



Editorial

## A Call for Research on Climate Adaptive Products

Dana L. Alden

Department of Marketing, University of Hawaii at Manoa, Honolulu, Hawaii, United States

**Keywords:** climate adaptive products, frugal innovation, resource scarcity

**Article History:** Accepted: 15 June 2023 | Published: 30 June 2023

In his book, *How to Avoid A Climate Disaster*, Gates (2021) includes a chapter that is titled, “Adapting to a Warmer World.” Therein, he makes the point that people living in regions least responsible for the global warming crisis are the ones who are most likely to suffer dire consequences as temperatures rise around the world. In this context, Gates is referring to people who live in what the United Nations refers to as the “91 most vulnerable nations; those that are least developed, landlocked or small islands” (United Nations, 2023b). In response to this reality, Gates (2021) calls for investment and research aimed at identifying innovative ways to help people everywhere, but in particular in lower income countries, adapt to the negative impacts of global warming.

While Gates repeatedly discusses and illustrates the importance of mitigation innovations that lower greenhouse gas (GHG) pollution either through GHG emission reduction or capture, he argues that these advances are unlikely to be sufficient to address global warming’s disastrous consequences such as excessive heat, extreme weather, and massive forest fires. Given the seemingly unavoidable rise of global temperatures by more than the 1.5°C goal (Diffenbaugh, 2023) set by the Paris Agreement in 2015 (United Nations, 2023b), a dual focus on mitigation and adaptation appears warranted.

Furthermore, his call for special attention to the climate change adaptation needs and problems of the world’s poorest regions is appropriate given wealthier countries’ greater access to capital and the fact that these countries collectively have contributed far greater shares of GHG per capita over time than their counterparts in less fortunate regions. As Popovich and Plumer (2021) note in a *New York Times* article, “Rich countries, including the United States, Canada, Japan and much of western Europe, account for just 12 percent of the global population today but are responsible for 50 percent of all the planet-warming greenhouse gases released from fossil fuels and industry over the past 170 years.” Further highlighting this disparity is a quote from an IEA report in February 2023 which states, “In 2021, the average North American emitted 11 times more energy-related CO<sub>2</sub> than the average African” (Cozzi et al., 2023).

To date, sustainable marketing research addressing challenges posed by global warming has primarily examined issues related to climate change mitigation, for example, narrowing the green product purchase intention-behavior gap (White et al., 2019; Elhaffar et al., 2020), decreasing food waste (Zhang et al., 2022), and understanding factors associated with demand for plant-based protein alternatives (Nguyen et al., 2022). However, studies that investigate innovative new products and processes designed to help



Corresponding author:

Dana L. Alden | [dalden@hawaii.edu](mailto:dalden@hawaii.edu) | Department of Marketing, University of Hawaii at Manoa, Honolulu, Hawaii, United States.

**Copyright:** © 2023 by the authors. | **Published by:** Luminous Insights LLC, Wyoming, USA.



This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

consumers adapt to warmer temperatures in resource challenged regions and elsewhere appear to be very limited.

A recent search by this author on the *Web of Science* using a variety of keywords referring to product innovations that center on climate change adaptation as opposed to mitigation, produced very few published studies. Specifically, the search identified an investigation of bamboo use in Ethiopia's rural areas (Endalamaw & Darr, 2021) and an analysis of marine food producers' product adaptation possibilities in response to increasing ocean acidification (Oliva et al., 2022), but little else. Other search term variations, e.g., using "global warming" instead of climate change, produced no results or results that primarily addressed global warming mitigation strategies and products (e.g., frugal energy products such as fuel-efficient biomass cooking stoves, small-scale photovoltaic systems, and pico-grids<sup>1</sup>; Numminen and Lund, 2017), rather than focusing on climate adaptation. Thus, despite the critical need for product innovations that help consumers in lower income countries and elsewhere adapt to global warming, scant research seems to exist. This theoretical and applied knowledge gap increases challenges faced by managers and policymakers who seek to develop or support the development of innovative goods and services that will assist low income consumers and others in efforts to adapt their daily lives to increasingly hot temperatures.

