



Frugal Innovation and Entrepreneurship

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Abstract. By elucidating the values and methods, social entrepreneurs provide a narrative of perspectives and aspects of innovation models that are pertinent to theory, practice, and policy related to innovation management. This chapter's statistics and discussion show that social entrepreneurs have differing views on and reasons for innovation. We empirically define new concepts, like frugal innovation, using data from many perspectives on the reasoning, incentives, and methods of innovation. We show that the inventiveness of social entrepreneurs is not limited to social innovation. Future researchers who associate innovation with social entrepreneurs or who disagree with the current research's emphasis on the causes and purposes of social innovation will find this finding helpful.

Keywords: Entrepreneurship, Frugal Innovation, Rural Entrepreneurship.

1 Introduction

Innovation is viewed as an essential tool for boosting India's economic growth, lowering poverty, and raising living standards [6]. The Informal sector which is often characterized by small productivity and little-skill activities, employs nearly 90% of India's labour population, of which 60% work in informal agriculture. India would gain from supporting impoverished people's inventive endeavors at the rural [9]. Regardless of the educational background of the innovators, innovations are occurring all throughout the nation. These innovations are typically spurred by the desire to use locally accessible technologies and resources to address local problems or increase the effectiveness of services or operations. These kinds of advances rely more on thrifty resources and support systems than on large investments in research and development. These low-cost inventions are catching up to big businesses to form an inclusive innovation ecosystem [4]. The Latin term "frugalis" from the middle of the 16th century is where the word "frugal" originated. Frugal is defined by the Oxford Dictionary as "sparing or economical as regards money or food." When there were few financial resources available in the old world, frugal living was a virtue. This is still true in most of today's emerging economies. The concept of "frugal innovation" is not new, despite the term's recent adoption.

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Henry Ford's utilitarian philosophy, together with a laser-like emphasis on efficiency, waste reduction, and cost minimization, led to a significant increase in employment and market expansion [7, 27]. Frugal innovation is the process of rethinking products and manufacturing procedures to make them more effective and economical by breaking them down into their most basic components. One example of the economic relevance of frugal innovation is the creation of low-cost mass-market items that are available to all socioeconomic strata, including the less affluent ones [24]. It was primarily developed in relation to initial markets. The primary goal stayed to provide goods and services that would satisfy the unique demands of these markets while remaining reasonably priced to allow non-affluent consumers to participate in the market [31].

2 Dimensions of Frugal Innovation:

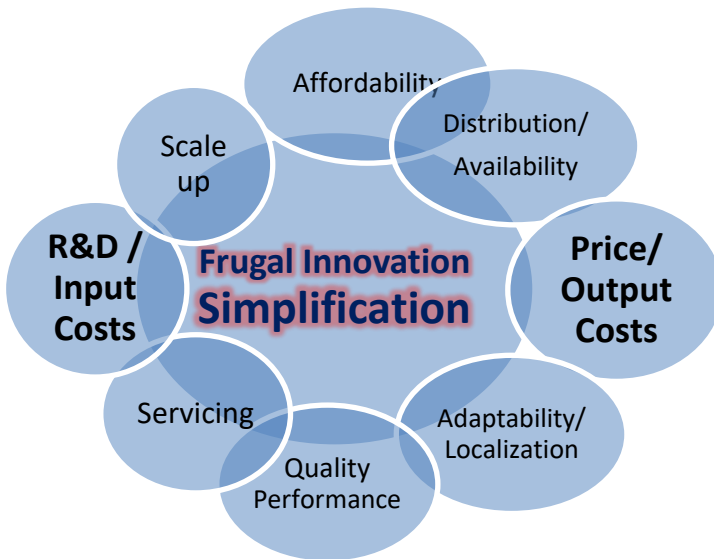


Fig. 1. Dimensions of Frugal Innovation, Source: Author compilation

It may be crucial to the transformation of rural areas for sustainable growth. Unfortunately, the majority of these low-cost inventions stay at the prototype or concept stage due to a lack of scaling up skills and support. Such ideas sometimes fall short of market success because of insufficient design advancement and material efficiency. Establishing a well-structured infrastructure to facilitate these cost-effective innovations is crucial. Enlisting volunteer assistance in the form of technical and mentoring help is also necessary to turn these creative concepts and prototypes into a finished good or service that is commercially viable, socially acceptable, and technically practical. The Indian National Academy of Engineering (INAE), Vijnana Bharati, and National Institute of Rural development and Panchayati Raj are collaborating to support and encourage rural

innovators and raise awareness of these innovations. The workshop on "FRUGAL Innovations" will be held to provide an inclusive platform for ideas and innovations that facilitate new business models and work out the next steps with potential mentoring support from INAE's expert members [4].

