



## Promoting inclusive innovation in Latin America

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Latin America shows high levels of inequality due to its productive matrix that still relies mainly on natural resources. This is in contrast with countries exporting knowledge-intensive products that show considerably lower levels of income inequality.

On the other hand, employment associated with routine activities is likely to decrease in the near future due to increased automation. This is already happening in industrial agriculture in the region, with the consequent displacement of rural population to the big cities.

It clear then that unless deliberate actions are implemented at the government level, political tension in the region will arise. Therefore, promoting inclusive innovation, understood as the development of value chains based in new technologies that create job opportunities even for those that cannot access to a better education, should be a priority for the region.

I will briefly summarize some of the actions that are being implemented in Argentina. This direction could be extrapolated to other countries of the region.

One of the main changes that we are witnessing is the digital revolution. In contrast with the industrial revolution that produced deep asymmetries in the distribution of wealth between countries, the digital revolution is horizontal and can reach populations that were heretofore not benefited by the previous technologies.

However, these benefits can only take place when proper training is provided and new value chains are developed that lead to an improvement in the number and quality of the job post.

As an example of the magnitude of the digital divide that we have in our country I can mention the case of a region in Mendoza, close to the Andes. We have there an antenna from the European Space Agency which is operated by five Argentinean engineers that can communicate with the Curiosity rover in Mars. A few kilometers from that station was a local community that had no electricity or telephones and therefore could only communicate with people within sight. Thanks to a special program promoted by the Ministry of Science that gathered scientists from different government institutions, this community was able develop a technology to manage guanacos (a South American Camelid) and produce fiber worth up to 600 USD per kg. They have since not only obtained electricity but also internet and access to an e-commerce platform that allows them to commercialize their products. In this context we are also promoting the use of blockchain for the certification of organic products by small producers in order to facilitate access to foreign markets.

On the other hand, Argentinean companies were able to export experimental nuclear reactors and we have just launched a satellite based on radar technology. Three of the Latin American Unicorns are Argentinean software companies. However, there is a shortage of about five thousand engineers and programmers. To provide training and attract youngsters to STEM careers we are teaching code and introduction to robotics in elementary schools and we run a 50-hectares science fair (Tecnopolis) in Buenos Aires, with smaller versions that travel throughout the different provinces. In addition, we run a TV channel called TECTV that airs locally produced documentaries and series showing the opportunities offered by the new technologies, from biotechnology to the development of videogames.

We are also developing value chains for organic and premium food that incorporates technologies such as freeze drying for conservation and blockchain for traceability and validation of environmental and fair trade certifications. The idea is also to associate these products with ancestral cultures, thus providing differential value to the so-called responsible consumer market.

Finally, it is necessary to start forming scientists in the region under a new paradigm. Until now, the norm in Latin American countries has been to send graduate students or postdocs to centers of excellence, usually in Europe or the US. This has been extremely satisfactory in terms of access to the forefront of science in the different areas of research. This strategy has also allowed continuous updating of the technologies used in their countries of origin, provided special conditions required for repatriation are implemented. Otherwise, this policy leads to a brain drain.

In Argentina, thanks to a special program called “RAICES” (which stands for “roots”) which provides special contracts and grants to those professionals willing to return, we have succeeded in repatriating more than 1,300 Argentinean scientists. This program also maintains a network of five thousand Argentinean professionals working abroad; these investigators receive weekly information about events and programs taking place in our country. Moreover, we have established a special initiative providing for joint grants that link them with the local scientific community.

In spite of the above-mentioned benefits, education of the scientific labor force in developed countries has two pitfalls.

First, scientists in developed countries have production of knowledge as their sole responsibility. The conversion of this knowledge into wealth is carried out by a productive system that depends on innovation to maintain competitiveness. In those countries, for example in the US and Israel, governments and/or the private sector are also able to make an effective use of the resulting technologies.

However, in Latin America we need a different type of scientist. Like the Roman god Janus, they need to have two faces. One face should look outward to the frontiers of competitive science and the other should focus inwards, searching for means to improve their fellow citizens’ quality of life. This latter insight is not usually learned in the centers of excellence of the Northern Hemisphere and is related to scientists’ social responsibility.

In Argentina, the vast majority of scientists graduate from public universities which are State-funded and free. Therefore, although they do not have financial debts, they should have an ethical debt towards their community.

However, when students study abroad, they end up having professional and personal acquaintances with scientists from different countries, and less of a link to their community of origin. This, in turn, will make it more likely that potential future collaborations will not include other Latin American scientists. Of course, this also implies that the subject of such collaborations will most likely deal with the mainstream topics of a given field rather than with problems that are relevant to their country of origin.

On these bases we decided to create the Latin-American Centers for Interdisciplinary Formation (or CELFIs in Spanish). The idea behind the creation of these centers was to provide an environment in which young scientists from Latin America could bring problems with such complexity that could not be tackled by a single discipline. This common space should also provide opportunities for students and scientists to share experiences and to develop personal bonds that could be the basis of future collaborations. Thanks to the support from the Latin-American Development Bank we have provided fellowships to more than 1500 students and professors from 19 Latin-American Countries to participate in 270 different courses and research programs.

To conclude, it is clear that scientific and technological development is a necessary but not sufficient condition to promote economic growth. Specific actions are required in developing countries to produce wealth out of knowledge and promote inclusive innovation.