

# FRUGAL INNOVATION FOR ECOLOGICAL TRANSFORMATION - A WAY FORWARD?

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Tilonia, Rajasthan, India, 6 September 2011: Women constructing solar cookers at the workshop of Barefoot College in Tilonia, Rajasthan, India.

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Frugal innovation is increasingly promoted as a solution to meet the needs of a growing human population while remaining within planetary boundaries. This article presents a nuanced understanding of what frugal innovation is and is not; highlighting that a wider understanding of frugality has the potential to promote the resilience, dignity and economic prosperity of people and communities that are not traditionally seen as part of innovation ecosystems. It highlights the necessity of overhauling the existing social and economic spaces of innovation, production, and consumption to envisage a just, inclusive way forward towards an effective ecological transformation.

## INTRODUCTION

A successful ecological transformation holds the key for a sustained wellbeing of the planet we are living in. One of the most challenging tasks of the ecological transformation will be to balance the ever-increasing need of a growing population with the limited absorptive capacity of the Earth.

Frugal innovation, which can broadly be understood as a form of or approach to innovation that does more with less is one solution to this challenge. However, this definition of frugal innovation is overly simple, hiding both opportunities and challenges. Understanding not only the outcomes of frugal innovation and the principles and processes that underpin it unveils a more nuanced understanding of the ways that it can contribute to successful ecological transformation.

## THE RISKS OF A NARROW UNDERSTANDING OF FRUGALITY

Frugal innovation emerged as a prominent topic in many businesses during the global recession of the 2008-09. In a time of economic downturn, large corporations sought to extend their reach by producing goods that were affordable and accessible in resource poor settings.

This called for a reorganisation of existing production, innovation, and distribution mechanisms of corporations, to make products which would be substantially less expensive and simpler, while retaining their core functionalities<sup>1</sup>. For example, in 2009, Tata Motors, an Indian multinational automotive manufacturing company, introduced the Tata Nano, a compact, low-cost vehicle specifically designed for the Indian market. With a price tag of only \$2,000, it was branded as the world's cheapest car, providing an affordable transportation solution for millions of families. The cost reduction was achieved by minimizing the size and weight of the car, using lighter and less expensive materials, and new manufacturing processes.

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However this definition and example of simply doing the same with less misses much of the potential of frugal innovation. Increasingly, such definitions have received pushback from developmental scholars in particular. As businesses increasingly now look to frugal innovation as a means to accelerate ecological transformation, a broader and more nuanced definition is needed.

Without altering the core of the existing production, innovation, and distribution we would achieve very little in environmental sustainability terms. Consider a clothing manufacturer that adopts a cheaper, faster chemical dyeing process as a frugal innovation; while this increases profitability and product accessibility, it could inadvertently exacerbate water pollution and textile waste, thereby escalating environmental harm.

What's more, frugal innovation activities, while ostensibly providing more affordable solutions, can, allegedly, cannibalise "informal", social spaces of innovation, production, and distribution, by usurping localised mechanisms of innovation and production<sup>2</sup>. This can have a negative effect on the diversity of organisational spaces and associated knowledge and practice of communities, harming the cause of social sustainability and livelihoods.

## A NUANCED DEFINITION OF FRUGAL INNOVATION

A deeper understanding of frugal innovation grounded not only in its outputs but in its processes and social value helps to demonstrate the true value of frugality to ecological transformation.

Recent scholarship has examined the historical legacies of the term, delving deeper into the meaning and nuances of "frugality"<sup>3</sup>. As early as Adam Smith, frugality is associated with "judiciousness," and "industriousness" in organising economic activities. It emphasises the ability to learn from one's experience with the environment and to implement decisions which are practical<sup>4</sup>. In this sense, frugal innovation needn't only apply to the replication of existing products in less expensive ways, but to new invention with practicality and effectiveness as core principles.

A frugality-embedded innovation, however, also needn't be a radical technological breakthrough. In fact, scholarship concerning innovation have long demonstrated how economic benefits of innovations have often been associated not with radical technological breakthroughs, but with minor innovations and invention around a given technology that extend its life or uses. For instance, the introduction of smartphone protective cases, a relatively minor invention, extended the lifespan and functionality of existing smartphone technology, leading to significant economic and environmental benefits without necessitating a radical technological breakthrough.

Many countries in Asia and Latin America brought about significant economic prosperity through such iterative approach<sup>5</sup>. In these contexts, what was required was a change in the mindset which welcomed and legitimised local approaches to innovations to bring economic prosperity. Critical to a wider understanding of frugal innovation is to pay attention to the processes it involves. Scholarship concerning decision theories show how "frugal" ways of decision-making based on heuristics, rules of thumbs and improvisations, can lead to more efficient and faster solutions in conditions of uncertainty compared to decisions predominantly based on protocols, which are often determined at a global or otherwise nonlocal scale.

