

Efficient shift scheduling with multiple breaks for full-time employees. A retail industry case

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Abstract

A work shift scheduling methodology is presented that can assign shifts incorporating multiple breaks, providing the flexibility vital to service sector firms for reducing staff surpluses and shortages and thereby improve staff demand coverage. The proposed approach differs from previous works in the literature because it attempts to minimize the levels of overstaffing and understaffing, but also the possible negative impacts associated to a strategy of multiple breaks. The approach is built around four modules that implement a sequential iterative process to solve the scheduling problem. The first two modules use novel heuristic procedures to construct efficient break profiles that define the distribution of multiple breaks across a shift. The third module consists of a mixed-integer programming model that assigns shifts to full-time employees over a one-day planning horizon. The model uses the best break profiles constructed by the first two modules to minimize over or understaffing arising from demand seasonality. The fourth module compares the level of over or understaffing minimized by the model to the minimum possible level of over or understaffing, and if the former is not within a percentage considered to be satisfactory the entire procedure is iterated until a satisfactory solution is found. A test case using different daily demand profiles generated results showing that the level of over or understaffing obtained by the methodology under each profile was within 1 percentage point of the minimum possible despite assigning only one break additional to the mandatory meal break.

Keywords

Heuristic procedures, Implicit formulation, Multiple breaks, Personnel scheduling, Shift scheduling, Workforce flexibility.