

International Centre for Frugal Innovation
Leiden-Delft-Erasmus Universities

Frugal innovation in science and society

A brief introduction to frugal innovation and ICFI

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Societal challenges and frugal innovation

More and more innovators, entrepreneurs, policymakers and citizens believe that we need to think differently about the relationship between innovation and what it does for society. There is growing awareness that innovation trajectories need to be redefined and restructured to address today's challenges, and that this may need a fundamentally different perspective and rethinking on what innovation is.

In a world that has made products, services and systems overly complex, sophisticated, sensitive and expensive, a frugal perspective is a way to make products, services and systems simpler, with a focus on core functionalities, robustness and affordability. Innovating in a frugal way thus helps to reduce wastage, and to achieve more sustainable outcomes with fewer resources.

What makes innovations successful? How can they contribute to better living conditions and more sustainable societies? And how can innovations do more with fewer resources?

Who we are and what we do

At the International Centre for Frugal Innovation (ICFI) we generate and share knowledge on frugal innovation; smart, simple to use and affordable solutions. We are an international research centre with a global network of academics that focus on research, education and knowledge exchange on frugal innovation, from various disciplines, perspectives and geographies.

We collaborate internationally with academics, students, innovators, policy makers, entrepreneurs, NGOs and communities that are involved in studying, developing or implementing innovations with frugal characteristics.

We focus on all innovations with frugal dimensions which are often referred to using other labels such as grassroot, bottom-up, responsible or inclusive innovations. What matters within ICFI is the search for, and implementation of, innovations that are of significant relevance to address major societal challenges like the climate and energy transition, global health and food security.



— Rethinking innovation with Frugal Innovation

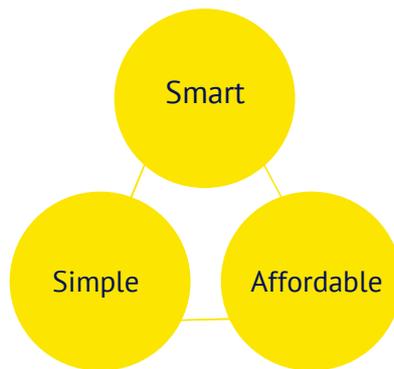
● Frugal innovation is an alternative perspective that can profoundly change the ideas of what innovation could be. Including in relation to technologies, sources of knowledge, business models, actors involved, governance, institutional and policy environment, and outcomes.

— What is frugal innovation?

● Frugal innovation is about finding smart, simple and affordable solutions. The basic idea underlying frugal innovation is that extreme resource constraints inform the process, outcomes and value of innovation. It is a multidisciplinary approach to innovation that focuses not only on technology, but also integrates entrepreneurial, environmental and socio-economic considerations - with an eye for local ideas, knowledge and resources. It's about doing more, with fewer resources, for more people.

— Main characteristics of frugal innovation

● Innovation through a frugal mindset is a technique, a way of thinking, which at its core has three key points: *smart, simple and affordable*.



An example

- *Innovation:* Portable cardiogram devices for (initial) scans for health workers in India
- *Developed by:* General Electric
- *Affordable:* Costs are <10% of costs for “standard” cardiogram devices
- *Simple, smart & accessible:* Can be used in ambulances or at general practices
- *Potential benefits:* Large-scale use of such innovations in healthcare contribute to better working and living conditions for patients and healthcare providers in the short-term, while contributing to financial sustainability of (public) healthcare in the long-term.

The value, challenge and opportunity

Technological developments are considered essential in accelerating existing changes in business processes and finding innovative solutions to better serve society. Technology can help meet key needs, lower costs and improve quality. Think, for example, of how disruptive technologies such as the Internet of Things, robotics, virtual reality and artificial intelligence are on a global level shaping our future society.

The challenge

“Over-engineering” and the lack of awareness of it, is a problematic aspect of existing technological development. Products and services are frequently equipped with attributes that are not or hardly used by many people and organizations, yet we all pay for them. This is partially caused by over-regulation, which comes from fear of failure of new products and services (including in crucial sectors such as healthcare, construction and (cyber) security). As stated by Eroom’s Law, innovation costs rise sharply as a result of overregulation and inefficient design processes. Meanwhile, high costs translate into higher prices, making products and services less accessible. Can innovation be more cost and resource efficient? The answer is yes.

The opportunity

In a world that has made products, services and systems overly complex, sophisticated, sensitive and expensive, frugal (economical) designs and innovation processes offer a remedy. It enables development of products and services equipped with necessary (technical) attributes, making them not only more resource efficient and functional, but also accessible for wider segments within society. While frugal innovations were initially primarily targeted at offering solutions for relatively low-income consumers and producers in the Global South, more recently frugal innovations are increasingly also seen as part of sustainability transitions elsewhere through ‘doing more with fewer resources’.

Frugal Innovation as a complementary component

New digital technologies can be crucial to the advancement and dissemination of frugal innovations. While frugal innovations can be low-tech, or use a mix of technologies, we increasingly see the application of digital technologies in the development and implementation of frugal innovations. Such technologies can be quite complex behind the scenes, but are easy to use and affordable for the consumer. Think of for example mobile money transfers through SMS text messages. Frugal innovations with high potential to achieve societal impacts often combine ‘local’ knowledges with ‘new’ technologies and Research & Development expertise through adaptive learning based on mutual respect. This also means we posit the importance of frugal innovations not as a substitute for investments in high-end R&D, but as a complementary component to be woven into broader mission-oriented innovation systems.

