion of academic freedom and, in his case, the freedom of scientific inquiry to welcome intricate interactions between science and society without either maintaining the division of powers by the department boundary or denying the merits that modern science could bring to human society.

Similarly, Wen-Hua Kuo, in the article "*Pharmaceutical Regulation as Transnational Vision and Strategy: Japan and Taiwan in the Wake of the ICH*," applies Sheila Jasanoff's concept of co-production to investigate, among other things, how the process of addressing and resolving the problem about nature, *i.e.*, race and ethnicity, triggers simultaneously the process of addressing and resolving the problems of society, *i.e.*, the regulatory framework for pharmaceuticals. Through the study of the interactions between globalization of pharmaceutical regulation and local endeavors to envision and develop individual regulatory strategies as transnational schemes, Kuo identifies the pivotal role that technological discourses of "bridging study," which are meant to evaluate drugs' ethnic effects, play in catalyzing this co-production process.

With the understanding that maintaining an exclusive territory for science to produce objective knowledge is no longer plausible, the other three chapters examine the impacts of commercialization on scientific



activities and the adequacy of current regulatory schemes. Two of these three essays take up the problem of conflicts of interest arising out of university-industry research relationships. Ching-Yi Liu's article "*University-Industry Relationship, Conflicts of Interest and Scientific Integrity*" first gives accounts of the concept of public science and the importance of scientific integrity in an age of academic entrepreneurialism. Liu argues that since commercialized science still enjoys the protection of academic freedom and retains the proclaimed mission to pursue truth, and since the process and the products of scientific research affect human life even more profoundly, it is legitimate to demand that science retain a certain public nature and maintain its integrity. While conflicts of interest are the most corrosive factor that harms scientific integrity and need to be prevented in advance, Liu faults the loosely enforced disclosure policy for failing to effectively control the situation. She advocates instead adopting more proactive strategies, such as recusal or the mechanism of buffer institutions. Along this line, Liu critically reviews the current legal framework in Taiwan. She finds that the issue of conflicts of interest is surprisingly missing in the existing laws and policies, such as FAST and ADBNPI, which promote technology transfer and university-industry collaboration. Liu warns especially that the policy of lifting the ban to allow faculty-employees in public research institutions in administrative or decision-making positions to participate in spin-offs would distract their official duties and eventually jeopardize the public nature of science.

Wei-Ling Wang, in contrast, does not paint such a dire picture of university-industry collaboration in Taiwan. After assessing in general terms the problem of conflicts of interest and the restrictive effect on access to knowledge, Wang argues in, "*An Examination of Conflicts of*

*Interest and Restriction on Access to Knowledge Arising out of Academia-Industry Cooperation,*” that a March-in Right as provided in the Bayh-Dole Act of the United States should be able to reasonably control the side effects, which he thinks are largely speculative thus far, of university-industry collaboration. Wang’s optimism nevertheless is clouded by his hesitation to endorse the current patent policy in FAST that does not distinguish between rules governing inventions made by publicly funded contractors and grantees and those governing inventions made directly by public employees. For him, while a “title in contractor” policy is good for commercializing inventions arising from publicly funded researches, inventions developed directly by governmental agencies or public employees should still be left in the public domain.

While commercialization of science occurs mainly through the regulatory schemes within sovereign states, its effects might go beyond national borders through varied channels, such as international politics, trade agreements and globalization. In *“Current Development and Implications of Data Exclusivity Protection under U.S. Free Trade Agreements,”* Pei-Kan Yang investigates as a case study the impact of the U.S. data exclusivity regime on trading partners’ public health condition in general and their access to medicine, mostly generic drugs, in particular. While exported and implemented through bilateral or regional Free Trade Agreements, the data exclusivity protection imposes more stringent conditions than TRIPS would require on public access to a drug’s safety and efficacy data required to be submitted by pharmaceutical companies to a regulatory agency for the purpose of obtaining marketing permission. The data exclusivity protection prohibits generic drug companies from relying on the test data produced by other company to apply for generic drug’s marketing permission even

when the patent of the drug expires. As a result, the data exclusivity protection would delay the provision of generic drugs in other countries and would make it more costly for the poor to gain access to life-saving drugs. While Yang proposes several strategies to mitigate the impact of the data exclusivity regime on the social utilization of knowledge, his case study provides a vivid example of how the logic of commercialization of science seeks to reproduce itself so as to extend its life span.

As the only chapter dealing specifically with the third key issue of the volume, Chuan-Feng Wu's article, "*Benefits with Boundaries: Healthcare Distribution and Medical Technology Development*," reviews the question of distributive justice in healthcare. Wu argues that society has an obligation to fulfill only the minimum standard of health necessary for an individual to maintain two basic moral powers, with which he/she can obtain a fair share of the normal range of opportunity. Wu's thesis is more a revision than a rebuttal of Norman Daniel's theory of just health, that justice as equal opportunity requires that efforts be made to ensure that an individual's health condition meets the threshold of "normal functioning of human species." Instead of relying on the biomedical framework to determine the social obligation toward individual healthcare, Wu's revised standard brings in more societal considerations. At first glance, his engagement with Norman Daniel seems to bear only a tangential relationship to our concerns. However, Wu's thesis provides a possible benchmark against which the necessity and the urgency of a biomedical research agenda can be publicly assessed and the pursuit of scientific progress in a society with limited social resources can find a proper boundary.

Although each one of the chapters in this volume represents a preliminary attempt to tackle, from a different perspective, the thorny issues regarding the crisis of public science in Taiwan, together they depict a coherent picture in which science, no longer a forbidden realm insulated from all external factors, is now open to both the commercial influences and public scrutiny. They shed considerable light on the challenges before us.