[32] used the criteria of technological novelty and market novelty to analyse the Frugal Innovations. Compared to cost and good-enough innovation, Frugal Innovations has a greater technical and commercial originality. Furthermore, according to their conception, frugal innovation is new for less, well enough innovation is fitted for less, and cheap innovation is the same for less [22].

As differentiate between cost innovation, Juggad Innovation, Gandhian innovation, good enough innovation and frugal innovation, a similar paradigm with the criteria the same for less, modified for less and new for less. As per the standards the Tata Nano city vehicle is a best example of Gandhian innovation (adapted for less), while the GE LOGIQ Book ultrasound machine is an example of frugal innovation (new for less). The Tata Nano is also touted as a typical example of frugal innovation [25, 29, and 31].

Frugally inventive, the informal Hindi term "jugaad" means "an inventive remedy; an improvised solution resulting from cleverness and ingenuity. "Jugaad is just a different way of thinking about and responding to situations; it's the brave art of seeing chances in the worst situations and creativity coming up with the quick fixes using basic tools. Using jugaad to do more with less [20].

We discovered the six practices of extremely successful innovators in complicated environments like developing economies are anchored by the six guiding principles that we identified to be the essence of jugaad.

The six principles are:

- Seek opportunity in adversity.
- Do more with less.
- Think and Act flexibly.
- Keep it simple.
- Include the margin.
- Follow your heart.

Different levels of innovation, such as those motivated by efficiency, social impact, user challenge, and efficiency, have been brought to our society throughout varying time periods based on scalability and proof.

Scalability	<p>Efficiency-Driven Innovation FIRM LEVEL</p> <p>Efficiency and financial bottom line focused, large firm and MNCs centric, with ambitions for cost leadership based globally profitable competitive advantage</p> <p><i>e.g. 'Reverse' innovation strategies by GE, TATA, EasyPaisa, Haier (Govindarajan and Trimble, 2012)</i></p>	<p>Social-Driven Innovation COMMUNITY LEVEL</p> <p>Socially beneficial, entrepreneurial, with ambitions to scale but not necessarily profit from it</p> <p><i>e.g. Aravind, NHH, Grameen Microfinance, BRAC (Nicholls, 2006)</i></p>
	<p>User-Driven Innovation INDIVIDUAL LEVEL</p> <p>Grassroots, need based, mostly individual based, little ambition for profit or scale</p> <p><i>e.g. Local jugaad applications, Honey Bee Network, Mumbai Dabbawallas (Von Hippel, 2005)</i></p>	<p>Challenge-Driven Innovation SECTORAL LEVEL</p> <p>Challenge focused for radical cost or performance improvements, entrepreneurial & network enabled; various social, economic, technological goals</p> <p><i>e.g. X-Prize, \$300 House, OLPC, Tata Nano (Diamandis & Kotler 2011)</i></p>
Proof of Concept	Necessity based	Ideational based

Fig. 2. Matrix model of Perceptions of Innovation (Source: <https://doi.org/10.1017/9781316986783.005>)

Table 1. Frugal Innovation at a glance in the recent past

Product	Sector	State	Year
Coconut husker	Agriculture	R Jayaseelan, Tamil Nadu	2018
Intelligent Goggles for blind	Engineering	Arunachal Pradesh.	2019
Sheetal Bichona – the cooling Bed, Belt system dryer (BSD) for Green Tea and others	Engineering	Assam	2019
Cooker for coffee	Engineering	Bihar	2012
Automatic engine stopper for Two Wheelers	Transport	Chhattisgarh	2005
Windmill powered water pump modified stove hybrid tractor and others	Agriculture	Gujarat	2013
Ceiling Cooler	Agriculture	Haryana.	2009
Toothbrush with paste holder and paste dispensing mechanism	Consumer durables	Delhi	2009
Solar ironing cart	Engineering	Thiruvannamalai, Tamil Nadu	2009

Biodegradable water bottle using local materials	Engineering	Bhopal, Madhya Pradesh	2009
Small Animal Restraining Cum Operation Table	Engineering	Nagaland	2019
Cooking cum drying stove	Utility	Manipur	2017
Manual Brick Making Machine	Engineering	Andhra Pradesh	2015

(Source: National Innovation Foundation)