These innovation processes are guided by the knowledge of the relevant challenges and local environment, leading to better outcomes for that context. For example, in emergency disaster management, a local team using frugal innovation strategies, such as relying on practical experience and improvised solutions, may achieve more effective and swift outcomes than a team adhering strictly to comprehensive, but non-local, protocols.

In the global South, the value of frugality is seen in the vast innovative activities taking place in informal economy spaces. In India, the term "Jugaad" can be loosely translated as a "hack" or an innovative fix. It refers to the practice of finding low-cost solutions to problems by thinking out-of-the-box and using available resources in an unconventional way. In Kenya, "Jua Kali" refers to the creativity and resourcefulness informal workers use to find effective solutions in resource-constrained environments. In Brazil, the "solidarity economy" is also underpinned by processes and practices that embody frugality.

<sup>3</sup> Jain, S. and Bhaduri, S., 2021. The many facets of frugality: Insights from a quasi-comprehensive literature survey. *Journal of Scientometric Research*, 10(2), pp.265-278.

<sup>4</sup> Bhaduri, S., 2016. *Frugal Innovation by 'the Small and the Marginal': An Alternative Discourse on Innovation and Development*. Erasmus University Rotterdam.

<sup>5</sup> Rosenberg, N. and Steinmueller, W.E., 1988. Why are Americans such poor imitators?. *The American Economic Review*, 78(2), pp.229-234.

<sup>1</sup> Radjou, N. and Prabhu, J., 2015. *Frugal Innovation: How to do more with less*, The Economist.

<sup>2</sup> Meagher, K., 2018. Cannibalizing the informal economy: Frugal innovation and economic inclusion in Africa. *The European Journal of Development Research*, 30, pp.17-33.

This understanding of frugality as a process as much as an outcome demonstrate the possibilities of frugal innovations by recognising the power and value of various alternative forms of knowledge creation and innovation activities undertaken at the grassroots level by communities, social enterprises, and civil societies<sup>6</sup>. These innovations originate either from individuals or socially connected actors, outside the controlled environment of a laboratory or a factory, to resolve localised problems in the actual environment of use and application<sup>7</sup>. They are driven by the experiential local knowledge, and an awareness about the local environment of opportunities and resources. The values they create are diverse<sup>8</sup>.

## FRUGAL INNOVATION'S ROLE IN ECOLOGICAL TRANSFORMATION

Ecological transformation calls for radical changes in existing production and consumption mechanisms. At the same time, these changes must enable greater societal inclusion and justice. A frugality driven narrative of innovation-production and consumption has the potential to be a driver of both.

One major challenge that frugal innovation can play in driving positive environmental impacts is in the reduction of resource consumption and waste. Social movements like "right to repair" and "do-it-yourself" that seek to undo environmentally devastating consequences of existing dominant approaches to innovation like "planned obsolescence" and "disposable economy" inherently apply frugal approaches. In many, though not all, contexts, the innovations these groups promote use local knowledge, supply chains and locally available, often discarded, materials to extend the lives of many items.

In support of greater societal outcomes, frugal innovation helps make innovation processes more inclusive by opening up the possibility of innovation to the diverse traditions of knowledge creation and invention. It gives legitimacy to the activities and experiences of "fringe" people, not only "experts"<sup>9</sup>. By addressing barriers to frugal innovation and creating supportive mechanisms like financing and opportunities for knowledge sharing, more communities can develop solutions that help them to adapt to and mitigate the environmental ills facing our planet.

Its production can also be localised, and contextual. This implies lesser dependence on transportation and scale, particularly when facilitated by new decentralised processes and technologies such as 3D printing, for example. Such solutions not only promote positive environmental outcomes such as reductions in waste and pollution related to transportation, they also address local

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Smartphone protectors help extend their lifespan.

needs, while leveraging local skills and experience, signifying greater fairness and justice<sup>10</sup>.

This localisation of innovation and production through frugality can be particularly of value in promoting resilience to shocks. For example, during the pandemic, the various efforts to intervene in the disease management process through open-source manufacturing of ventilators, experimental therapies and validation of medical kits based on their performance in real-world settings symbolised a shift towards frugality, even in the countries of the global North. They symbolised a shift away from the conventional innovation-production-consumption mechanisms too, where the usefulness in the actual context of consumption validated the methods of production and innovation, more than "what ought to be" produced/innovated<sup>11</sup>.

