

Upfront

Greening Supply Chains: When scarcity sets in, market forces can lead corporations to adopt green practices

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Greening Supply Chains

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Cobalt is the kind of resource that people don't think about much until it isn't around – which is what happened in the late 1970s. At that time, a rebellion in Zaire cut off access to the largest reserves of the metal, which is used in a host of products, including aircraft engines, turbines, and cutting tools. The shortage caused cobalt prices to rise 380 percent. To cope with the drop in supply and the uptick in price, firms unveiled a host of strategies. Mines in Zambia and Australia went into overdrive. Manufacturers substituted other elements. And various actors developed a recycling process that doubled the amount of cobalt recovered from alloys. By 1982, prices had returned to pre-rebellion levels.

The case of cobalt illustrates that when firms know that resources are threatened, they quickly correct their course to protect their supply chains, write researchers in the Oct. 1, 2007, issue of *Environmental Science & Technology*. And in so doing, they often adopt more socially and environmentally sustainable practices such as conservation and recycling. “We are able to frame an otherwise environmentally motivated decision as a business case,” says Randolph Kirchain, one of the article's authors and a professor of materials science and engineering systems at the Massachusetts Institute of Technology.

Events such as civil strife, pandemics, and natural disasters routinely rock global supply chains. And although people have yet to exhaust any of the planet's major raw materials, their unprecedented levels of consumption are threatening to drive resources to the brink.

Yet firms are often not aware of the risk of scarcity, says Kirchain. As supply chains have become more outsourced, companies have become detached from their supply of raw materials. He also points out: “Most of a firm's endeavors focus on efficiency, not on robustness. The cheapest option is to have one supplier, but if something happens to that supplier, the firm doesn't have the materials it needs.”

The researchers analyzed ways that firms can detect and react to materials shortages. The first step is knowledge. Firms need to assess systematically the quantities of and demands for remaining raw materials, as well as possible substitutions. For example, although copper is not in imminent danger of scarcity, the authors' analysis shows that it is more vulnerable than many other metals. Busi-

nesses that depend on copper should therefore figure out how to mitigate the risk of copper supply disruption.

A second strategy for protecting supply chains from scarcity is to add flexibility. This means having multiple suppliers, stockpiling inventory, substituting more sustainable materials, and recycling. A final technique is to increase robustness by cutting down on materials use in the first place. This entails developing more efficient processes, as well as recycling.

“My background is in metallurgical engineering,” says co-author Elisa Alonso. “I decided to take my technical background and find technical solutions to social and environmental problems.” –A.C.



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