

Embedding Sustainability Constraints into Undergraduate Inventory Control Instruction

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Abstract:

Saudi Arabia's Vision 2030 emphasizes sustainable economic diversification and responsible resource management, positioning sustainability as a key priority in higher education reform. However, research in Saudi higher education has largely focused on policy alignment and sustainability awareness, with limited empirical attention to structurally embedding sustainability within specific quantitative business models. In quantitative courses, optimization tools such as the Economic Order Quantity (EOQ) model are typically taught under purely financial objectives, while environmental considerations remain contextual rather than structural.

This study addresses this gap by integrating sustainability-related cost parameters directly into the EOQ model and examining their instructional impact within an undergraduate Quantitative Business Analysis course. Using a within-subject quasi-experimental design, students solved both classical and sustainability-integrated EOQ problems. Two outcome measures were analysed: computational accuracy and trade-off reasoning.

It is anticipated that computational accuracy will remain comparable across conditions, as the sustainability-integrated formulation preserves the same mathematical structure. In contrast, trade-off reasoning scores are expected to improve under the sustainability-integrated condition, as explicit environmental cost parameters may encourage deeper reflection on optimization trade-offs between financial and environmental objectives.

Keywords:

Education for Sustainable Development, Inventory Control Model, Economic Ordering Quantity, Quantitative Business Analysis, Mathematics Education.