

# **Frugal approaches to innovation: industrial settings and innovation strategies**

Viviana D'Angelo – Università Cattolica del Sacro Cuore (Italy) – [viviana.dangelo@unicatt.it](mailto:viviana.dangelo@unicatt.it)

Mats Magnusson - KTH Royal Institute of Technology (Sweden) - [matsmag@kth.se](mailto:matsmag@kth.se)

## **ABSTRACT**

Frugal innovation is a strategy for organizations that provides products with cost advantages compared to existing solutions. Frugal innovation can be applied to both products and services across industries. We provide lessons for managers and organizations based on a scientific review of frugal innovation as an innovation strategy. Using published studies four distinct frugal innovation strategies are introduced. Frugal innovation can be operationalized across different industrial contexts. It also interplays with other firm innovation strategies. We also identify concerns and barriers associated with frugal innovation approaches.

**KEYWORDS:** Frugal Innovation; Innovation; Strategy

## I. INTRODUCTION

Frugal innovation—as the name implies—is the process of innovating by removing non-essential features from an existing product or service. For example, frugal innovation may deliver existing product functions through legacy technology reconfiguration, different architecture, and new features such as portability or cheapness [1].

The term frugal innovation derives from *frugal engineering* coined in 2006 by Renault-Nissan CEO Carlos Ghosn in the context of Indian engineers' ability to innovate “cost-effectively and quickly under severe resource constraints” [2].

A few years later, the term frugal innovation appeared in an article of *The Economist* [3] which introduced the idea of a frugal approach to innovation in the Indian healthcare system. In that case, the term referred to the simplification of a surgery protocol for a complex heart surgery which has then proven to be very effective, paving the way for the approach of reducing the non-essential *frills*.

Frugal innovation differs from a traditional innovation approach, as the former is based on addressing essential needs. Frugal innovation is inspired by a bottom-up process and focuses on core functionalities. Traditional innovation focuses on *what would be nice to have* and while pursuing performance that include technological sophistication, desirability and design [4].

The frugal approach to innovation is increasingly becoming popular in many industrial contexts and companies thanks to its becoming a novel approach for creating innovative solutions. This increased interest in frugal innovation arises from a number of organizational benefits including: less raw materials; less sophisticated technologies in favor of old, downgraded technologies; simpler product design; simpler production processes—leading to cost reduction; and a potentially large customer base that is price sensitive [5].

The mounting concerns over resource scarcity and sustainability confirm the potential attractiveness of frugal innovation strategies.

Although frugal innovation is led by practice, it has also captured scholarly interest. Studies have argued that frugal innovation overlaps with multiple similar topics, such as *jugaad*, frugal engineering, constraint-based innovation, Gandhian innovation, catalytic innovation, grassroots innovation, indigenous innovation, and reverse innovation. These areas build on similar foundations, including cost reduction and design simplification.

Studies cover applications of frugal innovation in several industrial settings. We carefully examined frugal innovation academic studies through a bibliometric analysis.

A bibliometric analysis is a quantitative approach to analyze the literature which combines the classification and visualization methods of analysis of aggregated bibliographic data produced by scientists of a research domain [6].

We reviewed and analyzed 65 articles covering the period 1985-2018, obtained from the ISI Web of Science SSCI database [7].

Our research uncovered four different clusters of research—strategic challenges; inclusive development; sustainability; and industrial applications. Industry applications were found to focus on four main industries-- automotive and industrial manufacturing; healthcare and medical equipment; payment systems and information systems; and utilities, agriculture and clean technologies.

For each major study cluster, we identified a distinct innovation strategy driving frugal innovation including (1) disruptive innovation; (2) social innovation; (3) green innovation; and (4) lean manufacturing innovation.

Each industrial context could adopt one or more of the different frugal innovation strategies. This linkage can provide managers and organizations key insights for how frugal innovation strategies relate to other organizational innovation strategies. In each case there are also challenges and barriers for the frugal innovation approaches—which will be discussed in a later section.

Our results show that there is a blurred distinction between traditional and frugal

innovation strategies. We also observe that a single, specific frugal innovation strategy has not yet emerged. Our findings do show that frugal innovation is an important component of a more comprehensive overall organizational innovation strategy.

## II. A FRAMEWORK FOR FRUGAL INNOVATION

Our analysis of the scientific domain identified four frugal innovation strategies: disruptive innovation; social innovation; green innovation, and lean innovation.

We also discuss the applicability of the frugal innovation strategies in different industrial settings and their alignment and interaction with other aspects of firm innovation strategies.

### *A. Disruptive Innovation*

Disruptive innovation [8] refers to innovations that target the less profitable low-end segment of the markets and eventually displace the established leading companies. This happens because the low-end market segment is typically ignored by the incumbents, which are instead mostly focused on the needs of existing

customers in mid- and high-end market—high cost—segments.

Disruptive innovations tend to overtake existing technologies, displace market leaders, and revolutionize the entire market. In this sense, frugal innovations have strong disruptive potential, as they explicitly target consumer groups with lower expectations or low-income markets. This situation means companies should consider the needs of both high-end customer segments and low-end markets, which are not yet customers, but may be or want to be.

