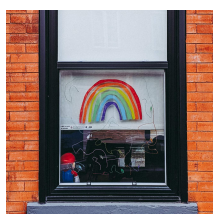


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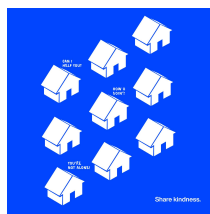


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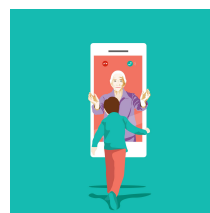


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TEXTES D'INVITÉS | GUEST CONTRIBUTORS



Le Philab est un réseau de partage et d'échange d'informations. C'est pourquoi une rubrique "textes invités" permet à des chercheurs-es ou praticiens-es non-membres du Philab de venir s'exprimer.

Philab is a Network for information sharing and exchange. This is why we have included a Guest Contributors section to allow non-member researchers and practitioners to express themselves.

TEXTES INVITÉS

How does frugal innovation offer a new form of solidarity in a pandemic and post-pandemic context?

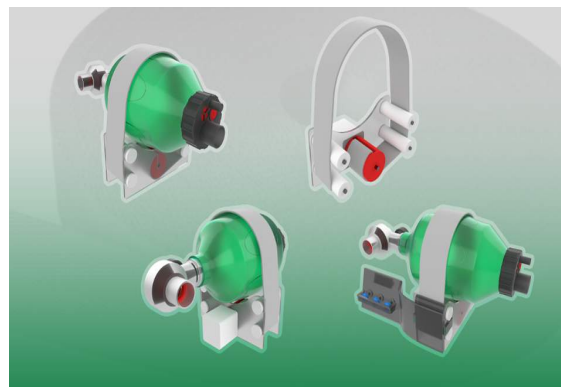


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Considering the current COVID-19 pandemic context, within which many disruptive innovations can surface, from the most useful to the most dangerous, the time is ripe for the emergence of grassroots actions and frugal innovations (Radjou 2020; Raymond 2020). The inadequacy of health infrastructure, medical supplies, health professionals and technologies have given rise to localized, practical, responsible and affordable frugal solutions. Shaped by inherent resource-constrained environments and spontaneous responses to immediate and concrete needs, individuals and groups have mutualized their capacities and competencies, "a form of [...] – grassroots, horizontal, community-led aid" (Raymond 2020).

Many examples of frugal innovation are emerging worldwide such as homemade masks (e.g., Government of Canada 2020), 3D printed medical components (e.g., The Mechanical Ventilator Milano), decentralized health care delivery in non-hospital settings, at point-of-care (e.g., Miesler et al. 2020; Ramanan 2020) and digitalized medical devices (e.g., Eddy 2020). Funding, resources and calls for action are increasing to support such innovations, from many actors like The Dutch Coalition for Humanitarian Innovation which are gathering resources to support collaborative and innovative practices of frugal innovation. Philanthropic foundations like the Indian Marico Innovation Foundation (Datta 2020) also provide financial incentives to innovators' frugal ideas during the pandemic.

Image: Open Source Ventilator Ireland

What is frugal innovation in brief?

Frugal innovation is a philosophy, a new paradigm of innovation for the Western societies, and an old one rooted in the cultures of the East and South that enables to see "...resource constraints as an opportunity rather than a handicap" (Radjou & Prabhu 2014). It is "a means and ends to do [better] with less for more people" (Bhatti & Ventresca 2013, p.4) in both developing and industrialized countries. Three key lessons, which will be presented afterwards, can be learned from embracing this philosophy in an attempt to reinvent the economic system to one based on democracy and social justice, both during and post-pandemic. First of all, the frugal innovation philosophy promotes a more horizontal, sharing economy by leveraging quick and cheap access to knowledge and prioritizing proximity-based resources. The second lesson emphasizes the role of digital solutions in the dematerialization of some parts of the healthcare value chain to make healthcare more accessible and efficient in addressing populations' health. Finally, harnessing existing local capacities, or developing others, is the third lesson to allow for the efficient capitalization of all health workers present in the local health systems.

