

## Track #1 - Published Abstract

Presented at the 41<sup>st</sup> Annual Council on Forest Engineering Meeting, Williamsburg, Virginia, July 15-18, 2018. *Revolutionary Traditions, Innovative Industries.*

---

### Can we gain from improving input data quality for industrial forestry value chain planning?

Leandri Viljoen <sup>1, 2, 3</sup> \*, Luc Lebel <sup>1, 2, 4</sup>, Pierre Ackerman <sup>1, 2, 3</sup>

#### Abstract

Pre-harvest wood characteristics of mixed natural stands are difficult and expensive to predict. Yet, since each species has different wood qualities and attributes, proper wood allocation is crucial to maximize value creation. Previous work suggested that there is financial gain in using an optimization model for wood allocation as opposed to manual planning methods. Collecting accurate data on forest stand characteristics is costly and the tradeoff between optimal allocation and the cost of information needs to be known to wood supply planners. Measured inventory is usually not completely accurate, but often the forester has already done planning according to the available data. We aim to investigate the financial impact of continuing 'as planned' in terms of mill allocation, even though we know the volumetric input data has a degree of inaccuracy. We also aim to highlight the opportunity cost of improving volume information.

FORAC has developed a wood allocation tool, Logilab, that uses a value optimization model to allocate wood from the forest to a network of processing mills. It considers harvesting factors, transport mode and distance as well as mill performance. The analysis was performed using Logilab for a forest data set consisting of sixty-six blocks for a total volume of 2.8 million  $m^3$ . Mill production data associated to a large industrial network is also considered.

Firstly, an optimization was done on the current inventory estimates, assuming them to be accurate, using Logilab to determine the ideal mill allocation and transport routes to serve as a base plan. Thereafter, a simulation model was built to serve as a random data generator to make several replications with differing total volume per block, within pre-determined levels of imprecision. These generated replications were created to represent real data.

Logilab was used to create a scenario where the simulated real data is forced to follow the same mill allocation as the base plan. Then an optimization was done on the same simulated real data which gives us an indication of the 'ideal plan' if we had the perfect data from the start. The potential profit of both plans could then be compared to evaluate the gains of having ideal data from the start.

1. Consortium de recherche FORAC, Université Laval (Québec) G1V 0A6
2. Département des sciences du bois et de la forêt, Pavillon Abitibi-Price, 2405 rue de la Terrasse
3. Department of Forestry and Wood Science, Stellenbosch University, South Africa
4. Centre interuniversitaire de recherche sur les réseaux d'entreprise, la logistique et le transport (CIRRELT)

\*Corresponding author : leandri.viljoen.1@ulaval.ca