The general type of research on climate adaptive product development that this editorial suggests is needed is illustrated by one of the few relevant studies

---

<sup>1</sup> Some products exist at the intersection of global warming mitigation and climate adaptation such as pico grids, which could arguably reduce energy consumption by other home appliances, allowing more energy to be devoted to cooling, thus providing a climate adaptive benefit. Heat pumps are another example, though their costs may be beyond the reach of most consumers in resource challenged markets. The existence and importance of such innovations is acknowledged, but not discussed in detail in this editorial. It is hoped that future research will refine the two-category taxonomy employed herein to include innovative products that serve both global warming mitigation and climate adaptation functions.

identified in searching the *Web of Science* – Zeng et al. (2021). In this study, published in *Science*, the authors report the results of efforts to improve clothing adaptation to higher temperatures by building "woven metafabrics" that can pass higher levels of human heat to the atmosphere, while more effectively reflecting, as opposed to absorbing, solar spectrum light. This editorial is not suggesting that sustainable marketing scholars shift their research emphasis to applied physics and engineering. However, there are numerous research areas related to developing innovative climate adaptive products for consumers in lower income markets and elsewhere that can and should be addressed by marketing and other social scientists interested in sustainability.

For instance, sustainable marketing scholars could assist by improving understanding of lower income consumers' knowledge, attitudes, and practices concerning, as well as desires for, climate adaptive goods and services. Furthermore, sustainable marketing scholars could team with researchers from other fields such as engineering, architecture, and healthcare to facilitate co-creation of climate adaptive products by identifying ways to optimize input from multiple stakeholders. Examples of potential climate adaptive product categories that could benefit from sustainable marketing research in resource challenged markets and elsewhere include, but are not limited to, the design, development, and diffusion of: a) affordable indoor home exercise products for adults and children; b) inexpensive healthy foods that require less or no refrigeration enabling higher percentages of home electricity budgets to be used for human cooling; c) culturally compatible, low cost housing that reduces the damaging effects of extreme heat, flooding, and wind; d) affordable personal and family survival kits that support emergency responses to heat waves, massive forest fires, and devastating tropical cyclones and hurricanes; e) inexpensive self-cooling systems, powered by rechargeable solar batteries (e.g., personal fans, water sprayers); f) weather advisory apps that include guides to effective behaviors during climate disasters; and g) affordable digital wearables that monitor body temperature, hydration, and likely

complications from excessive body heat.

Fortunately, a strong social science research stream at the intersection of new product innovation and entrepreneurship - frugal innovation - provides a valuable and important basis for sustainable marketing researchers to contribute to the development of innovative climate adaptive products that help individuals better cope with global warming. [Pisoni et al. \(2018\)](#) note that frugal innovation faces the challenge of introducing new product solutions developed and bought with fewer resources, primarily in emerging and developing markets. [Upadhyay et al. \(2023\)](#), provide a cogent summary of the stream's focus when they state:

*Frugal innovation can be understood as the net positive result created in social contexts by implementing novel and low-resource-intensive products and services. Such products and services are uniquely suited to tackle the problems faced in low-income and marginalised contexts. Marginalised contexts are social scenarios where people have low income, low capabilities and lack access to infrastructure and institutional support. Frugal innovation can provide appropriate solutions at significantly lesser costs and with fewer resources, thus being suitable for such contexts. (p. 1)*

Scholars working in this area have not only been interested in frugal innovations for low income markets. For example, [Rosca et al. \(2017\)](#) demonstrate that frugal innovations benefit customers in marginalized communities, but also “make their way back to industrialized countries” as reverse innovations (p. 133). In addition, the authors outline four business model elements that can be applied in developing frugal and reverse innovations. Hence, their research is very useful in terms of providing theoretical grounding in this stream. Testimony to this is the fact that the paper has been cited 117 times (Web of Science, June, 2023).

Moreover, opportunities exist for sustainable marketing scholars who are interested in frugal innovation to apply related entrepreneurship and innovation

research conducted in developing countries. For example, [Emami et al. \(2023\)](#) find that perceived market need urgency (MNU) is a strong predictor of new venture creation and that this positive relationship is mediated by three other constructs: supply-driven insight (SDI), demand-driven insight (DDI), and opportunity confidence (OC). However, the authors do not explicitly consider the case of frugal innovation. Thus, application of more general entrepreneurship research that builds on and increases the richness of the frugal innovation stream is also possible.

Returning to the frugal innovation literature, a very insightful, in-depth, and recent review is provided by [Dabic et al. \(2022\)](#). This team of researchers applied multiple correspondence analysis to a sample of 199 articles, along with a Delphi analysis involving the most “prolific” authors in the stream. The researchers summarize several theoretical perspectives that have been applied to frugal innovation research (e.g., innovation theory, network theory, and resource-based and knowledge-based views) and then, identify current themes that also serve as a guides to future research. The fifth theme that the authors identify centers on sustainability.

