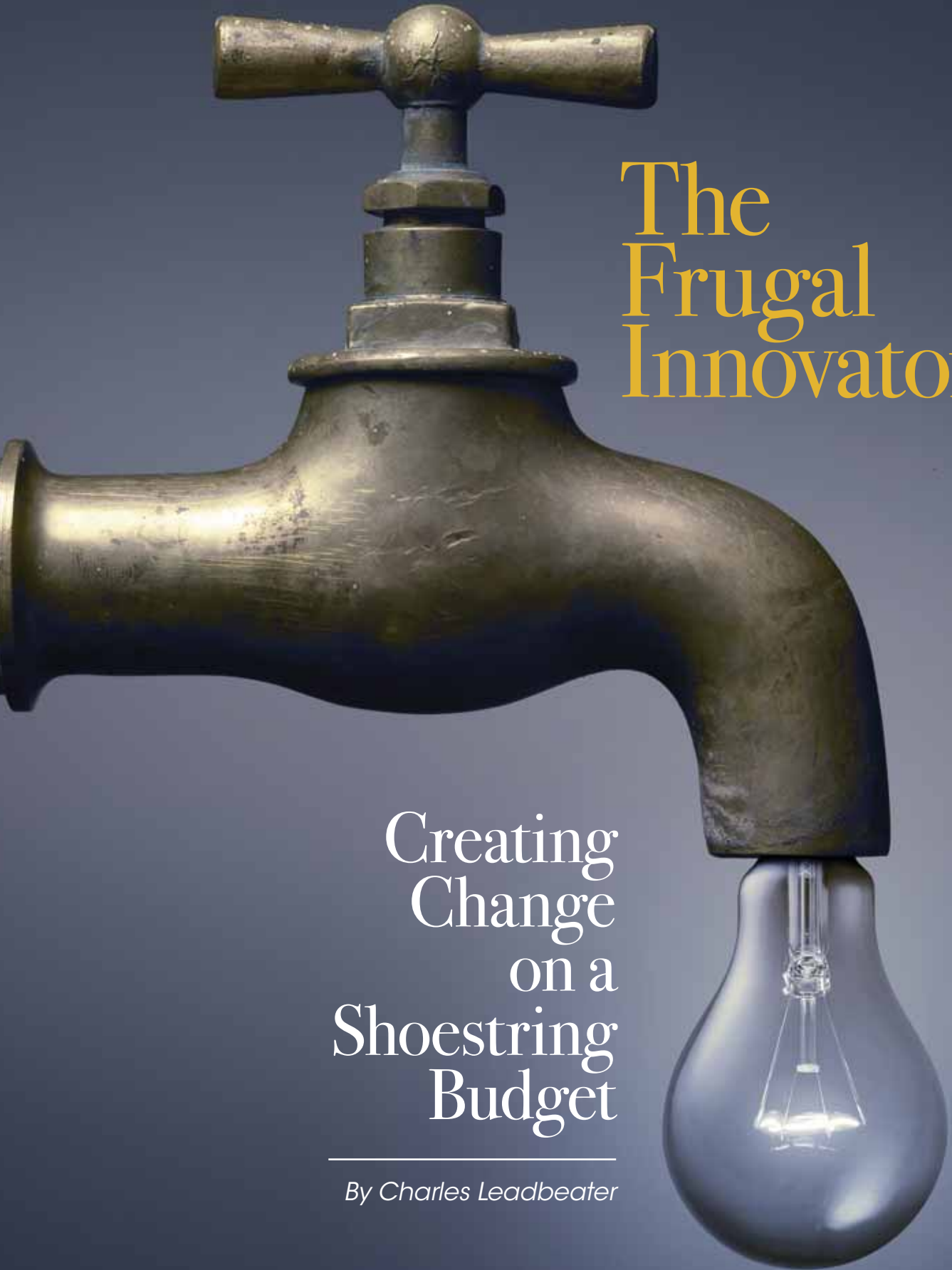


# The Frugal Innovator

Creating  
Change  
on a  
Shoestring  
Budget

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*By Charles Leadbeater*



## The world needs innovation that is lean, simple, clean and social.

When we think of innovation, Apple Inc. is one company that immediately comes to mind. Its products are viewed as the epitome of Silicon Valley design-led innovation. When I look at an iPhone, it talks to me, “You may be balding, middle-aged and old-fashioned, but if you buy me, you *will* look cool!” Companies like Apple look at innovation as a competitive undertaking, using new technologies and unfettered original ideas to open up new needs and markets, and realise their limitless market possibilities. While this is certainly a powerful way to innovate, innovation doesn’t always come from pure freedom and blue ocean opportunities.

