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Special focus: the Latin American university and R&D

Introduction

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The three case studies that follow in this special focus on Latin America arise from the UNESCO/COLUMBUS project on 'The Higher Education Contribution to R&D in Latin America'. In this introductory article, Hebe Vessuri discusses some of the findings of the research carried out in that project and presents an analytical summary of the major issues and challenges facing Latin American universities in evolving the culture and conditions for an R&D effort that will underpin their countries' economic and social development. Among the issues she picks out are evaluation systems and quality criteria; the establishment of research priorities; institutional restructuring and strategic thinking; and the essential elements in a consensus among the major universities, the state and industry, which the most influential universities must take a lead in establishing.

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In spite of a relatively low level of research and development compared with industrialized countries, Latin American nations have promising areas of scientific and technical achievement, and a wealth of valuable scientific and manpower resources. These are, however, caught in the traps of scarce funding, large inefficient bureaucracies and the absence of strong research traditions.¹ Universities, the traditional research *locus* in Latin America, offer a particularly interesting starting point for the analysis of current trends, for they

are sensitive thermometers of what goes on in the broader society.

Calls for reform of higher education in terms of efficiency, practicality and relevance are growing and becoming more articulate. Recent domestic science and technology (S&T) policies aim, among other things, to transform the universities in order to improve research and the training of a new crop of researchers and professional graduates. In response to this, a number of universities are beginning to emphasize one of their activities, which has not been very visible in past decades but is

of crucial importance for economic development: R&D - ie advanced applied technology, technology transfer, and the training of a competitive scientific and technical professional labour force.

The institution which employs the researcher is often the one that enables his

research. Not only does it provide a physical and laboratory base, library services, telecommunications, technical/secretarial support, etc, but also a group of colleagues who are essential to intellectual inquiry. In the case of a university, it affords students as

helpers and fresh minds and a set of operational values to protect research from restrictive forces, including the vagaries of governmental patronage. Of course, the institution to which the researcher belongs may also hold back the research, if it is too bureaucratic or lacks a critical mass of researchers.

Recognizing the importance of the institutional level, the UNESCO/COLUMBUS Chair on 'The Higher Education Contribution to R&D in Latin America' focuses on R&D at individual universities. It aims to give greater visibility to the subject as well as to promote a better acquaintance with Latin American institutions which probably are not well known internationally but which may offer good academic programmes and original organizational solutions and have great potential for development. A common approach to fifteen Latin American higher education institutions, with their different histories and varied evolution processes, offers an opportunity to consider them from a comparative perspective. The expected result is an improved understanding of the common factors and specificities conditioning them.

Issues

R&D and related activities

The weight of R&D in the region's universities is variable, and is generally small and marginal to the rest of the universities' endeavour, and only loosely linked to the market. The initial problem of the case studies in the COLUMBUS Chair, ie to describe the R&D activities of particular universities, turned out to be the continuing problem that, at the end of the exercise, remained as an issue open for future research - in the sense that the isolation of R&D from the range of activities performed proved to be an exacting task when an attempt was made to identify and describe the structure of the research system in the universities under analysis. Available data in the institutions are produced with other criteria in mind, generally administrative or accounting ends, and not evaluative ones. But since it is by now well known that the types of R&D data collected at the 'first level', for internal monitoring, budgeting and planning by different organizations are an important input into policy making and analysis at other levels, and given the extensive development of 'second level' indicators for research purposes on the basis of indicators from the first level, it is regrettable that most Latin American universities do not take advantage of the battery of indicators available in the international literature.² The main difficulties found in the information available from the universities examined may be summarized as: problems of access to the data because they are widely decentralized; divergence in the data relating to the same area, for they are processed by different institutional or national units; temporal discontinuity in the statistical series; lack of reliability of available data; and absence of or lack of access to data about certain topics, particularly those concerned with funding. These difficulties with data are particularly evident when considering the relationship between university R&D and university-firm linkages, as well as the coordination, of these activities with national S&T policies. Nevertheless, the case studies try to present institutional breakdowns of data from the S&T sector, the higher education sector and, when possible, the business enterprise sector, as they converge in the particular university considered.

