

# OPTIMIZING FACILITY LOCATION AND DESIGN

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## ABSTRACT

We develop a generalized framework and a novel methodology to simultaneously optimize locations and designs for a set of facilities that may be facing competition from pre-existing facilities. The framework encompasses both, proportional allocation (“gravity type”) models where customer demand is distributed among many (typically all) available facilities in proportion to the “utility” a customer derives from a given facility and all-or-nothing models, such as the  $p$ -median that traditionally assume that customers are only attracted to the closest facility. Many classic models are included as special cases of our Generalized Facility Location and Design Problem (GFLDP). The methodology we develop allows us to separate design and location decisions, and appears quite effective, allowing for computing optimal solutions (up to user-defined tolerance level) to medium-size problems (with several hundred potential facility locations and up to 20 new facilities to be located) relatively quickly.