

*Charles Leadbeater*

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## **The Frugal Innovator**

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Creating Change on a  
Shoestring Budget

# **The Frugal Innovator**

Charles Leadbeater

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*For  
Iris M. Bedell,  
the original frugal innovator*

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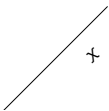
# Preface: The Surfer and the Wave

Ideas that change the way we live and work are like waves. They start somewhere far off, out of view, and grow into a swell, taking in contributions from many different sources. As a wave builds up its momentum, it becomes more clearly part of a pattern of waves crashing onto the shore, with a rhythm, one feeding the other. Taking sole credit for any idea that really changes the world is like surfers claiming to have made the waves they ride. Surfers excel in reading the sea and spotting where the next big wave is coming from, knowing when to bide their time, when to shift position and when to make their move. The wave is more powerful than the surfer; yet the surfer shows what can be made of it.

This book is about a new wave of innovation that is spreading around the world. Frugal innovation is designed for and a response to its times: to make the most of the limited resources we have in order to create better, more successful and sustainable ways to live. Frugal innovation thrives on constraints, turning them to its advantage. Frugal innovation follows from something like a new economic equation:

*Providing better solutions for more people by using fewer resources by doing things completely differently.*

We need frugal innovation in many different industries and walks of life to allow us to face the immense, combined challenges of the next few decades: meeting the explosion of demand from billions of aspirational new consumers in the developing world; working within tight resource constraints on water, energy and carbon, imposed by climate change,



scarcity and rising costs; providing a new model of growth for the majority of low- and middle-income families in the developed world who have seen their living standards stagnate. Meeting these challenges simultaneously will be possible only with a new model of innovation, one which creates better products, services and ways to live while using fewer resources.

The frugal innovators profiled in this book are among the first surfers of this wave. They come from far and wide; they tend to be both cosmopolitan in their ideas and outlook and yet also deeply rooted; they are committed to solving real-world problems that matter to them, where they live and work.

Devi Shetty in Bangalore has created the world's leanest low-cost hospital that provides heart operations at a fraction of the price of those in the developed world. Madhav Chavan and his team based in Mumbai found a way to educate pre-school children for just \$10 a year. Suresh Kumar in Kerala invented a system of healthcare that relies on thousands of volunteers working with a tiny team of specialist doctors. Mitch Besser in South Africa found a way for HIV-positive women to counsel and mentor one another to improve their chances of taking anti-retroviral drugs. Pedro Yirogen in Mexico City has developed a mobile phone-based primary healthcare system used by 5 million Mexicans and which costs them just \$5 a month. In Kenya Shannon May is growing a network of hundreds of low-cost schools, charging parents only \$4.50 a month for an education that delivers far better results than much more expensive schools. In Australia and the Middle East innovators inspired by the ideas of British inventor Charlie Paton are creating water out of thin air, almost by magic, through desalination systems that use solar power. A team of Canadian-Indians, financed in the UK, are making the world's lowest-cost tablet computer, which performs as well as an original iPad but costs less than £40.

Many frugal innovators create their own organisations to make their innovations. But others work at established companies such as Tata and Unilever, Procter and Gamble and General Electric, which are now producing a string of frugal innovations. The Indian conglomerate Tata has produced the low-cost Tata Ace van, the iconic Tata Nano car and the Tata Swach low-cost water unit. Next it will launch itself into low-cost, prefabricated self-build housing that can be put together almost as easily