New, powerful solutions can arise out of limitations, tensions and conflicts. Frugal innovation is one such model that thrives on constraints, creating timely and relevant solutions for socio-economic challenges that plague the world today. These solutions make optimal use of limited resources to create better, more successful and sustainable ways to live. Be it the provision of clean water, energy, affordable housing, healthcare or basic education, resource scarcity and rising costs give

frugal innovators the opportunity to think radically and challenge conventional wisdom in providing socially beneficial solutions.

This article provides an insight into what promises to become a worldwide movement as large companies in developed economies start attuning themselves to learn from entrepreneurs in the developing world, who are coming up with uncommon solutions to common challenges.

### Impetus to frugal innovation

This kind of bottom-of-the-pyramid innovation is seen more in developing countries, where teeming millions are looking to fulfil their most basic amenities, and find a livelihood to make ends meet. The combination of rising aspirations and tight constraints leads to frustration, which in turn is the motivation for innovation.

Frugal innovation creates better outcomes for more people, while using fewer resources, by developing out-of-the-box solutions for social and economic problems. One of the key characteristics of frugal innovators whom I have worked with is their ability to use the constraints

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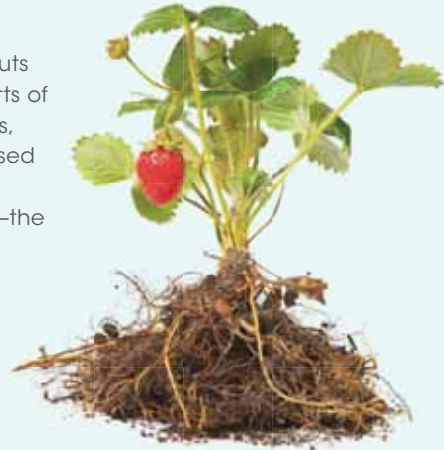
## THE STRAWBERRY EFFECT

In 1995, Madhav Chavan started a movement called Pratham (which means 'first' in Hindi), an NGO that provides pre-school education to children living in the slums in India. Chavan tackled two major constraints of *space* and *talent* by creatively drawing on community resources. Under Pratham's Balwadi (pre-school) programme, groups of children gather in a local temple, under a tree, or in the home of an instructor, and engage in basic skills-building such as numbers, shapes, colours, stories, poems and songs. There is no rent expense, the location is conveniently situated in the neighbourhood, and learning materials are provided by Pratham.

The teachers also come from the community—young local women who have completed their secondary education are trained in 12 half-day sessions (not too lengthy or expensive) to set up and run the Balwadis. The women are eager to work as teaching is seen as a vital route to independence and social mobility. They recruit the children and charge a nominal fee of about 7 to 15 cents to cover their costs, which is affordable and agreeable to the families.

The simplicity and localisation of Chavan's model makes it easy to replicate and widen its reach. Much like the strawberry plant that puts down its roots as it grows and draws its resources from different parts of the soil, Pratham's Balwadis also draw resources (teachers, materials, location) from where they are, rather than depending on a centralised resource point. In effect, the Balwadi system taps into the lean principles of decentralisation and embraces efficient resource use—the idea being to make do with whatever resources are available.

An evaluation of Pratham's work shows that the model has had a remarkable effect on improving continued education and achievement than, say, the presence of computers and technology.



that they face as a means for advancement, rather than seeing them as hurdles and hindrances. 'Re'-thinking doesn't always mean coming up with a brand new idea or invention that is resource-intensive and costly. It can be achieved through modest systems that recycle, reuse, repurpose and remediate. Frugal innovators follow four common design principles to create these solutions: lean, simple, clean and social.

