
Editorial: 'Pushing the envelope' – transcending the conventional wisdom on frugal innovation

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1 A brief history of frugal innovation

Frugal innovations have become increasingly established in the scholarly and societal discourse in the previous 10–11 years. Since the origins of this concept lie in reports of business press, it took a long time for scholars to develop a quasi-consensus about its definition, scope and theoretical antecedents. Its historical roots gave rise to the initially justifiable notion that this concept was a phenomenon typically found in the developing world, where a large number of resource-constrained and unserved (potential) consumers live. As a result, frugal products and services were often seen as 'low-tech, low-price' solutions. Recent research has however shown that frugal innovations are *no more* confined to the world of unserved consumers in the emerging and developing economies. Highly affordable, resource-efficient and high quality solutions are demanded in all parts of the world, including – and to a great extent in – the business (B2B) segment, especially in the face of the ongoing COVID-19 pandemic. Voluntary simplicity, environmental concerns, desire for social inclusion are as much factors to take into account, as is monetary affordability, when talking about frugal innovation. Digital technologies can act as enablers of 'affordable green excellence'. This special issue is devoted to this paradigm shift, as is elaborated in the following.

The concept of 'frugal innovation' is a relatively new one. It was Carlos Ghosn, the then chief executive officer of the Renault-Nissan Group, who reportedly coined the term 'frugal engineering' in 2006 (see, e.g., Radjou et al., 2012a). Interestingly, his exact statement or a publication where it was reported at that time is not easily traceable today. However, in October 2007, India's *Daily News & Analysis* newspaper reported that Ghosn, "[m]ore than a year after coining the term 'frugal engineering' to describe Indian engineers" further elaborated his viewpoint while speaking to media persons in Chennai in India, as follows:

"Frugal engineering is achieving more with fewer resources. The cost of developing a product in the West is high since engineers there use more expensive tools. In India, they achieve a lot more with fewer resources [...]" (Ghosh, 2007)

It is remarkable to note at this juncture that Ghosn, apparently connected frugal engineering with a specific country, i.e., India; and secondly, that he attested Indian engineers a supposed ability to achieve *much more* with *fewer resources* than their Western counterparts. Engineers in economically advanced nations, in his perspective, had the luxury of working in a *resource-rich* environment. This luxury of working with much more expensive, and therefore probably much more modern, tools and equipment apparently was seen as affecting their ability to ‘improvise’ and get the most out of a set of limited resources.

First direct use of the term *frugal innovation* was probably by the British weekly, *The Economist*, which in a series of articles in 2009 and 2010 reported about unconventional-yet-innovative solutions in emerging market economies (Economist, 2009, 2010). In the first-of-its-kind article, entitled ‘Health care in India: Lessons from a frugal innovator’, *The Economist* reported about a ‘beating heart’ surgery procedure at *Wockhardt*, an Indian hospital chain (Economist, 2009). The article said that this procedure caused little pain, did not necessitate general anaesthesia or blood thinners, and that patients were back on their feet considerably faster than usual. The procedure was reported to have been “so safe and successful that medical tourists come to Bangalore [in India] from all over the world” (Economist, 2009). The article further stated:

“This is just one of many innovations in health care that have been devised in India. Its entrepreneurs are channelling the country’s rich technological and medical talent towards frugal approaches that have much to teach the rich world’s bloated health-care systems.” (Economist, 2009)

Again remarkably, the article quoted doctors and practitioners saying that they selected instruments and technologies based on a stringent cost-benefit-analysis and that they were not in what they called were an ‘arms race’ for the newest technologies. The emphasis was reported to be rather on ‘world class’ tools and techniques that *spare resources* while *improving outcomes* than on the newest technology *per se*.