Doing better with less: an opportunity for sobriety, responsibility and collective intelligence

The frugal innovation philosophy finds its roots in the Indian term "Jugaad innovation" - "the gutsy art of spotting opportunities in the most adverse circumstances and ... improvising solutions using simple means" (Radjou et al. 2012). Adopting a "frugal and agile mind-set" (Radjou 2020) helps reconfigure value chains, re-conceptualize products and services, and prioritize less sophisticated and more local and bottom-up innovation activities in a scalable way (Basu et al. 2013; Cunha et al. 2014). Frugal solutions stemming from this process are consequently affordable, simple, easy to maintain, use existing resources and/or digital technologies, possess essential, optimized performance adapted to their application context and lower barriers to access (Ahuja & Chan 2019; Weyrauch & Herstatt 2017). In the context of healthcare, frugal innovation "... means the ability to provide safe [care] in the best way possible under given circumstances and constraints" expanding "access to care and to ensure that the care, although perhaps not perfect (yet), is good enough under the current circumstances" (Harris et al. 2020). In other words, frugal innovation can lead to impactful social, technological, business model, process or service innovations.

Moreover, frugal solutions often target key public sectors, like health, education, waste and resource management, climate change, or public security (Commission de la science et de la technique au service du développement 2017; Rosca et al. 2018). Furthermore, frugal innovation practices encourage other stakeholders to take upon a key role in the innovation process (Cadeddu et al. 2019). Many actors are now considered critical components of the innovation cycle, such as the civil society, vulnerable and marginalized communities, university and expert networks, non-profit organizations such as foundations, social enterprises, governments and non-governmental organizations (Commission de la science et de la technique au service du développement 2017; Grant-Poitras et al. 2020).

In fact, the strength of the frugal philosophy is that it moves away from a consumerism mindset towards a "prosumerism" one, where conscientious consumption and responsible production go hand-in-hand (Radjou & Prabhu 2015). Frugal innovation can considerably increase innovation practices' sobriety, in particular when traditional ones are "still dominated by a logic ... originated during the 2nd industrial revolution, i.e., a strong dependency on natural resources extractivism and large centralised technological systems" (paraphrase of Fressoli (2015) in Pansera & Sarkar 2016). Close parallels can be made with the concept of degrowth (Pansera & Owen 2018), which seeks to reduce consumption growth, production volumes and the exploitation of the earth's resources while increasing social and environmental well-being (Abraham 2020; Schneider 2010). While the frugal innovation paradigm has been demonstrated to benefit innovation theories and help address sustainable development problems (Rosca et al. 2018), it is often assumed that only positive externalities result from its introduction and adoption in markets. However, research may be overlooking important responsibility impacts for the environment and the society, including the rebound effect, unanticipated societal impacts and lack of evidence-based evaluations (Harris et al. 2020; Le bas 2020; Pansera 2018). Thus, there are conditions and challenges for frugal innovation to avoid traditional innovation traps, 'frugal-washing' and to continue being relevant to the current and post-pandemic situation as well as to face long-term sustainable development challenges.

Frugal innovations that emerge from this pandemic context can considerably highlight and question the flaws of purely profit-oriented solutions and the continuous growth system in which they are embedded. The pandemic context is clearly making space for non-traditional innovations, often anchored in social economy from which many individuals or groups - grassroot-led - initiatives arise, to demonstrate their legitimacy and applicability (UNESCO 2019). While frugal innovation cannot address all of the current challenges, the lessons stemming from this concept show how, particularly when in a state of pandemic, economic growth should no longer be a priority. Instead, "[t]he fair distribution of health, well-being and sustainability [should be] important social goals" (Marmot 2010, p.15). This pandemic is uncovering how sophisticated and costly innovations (e.g., proton cancer therapy; CAR-T cell therapy) - and by default, associated government support - have made "health care more sophisticated [and] expensive", leaving a vulnerable part of the population without access to healthcare (Bisaillon et al. 2019; Mullangi et al. 2019, p.S107). This demonstrates the need for optimized simple solutions available to and accessible by everyone, which can respond to health inequities.

How COVID-19 pandemic creates resource-constraints opportunities to renew the innovation paradigm

The COVID-19 pandemic imposes crippling resource constraints on healthcare service production, organization and delivery (Leliveld 2020). While the situation is similar, and even worse, in developing and fragile/vulnerable countries (Biller et al. 2020; The Lancet 2020), this current crisis forces us to rethink of the innovation paradigm of industrialized Western countries to derive solutions that are fit for constrained contexts (Miesler et al. 2020; Mullangi et al. 2019). The philosophy of frugal innovation offers three key valuable lessons providing a way forward to responsibly encourage simplified, local frugal solutions for worldwide situations of scarcity.

A horizontal sharing economy

Frugal innovation practices often allow for ordinary citizens, entrepreneurs, designers, engineers and civil society scientists to use open source, makers labs and affordable manufacturing practices via shared and localized equipment, such as 3D printing (Portnova et al. 2018).