Though there is no systematic body of research as yet, many of these efforts, in popular perception at least, have importantly contributed to building a resilient response to the pandemic. Given the warnings of the WHO about possible recurrences of such events, we need to take proper lessons from these experiences, including in how we allow innovation to happen. Often, these innovation-production-distribution activities could be successfully organised at places local levels through platforms and the use of 4th Industrial Revolution technologies.

## SCALING FRUGAL INNOVATION

Today, the commercial prospects and scalability of localised frugal innovations remains inadequate. Solutions that promote community participation and the nurturing of "innovation democracy" are proactive solutions that can be pursued. However, to allow frugal innovation to flourish and play its role in ecological transformation, existing levers and boundaries that are set around innovation will also need to change, particularly regulatory and financing models.

6 Leliveld, A. and Knorrinda, P., 2018. Frugal innovation and development research. *The European Journal of Development Research*, 30, pp.1-16.

7 Devi, W.P. and Kumar, H., 2018. Frugal innovations and actor-network theory: A case of bamboo shoots processing in Manipur, India. *The European Journal of Development Research*, 30, pp.66-83.

8 Sheikh, F.A. and Bhaduri, S., 2020. Grassroots innovations in the informal economy: Insights from value theory. *Oxford Development Studies*, 48(1), pp.85-99.

9 Bhattacharjya, B.R., Bhaduri, S. and Kakoty, S.K., 2023. Co-creating community-led frugal innovation: An adapted Quadruple Helix?. *Technovation*, 124, p.102752.

10 Hazenberg, H and Bhaduri S (2023, forthcoming) Fairness institutions for frugal innovation. In Leliveld A, Bahduri S, Knorrinda P and van Beers C (eds). *Handbook on Frugal Innovation*. Edward Elgar. Cheltenham.

11 <https://www.iss.nl/en/news/covid-19-should-europe-embrace-frugality>. Accessed on 17 July 2023.





Urban Horticulture - Community garden in central square of the city, Turin, Italy - September 29, 2016.

Most regulations related to physical products today are built on the idea of separation between producers and innovators. Innovators design products and associated processes; once these are set, that product moves to production in a highly standardised way. These two spheres are controlled by their specific protocols and regulations. However, many kinds of frugal innovations combine production with innovation. Innovation here happens at the site of the production. When regulations dictate this separation of spheres there is hardly any scope to indulge in trial-and-error in the production stage.

To enable frugal innovation, we need to create regulations that would indulge and allow for trial-and-error in the spheres of production. Scholarship concerning this idea is at a very nascent stage and requires further development<sup>12</sup>. There are major tensions that will need to be resolved and that are even more challenging when also seeking to specifically promote innovation in service of ecological transformation. For example, how to ensure adherence to various safety and environmental standards in more varied products.

Financing of frugal innovators, and particularly of smaller-scale, localised frugal innovation is another significant challenge. A wide range of funding sources can support frugal innovation at local scale. Private sources of funding might both grow as the potential of frugal innovation as a tool for ecological transformation, resilience and adaptation becomes clearer. Governments, too, may recognise the role that innovation can play in building localised resilience and economic prosperity. However, today, very few such examples of large and widely accessible sources of funding exist.

In the meantime, other sources of financing such as individual crowd funding and other localised, participatory methods will also be important. The examples of Grameen Bank and other

microfinance organisations are notable examples that can be learned from. These sources also mitigate the potential negative consequences of imbalances in power between funders and innovators that can result in local gains from innovation to be lost. At the same time, there is a limit to the scale or spread of frugal innovation that can be expected to flourish when financing in support of it remains small and disconnected.

## CONCLUSION

Properly defined frugality-based approaches to innovation can contribute significantly to ecological transformation while democratizing the innovation space by giving legitimacy to fringe actors and bringing them into innovation process. It ensures diversity of knowledge traditions and social practices can thrive, while achieving greater environmental sustainability.

While scale remains important, one should also be mindful of the various trade-offs scale brings with respect to the control innovators enjoy over their creations, the limits that it imposes on the needs of specific contexts, and the ability of local actors to use their knowledge of the local environment and experiences to adapt their innovations in response to changing environment of demand, costs and social values.

A reorientation of our mindsets and enabling systems for innovation is also needed. Innovation - production - consumption systems which thrive on rapid product obsolescence and the idea of a "disposable economy" need to be done away with, to create space for frugality driven innovations. To allow frugal innovation to flourish in the service of social and environmental goods, our current "over-engineered" system of regulation that treats the spheres of innovation and production as non-overlapping spheres of activity must also be revisited.

<sup>12</sup> See Chowdhury in <https://trcfrugal.in/a-workshop-report-frugal-digital-technology-for-healthcare-delivery/>. Last accessed on 28 July 2023.