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Unraveling the Cryptic Nature of Know-How

By Ricardo Hausmann

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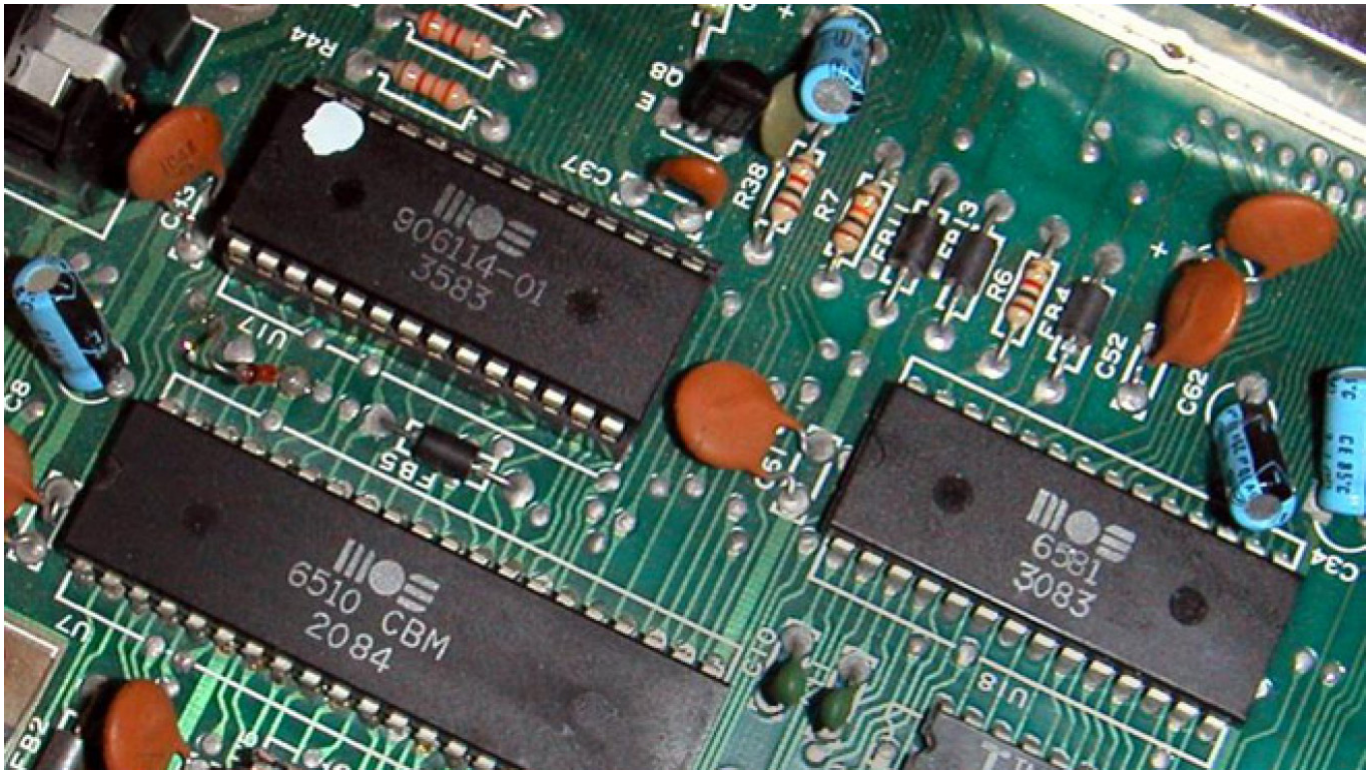

There is nothing better than fuzzy language to wreak havoc — or facilitate consensus. Austrian-British philosopher Ludwig Wittgenstein argued that philosophical puzzles are really just a consequence of the misuse of language. By contrast, the art of diplomacy is to find language that can hide disagreement.

One idea about which economists agree almost unanimously is that, beyond mineral wealth, the bulk of the huge income difference between rich and poor countries is attributable to neither capital nor education, but rather to "technology."

