Archives of Management and Social Sciences
2025, Vol: 02, Issue: 01, Page No. 03-05

LETTER TO EDITOR

OPEN ACCESS

Pollution as a Catalyst for Sustainable Entrepreneurship: Emerging Business Models in Waste Valorization and Green Innovation

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Received: *02 December 2024*
Revised: *10 February 2025*
Accepted: *24 March 2025*
Published: *31 March 2025*

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To cite this article: *Tariq, S. (2025). Pollution as a catalyst for sustainable entrepreneurship: Emerging business models in waste valorization and green innovation. Archives of Management and Social Sciences, 2(1), 3–5.*

DOI
https://doi.org/10.63516/amss/02.01/002

Dear Editor,

The intersection of pollution and economic innovation offers a robust avenue to sustainable development. While pollution poses a serious risk to ecosystems and public health—causing about 9 million premature deaths yearly (Landrigan et al., 2022)—it also drives entrepreneurial processes that reconcile profitability with environmental stewardship. Empirical studies substantiate how waste valorization, green technology innovation, and policy-driven markets can turn environmental challenges into sustainable opportunities. Industrial symbiosis frameworks, for instance, where the by-product of one industry is the raw material for another, have achieved a 20% reduction in emissions at the Kalundborg Eco-Industrial Park in Denmark (Chertow & Ehrenfeld, 2023). Similarly, firms such as LanzaTech convert industrial carbon emissions into ethanol, earning $150 million in revenue and releasing 200,000 tons of CO_2 back to the environment yearly (Zimmerman et al., 2021). These examples undermine the argument that sustainability will suppress economic development.

The plastic waste problem is a quintessential example of this dualism. Over 400 million tons of plastic are made annually, but only 9% is recycled (UNEP, 2023). However, advances in chemical recycling, like Pyrowave's microwave depolymerization, can restore 99% of plastics' original characteristics (Garcia & Robertson, 2022), creating a $120 billion opportunity in 2030 (McKinsey & Company, 2023). Policy environments amplify these possibilities. India's Extended Producer Responsibility (EPR) Act drove a 300% rise in plastic recycling start-ups over five years (Ghosh et al., 2021), and the EU's Carbon Border Adjustment Mechanism encourages low-carbon industrial redesign (European Commission, 2023).

Critically, pollution entrepreneurship also tackles social injustices. In Lagos, Nigeria, the Wecyclers initiative hires waste pickers who are not formally employed to recycle waste into products, taking 5,000 families out of poverty (Adeyanju et al., 2022). Solaris, in Bangladesh, meanwhile, empowers women to install solar panels in polluted

ISSN: 3007-2115
Publisher: Allied Nexus Publisher
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textile areas, decreasing their dependence on coal (Hossain & Rahman, 2023). These models show that environmental and social returns are not necessarily mutually exclusive.

To drive this transformation, three are needed. First, governments must spend more on R&D of scalable technologies such as enzymatic plastic degradation (Austin et al., 2023). Second, banks must offer green loans—a market expanding at 12% per annum (World Bank, 2023). Third, academia-industry collaborations need to scale lab-scale innovation to commercialization, such as MIT did with Boston Metal to make zero-carbon steel (MIT News, 2023).

Pollution does not have to be a zero-sum game. By viewing waste as a resource and uniting policy with imagination, we can create economies that flourish and mend the planet. This journal's contribution to sharing such research is critical to spurring workable change.

Keywords: Circular Economy, Green Innovation, Pollution Valorization, Sustainable Entrepreneurship, Waste-to-Profit.

AUTHOR'S CONTRIBUTION AND DECLARATIONS

This letter was conceptualized, written, and approved by the sole author, ***Shaista Tariq.***

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Publisher: Allied Nexus Publisher
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