While this section of the paper describes several very important contributions to the sustainability literature related to frugal innovation, the contributions focus primarily on climate change mitigation (e.g., fuel-efficient cook stoves, the circular economy, and lower resource use) as well as the role of intermediaries, the inclusion of social equity as an important frugal innovation topic, and the long-term viability of sustainable frugal innovations. Thus, the role of frugal innovation in terms of developing climate adaptive products, while not ruled out, is not included in this important paper. This observation is not a criticism of the authors' excellent literature review and analysis. In many ways, focusing on climate change mitigation as opposed to adaptation seems far more natural because conducting frugal innovation research on products that help consumers better manage global warming may be viewed as defeatist, selling out, or providing aid and comfort to the corporations, governments, and consumers that are not taking proactive steps to achieve significantly

smaller carbon footprints.

Thus, there is a pressing need for theoretically grounded and managerially relevant research on the processes and outcomes associated with innovative climate adaptive product development in general and specifically, for consumers in lower income regions around the world. Such research benefits from solid foundations in three well-established streams: the general entrepreneurship literature, the literature on strategies and products that help mitigate GHG emissions, and the literature on frugal innovation. Co-creation is likely to be key to success as is careful attention to the many other challenges associated with frugal innovation (Emami et al., 2023; Tesfaye et al., 2021). But, the potential benefits of identifying innovative ways to help consumers cope with rising temperatures as efforts continue to reduce GHG emissions to net zero are well-worth the costs and risks.

Readers of this editorial should not view the call for application of frugal innovation to the context of climate adaptive product development as an effort to divert attention from the very important task of reducing GHG emissions, particularly in wealthier parts of the world. This author recognizes that research that seeks to promote behavior change and new products that lower consumers' and companies' carbon footprints is absolutely critical to addressing the climate crisis. Thus, the major theme of this editorial is not to call for a shift away from research on GHG mitigation, but rather to include research on adaptation as a legitimate theoretical and applied research stream within the field of sustainable marketing. Unfortunately, adaptation is necessary as climate science tells us that mitigation initiatives, despite their increasing number, are not sufficiently reducing GHG pollution and resulting temperature increases. The major question, then, is whether sustainable marketing scholars will play a central role as they have in so many areas by providing a science-based, theory-driven basis for advances in climate adaptive product development. From this author's perspective, that role should be major and should begin now. As we all know, time is very short.

As a final note, this editorial addresses the growing use of ChatGPT and other forms of AI in researching and producing academic work, whether for the classroom or for submission to scholarly journals. While the use of AI to assist authors with editing their manuscripts prior to submission is viewed as acceptable by the *Journal of Sustainable Marketing*, use of ChatGPT is not recommended for conducting reference searches in a given area and is not approved for literature reviews as part of a more extensive manuscript. The former use can actually produce incorrect citations in given fields – citations that may not exist and are referred to as hallucinations in AI terms. Copying and pasting such references into one's manuscript is therefore likely to lead to erroneous citations and frustrate readers who are interested in source documents. The latter use of AI (i.e., to conduct and write literature reviews) amounts to plagiarism and will be treated as such. Like most journals, the *Journal of Sustainable Marketing* checks all submissions for plagiarism. We are now checking also for machine as opposed human produced manuscripts or sections of manuscripts. Thus, use of ChatGPT and other AI systems for editing is acceptable, but one should still carefully compare an AI-edited version to the original manuscript as there may be unintended meaning changes that alter important points made in the manuscript. Use of AI for reference gathering and literature review preparation is not appropriate for manuscripts submitted to the journal.

Enjoy the June 2023 issue of the *Journal of Sustainable Marketing*. This edition contains insightful commentaries from leading voices in their respective areas as well as several high quality research papers. And, as always, if you have any questions, comments, topics for special issues, or just want to talk about your latest sustainable marketing research ideas, please feel free to email me and we'll set up an online chat (dalden@hawaii.edu).

#### ORCID

Dana L. Alden

 | <https://orcid.org/0000-0001-8314-8315>

**Cite as**

Alden, D.L. (2023). A Call for Research on Climate Adaptive Products. *Journal of Sustainable Marketing*, 4(1), 1-6. <https://doi.org/10.51300/JSM-2023-106>

