



# Academic

## INTERNATIONAL WORKSHOP ADVANCES IN CLEANER PRODUCTION

“TEN YEARS WORKING TOGETHER FOR A SUSTAINABLE FUTURE”

### **Sustainable of tomatoes supply chain management – Cases of study**

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#### **Abstract**

It is important to think about ways to reduce costs and also minimize negative environmental impacts in the fruits and vegetables supply chain, seeking to improve the distribution system of these products for markets and benefits for society. An innovative approach to supply chain (SC) management requires a general bi-objective optimization framework that incorporates Life Cycle Assessment (LCA) principles. Linear Programming (LP) is a powerful mathematical technique that can be used as a tool in LCA. The objective of this work is to make an environmental and economic evaluation of the SC of tomatoes for the region of the Umuarama city, Brazil, accounting for different process configurations. The production of tomatoes has an important participation in the region economy. The scope of work encompasses three levels of decision-making within the life cycle: producers, warehouses and markets. The information gathering was performed from interviews with the producers, the supermarkets and the warehouses involved. The LCA study applied in this work was carried out according to ISO 14044/2009. A model of multiobjective LP was developed for the environmental and economic evaluation of SC and the global optimization solved with CPLEX 12.1 algorithm available on GAMS<sup>®</sup>, accounting for different environmental and economic charges simultaneously. As a result, the Pareto frontier was found offering a number of feasible options for system improvements. There are possibilities for improvement in the Tomato Supply Chain Management, since changes in process configuration can be translated into minimization of costs and environmental impacts.

**Keywords:** *Optimization. Life Cycle Assessment. Sustainability Management. Value Chain. Tomato.*