Cost Reduction of Wood Transportation with Network Analyst Extension

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International Paper of Brazil

- 3 mills of **pulp and paper**
- 2800 employees
- More than 50 years in activity

Forestry Unit

- Wood supply for **2 mills**
- **96,000 own lands + 30,000 third part land hectares** of **eucalyptus** plantation
- More than **350 farms**
- Average distance: **90 Km**
- Operation in Sao Paulo and Minas Gerais states
Wood Cost

Main issues
- Higher distances
- Legislation on weight and roads
- Higher diesel costs

Current Operation
- Transport operation realized by a third party company
- Payment based on:
  - Amount of wood (ton)
  - Travelled distance (Km)
  - Tolls (R$)
- Administrative cost involved:
  - Maintenance of roads

Base Year: 2016

Raw Material: Wood

Average Wood Cost
- Admin.: 9%
- Harvest: 20%
- Depletion: 33%
- Logistics: 38%

Base Year: 2016
Network Analyst

Before Network Analyst
- Google Earth software used
- Manually route draw
- Lack of roads near/inside farms
- Few resources to manipulate data generated
- Several hours to define route to each farm

Database preparation
- Routable roads database acquisition
- Insertion of roads near/inside farms into database
- Tolls database creation

Automation
- Model Builder workflow programming
- Storage of generated routes in Oracle database
Benefits – Doing more in less time

• Quick Information Generation
  • Routes for all farms generated in few minutes – Closest Facility option used
  • More accurate annual transport cost forecast – Higher precision of distances and tolls amount

• Information Improvement
  • Distance for empty and loaded trucks
  • Distance by type of pavement
  • Route maps availability

• Relationship to Forestry Database
  • Amount of wood to be transported
  • Types of trucks to be used on transport
  • Prediction of number of trips to transport all wood from farms
  • Quick adjustments in planning changes
  • Different scenarios comparison
Benefits – Saving money

• When there is more than one option of routes to a farm, a cost prediction is made for all routes, considering Amount of Wood, Distance and Tolls

• In some cases, we choose some option that does not have the lower cost

• Another important factors to be considered:
  • Security
  • Environment
  • Community

• Some Potential Issues:
  • Bad visibility
  • Bad condition of bridges
  • Risk of rear collision
  • Risk of load fall
  • Lack of road side
  • Higher cost of dirt roads maintenance
  • Community near from the route
  • Narrow Roads
  • Small curves
  • Prohibitive legislation
Benefits – Saving money

Avoid tolls but increase distance

Decrease distance but pay tolls

In this case, the best option was deviate from toll, despite the higher distance.

Total cost reduction: 7%
Benefits – Saving money

• What if there is some issue in the lower cost route?

• The saving would be significant in this route?

• What can we do to make possible the most viable route?
Benefits – Saving money

• Examples: Lack of Road Side

  Solution: Provide a space to trucks wait outside road

  This solution allows biggest trucks cross the opposite lane with safety, avoiding longer distances to some roundabout.
Benefits – Saving money

• Examples: Bad visibility

• Solution: Cut bushes

• This solution allows the driver to see if there is some vehicle coming in the road.
• When there is some commercial cultivation (e.g. sugar cane) blocking the view, is possible to plan the transport operation to be done after the harvest of this culture.
Benefits – Saving money

- Examples: Bad condition of bridges

- Solution: Fix bridge

- In some cases, if the bridge is located on a municipal rural road, it is possible to split the costs with the city hall, reducing even more the cost.
Conclusion – Network Analyst

- Quick information generation ✓
- Large amount of data processing ✓
- Higher level of information details ✓
- Integration to IP database and local intranet ✓
- Cost simulation among different scenarios ✓
- Base information for decision-making ✓
Thanks

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