Op-ed

Why Investing in Research for the Developing World Will Benefit the United States Too

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Most funding agencies in the United States support research on technology that will benefit only wealthy parts of the world. The nano/robotic/green breakthroughs achieved in universities and other laboratories may never reach the billions of people in developing and emerging countries who need immediate solutions to improve their quality of life. The socioeconomic and technical challenges facing this segment of the global population represent a new frontier in research. New solutions to old problems are needed to deliver levels of performance similar to those enjoyed in the Global North, but at a fraction of the price to make them affordable in the Global South.[1]

By investing in science and engineering research for international development—to address challenges in water, energy, and health, for example—funding agencies can facilitate the development of solutions for poor countries. The resulting technologies can also serve wealthy markets and provide higher value than those currently used.

Large-scale sociotechnical challenges in international development persist because there are no solutions that meet the performance and cost requirements of less developed areas. Scientific and engineering interventions for the developing world must deliver 70–100 percent of the performance at one tenth or even one thousandth of the price of western equivalents.

Academia could not ask for a more fertile bed for novel research: technical challenges that have no obvious solution and that impact millions and even billions of people, often in a life-or-death way. US intellectual power can produce unbounded research advances that address these challenges and meet the economic constraints to make them viable.

This is not a new idea—AT&T did it 100 years ago. Consumers increasingly wanted phone connectivity across the country, but AT&T was limited in how far it could run a connection—the maximum distance was from New York to Chicago. The key technical challenge was development of the capacity to amplify and repeat a weak voice signal multiple times. AT&T could have taken a tech-driven approach by manufacturing massive copper cables to transfer signals over long distances with little resistance, but this would have been too expensive for mass adoption. Instead, the company sought the help of science while keeping an eye on the business factors that would dictate the feasibility of a marketable, scalable solution. The *science + economics* approach led to the commercialization of the vacuum tube, which enabled intercontinental phone calls, and then the transistor, which is the backbone of all modern communications and whose inventors won the Nobel Prize. AT&T used science + economics to capture the emerging market of telecommunications.

Today's engineers and scientists should similarly apply their talents to create the technological breakthroughs needed to transform developing countries. A background in "development" is not required. Louis Pasteur likely did not consider himself a development expert, but pasteurization allows billions of people around the world to safely drink milk every day.

If US funding agencies incorporate the constraints of developing world challenges in their requests for

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[1] The Global North refers to North America, Western Europe, and developed parts of East Asia. The Global South comprises countries in Africa, Central and Latin America, and much of Asia, most of which face political, social, and economic challenges.

applications, they will spur innovations that benefit wealthy and poor markets alike.

For example, the US Department of Energy's Advanced Research Projects Agency–Energy (ARPA-E) GENSETS program (GENerators for Small Electrical and Thermal Systems) is supporting research to create off-grid, 1 kilowatt (kW) electrical output combined heat and power systems that cost $3,000. But Chinese-made 3 kW diesel generators already in use throughout the developing world cost only $500. What if ARPA-E posed the exact same challenge, with the same efficiency targets and promotion of novel technology, but required solutions that were affordable and implementable in developing countries? The agency could expand the impact of the resulting technology without compromising potential benefits to American taxpayers.

Furthermore, if the United States invests in technologies for emerging markets, it will spur US industry by enabling firms to increase their global reach and engage new customers.

As a wealthy nation, and one that has a long-standing commitment to international aid, it is the duty of the United States to shrewdly invest financial and intellectual resources to create development solutions that will lift billions of people out of poverty and substantially raise their standard of living. To do this, we engineers and scientists cannot simply adapt our western solutions; we have to disrupt by creating the high-performance, low-cost breakthroughs needed in developing and emerging markets.

Funding agencies should judge research by absolute gains in not only performance but also performance/price. By investing in research for the developing world that will deliver fundamentally improved performance at a better price, the United States can positively impact the lives of people at home and abroad.