### Lean: Minimising waste

Frugal solutions tend to be lean in the traditional sense. Toyota is a classic example of a company that had to reinvent its production model in the face of tight constraints. In 1949, Toyota was a fledgling and fragile company producing a few thousand cars a year, compared to Ford and General Motors in Detroit, that were rolling out millions off the production lines. As one of the smallest car makers in the world, Toyota had to find a way of working in small batches, which led it to pioneer lean techniques that

relied on a skilled yet flexible workforce, just-in-time inventory management and flexible machinery.

Today, some of the most interesting and innovative solutions to emerging market healthcare needs are derived from lean manufacturing solutions. The Narayana Health (NH) hospitals in India are a case in point. Launched in 2000 by cardiac surgeon Devi Shetty, NH's mission was 'to provide high quality, affordable healthcare services to the broader population in India',<sup>1</sup> NH today spans a network of 57 facilities with 5,600 operational beds, where doctors perform cardiac surgeries (among other procedures) at a fraction of the cost available in India or elsewhere in the world. A heart operation at NH costs between US\$2,000 and US\$5,000, as compared to US\$20,000 to US\$100,000 in the United States.

NH applies the disciplines of lean manufacturing and total quality management to drive continual, incremental improvements in performance. While the quality of care is maintained,

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costs are kept low by cutting out expensive and cumbersome procedures, relying on digital X-rays rather than the more high-priced films and maximising usage of laboratory machines, X-rays and scanners.

Much like a Japanese car factory, NH is modelled on a continuous flow process. About 24 open-heart surgeries and 35 bypass operations are conducted daily, more than eight times the Indian average. Efficiency levels are maintained as patients are seamlessly streamed in and out of operation theatres with surgeons focusing only on the surgery and leaving other staff to complete the paperwork and prepare patients for pre- and post-operative care.

The social mission helps to motivate doctors who do a better job regardless of their compensation—they are paid a fixed salary, so the average costs fall when a doctor performs more procedures. Through a hybrid pricing model and cross-subsidisation, NH is able to offset the losses incurred from treating those that cannot afford the procedures. By creatively weaving in keen pricing strategies with low-cost lean techniques and economies of scale, Shetty has created a business that makes money, while offering superior quality services to the poor population of India at a highly subsidised price.

Another example of lean platform innovation is the U.S.-based Udacity, an online teaching start-up that offers vocational training in software skills such as mobile programming, data analysis and web development. Udacity’s business model aims to widen access to education while lowering costs. Through massive open online courses, known as MOOCs, Udacity reaches out to tens of thousands of students who learn from a single teacher. It offers certified ‘nano degrees’ for discrete, highly structured professional courses that develop skills which are in high demand in the IT industry. The nano degrees cost US\$200 a month and Udacity’s cost per student is a mere 62 cents.

### **Simple: Easy to use and replicable**

Another characteristic of frugal innovators is that they take great care to ensure that their design solutions are simple. To maintain simplicity, one has to think upfront what features are most important—giving people what they most want—and understanding what can be reduced or hidden. Cluttering a solution with extraneous features adds to the cost without delivering substantial additional value to the user. When innovation takes place in the absence of stringent resource constraints, the easiest way to build a new solution is to add some stuff, and then add some more stuff, and before you know it, you have quite a complicated solution because you are innovating in an ad hoc way. In fact, it takes a lot of good design thinking and saying “no” to come up with a simple, yet effective and innovative, solution.

An example of simple innovation can be seen in ‘Échale! a tu Casa’ (‘let’s build a house’), a movement that aims to tackle Mexico’s housing problem for the base of the pyramid, through assisted self-building housing options for and by the community. The programme offers each participating family all the necessary materials and training to build a two-bedroom home for themselves, combined with low-cost financing options.

