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## ‘Frugal Innovation’

Innovation is a major imperative for companies and governments worldwide. But following the financial crisis of 2008, it has become harder to rely on the tried-and-tested formula which sustained innovation efforts in the developed world for so long, namely, highly structured R&D processes that result in expensive top-down projects. Instead, everyone is asking how we can do more for less, while serving broader markets?

One solution is for the West to look to places like India, Brazil and China for a frugal, flexible approach to innovation – to individuals, like Dr Mohan, a resourceful innovator in Chennai, India, who has created a highly frugal and effective solution to a major public health problem, and Harish Hande whose Solar Electric Light Company (SELCO) in Bangalore, India offers affordable, sustainable lighting solutions for those who live outside the electricity grid.

Despite their remarkable work, such individuals are hardly exceptions. Emerging markets are teeming with frugal and flexible innovators like them. In the six years that my co-authors and I have been researching the phenomenon of *jugaad* (a Hindi term that roughly translates as ‘overcoming harsh constraints by improvising an effective solution using limited resources’), we have encountered hundreds of entrepreneurs in resource-constrained circumstances worldwide who have innovated in areas as diverse as health care, education, financial services, energy and entertainment.

## The self-expanding diabetes clinic

India has the dubious distinction of being the diabetes capital of the world. In many cases, rural patients don’t know what diabetes is, let alone that they may be suffering from it. Even when they do know, the lack of good rural health care means they have to travel to distant cities and take time away from work to get the necessary medical attention.

Given that 70% of India’s 1.2 billion people live in villages, this situation has all the makings of a public health disaster.

Dr Mohan is director of the Madras Diabetes Research Foundation and Chairman of Dr Mohan’s Diabetes Specialities Centre in Chennai, capital of Tamil Nadu. Deeply concerned about the consequences of a looming public health crisis, and aware of India’s socio-economic realities, Dr Mohan engaged in a frugal and flexible piece of thinking: what if physicians could consult patients remotely without either group having to travel?

After much trial and error, Dr Mohan brought to life a mobile clinic, housed in a satellite-enabled van, which visits remote parts of Tamil Nadu and links urban doctors to rural patients and community health workers. The van has telemedicine technologies to conduct diagnostic tests and transmit them via satellite, even from areas that lack internet connectivity. From their offices in Chennai, Dr Mohan and his colleagues can see and communicate in real time with rural patients through video monitors, while tests such as retinal scans are transmitted within seconds for immediate evaluation.

To avoid straining the frugal business model, Dr Mohan improved a partnership with the Indian Space Research Organisation to obtain free satellite communications for his telemedicine service, and recruited young volunteers from small towns to run most of the operations in the mobile clinic. Already Dr Mohan and colleagues have screened more than 50,000 people across over 40 villages in Tamil Nadu and provided treatment to thousands of patients.

## Solutions in clay

Mansukh Prajapati is another example of a resourceful innovator. A potter by trade, he had for years been experimenting with clay to produce a variety of durable goods. In 2001, an earthquake had devastated Prajapati’s village and the surrounding area. Reading a report of the devastation in the

local newspaper, he noticed a photo caption: “Poor man’s fridge broken!” The photo featured a smashed earthen pot commonly used by villages to fetch water and keep it cool. This triggered Prajapati’s first eureka moment: *Why not use clay*, he thought, *to make a real fridge for villages – one that looks like a typical fridge but is more affordable and doesn’t need electricity?* Most of the people in Prajapati’s village live without reliable electricity, as do many Indians across the continent.

Prajapati’s training as a potter, coupled with his intuition, told him that he was on to something. He experimented for several months and eventually had a viable version of what became the *Mitticool* (*mitti* means earth in Hindi). The product works like this: water from an upper chamber seeps through the side walls, cooling the lower food chamber through evaporation. The fridge consumes no electricity, is 100-per cent biodegradable and produces zero waste during its lifetime. Importantly, it only costs around US\$50.

Prajapati first sold the *Mitticool* to people in his own village and then, after making design improvements, began selling it across India and then internationally. Demand soon exceeded supply so Prajapati decided to find a way to transform pottery from an artisanal craft into an industrial process. After developing an entirely new and more efficient method of working with clay, Prajapati began training women in his village in these industrial pottery techniques. He then hired them to work for him in his new factory. The *Mitticool* was the first product that Prajapati mass-produced and following this he soon built other products from clay, such as a non-stick frying pan that retains heat longer than other frying pans and costs a mere US\$2. Prajapati now runs a flourishing social enterprise and his ground-breaking inventions, which deliver more value at less cost, have earned him accolades all over the world.

