

# A Panorama of Science In Mexico Today

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## THE VICISSITUDES OF SCIENCE IN INSTITUTIONS OF HIGHER LEARNING

Sketching the current situation and future challenges for science in our country implies first not losing sight of its indissoluble link to the development of institutions of higher learning, particularly the public ones, since it is there that 90 percent of Mexico's research is done. If we take into account the fact that university enrollment today is approximately 10 times what it was in 1970, and that for every academic post that existed then, there are now 24, we can say that the system of higher education (including the scientific sub-system) is the product of processes of institutional construction not more than four decades old.

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Two initial problems are derived from scientific research being carried out in institutions of higher learning: the first is related to funding and the second is a result of the day-to-day tension arising from competition for the legitimate respect of the other academic areas (teaching and dissemination of culture). Even during the so-called "expansion" (1970 to 1985), when the number of full-time positions, combining teaching and the production of knowledge, increased significantly, in practice, academics were required to fulfill teaching requirements, while research was a more ambiguous, lax matter. The people who occupied university cubicles were young, had limited training (bachelor's degrees were the most required) and lacked experience, among other things. For that reason, a process of professionalization on the job that continues to this day began, constituting the genetic mark of an important part of our institutions of higher learning.

FROM REGULAR FUNDING  
TO COMPETING FOR RESOURCES

The urgency of dealing with the growing demand for higher education, together with the economic crisis of the early 1980s, worked against more resources being designated for research. Nevertheless, the 1984 creation of the National System of Researchers (SNI), with its mechanisms for individual compensation; the transformation of the National Council for Science and Technology (Conacyt) in 1991, with the simultaneous differentiated assignation of funds for graduate and research programs; and the passage of the Law of Science and Technology in 2002, which proposed the creation of sectoral programs with private business community participation, all made for the possibility of access to resources linked to fulfilling a series of indicators and the commitment to periodically re-evaluate based on results.

Thus, in the last quarter of a century, competition for resources gradually became—not without resistance—a fundamental paradigm for scientific activity. However, these alternative forms of funding for science and scientists have not made for a significant advance in the conditions in which this increasingly broad and complex activity is carried out, with its permanent demands to improve its forms of organization, keeping up to date and access to cutting-edge technologies. Science is becoming more and more expensive, while resources are becoming scarcer and scarcer. One of the recurring indicators for measuring the importance the state and society place on scientific research throughout the world is the ratio of federal spending in science and technology to the gross domestic product (GDP), with the recommendation that it be assigned 1 percent of GDP. In 2006, Mexico earmarked 0.43 percent of GDP for scientific research, that is, less than half the amount recommended and the same exact amount assigned in 1984, the year when the economic crisis of “the lost decade” hit bottom. It should be pointed out that over the last 20 years, the greatest apportionment occurred in 1994 and 1998, when 0.46 percent of GDP was assigned to this item, while the lowest amounts were assigned in 2002 (0.39 percent) and 2005 (0.37 percent). Both of the low points came under the administration of Vicente Fox, the transition president whose sectoral plan included the goal of earmarking 1 percent of GDP to this area by 2006.<sup>1</sup> If we add that the proposed 2008 budget does not include any increase in government spending for science and technology and that prices of the inputs needed for carrying out

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research projects in the different fields of knowledge have jumped, the financial prospects for science seem anything but encouraging.

POLICIES THAT BUILD A PROFESSION

But while investment for scientific activities is stymied, it should be underlined that in the last 25 years, participants in Mexico’s scientific sub-system have seen the construction of an institutional framework for pursuing science as a profession, in many cases as observers and in others as actors.

As I have mentioned elsewhere,<sup>2</sup> the creation of the SNI in the 1980s is associated to two other outstanding events that would show the way forward for science until today. The first is the political activism of a large number of researchers who belonged to what was then called the Academy of Scientific Research. They met the lack of a government proposal for the sector with the formulation of an instrument combining professional recognition (being designated “national researcher”) with the assignation of a temporary monetary incentive that was eventually backed by the president. The second was the formulation of a series of rules and prerequisites that as a whole legitimized a professional profile for those who had made research the center of their daily work.

From that moment on, a full-time position and a doctorate, together with voluntary, individual, periodic peer review, based fundamentally on publications and academic citations, as well as training new researchers by advising graduate students on their theses, have become the central basis for differentiating among professionals in institutions of higher learning. This system has achieved such recognition that, since it was instituted, higher education policies have simply replicated it. While it has already been mentioned that during the period of expansion, scientific research was undertaken without objectives and precise guidelines in universities, after the

advent of the SNI, matters have changed significantly. Today, undefined evaluation mechanisms no longer seem to be a problem in the field of science, and the inquisitorial finger now seems to be pointing at teaching.

While this regulatory framework has achieved broad consensus in the scientific community, with an important impact on the careers of many academics—particularly prompting many of them to conclude their doctorates—and in formulating institutional programs for recognizing merits (fellowships and productivity incentives), it is also true that the number of researchers who fulfill the profile is still limited. Suffice it to recall that when the SNI was founded, the expectation was that 10,000 researchers would be registered by 1990, a figure that was only achieved 14 years later. In 2005—this is the most recent data available—Mexico had more than 240,000 academic positions, 27 percent of which were full time (about 64,800) and only 5 percent of which were recognized by the SNI. In short, there is one “national researcher” for every 20 academic posts, or, one “national researcher” per every five full-time positions.<sup>3</sup> In other words, although every year, more national researchers are registered, their institutional presence and influence is in many cases merely individual and limited to the older institutions.

