

The Next Wave of Globalization: Offshoring R&D to India and China

– Stephanie Overby, CIO

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Entrepreneur-turned-academic Vivek Wadhwa is up front about his use of offshoring and importing foreign talent in a previous professional life as founder and CEO of two technology companies. "I was one of the first to outsource software development to Russia in the early '90s. I was one of the first to use H-1B visas to bring workers to the U.S.A.," Wadhwa says. "Why did I do that? Because it was cheaper."

That tactic is even more lucrative for corporations today, says Wadhwa: "When you have a person on H-1B waiting for a green card, you have them captive for six to 10 years."

Wadhwa, who was addressing an audience at Harvard University, where he is now a Wertheim Fellow at Harvard Law School's Labor and Worklife Program, says outsourcing work to lower-cost countries and importing temporary foreign workers is all part of a larger globalization transformation that is happening "an order of magnitude faster than the industrial revolution." According to Wadhwa, the ramifications of globalization will be much greater than the industrial revolution. "It will impact our standard of living here in the U.S. in the next five to 10 years."

For better or worse? That depends on whom you ask, says Wadhwa. And it may be beside the point. "Globalization is the reality," Wadhwa says. "Whether you like it or not, it's happening."

It's no longer just "low-end" work like call center positions or data entry or even midlevel programming that's being shipped to China and India. High-value research and development work also is moving offshore, says Pete Engardio, a [BusinessWeek](#) senior editor who has been writing about globalization for 20 years in addition to being a Harvard Law School Wertheim Fellow. And while cost is still the major driver, it's also about where talent and capabilities are available - and where they are available in mass.

Challenging Conventional Wisdom About Engineering Talent, Visa Arguments

In fact, globalization is happening so fast, academics like Wadhwa (also an executive in residence at Duke University's [Pratt School of Engineering](#)) can't keep pace. Inspired by his students, Wadhwa decided to fill the void with some [research of his own](#). "I had four or five students come up to me one week and ask, 'What courses can we take that will make us outsourcing-proof?'" says Wadhwa. "These students were paying megabucks to study there and should be very well sought after and yet they were worried about their jobs. That didn't make sense to me." He and his students began to explore what he describes as commonly accepted misinformation about graduation rates around the globe and the "skills shortage" forcing U.S. companies to go abroad.

According to the [U.S. Department of Education](#), America matriculates 70,000 students with undergraduate degrees in engineering every year, versus 350,000 produced by India and 600,000 produced by China. But China's numbers, which Wadhwa calls "propaganda," include "short cycle" degrees and rely on a looser definition of engineering. "The Chinese government told the provinces they had to produce more engineering degrees," Wadhwa says, "and the provinces gave them what they wanted."

India's numbers also include two-year diplomas. As a result, India and China can promote themselves as engineering-degree machines but "the vast majority of the graduates are unemployable," he says. (Wadhwa is currently getting a mix of cheers and jeers for his [BusinessWeek.com](#) column from Oct. 26, "[The Science Education Myth](#)", in which he cites an [Urban Institute study](#) that claims that U.S. schools are turning out more capable science and engineering graduates than the job market can support.)

As for the talent crunch argument that Bill Gates and others employ when lobbying for more foreign worker visas, Wadhwa also pushes back. He and his students surveyed 78 leaders at U.S. companies that were outsourcing high-tech work. The majority said they had trouble finding qualified candidates in the U.S. However those same respondents recorded job acceptance rates of greater than 60 percent, with those rates either remaining constant or increasing, and time to fill an open position of four months or less. There's a shortage all right, says Wadhwa, but it's "a shortage of engineers below market price that work day and night like slave labor."

When asked about issues like the productivity and quality of Indian and Chinese employees versus their American counterparts, there was little debate among respondents to Wadhwa's survey. Eight-seven percent said U.S. workers were as productive as or more so than Indian or Chinese workers, and 96 percent said that their U.S. locations produced equal or higher quality work than their centers in China and India. The advantage with U.S. workers, according to survey respondents, included communication skills, understanding of U.S. industry, business acumen, education and proximity. Chinese workers were valued for their low labor cost and willingness to work long hours, while Indian workers were sought after for their low labor cost, work ethic, English skills and technical knowledge.

The View from India, Where R&D is Rising

In spite of the survey respondents' praise of American workers, the offshoring of engineering and IT work to China and India continues for a variety of reasons, including the availability and cost of labor, and its proximity to new product markets.

BusinessWeek's Engardio described for the audience what he saw on his latest trips to Asia. Bangalore, the capital of India's IT industry, is home to Motorola's R&D lab, where employees designed 40 percent of the value of company's latest RAZR models. Next door at NXP (a company spun off from Philips Semiconductors), workers are designing the chip sets for high definition televisions. General Electric's campus, called the Jack Welch Technology Center, features lovely low-slung buildings, first-class gyms and food courts-and much of GE's product design work. Ten percent of GE's Indian researchers are working on products the company plans to introduce in the next six months, 70 percent are working on products to be released in three to

five years and 20 percent are doing very early stage work on products that won't be released for more than a decade.