Quality aspects

After several decades of emergence, expansion and consolidation of S&T institutional complexes in the region, in the last few years there has been a growing awareness of the need to assess achievements and failures and to define new strategies in response to new international challenges. Although the practice of academic evaluation and the establishment of organizational structures to carry it out are still very incipient, evaluation appears increasingly on the debate agendas of Latin American universities and several initiatives are taking place.³ In turn, the present trend towards evaluation will probably spur improvements in the production of relevant data, helping to solve the problems referred to above. Obviously, the two are elements of the same process: a more competitive institution is keen to have greater accountability and thus it needs to collect precise data at the institutional level. In several national scientific communities there is consensus that the quality of the graduates being produced in many institutions is deficient and that a major challenge is to improve the general quality of higher education and

to establish or improve efficient accreditation mechanisms. However, in addition to the quality of personal skills of graduates there is also the problem of subject or technical knowledge. The gap facing the region in terms of the ability to make the transition to new knowledge structures, to become effective interlocutors with the producers and vendors of advanced technologies, is widening. What should be the policy agendas of individual universities in this respect? The issue is yet to have a widespread impact on what students learn at universities, but it is addressed by Renato Dagnino in his paper in this issue of *Industry and Higher Education* in connection with the University of Campinas (UNICAMP) in Brazil. He cautions against what he calls a 'conservative' view of quality that reduces it merely to international prestige as measured by number of citations, a view that he finds to be dominant in UNICAMP at present, and urges an interdisciplinary effort in the setting up of research priorities within the University.

Establishing priorities

Conventionally considered a central aspect of S&T policies, priority fixing in Latin America tends to remain largely an activity consisting of the listing of topics that either reproduce what is already being done or represent expressions of wishful thinking which suggests that there is a vacuum in the understanding of these processes. There are certain questions that must be made an explicit object of debate in the universities (in this respect, differences are noticeable between public and private universities and their positions in the national S&T system): are there priorities? If so, what are they? Is it necessary to have priorities? What are the bases for them? Who must fix research priorities (the state, the researchers, university officials, firms), and with what criteria? Clearly, the design of priorities cannot be conceived as a unidirectional process, for it must emerge from the context in which the institution operates. However, there are factors restricting the margin of manoeuvre of institutions in the orientation of research. Among the most frequent institutional limitations for carrying out research policies formally agreed upon, are:

- The institution's funding problems. In a critical context of scarce resources, it becomes particularly difficult to allocate funds for making effective political decisions related to research priorities.
- The autonomous character of research groups. In their strategy for seeking funds - very often their survival strategy - individuals and groups direct their research towards very specific contingent market demands.
- The influence of fashion or thematic trends from abroad, frequently accompanied by funding, may deviate research from local or national interests.
- The importance of cultural elements characteristic of scientific communities - for example, individual academic freedom and the right to define one's own research agenda.
- The discredit of anything with the appearance of a top-down decision forced by political lobbying and the pernicious effect of the actions of inexperienced individuals who participate prematurely in major decisions without the necessary scientific insight.

The case studies underline the need to devise methodological tools for determining the supply and demand of R&D staff within the specific national and institutional realities of Latin America. Given the importance of highly qualified human resources for the development of research and other activities linked to the demanding labour markets of the turn of the century, they are useful not only in interpreting what has occurred in the 1980s, but also in suggesting interventions in the 1990s.

Estimating institutional efforts

An issue that comes to the fore is the definition of the critical mass of R&D resources. What are its qualitative and quantitative parameters and the levels at which the question should be posed: institutional or national? This issue is related, on the one hand, to the establishment of scientific technological priorities and, on the other, to the strategies of human resource training, which includes graduate programmes, and the renewal and updating of knowledge.

The case studies pay a good deal of attention to the current redistribution of power that is underway between teaching and research in specific institutional settings. Maria Elina Estébanez, in this issue, emphasizes the problems of coordination and good use of the human potential in a mass university like Buenos Aires, when academic units tend to an autonomous behaviour independent of the central institutional management. She argues that, although the University registers a low number of R&D staff relative to the total academic personnel, in fact there is a similar group of people the University hires as teachers, who do R&D outside institutional management control and comprise a significant idle capacity that could have strategic value.

From a different perspective, Laura Cházaro in her paper on the Autonomous National University of Mexico (UNAM) reaches a similar conclusion about the waste of human potential. She admits that the segregation of research from teaching has managed to create a research university within the broader context of a mass teaching university. But she argues that the incentive mechanisms put in practice both by the institution and government have been less successful than expected in increasing the number of researchers and the general productivity of research. She suggests that among the reasons for this could well be the imposition of a single academically oriented excellence model that discourages rather than spurs R&D and technology transfer. The groups within UNAM that are most active in technology transfer to outside customers tend, in her view, to receive less support because of the lack of alternative monitoring mechanisms these groups and their reproduction are not necessarily reflected in the figures on human resources or research productivity registered by the institution and government databases.