as Ikea furniture. All over the world, in labs and design studios, a new generation of social designers is trying to create low-cost products that meet the needs of cash-strapped consumers, especially in the developing world. Many of them are adapting the mobile phones and the networks they run on to become, for example, banking infrastructures in Kenya and Pakistan or a test for anaemia or HIV. Meanwhile, a resurgent do-it-together movement of makers, hobbyists and craft producers is emerging, powered by the spread of low-cost digital technologies such as the Arduino motherboard, the Raspberry Pi computer and 3D printers. Advocates of this movement argue that it presages a new industrial revolution based on sustainable, local production, using local, recyclable materials. Many of the most important frugal innovations will not be standalone products and services but entire new systems for health, education, transport, energy and water. These systemic innovations will emerge from frugal cities around the world, which are inventing new ways for their citizens to sustain themselves. Singapore has solved a water crisis that threatened its future by turning itself into a giant, distributed, urban reservoir, recycling as much water as possible and desalinating seawater. Havana has learned how to feed itself from small plots within the city. Curitiba in Brazil recycles far more waste than comparable cities in the developed world, in large part thanks to an army of micro-recycling entrepreneurs. Freiburg in Germany has created new low-cost and shared approaches to housing and energy which make it possible for families on modest incomes to live well. A new generation of civic innovators, bringing together public and private sectors to solve complex problems, will create the frugal systems of the future that our cities need.

Although they come from many different sources, these early surfers of the frugal wave share some common features.

They make constraints work for them, forcing them to turn conventional wisdom on its head.

They regard being marginal as an advantage. They make the most of marginal markets, overlooked by large companies and where resources are scarce, to rethink traditional, costly, top-heavy business models.

They are unafraid to ask for the seemingly impossible and in the process sounding naive or even stupid. Charlie Paton asked whether it would be possible to make water from thin air using nothing more than the power of the sun. Gynash Pandey asked why it would not be possible for the poorest people to get electricity from the rice husks they throw away everyday. They do not mind posing questions that make them sound slightly mad.

They eschew cutting-edge technology. Instead, they prefer to do radical things with proven, often quite old-fashioned technologies, which are known to work, familiar to consumers and easy to maintain.

They are humble and unassuming rather than attention-seeking and arrogant. They welcome borrowing an idea from someone else and putting it to new use. They often do not invent anything at all, other than a way to take a solution to scale.

They excel at innovation as a process of 're'-thinking rather than as pure invention: they recycle, reuse, repurpose, remediate. They like nothing better than finding a new use for discarded, overlooked or wasted resources.

They cannot abide waste in any form. That is why they are disciples of the lean thinking first developed by Toyota in the midst of the crippling crisis that gripped the company after the Second World War.

When there is waste they turn it into fuel for another process. Were frugal innovators to become a political movement, their motto would be: waste is fuel.

Wherever possible they prefer simple, shared, social solutions. Simple solutions because they are easier to use, make and maintain. Social solutions because when people share an expensive piece of kit it makes it more affordable. Shared solutions help people to learn from one another.

Frugal innovations have four main common features: they are lean, simple, social and clean. The frugal innovators profiled in this book have created solutions with these four features, often over many years of trial, error and experimentation. The challenge is whether or not these principles can

now shape and guide the development of larger companies, markets and systems and the lives of the consumers who use them.

Frugal innovation – the provision of better solutions, for more people, using fewer resources, by doing things completely differently – will not be the only approach to innovation in the future. But it will be the most important because it offers a way to create a successful, inclusive and sustainable economy. Make no mistake: the frugal wave is coming. It's time to start learning how to surf it.

# Ask for the Impossible

Hospitals in India are performing heart and eye operations for a fraction of the cost of their equivalents in the West, and at a higher standard. A network of schools in Kenya has devised a way for children to be taught for \$4.50 a month, petty cash to the public system, but it gets better results. About 5 million Mexicans use a primary healthcare service that they access through their mobile phones by paying a subscription of \$5 a month. Researchers in Australia have invented a treatment for the most common cause of death among women who have just given birth – a treatment that can be delivered at home, by the woman herself, using a simple oral spray that costs a fraction of the traditional treatment. A city in Asia has worked out a way to provide itself with water by building a system of reservoirs beneath it so no rainwater is wasted, while a city in Central America has developed a way to feed itself by growing food on vacant lots.

All these solutions have been devised by a new wave of frugal innovators who are rewiring our economic operating system. If they succeed, so will we, because we will live and work in an economy that is less destructive, unstable, predatory and unequal. If they fail, then our future will be clouded by mounting conflicts over unequal access to scarce resources, especially in huge cities teeming with hot, hungry and angry young people disappointed that the promise of a better future has been betrayed.