These offer quicker and more agile ways to be creative, increase availability of information technologies and equipment, reduce information asymmetry and enable product or equipment repair (Parry-Hill et al 2017; Portnova et al. 2018). In the current pandemic context, "collaborative behaviour can be a crucial advantage under conditions of resource scarcity" (Pansera 2018, p.8); indeed, communities are mobilizing worldwide to create open-source, frugal equipment for health workers experiencing a shortage of vital medical protective devices. An example is PATH's preventive face shield made of locally available materials, involving a community of innovators majorly supported by foundations (Furtwangler 2020; PATH 2020). The University Hospital of Montreal (CHUM) (Quebec, CA) also collaborated with Montreal universities and local health institutions to create 3D printed equipment on demand (Research Center of the CHUM 2020). Online communities of researchers amidst the COVID-19 crisis has also led to "open-source methods of drug development front and center" e.g., online publication of the virus' genetic sequence (Reader 2020). Even organizations start sharing their capabilities and assets, creating unique inter-enterprises collaboration as well as integrating makers thinking, e.g., SEBlab (Makertour 2015).

The Field Emergency Ventilator (FEV) system is another example of a frugal innovation. This low-resource, emergency-use, user-friendly ventilator was developed and scaled rapidly based upon open source knowledge, using mostly 3D printed components, local supplies and materials (Open Source Ventilator 2020). A volunteering "team of engineers, designers and medical practitioners" establishes product specifications and validation testing, which are available to local health services (Open Source Ventilator 2020). Also, the team's bottom-up approach increased collaboration with frontline health workers to better understand local problems. The innovation practices underpinning the FEV like other open-source ventilators (e.g., The Mechanical Ventilator Milano; Emergency Ventilator Response's Spiro Wave) are a recipe for affordability, accessibility and optimized performance that serves the urgent needs brought on by the COVID-19 pandemic, despite some examples of challenges encountered by such frugal products, e.g., not field tested yet or not suitable for all patients (Harris et al. 2020).

The FEV innovation, leveraging volunteers' energy and financial resources, stemmed up from a context constrained by shortages of certified medical supplies, disrupted worldwide logistics and favored by a decrease of regulatory barriers (Open Source Ventilators 2020) which facilitated the entrance of frugal and responsible innovations. In addition to supportive initiatives led by multinationals, philanthropic institutions could play an important role in contributing to spontaneous solidarity-based initiatives in the pursuit of restoring health equity among Canadians and contributing to the overall well-being of society.

Dematerialization by digitalization

Digitalization, achieved by leveraging readily available, asset-light SMACIT (Social Media, Mobile, Analytics, Cloud, and IoT) technologies, can lead to low-cost and high-impact solutions in resource-constrained contexts through the development of strategic capabilities (Ahuja & Chan 2019). Digitalization can be environmentally destructive if used without moderation (Strubell et al. 2019) and data privacy issues can be raised. However, used intelligently, "frugal digital solutions" can facilitate innovation processes and solutions through physical and digital infrastructure sharing, circular business models, and low-energy monitoring and control via IoT sensors (R&D management conference 2020). For example, the smartphone is increasingly leveraged as a platform that is ubiquitous, accessible, and identifiable for delivering both hyper-local and remote services at scale, especially in the healthcare sector where there is growing demand from patients for more control over their own health data, coordination, and decision-making (Beckers Hospital Review 2020; Canada Health Infoway 2020). With potential issues stemming from patients' capabilities for digital solutions (e.g., technology literacy), focusing on delivery of solutions through digital infrastructure that is distributed, familiar, and easy-to-use not only provides consumers with a user-friendly experience but also lowers costs for providers by allowing innovation in partnership with customers using readily available tools and technologies (Fréry et al. 2015).

For example, the use of 'telehealth' is increasingly recommended as people are being discouraged from visiting hospitals or clinics during the COVID-19 pandemic; this digital solution can consequently address current health gaps (Greenhalgh et al. 2020).

Yet, some parts of rural America do not have broadband infrastructure for telehealth, leaving a vulnerable part of the population underserved by new digital medical devices (Matt Dunne interviewed in Shawn 2020). Nonetheless, places in India that suffer from severe resource constraints have demonstrated how they have benefitted from healthcare solutions that leverage SMACIT technologies (e.g., Karma Healthcare and Forus Health) to serve the needs of remote, rural, unserved, and underserved populations at affordable prices by overcoming infrastructure voids. Thus, "frugal digital solutions" could help reduce material and infrastructure consumption in the delivery of healthcare services and provide quality care through existing affordable digital channels. Many of these start-ups, including those involved in "advanced frugal innovation" (Rao 2019), are often supported by philanthropic organizations who typically promote the development of innovative solutions towards social justice and equalities (e.g., Bill and Melinda Gate Foundation; Marico Innovation Foundation India).

