

Foreword

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In Mexican universities scientific research as a substantive role is still considerably underdeveloped. Worldwide, university authorities from all countries find mechanisms to develop research, and innovating ways to accomplish this. In Mexico, few institutions incorporate this function beyond the institutional rhetoric, and indeed, little is known about the conditions under which research is conducted, or of scientific activity and its role in society and the economy.

The motivation for bringing together the contributions on this theme issue, that try to elucidate the dynamics of scientific research in Mexico, comes from observing a delay in absolute and relative terms in the field of research.

But how should the analysis of Mexico's situation, prospects and challenges be approached?

The propositions by the authors who contributed to this theme issue represent open and free approaches, that depart from a perspective aimed at creating some coherence and integration of the whole. All of them, however, have produced materials from their own research lines, which were well under way even before receiving the invitation to participate in this project.

The training of researchers is a long and thorough process and for many it is also confusing and exhausting. The reason for this is in many cases, the very immaturity of graduate programs in which researchers are trained, as well as the institutional conditions in which these programs operate. The work by Guadalupe Moreno Bayardo, a researcher at the University of Guadalajara, clearly documents these issues. Her work highlights the interaction between students' individual conditions and vocations with the graduate programs' opportunities and shortcomings that confront them. It is remarkable that, due to the theoretical and methodological framework the author employs, the particular case analysis is revealing of the regularities that generally take place in the research training processes in Mexico. For this reason, among others, many students and graduate programs will identify with the processes the author describes.

Yet reorienting and changing the institutional conditions in which scientific research occurs is not trivial. Veronica Ortiz Lefort presents an analysis that reveals, once again, that this is not possible by improvising, and that authorities who make decisions and design policies that shape these conditions lack the background to do so. All researchers in Mexico are witness to the consequences that incompetence and bureaucratic centralism have on the conditions in which scientific research is carried out. However, an analysis such as Veronica's allows us to rigorously document these processes and to understand and identify causal relationships that enable more intelligent action to change those circumstances. Nevertheless, the author's impa-

tience with policy makers that affect the development of science in Mexico is fully justified and founded in her deep understanding of the development of the scientific and institutional conditions that support these activities in countries that are more advanced in this field. Those of us who have the opportunity to observe the growing gap between one context and the other widely share those feelings of impatience and frustration.

From a quantitative perspective, Candelaria Ramirez, Mariana Reyna, Aida Garcia, Xochitl Ortiz and Pablo Valdez examine the success achieved, or yet to be achieved by researcher training. Focusing more on its outcome, and using an accurate and unforgiving criterion, they measure the effectiveness of the process by the number of scientific papers published by graduates from programs specifically designed to train researchers for the duties of science. The results, again discouraging, are unquestionable, especially when compared with those achieved by countries with which Mexico competes. The reading of this paper immediately raises questions such as: Why is this process so inefficient? Why aren't these studies routinely made for all graduate programs in the country that aim to train personnel devoted to science and technology? How many more of these studies are needed for them to appear on the radar of university authorities and those who define the policies of science and technology in Mexico?

Ana Isabel Metlich and Ricardo Arechavala present an analysis of the conditions and organizational contexts in which trained researchers perform their work. Researcher productivity is not only the result of personal characteristics such as intelligence and scientific vocation, but of the organizational conditions in which they work. What are the contextual factors that most influence their labor productivity? How does this influence manifest at the individual and group level? The authors of this paper document a systematic analysis of organizational factors, such as conflict and power that make up the scientists' work space. The bureaucracy (in the pejorative sense, not the technical term), regulations, incentives and inertia again appear, through an analysis that compares the conditions of scientific activity in a public research center and a university, both typical examples of their respective categories in Mexico. Again, a qualitative research approach seeks to understand on theoretical grounds the generality of the processes documented, purporting to show a relevant and useful analysis for managers of similar organizations.

At a higher, inter-institutional level, processes also take place that shape scientific research in universities, and determine their potential for change and evolution. Worldwide the demand and supply of knowledge are becoming increasingly important, especially in connection with economic activity. This is the domain addressed by the work of Alejandro Mungaray, Jorge Ramos, Ismael Plascencia and Patricia Moctezuma, documenting the current processes of restructuring the relationships between the creation of knowledge in the university and its application in the economic activity in the state of Baja California. Resorting to the perspective of regional innovation systems, used extensively in many countries, the authors focus on knowledge generation and rethinking the role that universities play in it.

Their analysis highlights the type of change that many Mexican universities would be excluded from, as most of them are still fixated on models of the teaching university and have not even developed significant capabilities in scientific research, and hence, would find themselves in even less of a position to develop skills of interaction with other social and economic actors within their respective contexts.

At the next level of aggregation, so to speak, we are able to see the development patterns of scientific activity in the country as well as in different states and institutions. What is the effect of policies for the allocation of resources devoted to science and technology? How do the criteria used to assign them affect the development of capabilities in this field? Guillermo Campos Ríos and Maria Eugenia Martínez present another quantitative analysis of the effects of government policies used to “govern” the development of Mexico’s scientific activity. Their conclusions, which seem inescapable, draw attention to certain processes that are beyond the intuitive and case oriented perception with which Mexico’s officers make decisions in this field; their policy recommendations invite us to partake in a much needed reflection, especially for those involved in the development of science in the country.

The article that Santos López Leyva contributes to this theme issue focuses on science produced by Mexicans based on its contribution to the international arena. Perhaps as a necessary counterbalance to what has been reported by colleagues who tend to focus primarily on the local perspective, he finds that Mexico needs to cover a lot of ground in order to appear on the global scientific map. Once again, here we have the result of a disciplined, quantitative approach, which goes beyond the confines of Mexican organizations for the production of science and their specific local contexts. It is the aggregate view of these processes, that the author proposes and documents, which makes it possible to identify patterns where change is imperative. The interesting analysis he makes about the behavior of organizations and institutions dedicated to publishing the results of scientific work reveals a profound knowledge of international science.

We thus find that the great diversity of approaches and methodologies of the articles included in this thematic section offer a particularly rich perspective. However, this same diversity also points to the need of addressing and integrating these efforts whereby contributing more systematically to motivate and encourage the development of research in Mexican universities. Many other development issues of science in Mexico and its universities are left unexplored, but we hope this theme issue will help stimulate research on the subject, and encourage the redesigning of policies and decisions that shape science in Mexico.