A key innovation that allows the self-build programme to work effectively and cheaply—and moreover keeps it simple—is the invention of an earth block brickmaking machine. The machine is small enough to fit in a truck and can be driven and unloaded at the place where the houses are to be built. The mechanics are simple: ordinary dirt (as opposed to cement) is shovelled into the machine along with some sand and water. The dirt is

formed into moulds using a gas-powered compression system. A lever is pulled and bricks come out at the other end. The bricks take a couple of days to dry before they can be used for house-building (refer to Figure 1). Typically, a village can produce enough bricks in three days to build ten two-room houses.

The earth block brick making machine is an excellent example of a simple product which is intuitive to use and is being put to a social cause. It provides a cheap and easy solution using a free raw material for villagers who would otherwise be unable to afford bricks from the market. This simplistic solution, which may seem marginal at first, helps tackle one of the biggest basic problems that cities all over the world face today.

While mud bricks may not endure in the humid climate of Southeast Asia, another ‘simple’ initiative is seen in the Philippines—‘8990’ is a low-cost housing initiative started in 2002 by a group of builders who wanted to do something for society. Its business

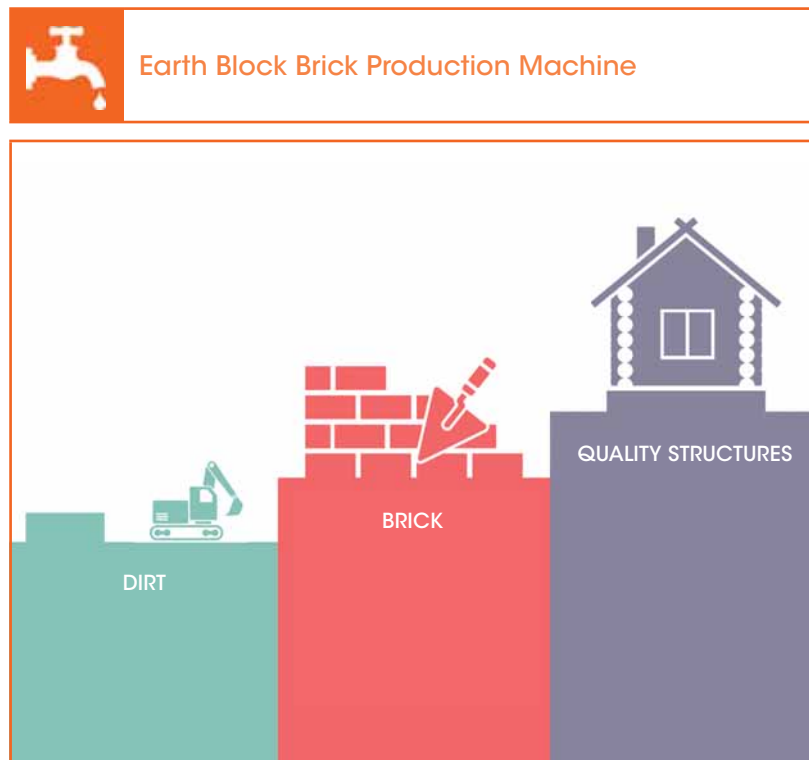


FIGURE 1

Source: Dwell Earth

model is based on a pre-cast technology whereby a single house is ‘clicked’ together and built in just eight to ten days. The building project has low materials and labour cost, and high quality control. Much like ¡Échale!, the 8990 initiative is also a complete housing solution adapted on the basis of locally available resources, and includes land, financing, building design and materials. In 2013, 8990 was listed on the Philippine Stock Exchange.

Simplicity in innovation can also extend to sectors that are often seen as complex, such as financial services. Kenya’s M-Pesa, one of the largest mobile-enabled money transfer systems in the world today, works on simple, user-friendly principles. Registering for the service on a mobile phone takes all of 30 seconds, and the money transfer takes but another minute. This innovation has proved useful not just for the poor people of Kenya, but for all Kenyans.

## Clean: Recycling, restoring and renewing

Even as people in the developed world worry about the impact of climate change, many more in the developing world worry about gaining access to the most basic of amenities, such as electricity and water. For these societies, life shuts down at sunset and the digital world seems a distant dream. While the industrial era seems to have bypassed these millions of people, the old systems that use non-renewable energy sources are now seen as costly, cumbersome and environmentally damaging.