Products made using frugal innovation are simpler, easier to handle, and produced at a significantly lower cost. A thrifty product has a low price and a correspondingly low profit per unit. Nonetheless, the mass market has a huge volume and offers astronomically large overall gains. Asia's rising markets are renowned for their inexpensive innovation and engineering. When discussing Mahatma Gandhi's austere lifestyle, economical engineering is commonly referred to as "Gandhian engineering" in India. Gandhian engineering is a system that Tata Motors established with the goal of challenging preconceived notions in the manufacturing environment and embracing frugality. The name was inspired by the economical, eco-friendly, and cutting-edge Tata Motors Nano, which is said to be the world's cheapest automobile. The mobile phone sector has made great use of frugal innovation. Nokia phones in India run about \$20 and are capable of making and receiving calls as well as messages. A relatively recent aspect of low-cost tactics is frugal innovation, in which cheap prices appeal to mass audiences while achieving low costs through economies of scale. The economics of substitution provides another explanation for frugal innovation, showing how technological innovation renews tried-and-true low-cost tactics. It functions best when the cost of updating outdated parts with more modern, high-tech ones is less than that of creating the product from scratch [24].

The goal of frugal innovators is to provide goods and services that excel in three areas: sustainability, quality, and affordability. A high-quality product is typically costly and not necessarily sustainable, as an overly complex, exquisitely designed, yet gas-guzzling automobile. Frugal innovation is to combine the three traits rather than looking for a trade-off or handling them separately. There is some grassroots innovation, which causes entrepreneurship to pick up steam in some sectors.

Here, entrepreneurialism and thrifty innovation now drive economic growth. An entrepreneur's role is essential to a country's economic growth since they are always seeking to implement novel combinations of means of production. Over time, the entrepreneur is viewed as the primary endogenous driver of development, since new entrepreneurial combinations disrupt existing economic equilibria and generate new ones [26].

Emerging economies are becoming "lead markets" for "low cost, high quality" products due to the fast-expanding middle classes in these largely unsaturated markets [29]. These products, in the form of "reverse innovations," are making their way into the markets of industrialized countries more frequently [36]. In terms of these advances, India has led the way [29, 25] conducted a comparative analysis of 13 distinct product categories' worth of conventional (non-frugal) and frugal level entry level items in the

Indian Market. The results showed that the former lowered expenses by anywhere from 58% to 97%. After accounting for labor differences, [36] research of the health care industry in India and the USA revealed a cost disparity of more than 80%. The challenge that arises from such a drastic cut in cost structure without sacrificing the required quality standards is: How can the creators of thrifty goods and services handle this seeming contradiction? For instance, a long-term study has demonstrated the technological performance of "sterilized mosquito nets as a low-cost substitute for the expensive commercial meshes," a technique that was successfully pioneered by an Indian doctor and is "around 4000 times cheaper than imported mesh" for the repair of hernias [1].

The process of creating, establishing and managing a new company— which is frequently a small firm at first—is known as entrepreneurship. An innovative concept arises from the existing circumstances when we encounter something that is necessary for the scenario, but it fails and ends up becoming the specific idea because of "lack of funding, bad business decisions, an economic crisis, lack of market demand, or a combination of all these." However, it may be a fantastic accomplishment if the entrepreneur has a highly effective approach, especially in a dynamic setting like proactiveness, innovativeness, and risk-taking tendency [3]. It is evident that entrepreneurship has a significant role in creating jobs, innovation, and economic growth [1].

The eager desire of a villager to organize his or her economic activity—be it a business, a job, an investment, etc.—with the aid of suitable technologies and practices designed for sustainable living is known as rural entrepreneurship.

It is essential for fostering creativity and inventiveness, preserving and advancing communities, creating jobs, and balancing the effects of farming, land use, community and economic growth [21].

In order for the Indian economy to grow, rural entrepreneurship is essential. Considering that about 70% of Indians live in rural areas, these towns may foster a vibrant entrepreneurial environment with the right financing and assistance. According to what is currently known, rural India is, in comparison to the country's urban population, economically impoverished, younger, geographically more remote, cut off from major markets, deeply ingrained in tradition, less dynamic economically, and undergoing depopulation.

Only 33% of India's Total Entrepreneurial Activity (TEA) falls into the category of opportunity-tea, or improvement-driven opportunity recognition, according to the Global Entrepreneurship Monitor (GEM), an international coalition of four reputable organizations. The share of improvement-driven opportunities (in percentage terms) in all entrepreneurial activities is displayed nationally in the chart below.