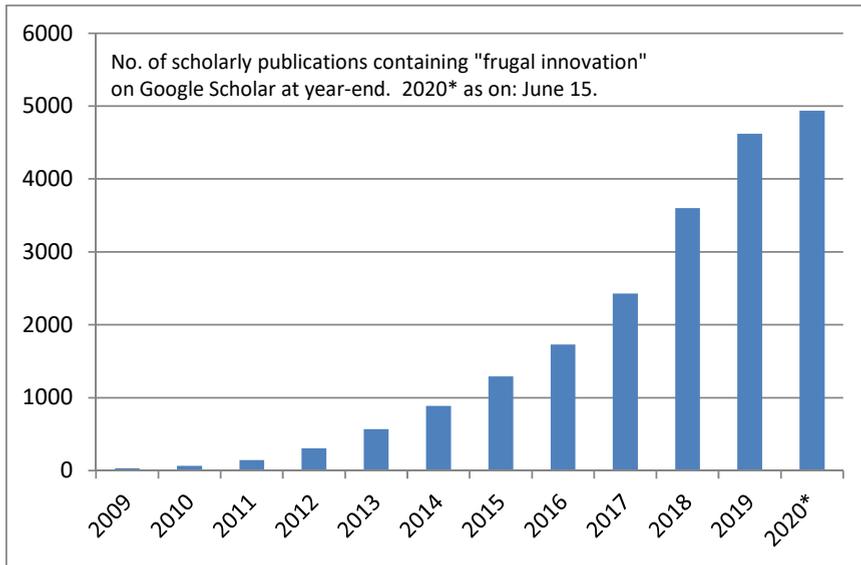
Connecting the dots to the observations made by Mr. Ghosn, we can see that frugal innovators, first of all, were found to be very *prudent* in their use of resources. This prudence was, in turn, *necessitated* by resource constraints imposed by the overall environment in which, e.g., the healthcare industry operated, and to a large extent continues to operate, in India (Srinivasan, 2004; Economist, 2009; Parthasarathy et al., 2015). Secondly, *The Economist* article insisted that the rich world counterparts could learn something from frugal innovators. Finally, many of the cited examples emanated from India, where availability of skilled human resources was reported to be high.

The benevolent attention by renowned mediums of international business press, such as the *Financial Times* (Lamont, 2010), the *Wall Street Journal* (Bellman et al., 2009), or the *Economic Times* (Kapoor, 2010), proved catalytic to the spread of this concept (cf. Tiwari et al., 2017). As a result, the concept of frugal innovation, especially the term itself, made a remarkable career in a relatively short span of time. While this term practically did not exist in scholarly publications in 2009, as of June 15, 2020, Google Scholar showed 4,940 scientific publications containing the term ‘frugal innovation’ (see Figure 1).¹

In the beginning numerous other terms were also used to describe the phenomenon of cost effective solutions, such as *Jugaad* (Radjou et al., 2012b), *Indovation* (Lamont, 2010), or *Gandhian Innovation* (Pralhad and Mashelkar, 2010). Many scholars, journalists and business leaders connected frugal innovations to the concept of the *bottom*

of the pyramid (BoP), which was originally advanced by Prahalad and his co-authors (Prahalad and Hart, 2002; Hammond and Prahalad, 2004; Prahalad, 2004), while others have investigated similarities and differences to *grassroots innovations* (Pansera, 2013), *inclusive innovation* (George et al., 2012), or *reverse innovation* (Zeschky et al., 2014b).

Figure 1 Number of scholarly publications on Google Scholar containing the term ‘frugal innovation’ (see online version for colours)



Source: Own illustration based on Google Scholar data

This multitude of terminology was sought to be consolidated by several researchers. For example, an initial conceptual framework was proposed by Tiwari and Herstatt (2012a, p.98), who characterised frugal innovations as solutions seeking “to minimize the use of material and financial resources in the complete value chain (development, manufacturing, distribution, consumption, and disposal) with the objective of reducing the cost of ownership while fulfilling or even exceeding certain pre-defined criteria of acceptable quality standards.” In this perspective, ‘frugal innovation’ was proposed as an umbrella term that could “fully encompass the key characteristics of individual related terms” (Tiwari and Herstatt, 2014). In addition, this approach saw frugal innovations having certain (but not complete) overlap with the concepts of disruptive innovation (Christensen and Raynor, 2003) and lean innovation (Schuh et al., 2011). The connection to BoP, grassroots innovations and disruptive innovations was further researched, validated and fine-tuned by studies of Ramdorai and Herstatt (2015), Praceus and Herstatt (2017), and Nair et al. (2017).