The frugal innovators who will provide the solutions to the immense challenges we face in the next few decades are not the usual suspects. They do not wear hoodies and hang out in dorms at Harvard. They will not be found in the cafés of Palo Alto or in the gleaming research centres of large multinational companies in California. They will prefer to adapt tried-and-tested technologies rather than explore the unproven, cutting edge. Revolutionaries start with few resources, in the margins, outside the mainstream of power. These innovators are no different. They will be found operating under the radar, often in extreme conditions, armed with sparse resources to meet pressing needs. Their trick is that they make these severe constraints work to their advantage. They manage to achieve more, *because* they have less; they make their weakness work in their favour. As they lack the resources to afford traditional solutions they have no option but to turn conventional wisdom on its head: it does not work for the people these innovators serve and in the places where their consumers live. They work in places where doing what seems mad in terms of conventional wisdom instead becomes obvious. This new wave of innovators is drawing in people and ideas from around the world to devise new ways to provide clean water and decent food; affordable healthcare and low-cost housing; renewable energy and quality education. Not for them innovation as the baroque proliferation of functions, features, looks and styles. Their innovations are designed to meet people's most basic needs in new and more effective ways, doing a better job by doing it completely differently. At the core of the solutions they are coming up with are a set of design principles for products and services that set the template for successful products and services in future: they are *lean* and so they minimise all forms of waste; they are *simple* to be cheap to buy, low cost, easy to use and maintain; they are *clean* and so wherever possible they recycle and repurpose energy, materials and ideas rather than creating solutions afresh or using new resources; they create shared, *social* solutions because these approaches are usually more affordable. Above all they are frugal innovators: they do more *because* they have less, and because they have less they have no option but to think completely differently.

They manage to achieve  
more because they  
have less

We will need the solutions they are coming up with because we face interconnected challenges of unprecedented scale and complexity. Business as usual will merely exacerbate many of these challenges rather than resolve them.

The economic growth model of the developed world is exhausted. The surest sign of that exhaustion was not the recession that followed the financial crash of 2008–9 so much as the mushrooming debt and financial irresponsibility which led to it. In much of the developed world the promise of rising living standards was kept alive only through financial smoke and mirrors. For most people the economy had already failed to deliver on its promise of steadily rising living standards long before the recession. The long, slow recovery from the crash is not a recession so much as a profound dislocation and disruption of established economic models. The developed world economies are looking for new models to provide sustainable growth which benefits the majority of their populations. All these economies are learning to live well with less.

Meanwhile, in the developing world hundreds of millions of people want access to the lifestyles of those in the developed world. The legitimacy of governments throughout the developing world, of all political stripes, rests on accommodating them. Meeting this demand from billions of new consumers for new televisions, cars, fridges, microwaves, houses, air conditioning and phones will not be possible within current models of production, but will tip the environment decisively towards potentially catastrophic changes and seriously aggravate growing conflicts over basic resources. Even if we were able to meet the demand of the next 2 billion middle-class consumers, this would still leave many millions more lacking clean water, reliable electricity, access to education, affordable housing. Using current models, many millions would be left behind in abject conditions, under-served and under-represented. All these pressures and challenges will be felt most intensely in the large, fast-growing cities of the developing world. These cities are where the 21st century will be won and lost. Each year 70 million people migrate to cities looking for a better future, arriving in places with housing, infrastructures and services that are woefully inadequate. Yet still they come. These cities, places such as

São Paulo and Dhaka, Istanbul and Lagos, will be where the future will be made as ingenious and determined people respond to the enormous constraints they face in creating a better life. If life in these cities can be made to work for the mass of the citizens with only modest incomes, then our future might be liveable. If new solutions do not emerge from and for these cities, then we could be in deep trouble.

This book is about where answers to these challenges will come from, the people who will devise those solutions and the methods they will use. These frugal innovators are generating clean local energy using recycled waste; growing food in cities and using solar-powered watering systems to dramatically reduce the energy involved; catching, recycling and cleaning water at low cost; providing access to basic health for millions for the price of a phone call; creating banking systems without banks; delivering education without schools and teachers; helping people to cope with disease, without doctors and hospitals. They will be innovators, but often not as we traditionally think of them.