In rural America, business owners guide their communities towards generating locally based jobs as well as income, opportunity, and value. Entrepreneurs are driven people who recognise and utilise important local resources to draw in capital and create long-term growth. Entrepreneurs serve as a conduit between local economies and worldwide market prospects [11]. Entrepreneurs historically have led the nation out of hard times [12]

In a White house event in March of 2009, President Obama identified entrepreneurship as the key to the nation's prosperity [2]. Small-scale businesses make up the majority of India's rural industries, and they are valued highly for both political and commercial reasons. The contribution of small-scale industries to the nation's growth is well acknowledged. It makes up over 40% of the Indian economy's gross industrial value added. And rural women make a difference. Twenty years later, 33 million women belong to Self-Help Groups (SHGs), and 1.3 million of them are chosen to represent their communities in panchayats. Additionally, 20,000 homemakers take their own lives every year [14]. Women-owned businesses are thought to be a successful way to combat poverty in both urban and rural areas. In India, women have historically been concentrated in low-wage industries like domestic work and agriculture. India is ranked 103rd in the gender related development index (GDI) by the Human Development Report, 2004. Women make up almost half of India's population, according to the 2001 census. 72% of the total were involved in agriculture, followed by other non-agricultural activities at 21.7% and home industries at 6.3% [30].

There are an estimated 1,23,90,523 women owned proprietary MSMEs in the nation, according to the NSS 73rd Round of NSSO [8].

The traits of entrepreneurs in remote areas:

- Capacity to take risks;
- Self-assurance;
- Decision-making skills;
- Understanding of emerging technologies;
- Market orientation.
- Firm experience condition.

Types of entrepreneurship, if we talk about are like the term "individual entrepreneurship" refers to sole ownership of a business. Group entrepreneurship primarily encompasses limited partnership, private firms and public enterprises. Cluster formation entrepreneurship includes networking among NGOs, Vos, CBOs, SHGs and more. These also include official and informal group affiliation based on caste, profession, money and other factors. Cooperative entrepreneurship refers to a self-governing group of individuals who have come together voluntarily to pursue a shared goal.

3 Role of Rural Entrepreneurship in Economic Development

Joseph Schumpeter posits that a country's pace of economic advancement is contingent upon its rate of innovation, which is derived from the population's inclination towards entrepreneurship. Meir and Baldwin contend that while economic conditions are somewhat favorable, development does not happen on its own. It needs a spark to significantly increase entrepreneurial activity. The abundance of entrepreneurs is responsible for the variety of activities that define wealthy nations. To produce wealth, they shift resources from less productive to more productive uses. They serve as agents of social

change and transformation as well as catalysts for economic development via the effective and efficient use of national resources. Rural industries contribute to increased productivity by making the most use of available local resources, such as labor and raw materials. An area's overall economic growth results from entrepreneurs using scarce resources in an efficient and productive manner [15].

Lata Baba SRC, Sumari, Rudra Prayag has established an Agriculture Tool and Equipment Unit under the MSME plan and is active in creating ploughs, hand hoes, and favadas, among other things. Agriculture tools have numerous benefits over people in that they are very efficient and complete tasks fast [13]. Indra Nooyi (chairman, CEO of PepsiCo, Inc) Recognize the proven potential of PepsiCo, the second-largest food and Beverage Company in the world, and the worldwide packaged nutrition sector, which is estimated to be worth \$500 billion and rising. These days, PepsiCo offers "good-for-you" (such as Quaker and Tropicana) and "better-for-you" (such as zero-calorie Pepsi Max and Propel Zero) meals and drinks to go along with its "fun-for-you" (such as Pepsi and Lay's) and "better-for-you" (such as Pepsi and Lay's) portfolios [20]. Dr. Rana Kapoor of YES Bank has spearheaded numerous efforts to provide financial services to the public, either directly or through intermediaries. These initiatives use sophisticated financial tools that were previously exclusive to large corporations to create offerings for nonprofit organizations and small and medium-sized businesses. It appropriates cutting-edge products from luxury investment banking for use in development banking [20].

As per Government of India latest definition, "Any industry located in a rural area, village or town with a population of 20,000 and below and an investment of Rs. 3 crores in plant and machinery are classified as a village industry."

4 Government Schemes for Rural Entrepreneurship in India:

- Provision of Urban Amenities to Rural Areas (PURA)
- Product Management, Design intervention and Packaging (PRODIP)
- Rajiv Gandhi Udyami Mirta Yojana (RGUMY)
- Khadi Karigar Janashree Bhima Yojana for Khadi artisans
- Entrepreneurship Development Institution Scheme
- Performance and Credit Rating Scheme (Implemented through NSIC)
- Marketing Assistance Scheme (Kumar, 2016)

Prime Minister Shri Narendra Modi's "Make in India" strategy is to promote innovation, entrepreneurship, investment, and skill development in the nation. As Mahatma Gandhi correctly noted, "India lives in villages." Indian villages are the social fabrics of the country and are a true representation of India. Entrepreneurs that operate in the rural sector of the economy by developing businesses and industries are known as rural entrepreneurs.

