Survey of Science & Technology: Assessing the R&D ecosystem in Puerto Rico [1]

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[4]

Our society is at the cusp of a scientific revolution. The generation and application of knowledge and innovation have fundamentally changed the way we live and are a driving force in the global economy. For that reason many countries around the world, including Puerto Rico, are making a push to establish knowledge-based economies.

Successful knowledge-based economies depend on a solid research and development [5] infrastructure: talented human capital, sounds investments, and good public policies that create a healthy innovation ecosystem. Given the importance of R&D for economic growth, the world's leading economies have been conducting science and technology surveys for decades, to estimate the human and financial resources dedicated to R&D, how those investments have changed over time and how those efforts compare to other countries. These surveys allow them to design better strategies to foster R&D, the generation and application of knowledge and innovation.

For more than 40 years, Puerto Rico has been a leader in the manufacture of pharmaceutical and medical devices. In the last decade or so there has been a continuing effort to attract more research and development to the Puerto Rican archipelago.

Now, with the publication of the first ever **Science and Technology Survey** [6], Puerto Rico has taken another step forward towards this goal. This pilot survey, published by the **Institute of Statistics of Puerto Rico** [7], gathered information about the human and financial resources devoted to research and development activities in Puerto Rico. The data provided by this study should inform the design of better strategies and policies to foster R&D in our archipelago. Also, because the data was collected in accordance to the standards established by the Organization for Economic Cooperation and Development [8], which are followed by many other countries, it will allow a comparison between Puerto Rico and other nations.

The Science and Technology Survey [9], performed in 2009, looked at three kinds of research and development activities: basic research [10], applied research [11] and experimental development [12]. Basic research [10] aims to understand the fundamentals of observable phenomena, like studying how cells divide, whereas applied research [11] aims to solve a practical issue, like finding a cure for a cancer. Experimental development [12] uses the existing knowledge to create a product, a device or a process, or to improve already existing ones.

The results of the Survey [9] revealed that in 2009 the total of R&D expenditure in Puerto Rico reached **$466.8 million**, representing **0.49** percent of the Gross Domestic Product (GDP) [13] – a measure of a country's economic output.

Out of the four sectors surveyed, the *private sector* was the biggest investor in R&D with a total of **$314.2 million**. Within the private sector, investments from pharmaceutical and professional services companies stand out. Ninety-one percent of the companies that invested in R&D in Puerto Rico during 2009 are headquartered in the United States.

Higher education institutions were second in terms of R&D investments, with an estimated **$131.8 million**. Public institutions like the University of Puerto Rico [14] and the Arecibo Observatory [15] account for 86% of that amount. Many of these funds come from federal agencies like the National Science Foundation [16] or the National Institutes of Health [17]. In public universities, the areas with the highest amount of R&D were information and communication technology, environmental control and protection, biotechnology, nanotechnology and defense.

Lastly, *the public sector and non-profit organizations* invested **$20.9 million** in R&D between both of them, mostly in the health care area.

In terms of human capital, an estimated **6,772** people work on research and development activities, representing **0.62%** of the workforce in Puerto Rico. Compared to other places, the proportion of women researchers, normally an underrepresented group in the sciences, was much higher (42%). More than a third of the researchers in the public sector hold PhDs, while that number goes down to 4% in the private sector, where 72% of the workforce are bachelor degree holders.

What does this information mean for Puerto Rico?

The publication of the first ever Science and Technology Survey [6] lays the foundation for the development of policies and initiatives that foster R&D activities in the Puerto Rican archipelago. For the first time, the R&D data on Puerto Rico can be directly compared to that of the United

States and other countries. This should allow a better assessment of competing economies and help in the creation of effective strategies to attract R&D to Puerto Rico.

The results of the Survey suggest that to become a competitive knowledge-based economy, Puerto Rico must increase its investments in R&D. Puerto Rico invests **0.49%** of its economic output in research and development, lagging behind competing economies, such as Ireland, which invests **1.42%** of its GDP in R&D, and other Latin American economies like Brazil and Uruguay.

It is of special concern that the government spends such a meager amount in R&D (**0.01% GDP**). Most of the R&D investments in Puerto Rico come from either federal funding or the private sector. If Puerto Rico is to have a solid knowledge-based economy in the future, the government needs to do more. Another issue that deserves attention is the lack of collaboration between the academic and private sectors, as these partnerships have proved to be vital for the advancement of knowledge-based economies elsewhere.

In spite of the relatively modest investment in R&D in Puerto Rico, the Survey shows that it did make a contribution to the Puerto Rican economy in 2009. Also encouraging is the fact the economic recession barely affected R&D investments and in fact they have increased since 2006 and are expected to keep following that trend.

The importance of R&D in the Puerto Rican job market is relatively reduced compared to other countries. Also, there is a marked disparity between the education levels of researchers in the public and private sectors. This highlights a need to increase training in science and technology, to encourage the pursuit of higher education degrees, and promote the return of talented scientists that train in the United States and abroad to Puerto Rico.

The Science and Technology Survey [6] is a valuable effort that should be followed up and built upon. You can download the Survey of Science and Technology here [6]. For more information on the Institute of Statistics of Puerto Rico you can visit their website [7].

Tags:

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