Frugal innovators eschew the unproven, cutting edge of technology in favour of readily available, already proven, simple-to-use technologies that are known to work and which can be easily adapted to new tasks. They prefer services that work on robust second-generation mobile networks rather than experimenting with third- and fourth-generation services. They are not interested in the leading-edge, early adopters but in the mass of consumers with access to basic, low-cost technologies that are easy to learn how to use, cheap to acquire and simple to maintain. They like technologies that are simple, familiar and adaptable. They prefer solutions that are old, unsexy but reliable. They are inveterate tinkerers, they love DIY (do-it-yourself). But they really excel at DIT (do-it-together). Their forte is not pure creativity but innovation as a process of 're': *recycle, repurpose, reuse, recuperate*. They are re-innovators.

Frugal innovators do not confine themselves to technologies, products and services. They innovate organisations and business models, to mobilise resources and ideas in new ways. They will favour solutions that work with and can be used by consumers, enlisting their help to devise solutions, rather than just delivering to and for them. They can only work

with consumers by staying close to them, understanding their lives. Like a guerrilla army, they operate among the people. They build organisations that resemble movements, encouraging people to make their own contributions to the organisation's goals. As organisations they are lean, clean and social: they draw on only the resources they need locally; they recycle as much as possible, often piggybacking on existing infrastructures rather than building them from scratch; they create shared forms of ownership and usage, to drive down costs; they parcel their products up in novel ways that poorer consumers can afford. Often they are financial as well as product innovators: they invent new ways for people to save and pay for products, whether through mobile banking or microcredit.

These frugal innovators cannot afford to be proud, arrogant and isolated. They have to be humble to borrow and generous to create shared solutions. They cannot afford to work in special, contrived environments, shiny innovation zones, cut off from the world around them. They have to innovate in the real world, in real time, learning rapidly by testing barely viable products with real consumers. They make the most of their marginality. They are not encumbered by being rich, powerful and professionalised. They are driven to innovate because they have very limited resources to respond to high aspirations and growing need.

Frugal innovators are like living oxymorons: they will have to make possible the seemingly impossible by providing better solutions while using fewer resources; and include many more in capitalism's embrace and yet reduce energy usage and the carbon footprint. That means creating a capitalism that is more socially responsible to help address basic social needs – for health, education, care, food, energy – on a vast scale, while also being far less wasteful and more environmentally sustainable, by husbanding resources more skilfully and thoughtfully. All this will require fundamental changes to our economic operating system. This book is about who they are, where they come from, how they work, the solutions they are devising to make our futures liveable and what business can learn from them.

In the next thirty years we face stark choices. We will prosper only if we embark on innovation on an unprecedented scale. What now looks impossible must become daily reality. That means the coming decades

should be one of the most exciting times to be alive because radical new innovations which empower millions of people to live better lives should be emerging from all over the world. If this does not happen, then it may become one of the worst times to be alive as the constraints we face, compounded by deep inequalities in access to basic resources, will fuel conflict in an increasingly interconnected and technologically complex society. The following three chapters look at the three big changes to the context for innovation: the explosion of demand from billions of newly minted urban consumers in the developing world; the growing failure of developed world economies to deliver rising living standards for the majority; tightening constraints on resources imposed in part by climate change. These three factors create a new context and mission for innovation: to provide better solutions to basic needs using fewer resources. Chapter 5 starts to explore what all that means for innovation: how business develops new products and services and who for. Innovation has become almost a religion, a form of faith in the future. Yet innovation has increasingly become a force of proliferation, adding ever more products and features to lives already crowded with material possession. Innovation needs to be guided by an ethic of frugality – making a lot from a little. Frugal innovation is emerging from many different sources – from India and China, Brazil and Kenya; from grass-roots innovators but also from university labs; from big companies and small.

