

Operational planning for a forestry supply chain

Enterprise

Kruger Inc. and the Feric division of FPInnovations

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Abstract

Kruger Inc. is a large Canadian enterprise involved in the pulp and paper business, as well as in packaging, forestry products, energy, recycling, and wines and spirits. The mandate of its Forest and Wood Products Business Unit is to market timber, panels and wood chips. In particular, this business unit plans and implements an on-going and stable provisioning of wood for each of its production units. The provisioning consists of a sequence of steps. First the wood supply is harvested and stored by the side of the road. Then it is transported to the plants where it is stored again. The flow of wood is dictated by the demand at the plants.

The problem faced by the company is that of planning its operations. The managers must determine where and when the wood must be harvested so that the plants demand is satisfied and the inventories of wood (by the side of the road and in the plants) is minimized. Two activities (harvesting and transportation) must be scheduled for a given year and a given area. The demand at the plants may also be met through the inventories by the side of the road or at the plants themselves. In each time period, the inventories are adjusted by taking into account the number of production units assigned to harvesting or transportation. The inventory sizes at the road side and at the plants are known.

The dimensions of the planning problem are as follows: 400 harvesting blocks within 20 sectors, 5 product types by the side of the road, 5 plants, and 52 periods. The available products within each block and the demands at the plants, which vary from one period to the next, are known. The productivity of the harvesting units is stable while that of the transportation units depends upon the trip length. When the harvesting of a given sector is not completed within the required time frame, the total cost must include the transport cost for the harvesting unit. There are lower and upper bounds on the sizes of inventories by the side of the road and at the plants; these bounds depend upon the product type and the period. When the inventory sizes are too small or too large, an inventory cost must be included in the total cost.

The goal of this project is to provide the managers with a method of determining (automatically) a yearly harvesting and transportation plan, as well as the number of production units to be hired. The yearly plans must be revised every month because of many unforeseen events. For this reason, the planning problem must be solved within a reasonable amount of time.