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A STUDY OF OPTIMAL SUSTAINABLE INVENTORY MODEL FOR NON-INSTANTANEOUS DETERIORATION WITH QUALITY ASSESSMENT

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ABSTRACT

An optimal sustainable inventory model for non-instantaneous deterioration with quality assessment addresses the dual challenges of managing stock degradation and ensuring product quality. In such models, deterioration occurs gradually rather than immediately, as seen in items like fruits, pharmaceuticals, or semi-finished goods. The model integrates sustainability principles, aiming to minimize waste, reduce costs, and enhance resource efficiency. A key component is quality assessment, which ensures that products meet consumer standards during their shelf life. By incorporating quality parameters into inventory decision-making, businesses can effectively balance demand satisfaction with the reduction of spoilage or obsolescence. This model involves determining the optimal order quantity and replenishment cycles to account for both the deteriorative nature of goods and their quality thresholds. Advanced approaches may use real-time monitoring technologies and predictive analytics to forecast deterioration rates and quality changes. Additionally, environmental considerations, such as reducing carbon emissions through optimized transportation and storage, are integral to sustainability. This approach benefits businesses by minimizing holding and ordering costs while maintaining customer satisfaction through consistent product quality. Ultimately, adopting an optimal sustainable inventory model helps organizations achieve a competitive advantage, reduce environmental impact, and align with global sustainability goals, fostering long-term profitability and social responsibility.