Harnessing existing, and/or developing other, capacities

Leveraging locally available resources and skills (e.g., human capital, existing infrastructure), often spread across smaller entities and partners, allows for a horizontal local dispatch of production and distribution units that lower investment and infrastructure costs (Cadeddu et al. 2019; Radjou 2020). Local, grassroots-based, community-driven solutions emerge from "contextual intelligence" and dynamics of the community regarding their needs and resource availability (Hossain 2020; Khanna, 2014). In the healthcare context, frugal innovation practices would address the inefficient use of specialized and less specialized health workers by repurposing and optimizing their roles in the health systems according to their competences and the local issues (Bhatti et al. 2017). This is highly relevant to the current situation due the high afflux of people in emergency rooms that impacts on the availability of trained medical staff. This constraints highlights the importance of optimizing, repurposing and developing current and new human resources' roles and skills in the health systems, and "enhancing the competence of professionals rather than their titles" (translated from Regis et al. 2020).

For example, in addition to the former emergency room of Montreal's Hôtel-Dieu Hospital, walk-in screening centers for COVID-19 in Montreal area (Quebec, Canada) were set up in March 2020 in two areas, Place des Festivals and Longueuil, where specialized services and health workers were required (CBC news 2020; Stevenson & Harris 2020). On top of aggravating the virus spread as symptomatic people travelled to reach these locations, often overcrowded (Brennan & Rowe 2020), screening centers could have been more decentralized to Montreal area's suburbs, and the model of blood-drives that use mobile trucks could have been leveraged, like a frugal innovation perspective would suggest. During other pandemic outbreaks like Zika or Ebola in less developed countries (e.g., Brazil, Ethiopia, Pakistan), frugal innovation practices in health systems increasingly encouraged decentralizing capabilities by harnessing lower-skilled community health workers (CHWs) for primary care support to local communities (Harris et al 2020). Using online courses and "...risk-assessment tools based on the most basic protocols, CHWs can identify at-risk groups, refer patients to the health system, understand the local determinants of health and develop community-wide interventions to support the national response" (Harris et al 2020).

In line with this, in May 2020, Montreal district deployed mobile clinics using available public transport buses on Montreal Island achieving a capacity of 225 tests a day to reach out the most affected neighborhoods (Lauzon 2020). Here, the repurposing of existing capacities while increasing of safety of Montreal's population, specialized health workers and health infrastructure shows a frugal innovation thinking. Here, frugal innovation can be a major lever towards the "Quintuple Aim" – a reference framework aimed at optimizing the quality of care according to five key values : 1) patient care and experience; 2) populations' health considering an equitable distribution of resources; 3) cost reduction; 4) quality of work and well-being of health professionals; 5) equity and inclusion (Matheny et al. 2020). These values are in line with the mission of established foundations such as the Canadian Foundation for Healthcare Improvement (2020) that supports innovations that enhance care closer to home and communities, demonstrating the significant role of foundations in achieving the "Quintuple Aim".

Concluding remarks

While frugal innovation may not be the only solution to help face the current crisis, there are many lessons we can learn from it as it questions our evidence, in particular as "Western innovation model is not in tune with market realities, it does not fulfill its promise to encourage social progress and improve the well-being of citizens" (Radjou and Prabhu 2014). Innovating with sobriety, responsibly and collectively is becoming a necessity, the main reasons for the relevance of frugal innovation in industrialized countries. As individuals, businesses and governments "have been remarkably quick to adopt or call for practices that they might once have dragged their heels on" (Yong 2020), the context of the COVID-19 urgency is thus an opportunity to wipe the slate of innovation routines clean and consider the important roles that should be held by many actors during this transformation (Regis et al. 2020; Sullivan 2020).