So what is technology?

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know-how cannot be acquired
through comprehension.

The answer explains the unusual consensus among economists. "Technology" is measured as a kind of "none of the above" category — a residual. Nobel laureate Robert Solow called it "total factor productivity," which remains unexplained after accounting for other production inputs, such as physical and human capital. As U.S. economist Moses Abramovitz aptly noted in 1956, this residual is not much more than "a measure of our ignorance."

So, while agreeing that technology underpins the wealth of nations sounds more meaningful than confessing our ignorance, it really is not. And it is our ignorance that we need to address.

In the book,"The Nature of Technology — What It Is and How It Evolves," W. Brian Arthur defines technology as a collection of devices and engineering practices available to a culture. But devices can be put in a container and shipped around the world, while recipes, blueprints and how-to manuals can be posted online, putting them just a few clicks away. So the Internet and free trade should make the ideas and devices that we call "technology" available everywhere.

In fact, much of modern growth theory, starting with Paul Romer's research in the late 1980s, sprang from the idea that output was driven higher by ideas that are hard to come by but easy to copy. That is why inventors have to be protected by patents and copyrights, or subsidized by governments.

So if ideas are easy to copy and devices are easy to ship, why do differences in "technology" persist between countries?

When something upsets a beneficent natural order, humans crave for stories featuring some malign force. For example, the argument in Daron Acemoglu and James Robinson's book "Why Nations Fail" is essentially that technology does not diffuse because the ruling elite does not want it to. They impose extractive [bad] institutions instead of adopting inclusive [good] institutions. And because technology may upset their control over society, they choose to do without it.

As a Venezuelan who is seeing his country collapse at this very moment, I do not doubt that there have been many instances in human history during which those in power have prevented progress. But I am also struck by how often governments that embrace the goal of shared growth — post-apartheid South Africa is a good example — fail to achieve it.

Such governments promote schooling, free trade, property rights, social programs and the Internet, and yet their countries' economies remain stuck. If technology is just devices and ideas, what is holding them back?

The problem is that a key component of technology is know-how, which is an ability to perform a task. Know-how, unlike devices and ideas, cannot be acquired through comprehension.

Tennis champion Rafael Nadal does not really know what it is that he does when he successfully returns a serve. He just knows how to do it. Putting it in words is impossible, and any effort to do so would not make the rest of us better players. As scientist and philosopher Michael Polanyi would say of such tacit knowledge, we know more than we can tell.

So we do not need extractive elites or other evil forces to explain why technology does not diffuse. Technology has trouble diffusing because much of it requires know-how, which is an ability to recognize patterns and respond with effective actions. It is a wiring in the brain that may require years of practice to achieve. This makes its diffusion very slow. Know-how moves to new areas when the brains that hold it move there. Once there, they can train others.

Moreover, now that know-how is becoming increasingly collective, not individual, diffusion is becoming even slower. Collective know-how refers to the ability to perform tasks that cannot be carried out by an individual, like playing a symphony or delivering the mail. Neither a violinist nor a letter carrier can do it alone.

Likewise, a society cannot simply imitate the idea of Amazon or eBay unless many of its citizens already have access to the Internet, credit cards and delivery services. In other words, new technologies require the previous diffusion of other technologies.

That is why cities, regions and countries can absorb technology only gradually, generating growth through some recombination of the know-how that is already in place, maybe with the addition of some component — a bassist to complete a string quartet. But they cannot move from a quartet to a philharmonic orchestra in one fell swoop because it would require too many missing instruments — and, more important, too many musicians who know how to play them.

Progress happens by moving into what the theoretical biologist Stuart Kauffman calls the "adjacent possible," which implies that the best way to find out what is likely to be feasible in a country is to consider what is already there. Politics may indeed impede technological diffusion. But to a large extent, technology does not diffuse because of the nature of technology itself.

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