IÉSEG SCHOOL OF MANAGEMENT

EMPOWERING CHANGEMAKERS FOR A BETTER SOCIETY

'COST-VERSUS ENVIRONMENTALLY-OPTIMAL PRODUCTION IN INSTITUTIONAL FOOD SERVICE OPERATIONS'

RONALD McGARVEY
UNIVERSITY OF MISSOURI, RAND CORPORATION, ISAE-SUPAERO

ABSTRACT

We explore production planning in all-you-care-to-eat food service operations, where lack of marginal revenue associated with lost sales constrains the applicability of cost-minimizing strategies. We integrate forecast uncertainty considerations into an operational model of food service production, and derive strategies that minimize food waste subject to target shortfall probabilities. We model this situation using a nonlinear penalty function formulation, utilizing kernel density estimation to characterize deviations from demand forecasts, allowing enumeration of the efficient frontier between conflicting objectives of demand shortfall and food waste, where food waste is measured by either its mass or its embodied CO_2-equivalent emissions. When food waste is measured using the weight of wasted food, reducing the substitution threshold (minimum-allowable production level for leftover substitution) for meat-based items at certain meals is preferable. Alternatively, when using CO_2-equivalents embodied in wasted food, a variety of strategies, including reducing the substitution threshold at certain meals, increasing the percentage of demands that are satisfied from leftovers at certain meals, and increasing the allowable shortfall probability for beef-based meals, are all attractive. The results provide insight into targeted production level modifications, rather than broad increases or decreases, that can help food service operators manage the tradeoff between these conflicting objectives.

LEM LILLE ECONOMICS MANAGEMENT

CNRS

UNIVERSITÉ CATHOLIQUE DE LILLE 1875