Significant contributions to the discourse on frugal innovation also came from researchers such as Alexander Brem and Nivedita Agarwal (Agarwal and Brem, 2012; Banerjee, 2013; Brem and Ivens, 2013; Agarwal and Brem, 2017), Marco Zeschky (Zeschky et al., 2011; Winterhalter et al., 2014; Zeschky et al., 2014b), Jaideep Prabhu and Navi Radjou (George et al., 2012; Radjou et al., 2012b; Radjou and Prabhu, 2015; Bocken et al., 2016; Prabhu, 2017), and Radha Basu (Basu et al., 2013). Many of these

publications received significant academic attention, e.g., in terms of citations, and helped establish the concept of frugal innovation in the scholarly research, while also contributing to a broad consensus about what constitutes frugal innovation, especially in differentiation to merely ‘low cost’ products.

A major contribution to streamline the definitional scope was made by Timo Weyrauch (Weyrauch and Herstatt, 2016), who with the help of a multi-method study could identify three core criteria of frugal innovations:

- a significant cost reduction
- b focus on core functions
- c optimised performance level.

These three factors were identified as *necessary* conditions for frugal innovations that always had to be fulfilled, while other factors, e.g., localisation, customer integration, etc. could be incorporated or excluded on a case-by-case basis. This framework has been by now widely accepted and is often cited in the literature on frugal innovation. The changes brought about by digital technologies are, however, also necessitating an update of the definition to shift the focus away from mere cost reduction towards higher affordability. The need for update, and the suggested updates, have been discussed in more recently published or forthcoming works, e.g., (Tiwari and Herstatt, 2020; Tiwari, forthcoming; Wimschneider et al.).

Another key contribution to shape the discourse on frugal innovation was made by a research project on frugal innovation funded by the German Federal Ministry for Education and Research (BMBF) that undertook a first major literature analysis of the societal and scholarly discourse published up to 2016, including with the means of a bibliometric analysis (Tiwari et al., 2016; Tiwari and Kalogerakis, 2016). Results of the study identified four schools of thoughts that provide theoretical antecedents to the concept of frugal innovation and also clearly established the need for taking a multidisciplinary approach in dealing with frugal innovation. The study suggested that the acceptance of frugal solutions by consumers and by firms is often not merely an economic decision. Very often, the success of a frugal product or service also depends on societal and psychological perception of the virtue of ‘frugality’. The commercial failure of the world’s cheapest car, the Tata Nano, being a case in point (Chakravarti and Thomas, 2015; Nielsen and Wilhite, 2015). This research also established the need for cross-functional collaboration within firms as well as outside firm and national boundaries, e.g., in open global innovation networks (OGINs) that was first suggested in context of frugal innovations by Tiwari and Herstatt (2012b). Furthermore, this research project undertook an analysis of innovation pathways leading to frugal solutions in the auto-component industry in India and contrasted them with the conventional innovation pathways in the German auto-component industry. The comparative analysis helped identify special features of frugal innovation pathways, such as the role of high resource efficiency, collaborative product development, enabling role of digital technologies and the question of a frugal mind-set supported by a suitable corporate culture (Kalogerakis et al., 2017; Tiwari and Kalogerakis, 2017).

In the following, we can analyse the implications of these initial ideas that shaped the very concept of frugal innovations and helped create a ‘dominant logic’ in this sphere.

