

We develop a novel mixed integer programming (MIP) formulation to address the complex problem of multi-modal transportation network design under uncertainty. The model integrates discrete decisions (such as facility locations and mode selections) with continuous variables representing capacity and flow, while incorporating robustness against demand fluctuations. Advanced decomposition algorithms and cutting-plane methods are employed to solve large-scale instances efficiently. Computational experiments on real-world datasets demonstrate that our approach outperforms traditional heuristics, achieving up to a 15% reduction in operational costs and a significant improvement in network reliability. The proposed framework offers a versatile decision-support tool for transportation planners facing intricate trade-offs in system design.