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Technological eco-innovations in manufacturing processes: diffusion and adoption by automotive multinationals

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Introdução

Technical progress is fundamental to the socioeconomic development of companies and nations, but it also generates negative environmental impacts, notably resource depletion, pollution, and environmental degradation. Among the initiatives to meet the principles of environmental sustainability are eco-innovations, defined as the production, assimilation, or exploitation of a product, process, service, or management that reduces environmental risk, pollution, and other impacts from the use of resources throughout its life cycle compared to other alternatives.

Problema de Pesquisa e Objetivo

The first theoretical gap is related to the diffusion of process eco-innovations, once how this process occurs in organizations is still little explored. The second gap refers to adopting eco-innovations in production processes, which have different drivers from traditional innovations. Finally, there is a lack of action research in studies on technological eco-innovation. The main objective of this research is to investigate how can technological eco-innovations be diffused and adopted in production processes in an automotive multinational.

Fundamentação Teórica

Diffusion of innovation is the process by which an innovation is communicated over time through a communication channel between members of a social environment, and adoption is the ultimate goal of innovation diffusion (Rogers, 1962). In the automotive context, companies have made little progress in adopting eco-innovations and generally still have industrial processes that use natural resources on a large scale. These processes are also sources of greenhouse gas (GHG) emissions and the generation of solid and liquid waste during manufacturing, what demands eco-innovations' diffusion and adopt

Metodologia

We applied the action research method based on a four-phase protocol: explore, plan, act, and evaluate. The implementation unit was the production area of a subsidiary of a foreign multinational that has been operating in Brazil since 1979. The action research team was defined to support research intervention in the industry. The team was nominated by the leadership based on their knowledge of and contribution to environmental issues. The research team collected the data using the action research technique through actions suggested, tested, and analyzed between June and December 2022.

Análise dos Resultados

The action research resulted in the diffusion and adoption of three incremental eco-innovations: reuse of rinsing water, change of compressed air source for component testing, and replacement of the combustion conveyor. The environmental results of the adoption were measured and audited by the headquarters company's environmental management system (EMS) and by ISO 14001. The results showed significant reductions in CO2 emissions, water consumption, wastewater treatment volume, fossil fuel consumption, workplace noise, and non-aggregated labor costs.

Conclusão

We conclude that the adoption of technological process eco-innovations in multinational subsidiaries is mostly incremental and does not necessarily require high levels of technology and investment for diffusion and adoption. These processes can be scaled up to multinational headquarters and other subsidiaries, can be simple and efficient, and can deliver significant environmental benefits by contributing directly and indirectly to sustainability. Adoption has promoted the visibility and recognition of eco-innovations.

Contribuição / Impacto

Spreading eco-innovations has led to environmental questions about other innovations adopted that did not consider environmental gains or went unnoticed. Due to inexperience and lack of knowledge in dealing with environmental issues and innovation, sometimes high degrees of uncertainty are generated about innovation and a lack of vision about the competitive advantage for the business that it can generate.

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