The idea that the ‘rich world’ in the global North can learn something from its economically poor cousins in the global South found significant traction in two streams

of research in innovation management: The first stream concerned scholarly research on ‘lead markets’, which generally denote countries that provide particularly useful impulses for innovations in specific industry segments. Research had suggested that nations with high per-capita income, anticipatory demands in relation to the products of that industry segment in conjunction with highly developed physical and institutional infrastructure take the role of an innovation pioneer. The anticipatory nature of demand endows these nations (or regions) with a ‘signalling function’ vis-à-vis the rest of the world as similar demand conditions evolve elsewhere with a time lag. Some of the widely known examples of lead markets are Denmark for wind energy, Scandinavian countries for mobile telephony, the USA for information technology, or Germany for (premium) automobiles (Beise, 2004; Jänicke, 2005). An investigation of India’s national innovation system by Herstatt et al. (2008), however, made an unexpected revelation that India showed lead market characteristics for certain categories of products that were cost effective, easy to use, and robust. This initial idea led to multiple studies seeking to understand, if and how an emerging market economy can become a lead market, see, e.g., Tiwari and Herstatt (2012a, 2014), Jänicke (2014), or Quitzow et al. (2014). Today, India is widely regarded as a key lead market for frugal innovations (Soni and Krishnan, 2014; Agarwal and Brem, 2017; Herstatt and Tiwari, 2017).

The second research stream concentrated on the phenomenon of ‘reverse innovation’, where the focus was rather on utilisation of the innovation potential of countries in the global South. Most notable works in this stream came initially from Vijay Govindarajan and his co-authors (Govindarajan and Ramamurti, 2011; Govindarajan and Trimble, 2012). As the concept of reverse innovation established itself, more scholars came up with contributions that also linked it (though not exclusively) with frugal innovations (Agarwal and Brem, 2012; Zeschky et al., 2014a; Von Zedtwitz et al., 2015; Le Bas, 2016; Tsujimoto et al., 2016).

As the discussion shows, the historical development of the discourse on frugal innovations gave rise to certain notions:

- 1 frugal innovations were historically widely regarded as being primarily relevant for developing economies
- 2 frugal products and solutions were often connected with low-tech and low-prices solutions targeted at extremely resource constrained (poor) consumers in private households
- 3 the potentially positive contribution of frugal innovations to environmental sustainability was often considered merely coincidental, as the phenomenon was mostly considered from a purely economic point of view.

As research moved on, it was noticed that frugal solutions might be also useful for economically advanced nations, especially in market segments where:

- a financial constraints are high (e.g., economically weaker sections, intermediate goods in B2B segments, and for public procurement)
- b there is a need for complexity reduction (feature fatigue, senior citizens as users)
- c customers have an intrinsic moral/ethical drive to reduce their environmental/consumption footprint (voluntary simplicity).

There is also a greater appreciation that a frugal consumer does not necessarily have to be financially constrained, it might be simply his or her desire to spend less (high price sensitivity).

2 Objective and contents of the special issue

This special issue has been conceptualised to go beyond definitional issues and takes the research on frugal innovations to the next level by addressing strategic, technological, processual, organisational as well as cultural aspects of realising frugal innovations in both the developing as well as the developed world.

The issue contains eight articles that have the potential to significantly advance our understanding of frugal innovations. The issue deals with three core themes: The first theme is concerned with the global relevance of frugal innovation and there are three papers dealing with it. The second theme concerns ecological sustainability and its connection with frugal innovation, which is also discussed by three papers. The third and final theme deals with the social relevance of frugal innovation, which lies at the core of two papers. The articles are introduced briefly in the following:

The special issue begins with an article that discusses ‘Opportunities of frugality in the post-corona era’ and is authored by Cornelius Herstatt and Rajnish Tiwari. This paper sets the global context of the special issue in the face of the contemporary challenges and opportunities that have been reinforced, if not created, by the spread of the coronavirus. The authors take a closer look at the global economic, social, and environmental after-effects of the currently ongoing COVID-19 pandemic. Taking a normative-conceptual approach, the authors first showcase the immensely increased need for financially affordable products (goods, services, technologies and business models) in a world beset with unprecedented economic losses in all regions of the earth (Gopinath, 2020). Apart from this ‘forced frugality’, the paper also reflects upon the observable trend of ‘voluntary simplicity’ or ‘frugality by choice’ especially in the more affluent sections of the society, and the positive ecological impact of the slowdown in economic activity. With the example of the ‘Blue Movement’ from The Netherlands, the authors argue that it is both *necessary and feasible* to combine financial affordability with some additional, non-monetary dimensions. For this the authors expand the concept of affordability to a comprehensive multidimensional approach, in which affordability is understood as being in a position to do something without risk of adverse consequences in other spheres (Tiwari et al., 2017). The paper defines affordability on four dimensions:

- a financial tenability
- b social justifiability
- c infrastructural reasonability
- d environmental sustainability.

A frugal approach based on this expanded understanding of affordability is called ‘Frugality 4.0’ by the authors and they see it emerging as a major global trend in the post-corona world. The paper ends with five core propositions for future research and policy measures.

The second article, entitled ‘Frugal innovation in, by and for Europe’, is authored by Henning Kroll and Madeleine Gabriel. As noted earlier, frugal innovations have been predominantly discussed in the context of emerging market economies and the developing world. This paper has its roots in a study commissioned by the European Commission (cf. Kroll et al., 2017) and integrates the authors’ subsequent work in this realm. The paper contributes to the discourse of frugal innovation in the context of advanced economies. The authors argue that innovation in the advanced economies of Europe, as indeed in those elsewhere, is normally an ‘exclusive activity’ that involves large investments in research and development (R&D) to create ‘high specification products and services for elite customers’. Frugal innovations, in contrast, operate on the basis of a different paradigm: aiming to be inclusive, to create value from fewer resources through ingenious creativity; and they reach out to unserved customer bases. The authors analyse how Europe can better capture this potential. They build upon the argument that frugal innovations should enable not only economic affordability but also social and environmental sustainability (Tiwari et al., 2016). The authors address four research questions that explore ‘both necessary and sufficient conditions for the emergence of sufficient momentum for frugal innovation’ in Europe. The study finds that frugal innovations from and for Europe need to fulfil three main criteria: “First, they should be smart, i.e., truly more than just cheap. Second, they should be high-quality, avoiding an image of poor innovation for the poor. Third, they should be integrated into regional and national innovation strategies as a complement, not a substitute.”

The next paper of the special issue carries the title ‘Market maketh magic – consequences and implications of market choice for frugal innovation’ and is authored by Lukas Neumann, Stephan Winterhalter and Oliver Gassmann. The authors set out to investigate the consequences and implications of market choice in the context of frugal innovation with a systematic analysis of 237 relevant cases based on primary data and sourced from various industries and product domains. Their results suggest that frugal innovation is disruptive to its respective target market. Further, the study indicates that firms engaging in frugal innovation generally ‘tend to focus either on activities along the value chain or the solution (product/service) itself’. This distinction has yielded four clusters of frugal innovation.

The fourth paper in this special issue marks the beginning of the theme of environmental sustainability in relation to frugal innovation. The paper is authored by Christian Le Bas and is entitled ‘Frugal innovation as environmental innovation’. This conceptual paper contributes to the literature on frugal innovation in two directions: First, building upon classic works of the likes of Dosi (1982) and Von Tunzelmann (1995), it defines frugal innovation as a *new technological paradigm*, that is associated with a new ‘research path for engineers and researchers’. In this regard, the paper connects to research on frugal innovation pathways (Hall et al., 2014; Tiwari and Kalogerakis, 2017), and makes a contribution to further entrench the frugal innovation paradigm in the established theoretical concepts. Second, the paper explicitly proposes frugal innovation “as an environmental innovation by defining, considering, and drawing the consequences of the economic impact of the environmental side of frugal innovations and connects it to the concept of circular economy.” The author proposes a framework to account for how frugal innovation contributes to sustainability. The paper also discusses the factors driving the implementation of frugal innovation as well as barriers to their diffusion.