Existing ideas and next frontiers on Frugal Innovation in science and society

The early explorative literature on frugal innovation has three streams.

- **Prototypes and initial technological and engineering implementations**
● The first stream focusses on case studies on developing prototypes and initial implementation of frugal innovations from technology and engineering disciplines like civil engineering and industrial design. These studies focus on the innovation process and its stages, (value-sensitive) design, robustness, simplicity and affordability.
- **Frugal Innovation as commercial proposition and business model**
● The second stream comes from management and entrepreneurship studies, spearheaded by the Fortune at the Base of the Pyramid discussion and the framing in the Economist in 2010 of frugal innovation as 'breaking all the rules'. These studies investigate frugal innovations as a commercial proposition and business model for firms to penetrate lower income markets with 'good enough' products and services. In some cases to also simultaneously achieve social goals.
- **Innovation under conditions of scarcity**
● The third stream is actually much older and originates from development studies, sociology and anthropology, and focuses on how low(er) income groups innovate under conditions of scarcity. This literature often uses a variety of labels like bricolage and grassroots innovation, and for us is part and parcel of a broad-based frugal innovation approach.
- **Next frontiers**
● Researchers involved in ICFI have contributed to all three of these streams of literature. We embrace all three streams and stimulate crossovers to look together for ways to better explain where and when frugal innovations are more likely to contribute to positive societal change. This emphasis on explaining why and when frugal innovations are more likely to deliver positive outcomes is an important part of ICFI's research agenda. Our aim is to move towards a more evaluative approach that investigates outcomes and longer-term impacts of frugal innovations.

A critical exploration of Frugal Innovation

The next steps.

— **Scaling up frugal innovations**

● ICFI is open to collaborations with researchers and practitioners involved in the provisioning of basic services like water, energy, agro-food and health, where frugal solutions are becoming increasingly scaled, making it important to study the governance, public policy and political economy dimensions. When frugal innovations are scaling and become more formalized, intellectual property rights and related legitimacy issues become an important area for further study.

— **Anchoring Frugal Innovation**

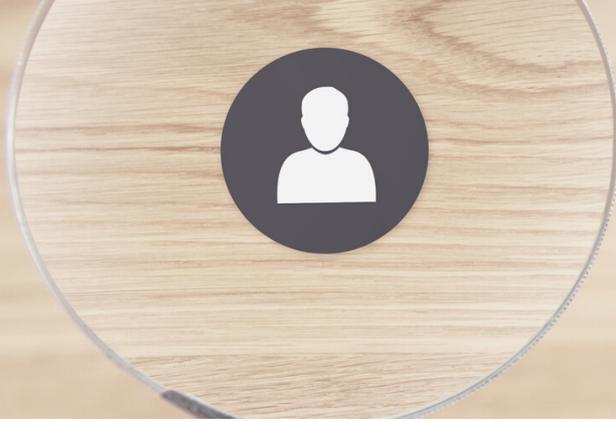
● Another interesting angle is the historical dimension, where researchers look at how frugal innovations were the default type of innovation before the industrial revolution, and what we might learn from those experiences in our search for more sustainable societal models beyond the present industrial capitalism.

— **Broadening the sustainability agenda**

● The frugal innovation angle is increasingly becoming part of academic, policy and practitioner discussions on broader themes like sustainability, climate change, mission driven innovation systems, green transformation, reverse innovation/engineering and the circular economy/society. In these 'system' approaches that aim at developing new 'structures', frugal innovations can be seen as part of the 'agency' dimension of how societal actors (public, private, civic) are trying to deliver actual steps towards achieving more sustainable systems by developing and implementing frugal innovations.

— **Motivations behind developing and using frugal innovations**

● Frugal innovators can be for-profit firms, social entrepreneurs, government agencies, Non-Governmental Organizations, communities, individuals. In most cases frugal innovations are developed by combinations of these actors, who often have different motivations and interests. Therefore, research on how different types of innovators operate - and why - is an important area for further study within ICFI. This also links to attempts to involve communities, citizens and consumers more in the development of innovations, instead of only being passive consumers, and to active consumer and citizen movements towards more frugal and sustainable lifestyles. More broadly, various philosophical traditions, from different regions in the world, propagate frugality as a key value.



Conclusion

A frugal perspective on innovation helps to reduce over-engineering and to increased involvement of communities and citizens in societally desirable innovation trajectories. With a focus on simplicity, functionality and affordability, a frugal perspective helps innovators to develop 'good enough instead of optimal' products, services and systems, that enhance the resilience and increase the speed of innovation processes. As an international academic centre, ICFI focuses on critically analyzing under which conditions these positive outcomes are more likely to occur.

ICFI contributes to an international academic understanding of societal issues by unfolding and implementing our multidisciplinary research programme on frugal innovation which builds upon, mobilizes, brings together and combines the relevant knowledge and expertise on innovation within our international hubs.

Interested in joining our quest? Join the ICFI network today #gofrugal



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