Integrating Environmental Barrier Prioritization and Strategic Implementation for Sustainable Manufacturing in Indian Chemical MSMEs

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Abstract:

Indian chemical Micro, Small and Medium Enterprises (MSMEs) face interconnected technological, financial, organizational, and regulatory barriers that impede environmental improvement. While identifying and prioritizing these barriers provides a foundation for informed decision-making, translating prioritization outcomes into feasible and measurable improvement strategies remains a critical challenge. This study proposes a strategic implementation framework that connects multi-criteria decision-making-based environmental barrier prioritization with practical sustainability interventions in Indian chemical MSMEs. Building on the broader research on environmental improvement barriers, the framework integrates barrier prioritization, sensitivity-informed decision support, intervention mapping, feasibility assessment, phased implementation, and performance monitoring. It considers five evaluation dimensions—impact, frequency, cost, ease of implementation, and policy influence—to maintain continuity with the established research model. Potential interventions include energy and resource-use monitoring, improved waste management, environmental compliance tracking, employee capability development, and process-level digital monitoring. Implementation decisions are structured around resource availability, technical readiness, regulatory requirements, and expected environmental benefits, recognizing the operational constraints of MSMEs. The proposed framework extends barrier assessment beyond ranking by providing a structured pathway for translating analytical findings into implementation priorities and monitoring actions. Its intended contribution is to connect environmental barrier analysis with strategic planning for sustainable manufacturing, offering a conceptual basis for managers and policymakers to select context-appropriate interventions. The framework also establishes a foundation for subsequent empirical assessment of implementation feasibility and environmental performance outcomes in Indian chemical MSMEs.

Keywords:

Indian chemical MSMEs, environmental barriers, sustainable manufacturing, multi-criteria decision-making, sensitivity analysis, strategic implementation framework, environmental improvement.