So the innovation challenge is to provide cheap and clean electricity to the hundreds of millions in the poorest parts of the world—by definition, it calls for frugal innovation. One of the most instructive solutions is found in India, where 480 million people lack reliable access to electricity. Husk Power Systems (HPS), the brainchild of Indian engineer Gyanesh Pandey, creates mini-utilities that serve a group of villages using a mini power plant powered by discarded husks from rice production. A single mini power plant is capable of delivering electricity to hundreds of homes for six to eight hours a day, which is adequate to power light bulbs, fans, refrigerators, televisions and charge mobile phones. The cost per household is US\$2 to US\$4 per month.

HPS leverages principles of frugal innovation, namely to reinvent, recycle and reuse resources, technologies and ideas. Using recycled material to power a recycled technology, HPS’ installation costs less than half that of other renewable power systems. HPS is truly an example of how a lean, simple and efficient system can also be clean.

In yet another example, in the early 1960s, Singapore’s survival was threatened by water shortages of the kind that now overshadows many cities of the world.

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As the economy grew and the land traditionally taken up for clean water catchment on the small island became commercially more valuable, the country’s water infrastructure was unable to keep up with the demand. Singapore went through three phases of clean solutions to ease the water crisis. The first strategy was to focus on rainwater whereby the entire city-state was turned into a water catchment system feeding rainwater into a network of localised reservoirs and tanks hidden beneath school playgrounds and expressway flyovers, all connected through a computer-controlled system of tunnels and pipes.

The second phase was NEWater—a strategy launched in 2002 to recycle industrial water. Within ten years, NEWater was fulfilling 30 percent of Singapore’s water demand, halving the need for reservoir capacity. And finally, tapping into its abundance of seawater, the country also invested in one of the world’s most sophisticated desalination plants, which uses reverse osmosis technologies that allow fresh water to be produced at low temperatures, with minimal energy and limited side-effects.

### **Social: Shared solutions and experiences**

Frugal innovation systems are social because they mobilise communities and create value through empowerment and efficiency. An example is seen in South Africa, where the HIV virus continues to plague the health of women and that of society. In 2009, 300,000 women were diagnosed to be HIV+. In Europe and the U.S., one child is born HIV+ everyday, compared to 1,100 in Africa. Thanks to medical advances, the treatment of HIV is now available to pregnant women and there are drugs that can prevent the transmission of the virus to the baby. So Mitch Besser, an American HIV specialist, was puzzled why mothers in South Africa would not take the drugs they needed to extend their own lives and save their babies from the virus. It became clear that the social stigma associated with AIDS was so great that they would not opt for treatment.

The problem was thus a social one—you cannot deliver a solution to a mother with HIV the way that DHL delivers a parcel to your door. Besser came up with a simple solution: Mothers-2-Mothers (M2M) used a mentoring system through which HIV+ mothers-to-be were offered support by another mother who was also HIV+. The mentor mothers offered emotional support, practical tips and social know-how, and helped the newly diagnosed cope with societal prejudices. The M2M case shows that sometimes medical, scientific and economic solutions

alone are not sufficient, we need social solutions—those developed by the community, for the community. Like others I have cited, this solution too illustrated the simple qualities inherent in frugal solutions.

I have found that ‘with’ solutions are often more powerful, efficient, effective and innovative. The more social the innovation, the more efficient it is and the social dividend generated from it engendered benefits beyond the economic. Convivial technologies generate wider, more lasting and multiplying benefits. They produce a greater dividend through trust, sharing and relationships, and generate not just efficient transactions, but also positive externalities and broader social benefit.

### **The frugal recipe**

At the core of frugal innovation are the four linked design principles; lean, simple, clean and social. Through years of trial and error and experimentation, frugal innovators have proved to the world that simple, shared, social solutions can work and can be profitable. Moving forward, these principles should be at the heart of innovation. Agreeably, frugal innovation will not be the only approach to innovation in the future. But it will become increasingly more important because it offers a way to create a successful, inclusive and sustainable world. Make no mistake: the frugal wave is coming. It is time to start learning how to surf it.

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#### **Reference**

<sup>1</sup> “NH identity”, Narayana Health website.