The next four chapters set out the four main ingredients of the frugal innovation playbook, to create solutions which are lean, simple, clean and social. Chapter 6 traces the lineage of lean solutions back to Toyota reinventing car production in post-war Japan ravaged by severe resource shortages, and shows how lean thinking is being applied by frugal innovators in fields from health to education and energy. Chapter 7 explores why frugal solutions need to be simple, to cut out extraneous features, minimise consumer learning to adapt new products and provide end-to-end solutions. Chapter 8 argues that lean, simple, low-cost solutions will not be enough to meet our needs unless they are also clean. Using fewer

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resources will favour solutions that recycle, reuse and repurpose resources. Chapter 9 shows that frugal solutions are generally social because shared, and cooperative solutions are often more economic and creative. Chapter 10 draws together the threads of this analysis to provide a concise guide to the core ingredients of frugal solutions and frugal systems.

The method of frugal innovation is set out in Chapter 11, which explores the people, places and processes of frugal innovation: who does it, where and how. Chapter 12 examines how the lessons of frugal innovation from the developing world can be brought back to the developed world through reverse innovation flows. A new dynamic of global innovation is taking shape in which the ideas and technologies will flow through cosmopolitan networks of people and institutions. These international networks will be the most important focal points for frugal innovation, carrying ideas and solutions back and forth. Chapter 13, the conclusions, sets out the fundamental principles of frugal innovation: why we need it and how to make it central to innovation in companies, cities and government.

## The Rush

Aziz Sagir sits intent and alert on a simple sofa in her bare apartment, her small face tightly drawn by her headscarf. In the densely packed Istanbul suburb of Esenler Merkez, the streets are so narrow it seems almost possible to touch the apartment buildings opposite. Aziz puts a protective arm around her four-year-old son Samet to encourage him to complete the worksheet that sits in front of them on a low table. He concentrates hard, keen to impress his mother; she responds by gently praising his efforts. The worksheet comes from a programme Aziz has enrolled in with about 20 other young mothers from the area, to prepare their children to go to school.

Aziz is in no doubt about what is at stake. She grew up in a remote Anatolian village, one of five siblings, and left school at the age of 12 to work in a market garden. Her frustration has turned into an implacable determination that her own children will not suffer a similar fate, their own potential stunted.

That sense of ambition and defiance leads Aziz each week to the cramped, windowless back room of a local community centre, where, with a group of other mothers, over a period of about six months, she learns how to prepare Samet to hold a pencil, make his letters, count in tens. They talk about what it means to be a good parent and how to deal with their errant husbands. Not one mother in the room went to school beyond the

age of 12. All are determined to give their own children a better chance in life. That is why they have come to Istanbul.

These women are part of a social revolution that is unfolding daily, in hundreds of millions of ways in places like Esenler Merkez in cities across the world as people recently arrived from the countryside enter a daily renegotiation of who they are and what they are entitled to. Cities like Istanbul, Delhi and São Paulo are thronging with young people full of ambition. These young people are the future of capitalism, as workers, consumers, entrepreneurs and citizens. The incomes they earn will determine what they can buy and so what can be sold. What they want will be increasingly what is designed and made. These fast-growing cities, and especially the places where these young people first arrive and gather themselves, are where the future will be made.

## ／ The New Middle Class

That is a big shift in the centre of gravity for our economy and so for business and innovation. From the late 19th century through to the late 1970s, the driving force of consumption and innovation was the emergence, growth and rising affluence of what started as the industrial working class and became the mass middle class of Europe and the US. Their jobs, lifestyles and homes drove the focal points for consumption and so for business innovation. The mass markets for mass consumer products – fridges and televisions, cars and stereos, holidays and entertainment – were created around the aspirations and incomes of the workers employed in the factories and offices of large organisations. Innovation, the development of new products and services, was aimed at these consumers and the markets their demand created.

In the next few decades however, as the developed world economy seeks to shake off the persistent after-effects of deep recession, growth will increasingly come from new consumers, fresh to the market, in the developing world. Innovation will

*Growth will increasingly  
come from new consumers  
in the developing world*



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