Bengaluru was regarded as one of the 46 "Global Hubs of Technological Innovation" worldwide, and India was regarded as one of the "dynamic adopters of technologies." 2001's UNDP.

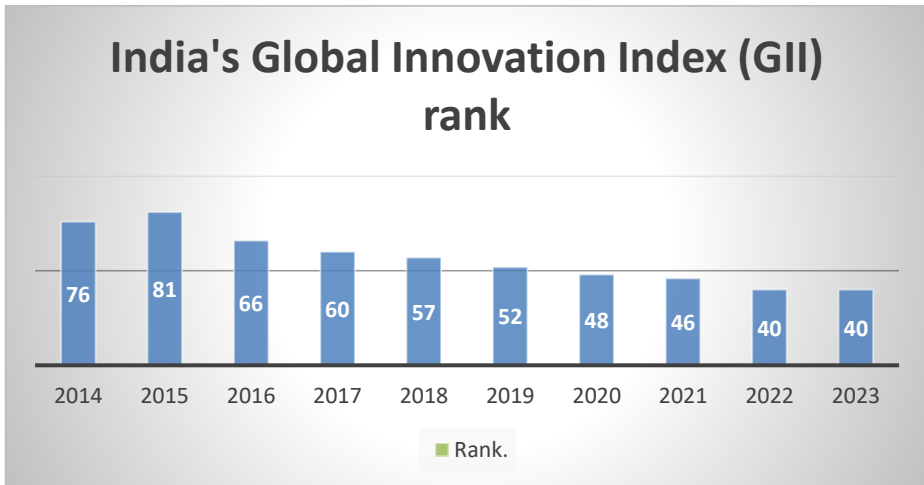


Fig. 3. India's Global Innovation Index (GII) rank

(Source: Calculated by author from Annual Reports of INDIA INNOVATION INDEX 2014-23)

5 Conclusion

We have made an early venture into theorizing about the nature, processes, and effects of social innovation in this chapter. We tried to refine the definition, composition, and methods of social innovation, distinguishing it from comparable concepts such as frugal innovation, social innovation, and entrepreneurship, as well as day-to-day change. We characterized frugal innovation as a fresh, helpful, and legitimate modification that undermines a social field's cognitive, normative, or regulative mainstays. We addressed how frugal innovation is like social innovation in that it is both unique and valuable to the adopting actor, but we expanded that description to include the invention being accepted as legitimate within its social milieu. We used the existing literature on frugal and social innovation to explain the definition, composition, and processual features of innovation and entrepreneurship. As many institutions improve the frugal innovation and assistance to enter the market to benefit more and more people with minimal input to maximum output that is easy to handle and access. India contributed only 6% of total entrepreneurial activity (2008 statistics), while the world innovation index position has risen to 40th (2023) from 76th (2014). The government also focuses on assisting as many people as possible through their own ideas, which helps to connect the dots of poverty.

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37. Figures 1,2,3,4



PHOTOS: Frugal inventions

Frugal innovation – The Miticool Fridge was developed and launched by Indian engineer, Manuakhbhai Prajapati (pictured), in 2006. Made entirely from clay, the device costs roughly \$50 and uses no electrical power. It can keep items of food fresh for up to five days and has been a valuable addition to rural communities in India.



PHOTOS: Frugal inventions

Affordable health – GE's Vscan is a pocket-sized ultrasound device being utilized in both developing and developed regions of the world. Launched in 2010, the hand-held tool costs just \$7,900 (compared to traditional ultrasound consoles which can cost as much as \$150,000) and has improved access to advanced prenatal care in areas of rural China, India and Africa.



PHOTOS: Frugal inventions

Blockbuster idea – Professor Anil Gupta shows Hollywood film director James Cameron a biomass gasifier invented by Raj Singh Dahiya. Dahiya was born into humble circumstances, but taught himself engineering from a young age. The gasifier -- developed over 20 years -- creates fuel from farm waste bringing power to otherwise isolated areas of the country to light houses, filter water, and run mills.



PHOTOS: Frugal inventions

Affordable prosthetics – Indian prosthetics organization, BMVSS, say they can produce an artificial limb for as little as \$45. This compares to upwards of \$10,000 dollars for a similar procedure in the U.S. Thousands of Indian amputees who would otherwise be unable to afford expensive medical procedures have benefited from BMVSS and their "Jaipur Foot" program since it was established in 1975.

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