The idea here is not to say that there are no successful experiences of collectively organized research. Over the years, each field has produced recognized efforts to combine professional commitment and academic exchange. In the global context, however, these are real *islands* in adverse institutional settings, or models in which the institutional framework—whether they be research departments, centers or institutes—favors this academic endeavor.

#### THE UNDESIRE EFFECTS FOR THE SYSTEM OF HIGHER EDUCATION

Both the SNI and the entire set of policies for science followed over more than two decades have been a change in the structure and values of scientific activity, although their undesired effects should be considered when evaluating their achievements. In that sense, Edward Hackett said more than a decade ago that the new circumstances of academic work are accompanied by ambivalence or underlying tension among university scientists.<sup>4</sup> These tensions are palpable in institutions of higher learning, and their resolution has tended to fragment research into different planes.

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In the first place, full-time university contracts are based on the always debatable complementarity of teaching and research activities. Nevertheless, both intra- and extra-institutional evaluation instruments made the relationship more complex by associating both functions with fundraising efforts. Requesting and managing funding has become a highly valued skill that fosters the development of larger projects. In this regard, Robert Merton’s Matthew effect comes into play: that is, the tendency of funding bodies to repeatedly benefit those who have already received funding.<sup>5</sup>

Another consequence linked to the new researcher profile requirements (constant production of results and fundraising) is the gradual decrease of the professional importance of teaching, particularly if we understand it as an activity that does not end in the classroom, but requires interaction and permanent availability for dealing with students: office hours for advisory services, review of work and lab practice. While these activities are actually carried out, today it is very evident that there is a paradox: as educational and productivity indicators rise, the time academics spend in institutional settings is dropping.

Another example of this undesired trend in scientific research is the proclivity to split up research results, given the urgency of periodic evaluations that demand quick, constant results. The inclination to publish books that present detailed information about research processes is gradually giving way to writing articles explaining the results obtained separately and in different publications.

There is another kind of criticism of the principles arising out of the policies implemented in recent years: doubts about the education received in graduate programs with high graduation rates, but with limited contributions in their theses or the curtailed freedom arising out of funding for select topics (putting a priority on *relevance*) that could be funded in the future. What should be underlined is the need to broaden horizons of “researching about academic research.”

## THE CHALLENGES OF THE INTER-GENERATIONAL TRANSITION

In conclusion, I think it is pertinent to reflect on the quarter century of science policies dealt with in this article, emphasizing the fact that the change in reference points, rules, norms and development patterns has happened essentially in a single generation of academics, whose careers have developed in changing surroundings.

As I mentioned before, the institutions of higher learning were populated 30 years ago by young, inexperienced academics. Many of those same people are still active in these institutions. Over the years, they have gone through a long process of professionalization with differing results, ranging from those who have mainly been teachers with temporary positions to those who have managed to create research collectives and who work in universities and institutes in highly favorable conditions (tenured positions with fellowships and incentives, on the highest rungs of their pay scales). The latter represent the desired result of the organizational efforts of these years. Unfortunately, however, they are the minority. Even so, guaranteeing that their numbers increase would be an important achievement for this generation.

The average age now exceeds a half-century; retirement is just around the corner. However, there is no hiring policy to allow for experience to be transmitted to a new generation. Many young people have worked with these researchers and


then left because they saw no long-term possibilities for developing their careers. The number of academic positions is growing, but specifically in small private universities that hire by the hour and have no interest in research.

We should not underestimate the fact that recent developments in science in Mexico are marked by *chiaroscuro* and are in transition with regard to its practitioners. Those who have forged the shape of research in the last four decades have a legacy; however, unfortunately, there does not seem to be any visible way to preserve it. The future of scientific research will to a great extent depend on dealing with this situation, above all for a generation that is already here and in need of opportunities. **MM**

## NOTES


- <sup>1</sup> Figures for federal spending on science and technology and researchers who belong to the SNI were taken from *Indicadores de actividades científicas y tecnológicas de Conacyt* at [www.conacyt.com.mx](http://www.conacyt.com.mx).
- <sup>2</sup> See Germán Álvarez and Mario González, "Las políticas de educación superior y el cambio institucional," *Sociológica* 13 (Mexico City: UAM-Azcapotzalco, 1998), pp. 55-87; and Mario Guillermo González Rubí, *La investigación académica en el fin de siglo. Tres experiencias en establecimientos no metropolitanos en el campo de las ciencias sociales* (Mexico City: DIE/Cinvestav, 2006).
- <sup>3</sup> The data about academic positions appears in *Anuarios Estadísticos de la Asociación Nacional de Universidades e Instituciones de Educación Superior* (ANUIES) at [www.anui.es.com.mx](http://www.anui.es.com.mx).
- <sup>4</sup> Edgar Hackett, "La ciencia como vocación en los noventa," *Universidad Futura* 13 (Mexico City) (Winter 1993), p. 15.
- <sup>5</sup> Robert Merton, *Sociology of Science* (Chicago: University of Chicago Press, 1973).

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