



THE RIGHT TRAJECTORY

What people really value and how designs can go astray when you don't know.

Engineers are very good at solving problems that they know are problems. The challenge in designing for developing markets is knowing what the actual problems are.

Many developing/emerging market technologies fail because design requirements were not correctly ascertained and accurately articulated. This is an easy trap to fall into as an engineer (and particularly as an academic), because you can make something that works “perfectly” on the lab bench, but fails in the real world because of unexpected factors such as how it looks, tastes, or smells.

Misreading or missing design requirements can set a project on an errant trajectory; even with great engineering behind a technology, error can grow over time and produce a well-designed product that misses its mark.

For one example close to home, my research group is collaborating with Tata Chemical to improve its Swach water purifier (www.tataswach.com), which is like a low-cost Brita filter. The Swach is a brilliantly designed product: it removes impurities and biological contaminants with activated carbon and silver nano particles; one filter element can purify 3,000 liters—enough drinking water for a family of four for a year—and automatically shuts off flow when it needs to be replaced; it has many desirable aesthetic features and a clever ad campaign that make it an aspirational product; and the whole device costs just 999 rupees (\$16 U.S.).

The Swach was designed to meet the drinking water needs of the rural poor at an affordable price. But it mostly sells in urban middle class markets. What went wrong? My guess is that there are additional unmet design requirements that we can uncover to improve the Swach, which will also shed some light on methodology for accurately setting design trajectories when creating development technologies.

One of the latent needs we are investigating is taste. About half the ground water in India is brackish, and a purifier like the Swach does nothing to reduce saltiness of the water. If you are a poor villager who has access to water that looks clear, smells OK, but tastes salty, what value is the Swach going to provide for you? In the long view, your kids will get sick less, go to school more, get better jobs, and make more money and rise out of poverty. But in the present, you are still stuck drinking salty-tasting water. The Swach was designed to deliver clean water, but could it deliver more to encourage people to drink clean water by adding easily perceivable value to their lives?

Whenever I fly into Mumbai and look out on the slums, I experience a mix of feelings. I am sad for the millions of people who have to live in cramped houses with tarpaulin roofs. But I am intrigued by how many of those roofs have satellite dishes on them.

India has a population of 1.2 billion. According to the Government of Tamil Nadu's Department of Economics and Statistics, in 2011 over 70 percent of those people were television viewers, with 250-plus million homes in the country owning a television.

I always think about these stats when people discuss low-cost houses for the developing world. I am fully confident cheap enough materials exist to make a house for a few hundred dollars. But designers

also have to consider what value a house is going to add to the family and why they will want to invest in it when food, schooling, medical care, as well as life's pleasures like weddings and television, are all vying for income.

Instant gratification, perceived value, and when that value is realized are factors that affect all of us, whether we live in Cambridge or Kolkata. As designers, we need to understand the full breadth of design require-

ments behind developing/emerging market technologies, including those that are latent and driven by socioeconomic factors. Articulation of these factors leads to accurate design trajectories, resulting in better products in the end. **ME**

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