**Magister en Ciencias de la Ingeniería, mención Ingeniería Industrial**

**Propuesta de Tesis**

**Título:** Effective solution approaches for combinatorial optimization problem under decision-dependent uncertainty

**Resumen:** Combinatorial optimization problems under decision-dependent uncertainty arise when decisions directly influence the uncertain parameters within a system. Such problems are prevalent in energy management, supply chain design, and scheduling, where dynamic conditions require sophisticated modeling and solution techniques.

This research proposal focuses on stochastic programming and adaptive methods to address the challenges posed by decision-dependent uncertainty. Stochastic programming leverages probabilistic models to incorporate uncertainty, enabling decision-making that anticipates a range of possible outcomes. By modeling uncertainty as a function of decisions, this approach aligns better with dynamic real-world scenarios, offering improved accuracy and solution quality.

Adaptive methods complement stochastic programming by allowing decisions to evolve iteratively as new information about uncertainty becomes available. These methods, including two-stage and multi-stage formulations, enhance flexibility and responsiveness, enabling a more dynamic optimization process.

The proposed approaches are applied to practical case studies, such as energy allocation in smart grids and multi-item production planning. The combination of stochastic programming with adaptive techniques proves effective in achieving cost-efficient and feasible solutions, even under complex and interdependent uncertainties.

This research seeks that incorporating decision-dependent uncertainty into optimization frameworks significantly improves their applicability to real-world problems. The results highlight the potential of these methodologies to provide scalable, high-quality solutions for dynamic and uncertain environments.

**Palabras Claves:**

Stochastic programming

Decision-dependent uncertainty

Combinatorial optimization

Mixed-integer linear programming.

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