The fifth paper in the theme of environmental sustainability and frugal innovation is titled 'The role of frugal innovation in the global diffusion of green technologies', which is authored by Carsten Gandenberger, Henning Kroll and Rainer Walz. The authors argue that frugal innovation, in contrast to classic innovation efforts, "is defined not only by its outcome but also by its (potential) socio-economic impact." Contributing to the further establishment of the ecological connect of frugal innovations the authors propose that frugal innovations have the potential to reconcile the three dimensions of sustainability, i.e., ecological, social and economic (Tiwari et al., 2016; Kroll and Gabriel). The study takes a normative approach emphasising the need "to avoid the low- to mid-price market for green products becoming saturated by solutions that do not live up to basic principles of environmental sustainability." The paper explores the complex relationship between frugal innovation and sustainable innovation in conceptual terms and identifies criteria that denote possible overlaps between these two concepts. Furthermore, the study suggests that "the debate on sustainable development and sustainable innovation could profit from the concept of frugal innovation, because both concepts acknowledge the limitations of a resource-constrained world." Furthermore, using world trade data for green technologies and case studies of innovations that fulfil the criteria of both frugality and sustainability, the authors demonstrate the increasing relevance of South-South and North-South trade and derive implications for development of frugal solutions. Probably the most important conclusion of this study, in the authors' own words, is "that the integration of frugal and sustainable innovation principles can breathe new life into the discussion about sustainable innovation and sustainable development in general."

The sixth paper of the special issue, and the last one that connects directly to the theme of environmental sustainability, is authored by Alexander Gerybadze and Malte Klein and carries the title 'Frugal innovation strategies and global competition in wind power'. This study provides a concrete sectoral context to frugal innovations in the wind power industry, from which a number of affordability-centred solutions have been reported recently (Tiwari and Tiwari, 2019; Tiwari, forthcoming), in addition, it brings forth a country context other than India (and to a lesser extent China) that often dominates the discourse on frugal innovation, as discussed earlier. This study 'provides an evolutionary model of industry development and learning within the wind power sector' and, therefore, contributes to better understanding of the diffusion processes of frugal innovations in a non-consumer sector. Wind power has reached a mature phase that is 'characterised by increased global competition, standardisation and stronger emphasis on process innovation' (cf. IRENA, 2019), which leads to a greater emphasis on frugal innovation and on cost reduction strategies. The authors propose that the share of emerging economies and developing countries in the global wind power generation will continue to rise because of frugal design concepts and efficiency improvements. Using an illustrative case of an advanced turbine blade manufacturer, the study identifies Brazil, in particular, as representing 'a prototype case for developing wind power based on frugal design concepts'. The study also proposes policy implications for renewable energy.

The seventh paper of the special issue marks the beginning of the theme of social relevance of frugal innovations. The paper, entitled 'Frugal innovation for the BoP in Brazil – an analysis and comparison with Asian lead markets' is authored by Christine Wimschneider, Nivedita Agarwal and Alexander Brem. This paper, too, provides a different country context as a deliberate choice and thus illustrates the importance of a broader base of frugal innovations. In words of the authors, "In recent

years, frugal innovation and its antecedents have gained significant attention in both theory and practice. However, the vast majority of research focuses mainly on China and India and their bottom of the pyramid (BoP) customers. Against this background, our research investigates frugal innovation and its reception in Brazil.” The study analyses six Brazilian company cases (three multinational corporations and three small and medium-sized enterprises) in terms of frugal product development, product characteristics, and commercialisation approaches, as well as compare these organisations with findings from Asian lead markets (cf. Herstatt and Tiwari, 2017). While the study results confirm that, the principal dimensions of frugal innovation are cost-effectiveness and ease of use. However, the study also contradicts the notion that frugal innovation must be essentially low-cost, which jigs very well with the need for a definitional update discussed earlier. The authors propose a twofold approach to the cost criterion differentiating between company and customer perspectives. The study also suggests that distinctive product features, branding, and specific marketing activities are crucial for successful frugal innovation in Brazil. This is probably in line with scholarly research that emphasises the need to match customer aspirations going beyond mere core functionalities and optimised performance levels, known as ‘no frills’ solutions (Maira, 2005; Tiwari and Herstatt, 2020). This research thus makes a contribution in extending the classification of frugal innovation in prior literature and suggests an understanding of frugal dimensions “as a set of building blocks that can be flexibly applied to frugal product development depending on the context and regional requirements.”