However, several considerations remain: How can frugal innovation help in avoiding traditional innovation traps and enhance more responsible innovation? As this pandemic reminds us about our dependence on frontline health workers in a well-functioning society (Regis et al. 2020), what is their role in generating bottom-up innovations during this pandemic and after? Could frugal innovation play a role in addressing systemic and social determinants of health, as opposed to innovations more frequently targeting global health issues (Pai 2020)? To respond to these questions, governments, policy makers, public health experts and communities will serve as the cornerstones for reframing public policies for the exploration, acquisition, adoption, and diffusion of responsible frugal innovations in health systems in a post-pandemic context. In this vein, the philanthropy sector can also serve as a catalyst and vocal supporter of frugal innovation initiatives as there are shared values between them: a desire to address social and epistemic justice, environmental concerns and support local economies. Both governments and philanthropic organizations could support and promote such initiatives to anchor and sustain the transformative role of grassroots actors and frugal innovators towards a more sober, responsible and collective innovation paradigm. ■

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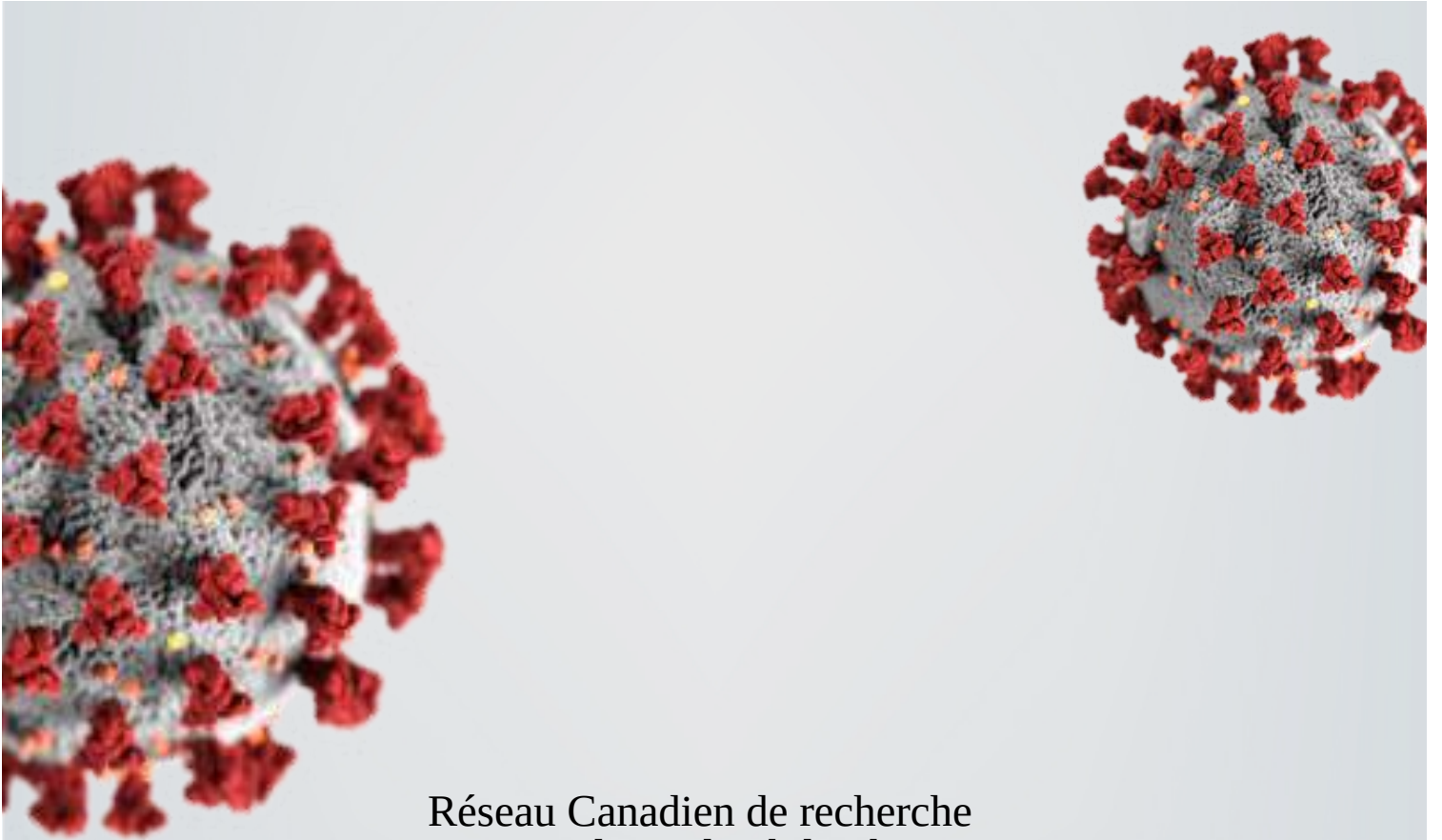
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