"When I talk to economists or I read a lot of the public discussion of outsourcing, they still draw a lot of distinctions between what's being done 'here' and what's being done 'there,'" says Engardio. "They'll say the high-end stuff is done here (in the U.S.). The low-end, repetitive stuff is done 'there.'" That's not true, says Engardio. GE and Motorola aren't just employing coders or call center workers abroad, "they're employing scientists."

North of Bangalore, Hyderabad has a booming biotech industrial zone, says Engardio, that stretches for miles, housing 37 contract research organizations. "Three years ago, you could not get a major pharmaceutical company to say they would shift R&D to India," Engardio says. "Today they're doing it. Big pharma is gearing up big time."

The same day Wadhwa and Engardio conducted their seminar at Harvard, General Motors announced its plans to build an [advanced research center in Shanghai](#) to develop hybrid and other leading-edge car technologies. "There are great quantitative and qualitative leaps in what is being doing in Asia," Engardio says.

And it's not just massive multinational corporations setting up R&D shops in Asia. Top-tier Indian IT service providers, once known for pure software development, are going after R&D business too, says Engardio. [Satyam](#) has set up a huge, industrial engineering facility. [HCL Technologies](#) is doing avionics work for [Boeing's 787 Dreamliner](#). Tata Consultancy Services actually designed a forklift for a U.S. company that was getting by its Japanese competitor and wanted to drastically reduce costs, says Engardio.

How is all this high-end work getting done if the vast majority of engineering undergraduates in India are indeed "unemployable" out of school and India produces fewer than 1,000 PhDs a year (compared to nearly 8,000 in the U.S.)?

For one thing, says Wadhwa, the multinationals and third-party contractors are more than happy to train local graduates who may not be ready to hit the ground running. Some have set up their own six-month "finishing schools" to do just that. The problem with post-graduate degree production in India is proving to be no barrier, says Wadhwa, because many of the researchers and scientists currently working there were educated in the U.S. Due to the difficulty of obtaining work visas or green cards in the United States, these workers have sought greener pastures in India, China and elsewhere, he says.

For its part, China is actually working on improving its educational system the way it improved its manufacturing processes over the last two decades, according to Wadhwa. But India doesn't have to produce its own post-graduate degrees, says Engardio. "We're talking about chemists and molecular biologists with master's degrees or PhDs coming from U.S. to India where it's not doom and gloom," Engardio says. "There's a lot of opportunity."

While R&D Goes Offshore, Innovation Stays. For Now.

When you're talking about offshoring, Engardio says, the conversation is no longer just about costs. It's also about where talent and capabilities are available. Though cost-cutting remains the driver behind offshoring, Engardio says this work won't come back to the U.S. as India's wages or other costs rise. "The shift is permanent," Engardio says.

In other words, American workers may be terrific. But they're expensive. And there aren't enough of them, according to Engardio. If the U.S. held on to more of the foreign-born students awarded advanced degrees, there might not be as many of them available in India or China either, according to Wadhwa.

One of the drivers of this R&D shift overseas is the rise of virtual prototyping. That ability to design and test machines on a computer has made design work more mobile. And engineers trained in the necessary software are plentiful in India. That's good, says Engardio, because these companies need "lots and lots of engineers."

Also integral to the shift of product R&D offshore is the focus on embedded software. Fifty percent of the value in new cars, for example, is in the dashboard, Engardio says. "There's a tremendous need for engineering and software expertise," he says, "and the Indian IT services companies like Wipro and Tata have that. They are now the biggest industrial design companies in the world."

The dynamic turns R&D offshoring into a slightly different numbers game. "If you want to keep up and have to introduce this kind of innovation and the myriad services you need to offer, it would be very difficult to do in the U.S. just due to workforce capacity issues," Engardio says.

Then there's the other reason R&D is increasingly headquartered in India and China: proximity to emerging markets. Cisco now has 2,000 people doing R&D in India. "The head of that center sits in an office and looks like a modern day Pharaoh with the scale of building under way around him," says Engardio. "He says in five years, they will have 10,000 people. And by the way, I'm not looking for average engineers. I want innovators. These are no cheap bodies." Why? He's not looking at the U.S. as his major market for product sales. He's looking at emerging technology greenfields markets like Dubai in the United Arab Emirates and Saudi Arabia. "All the new developments outfitted with next generation telecom networks we'll never see in the U.S.," says Engardio. "The next generation of services is going to be in Asia." So Cisco is situating the design work in India. "Is it going to work out?" asks Engardio. "Who knows? But it seems like the right bet."

Anything that a company's customer touches and feels will remain harder to offshore to India, China or anywhere else, says Engardio. And perhaps, most important, so too the innovation itself. The product ideas happen at headquarters and are executed elsewhere.

"The only thing (India) isn't doing is owning the intellectual property. The multinationals are pulling the strings and staying at the top of the food chain, which is why the debate over whether this is good or bad for the United States is very, very murky," says Engardio, "The American companies have India working for us, in a way."