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## Waste Reduction and Cost Estimation Optimization

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**Authors Note:** Ivan is pursuing a masters in systems science with a concentration in healthcare at Binghamton University. Daryl Santos is a faculty member in the Department of Systems Science and Industrial Engineering at Binghamton University, and the managing editor of the ISER Journal, which is affiliated with SISE. Daryl advised Ivan on this effort under the auspices of a SPIR project (see Acknowledgments).

**Abstract:** Outsourcing is a popular method in many manufacturing systems, as it can provide materials to plants that do not have the capabilities to self-manufacture the necessary goods. However, some concerns arise with outsourcing, such as: how much to order, how much is it going to cost, when will it arrive, and what quality will it arrive in. If a company is in possession of the capacity to self-manufacture the necessary goods, it is important to perform a risk management analysis to find out which methodology is cheaper, which methodology will meet minimum quality standards, and which will be most beneficial. This work takes an activity-based cost estimation approach to determine whether or not to bring the manufacture, in-house, of parts that have been outsourced. In so doing, the waste that will be generated from a significant cutting operation is to be minimized while considering two approaches to address the cutting stock problem. The two approaches are Linear Programming (via the Lagrange Dual Price Problem) and Genetic Algorithms.

*Keywords:* Outsourcing vs. in-house, cutting stock problem, Genetic Algorithms