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and scrutinizing how rules are applied in practice. This input will be key to ensuring that efforts are based on a consensus of the best available evidence — and that carbon-accounting methodology and accepted data sources are included when companies publish their reports. Governments and other authorities must be more proactive about reaching out for researchers' help in shaping policies.

Corporate climate reporting has come a long way but greenwashing remains a live concern. The McKenna report rightly urged that progress must be subject to independent evaluation against targets and strategies. Researchers clearly have more work to do to help ensure that the promise of a greener future becomes a reality.

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Frugal innovation: a low-cost option for technology

Science is starting to recognize the movement to create mass-market products using local knowledge and materials.

Politicians and policymakers often speak excitedly of the potential of scientific and technological innovation to boost economic growth and development. Generally, the innovation they have in mind emanates from shiny city-centre buildings.

But not all innovations that improve people's lives need such resources. And this is why the creation of low-cost products using locally available, sustainable materials for mass consumption — a process sometimes called 'frugal innovation' — is gaining traction.

A study in *Communications Engineering* provides an excellent case in point. An estimated half a billion people worldwide lack access to tampons and sanitary towels. Among other things, the costs are too high: menstrual pads are often made from scarce or relatively pricey materials, including cotton, plastics and wood products. Bioengineer Manu Prakash at Stanford University in California and his co-authors have set out to change that. It's a story that scientists, policymakers and publishers should study as an example of low-cost innovation that could have a big impact.

The team used the sisal plant (*Agave sisalana*) to make menstrual pads[1]. The plant is common in central America and parts of Africa. It is hardy and thrives even when there is little or no rainfall. The tough fibres derived from its long leaves are usually used to make rope, but Prakash and his colleagues' innovation includes a process, known as delignification, that creates fluffy and absorbent material from them. The authors are now looking to scale up production.

> **"In south Asia, this kind of innovation has its own word: *jugaad*."**

Studies of frugal innovation are uncommon in the natural sciences literature, but appear more often in the social-science literature. This is partly because such research has historically not been a priority for science and engineering in high-income countries. That is something that the Nature Portfolio journals, among others, are making a concerted effort to change — not least because it is also relevant to accelerating progress towards meeting the 17 United Nations Sustainable Development Goals.

The principles underpinning frugal innovation are not new. From the earliest times, people have used locally sourced ideas and materials to experiment with, research, develop and demonstrate low-cost products and processes, from mechanical devices to medicines. In south Asia, one version of this kind of innovation even has its own word: *jugaad*. This is difficult to translate simply, but can be taken to mean 'make do and mend'.

A complicating factor in research today is the lack of an agreed definition. Some interpret frugal innovation as being of low quality, or having low standards, for safety or performance, for example[2]. Others disagree, saying that the success and scale of the fast — and often frugal — innovation seen during the COVID-19 pandemic[3] showed that this is not the case. The publication of work in peer-reviewed journals is one way to drive home the point that frugal doesn't have to mean second best.

There are other key differences between historical and modern efforts. Today's innovators commonly insist that ideas be scaled up to benefit the maximum number of people. This touches on one of the big unresolved challenges in frugal innovation. The benefits of sharing knowledge — particularly in open-access literature — are clear. Equally, intellectual-property rights exist to protect creators and ensure that they are rewarded for their ideas and hard work.

Prakash and his colleagues have opted for the first option. Their methods and data are openly available for anyone to use. The team sees its work as offering research and development to entrepreneurs who are unable to undertake this work themselves.

On its own, however, frugal innovation is not enough. In the case of period poverty, reducing costs is important, but improvements in education and health services must also play a part. But this should not take away from the authors' remarkable achievement. Researchers have used their ingenuity and skills to create and test a quality, low-cost product that has the potential to benefit a huge number of people. It's an approach that policymakers, scientists and journal editors have neglected. It's time not just to make do, but to make amends.

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