**References**

- Cozzi, L., Chen, O., & Kim, H. (2023), The world's top 1% of emitters produce over 1000 times more CO<sub>2</sub> than the bottom 1%. Retrieved from <https://www.iea.org/commentaries/the-world-s-top-1-of-emitters-produce-over-1000-times-more-co2-than-the-bottom-1>, accessed date 2023-06-09.
- Dabic, M., Obradovic, Tena, Bozidar, Vlacic, Sahasranamam, S., & Paul, J. (2022). Frugal innovations: A multidisciplinary review and agenda for future research. *Journal of Business Research*, 42, 914-929. <https://doi.org/10.1016/j.jbusres.2022.01.032>
- Diffenbaugh, N.S. (2023). Data-driven predictions of the time remaining until critical global warming thresholds are reached. In *Proceedings of the National Academy of Sciences*, volume 120 of 6.
- Elhaffar, G., Durif, F., & Dubé, L. (2020). Towards closing the attitude-intention behavior gap in green consumption: A narrative review of the literature and an overview of future research directions. *Journal of Cleaner Production*, 275, 122556. <https://doi.org/10.1016/j.jclepro.2020.122556>
- Emami, A., Yoruk, E., & Jones, P. (2023). The interplay between market need urgency, entrepreneurial push and pull insights and opportunity confidence in the course of new venture creation in the developing country context. *Journal of Business Research*, 163, 113882. <https://doi.org/10.1016/j.jbusres.2023.113882>
- Endalamaw, T.B., & Darr, D. (2021). Institutional and technological innovation for the bamboo sector as an instrument for development and climate change resilience in Ethiopia. *Technology, Innovation and Development*, 13(7), 817-828. <https://doi.org/10.1080/20421338.2020.1837447>
- Gates, B. (2021). *How to Avoid a Climate Disaster: the Solutions We Have and the Breakthroughs We Need*. New York Toronto: Alfred A. Knopf.
- Nguyen, J., Ferraro, C., Sands, S., & Luxton (2022). Alternative protein consumption: A systematic review and future research directions. *International Journal of Consumer Studies*, 46(13), 1691-1717. <https://doi.org/10.1111/ijcs.12797>
- Numminen, S., & Lund, P.D. (2017). Frugal energy innovations for developing countries - a framework. *Global Challenges*, 1(1), 9-19. <https://doi.org/10.1002/gch2.1012>
- Oliva, R.D., Ponce, J., Human, J., Vásquez-Lavin, F., Barrientos, M., & Gelcich, S. (2022). RDP Firms adaptation to climate change through product innovation. *Journal of Cleaner Production*, 350, 131436. <https://doi.org/10.1016/j.jclepro.2022.131436>
- Pisoni, A., Michelini, L., & Martignoni, G. (2018). Frugal approach to innovation: State of the art and future perspectives. *Journal of Cleaner Production*, 171, 107-126. <https://doi.org/10.1016/j.jclepro.2017.09.248>
- Popovich, N., & Plumer, B. (2021). Who Has The Most Historical Responsibility for Climate Change?". *New York Times*. Retrieved from <https://www.nytimes.com/interactive/2021/11/12/climate/cop26-emissions-compensation.html>
- Rosca, E., Arnold, Bendul, M., & C, J. (2017). Business models for sustainable innovation - an empirical analysis of frugal products and services. *Journal of Cleaner Production*, 162, 133-145. <https://doi.org/10.1016/j.jclepro.2016.02.050>
- Tesfaye, L., Annala, & Fougère, M. (2021). Frugal Innovation Hijacked: The Co-optive Power of Co-creation. *Journal of Business Ethics*, 180, 439-454. <https://doi.org/10.1007/s10551-021-04883-4>
- United Nations (2023b), The Paris Agreement. Retrieved from <https://unfccc.int/process-and-meetings/the-paris-agreement>
- Upadhyay, P., Punekar, R., & Moksahi (2023). A Framework for Designing Frugal Innovations in Marginalized Contexts. *Journal of Cleaner Production*, 410, 137170. <https://doi.org/10.1016/j.jclepro.2023.137170>
- White, K., Habib, R., & Hardisty, D.J. (2019). How to SHIFT Consumer Behaviors to be More Sustainable: A Literature Review and Guiding Framework. *Journal of Marketing*, 83(3), 22-49. <https://doi.org/10.1177/0022242919825649>
- Zeng, S., Pian, S., Su, M., Wang, Z., Wu, M., ... (2021). Hierarchical-morphology metafabric for scalable passive daytime radiative cooling. *Science*, 373(6555), 692-696. <https://doi.org/10.1126/science.abi5484>
- Zhang, J., Wedel, M., & Bloem, M. (2022). Mitigating Food Waste in the Retail Supply chain: Marketing Solutions. *Journal of Sustainable Marketing*, 3(2), 87-97. <https://doi.org/10.51300/jsm-2022-59>

# LUMINOUS INSIGHTS



© 2023 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.

You are free to:

*Share* – copy and redistribute the material in any medium or format.

*Adapt* – remix, transform, and build upon the material for any purpose, even commercially.

The licensor cannot revoke these freedoms as long as you follow the license terms.

Under the following terms:

*Attribution* – You must give appropriate credit, provide a link to the license, and indicate if changes were made.

You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

*No additional restrictions* – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.