This situation requires constant monitoring of customers and non-customers to reconcile both a traditional and frugal innovation approaches. Frugal innovation in this environment is a vehicle to pursue a growth strategy through a new value proposition which satisfies an underserved market. New value propositions should blend with the existing value drivers rather than cannibalize other products or services. A company's ability to harmonize such contrasting and contradictory strategic market directions is crucial.

The automotive and industrial manufacturing sectors provide examples for these innovation and value driven strategies. When the Indian company Tata Group introduced the Tata Nano, a \$1000 car, the main purpose was to address the transportation needs of the low-end price market segment. These customers typically could not afford a car and therefore not historically part of a potential market [10].

### *B. Social Innovation*

The adoption of frugal innovation in some industries drives much broader social goals such as reducing poverty, inequity, improving of the quality of life, or providing adequate public services. Social innovation is in line with companies that pursue social goals.

Social innovation companies need to address their dual identities. These companies have to balance a profit logic and with a social good logic. Successful frugal innovation strategies with a social purpose need to set a solid organizational foundation that recognizes the need for this balance of profit and social goals—that may conflict.

An example organizational model that effectively balances these logics is the *hybrid* organization [14]. Hybrid organizations fruitfully mix elements, value systems and action logics—social impact and profit generation—across various sectors of society that include the public sector, the private sector, and the voluntary or non-governmental non-profit sector.

Although most of the companies explored in the literature are private companies pursuing clear profit goals, there are some cases of blended entities created to pursue such dual objectives [16].

As an example, there is a partnership between an Indian tertiary care hospital and a software service company to develop a software solution for enhancing critical patient care in intensive care units (ICU).

### *C. Green Innovation*

Green innovation are innovations “related to green products or processes, including the innovation in technologies that are involved in energy-saving, pollution prevention,

waste recycling, green product designs, or corporate environmental management” [17].

As frugal innovation is based on the idea of *doing more with less*, it represents a suitable innovation strategy for companies pursuing environmentally friendly actions. An example of this is Swach, a low-end water filter that does not require electricity and utilizes widely available waste—such as rice husks [18]. Another frugal innovation example is a simple machine that transforms agricultural bio-waste into gas—designed to be made with easily available material [19].

#### *D. Lean manufacturing innovation*

Frugal innovation strategies can be very effective for process improvement purposes. Lean manufacturing innovations seek to reduce non-essential features of industrial processes in line with the lean management practices appearing in many industrial settings [21], [22].

Frugal innovation can be an effective enabler to promote lean manufacturing practices and cost reduction in product development [23].

### **III. CHALLENGES AND OPPORTUNITIES**

The adoption of frugal innovation strategy is not without some challenges and obstacles. Studies have pointed to a number of them, we mention a few here:

- Undermining a company’s brand and reputation due to the conflicting market positioning. This effect might be alleviated by a clear marketing strategy of the frugal innovation as a different brand.
- Consuming company financial resources which may not be rewarded with limited profits associated with low-end consumer products. Investing in frugal innovation should be viewed as a shield against market disruptors, therefore the financial resources allocated for frugal innovation should be seen as an investment rather than a cost. The strategic perspective of maintaining market share can overcome a lessened profitability.
- Investment in new production systems or retooling existing ones. This could

encourage further efforts on the operations functions to design a system which optimizes the need for both traditional and frugal innovation-based products. Building flexibility can encourage longer term organizational agility as markets shift. Again, consideration of this situation being a strategic investment.

- Developing a new supply chain, new suppliers and new distributors. A joint-collaborative effort will be required between supply chain partners dealing with these issues could reduce the difficulties and enable to scale up the supply chain. First movers are more likely to assume a leading role within new systems and markets. Suppliers may view these new markets as a way to develop resilience.
- Cannibalizing existing products could be a concern. By providing lower cost alternatives, consumers might be encouraged to shift to the low-end version. To mitigate the effect, we suggest a different brand and

marketing strategy; with careful market research to alleviate any difficulties in cannibalization.

### III. CONCLUSIONS

Frugal innovation is related to a range of traditional innovation strategies. We shed some general light for managers on how frugal innovation interplays with other strategies, contributing to improve the consideration of frugal innovation approach among industries and companies.

Frugal innovation has been recognized as carrying several benefits that advance the traditional innovation concept: focus on core functionalities, cost reduction, complexity reduction, optimized performance, simple user centric design, and lean tools and techniques. All these attributes endow the frugal innovation with the ability to meet the challenges imposed by the current major societal challenges: natural resource degradation, inclusive development, and the need for sustainable solutions to slow the deterioration of the planet, efforts strongly

demanded by society from modern organizations.

In this scenario, the role of institutions and policy makers is crucial to promoting interdisciplinary and collaborative efforts among the different stakeholders, to encourage

companies to adopt frugal innovation approaches more extensively. This effort can be supportive of attempts to raise awareness for a more “frugal” lifestyle that can lessen resources depletion.



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