One and multiple

Under the name of universities, Latin America presents a highly diversified set of institutions that produce more than half a million graduates per year. Among the fifteen cases considered by the UNESCO/COLUMBUS Chair, a choice was made of universities that host the largest number of researchers in their nations, like Buenos Aires (UBA), Autónoma de México (UNAM), University of São Paulo (USP), Havana, and Central de Venezuela (UCV). The traditional output of university work is present in these institutions: they show the highest percentages of doctoral degrees and science graduates granted in their respective countries. They also have the largest number of scientific authors, although there is a wide variation in growth rates and absolute numbers of scientific publications in each country.

But the individual profiles of some of the other universities analysed show how they concentrate resources on special fields of activity. Some have an important regional relevance (like the Argentine University of San Juan, stronger in engineering, particularly electric power, mining, and automatization, and Córdoba University, also in Argentina). The State University of São Paulo (UNESP) in Brazil presents a daring organizational blueprint with decentralized campuses and other units in 18 cities of the State of Sao Paulo. No wonder one of the institution's urgent matters at present is linking the several campuses with a microcomputing network in a project whose cost is estimated at US\$18 million. A university like UNICAMP purports to be a model of the Latin American research university. Still others, like the University of Santiago de Chile, reinforcing its tradition in Chemistry and Chemical Engineering, and the National Engineering University of Peru (UNE), are medium-sized technically oriented universities. The Catholic Javeriana University in Colombia and the Cayetano Heredia University in Peru have strength in the biomedical sciences.

Each of these institutions, as a unique microcosm, with its specific problems and solutions, and all of them combined, reveal a significant trend in higher education in Latin America today. Involvement in R&D is here to stay and grow. It is already producing changes in many aspects of university life, including organizational structures and resource allocations. Most important, the growing emphasis on R&D reflects an ongoing change in the public's view of the role of universities and in the role that such institutions accept for themselves.

Conclusion

Until recently, scholarship on Latin American universities had focused primarily on the relationships between the institutions and society, the political processes, and the demands both from within and without relative to policy formulation problems (mostly in connection with rapidly growing student enrolments). In the 1980s, while the cycle of expansion of the higher education systems was still taking place, new problems emerged, some stemming from the fall in fiscal resources transferred to higher education by the state as a result of the crisis that affected Latin America throughout the decade, others derived from the retraction of the corporatist-populist-benefactor state from the public scene to enable a freer operation of the markets and induce the private sector to increase its share in the management of the economy and culture. New configurations of actors and interests become visible as the components of the national university systems interact with changing structural conditions in the political and economic domains. Although the central actors have not necessarily changed - state, industry, faculty, and segments of the public seeking a higher education and the benefits stemming from it - their complexity and the relationships between them have. Together, these shifts create new patterns of social behaviour, and, of course, new policy agendas.

Rather than government together with the scientific community having the dominant voice, there are indications that some members of the business community, in partnership with higher education leaders and international funding agencies, are beginning to be more vocal and take a more active position. It remains to be seen whether these new partnerships will be able to sustain the flow of resources to higher education in an era when economic competitiveness is central to all policy makers' agendas, in view of the weakened financial position of the state in most Latin American countries at present.

In this scenario, for universities to make a more significant contribution to the advancement of domestic R&D in Latin America in the future, at least a leading group of them must assume the responsibility of ensuring the means and conditions for enabling research. This involves the achievement of a new consensus among those universities, the state and industry, including the following elements: (1) There must be a commitment from the state and industry to support R&D, for effective results will be possible only in a stable and nurturing environment.

(2) Local installations must be upgraded and reorganized to enable the required transformation in the technological platforms for research and teaching.

(3) More attention must be paid to research in the planning process.

(4) There must be coordination among a sufficient number of higher education and research institutions and industrial laboratories for the acquisition of costly equipment and increased mobility of academic staff and students.

(5) A more balanced relationship is needed between teaching and research, strengthening gradually the research component.

(6) Improvements are needed in the status and working conditions of research staff.

(7) International collaboration should be attracted for well defined R&D projects that make optimal use of local resources.

(8) Centres of excellence should be promoted in cooperation with regional and international agencies in focused strategic areas.

(9) There should be efforts to promote an understanding of the role of basic science in development and to link research more closely to the needs of the economy, environment, society and national administration.

(10) The role of research committees within the universities needs to be reinforced.

Notes and references

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