## Here comes the sun

Providing lighting to rural homes in India is a major challenge. Over 40% of India’s population live outside the electricity grid and many have to rely on kerosene lamps for lighting. Kerosene is expensive and not always available, and produces a poor quality of light and unhealthy fumes.

Harish Hande saw this problem as a potential opportunity for *jugaad* innovation. In 1995, he founded SELCO to provide affordable solar energy to India’s rural poor. To do so he had to rethink how

he financed his business, priced his services, and distributed and maintained his solution.

He started with \$30 seed money. Banks were hesitant to lend and venture capitalists deemed his unproven business model too risky to invest in. So Hande bootstrapped SELCO: he used the \$30 to buy his first solar home lighting system, which he then sold. With the revenues, he purchased additional systems, which he also sold, and so on.

As Hande penetrated deeper into rural areas, he learned that his potential customers – many of whom earned \$1 to \$2 a day – could not afford the up-front costs of buying and installing his solar lighting systems, and there was no economical way to maintain them across multiple villages. His solution was to create a rural network of small-scale entrepreneurs who own and maintain the solar panels and batteries, and rent them out to consumers on a pay-per-use basis.

This business model made SELCO’s solution affordable and accessible to scores of rural customers, including corner-shops, small-scale farmers and women working from home. It also created an incentive for local entrepreneurs to distribute and maintain the equipment over time. Within a few years, 200,000 households have already taken up the solar lighting system.

## A universal solution to universal challenges

The fruits of *jugaad* innovation include the \$2000 Tata Nano car, the \$50 Aakash tablet PC, 1 cent/minute mobile phone calls, £500 electrocardiography (ECG) machines (and \$1 ECG scans), \$25 water purifiers, a \$70 fridge that runs on batteries, and so on.

In the course of our research we learned that the entrepreneurial spirit of *jugaad* is not limited to India. It is widely practised in Argentina, Brazil, China, Costa Rica, India, Kenya, Mexico, the Philippines, and other emerging economies. Brazilians call it *gambiarra*; the Chinese, *jiejian chuangxin*; and the Kenyans, *jua kali*.

A resource-constrained and unpredictable environment makes frugal and flexible innovation necessary, even vital. *Jugaad* innovators have a mindset that encapsulates several attitudes and practices, including the ability to seek opportunity in adversity, do more with less, think and act flexibly, keep things simple, include the margin, and follow the heart. Specifically, *jugaad* entrepreneurs are

resilient, frugal, adaptable, inclusive, empathetic and passionate. All these traits help them to compete and succeed in the complex world of emerging markets.

But the *jugaad* mindset, and the innovations that result from it, not only hold promise for the poor in emerging markets. Increasingly, such a frugal and flexible approach has relevance to Western economies that are reeling under the pressures of economic recession and limited budgets.

Unsurprisingly, we have found that many Western firms, faced with resource constraints of their own, and recognising the limits of the expensive, rigid and insular structured approach to innovation, have begun to apply *jugaad* and its principles within their organisations. For example, GE has applied *jugaad* to develop radically affordable ECG machines not only for India and China, but also the US and Europe; other firms applying *jugaad* include PepsiCo, Unilever, P&G and Renault-Nissan.

Yet, while *jugaad* offers an interesting and useful counterpoint to more structured approaches to innovation, it isn't necessarily a substitute for the latter. Rather, *jugaad* can be an effective complement. For instance, as in the example of Dr Mohan, although his *jugaad* approach has been successful in delivering diabetes care in an affordable and effective way for some people, it has yet to achieve scale. Scaling the solution will probably require a more systematic application of resources around the basic model he has developed.

In conclusion, for firms and governments around the world struggling to deal with scarcity and complexity, our research suggests that *jugaad* and the emerging markets it comes from offer a solution not only in the developing world but also in the increasingly resource-constrained and complex West. Innovators like Dr Mohan, Mansukh Prajapati and Harish Hande, and their relentless pursuit of frugal and flexible solutions, could be just the thing the world needs to grow without depleting the planet's resources.