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Social welfare in a design and distribution problem

While sustainability is a central concern in supply chain management, its social dimension remains widely underexplored. In the pharmaceutical industry, among various social sustainability standards, ensuring product availability and broad access to medicines is largely recognized as a key responsibility.
To integrate social objectives while preserving economic efficiency, this study proposes a decision-support tool for the strategic and tactical planning of pharmaceutical supply chains. A bi-objective mixed-integer linear programming model is developed to simultaneously maximize net present value and ensure equitable product availability across different demand regions. The model incorporates decisions related to inventory holding, distribution, and design of manufacturers and warehouses. Realistic data from a vaccine distribution problem is used to validate the model. Preliminary findings highlight important trade-offs between economic performance and social equity. Managerial insights are provided to improve equity with minimal impact on costs.

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