Has servitization reduced the embodied carbon emissions of manufacturing export trade?

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Manufacturing servitization, which introduces elements of the service industry to enhance the manufacturing structure, is increasingly being proposed as a carbon-reduction solution. However, the impact of rising service inputs on the embodied carbon emissions (ECE) of exports from the manufacturing sector has not been sufficiently investigated. This study departs from existing work by empirically examining the effect of manufacturing servitization on ECE in exports using a multi-way fixed-effect model and three-dimensional panel data from 18 manufacturing industries in 38 countries from 2000 to 2014. The results show that input servitization significantly reduces the carbon emissions embodied in manufacturing export trade. Furthermore, manufacturing servitization has a greater effect on reducing ECE in exports in developed countries (pollution-intensive industries) than in developing countries (non-pollution-intensive industries). While using the mediating effect model, the mechanism analysis shows that input servitization reduces ECE in manufacturing exports primarily through productivity improvement, energy substitution, and global value chain effects. Finally, we find that input servitization and the ECE from manufacturing exports exhibits nonlinear characteristics with changes in technological and economic development levels. The studyâ€™s findings highlight the importance of promoting deeper integration of service elements and manufacturing production processes in achieving the goal of global sustainable development.