The eighth and the final paper of the special issue and the second related to the theme of social relevance is entitled ‘The social dimension of frugal innovation’ and are authored by Rakhshanda Khan and Helinä Melkas: the authors emphasise that the core of frugal innovation is its social dimension. They explore it by investigating and demonstrating the potential of frugal innovation to prompt social innovation. Empirical material derived from four case studies of successful cross-industry and cross-national frugal innovation illustrates a strong social dimension. This study, in the words of its authors, “presents a novel view of frugal innovation and social innovation as closely related. The umbrella term socially driven innovation is suggested to incorporate both social and frugal innovation.”

3 Avenues for future research

Even though this special issue has succeeded in collecting an array of potentially significant and high impact research studies in the field of frugal innovation that can help usher in a paradigm shift in the scholarly and societal discourse on frugal innovation, there is still a vast scope which has been left uncovered here. In the following we provide some impetus for future research.

The currently ongoing corona crisis is expected to cause several deep disruptions to the fiscal and societal framework around the world. The unprecedented global economic recession and job losses (Gopinath, 2020) are likely to substantially increase the demand for affordable solutions. The new societal normal might lead to a much greater reluctance in travelling – not merely out of fear – but because people start to question certain practices and their ecological and fiscal impact, which might lead to calls for more moderate (frugal) lifestyles and greater use of digital technologies for long-distance

interaction. Potential implications of such trends need to be identified and problematised in the form of research questions and subsequently investigated using theoretical concepts and empirical surveys.

Several digital technologies have emerged as general purpose technologies and enabling technologies (Teece, 2018; Cetindamar et al., 2020). Digitalisation has been identified as a key driver of frugal innovation pathways (Kalogerakis et al., 2017). It is enabling ‘affordable green excellence’, by helping achieve very high quality standards in a resource-savvy and affordable way (Agarwal et al., 2020; Ahuja and Chan, 2020; Tiwari, forthcoming). Use of digital technologies, such as artificial intelligence (AI) or cloud computing offers exciting research avenues, as digital technologies can possibly resolve the challenge of creating economies of scale for successful frugal innovations. Digital solutions can have a broader outreach, can enable individual, tailor-made (customised) solutions, and bring together experts and product developers from around the world.

Another promising field of research in the domain of frugal innovations concerns use of inventive analogies, whether in the form of bionics or from other industry sectors (Benyus, 2002; Dahl and Moreau, 2002; Kalogerakis et al., 2010). Analogies have been identified as an enabler of frugal solutions in previous research (Tiwari et al., 2014), but there is still a large scope to identify its implementation in frugal innovation projects.

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Finally, we would like to take this opportunity to thank all authors for their interesting and valuable contributions that are part of the paradigm shift currently underway in the field of frugal innovations, and for the patience they have shown in the lengthy review process over the period since submission. We are equally grateful to all reviewers without whose support it would not have been feasible to examine and ensure the scientific rigour of the large body of submissions that we originally received in response to our call for papers. We would also like to thank all other colleagues who made a submission but whose works we were unable to include in this issue for various reasons, including for lack of space and difference of focus in the subject matter. We would also like to take this opportunity to specially thank Chief Editor Dr. M. Dorgham and his entire team for their continued good and trusting cooperation.

We wish the readers of this special issue a hopefully stimulating read, which will lead to further research in connection with frugal innovations and good discussions.

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Notes

- 1 The number of overall hits on Google for 'frugal innovation' was about 250,000 on June 15, 2020. This is twice the number of hits for the term 'reverse innovation'.