

IMPACT OF THE TRANSPORT DISTANCE IN THE ECONOMIC VIABILITY OF FOREST PROJECTS: RISK AND SENSITIVITY ANALYSIS

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Forest harvesting and transport activities account for more than 50% of the timber price, demonstrating need for an efficient planning in order to ensure the return of investments. These activities provide significant impacts on the forestry production chain, being essential consistent economic analysis that can contemplate risk simulations and sensitivity analysis.

The objective of this study was to analyze the economic risks of forestry projects considering four situations related different mean transport distances (150; 100 and 50 kilometer), with price paid by the mill of US\$ 33.95/m³, and also price paid by the mill of US\$ 15.43/m³, for a distance of 70 km, however, without cost of harvesting and transportation for the forest owner (standing trees sales).

The data used in the research were provided by company from the charcoal sector, located in the north coast of the state of Bahia, Brazil, which uses Bitrem trucks to forest transport operation with loading capacity of 55 cubic meters of wood. In the forestry company there are several variables that can increase the risks such as increased fuel cost, increased tires cost, increased timber harvesting cost, raising taxes, economic instability and variations average distances between plantation areas and mill.

For risk modeling and sensitivity analysis the software @ Risk and Top Rank were used, respectively. It was contemplated ten thousand interactions to analyze the risk considering the following input variables: timber harvesting cost; wood transportation cost and revenues from the timber selling. Variation of -10% to 10% was considered for risk simulation related input variables. It was adopted uniform triangular distribution for risk modeling. The most significant costs were related to timber harvesting and wood transportation activities. The cost per cubic meter in the transportation activity was of US\$ 69.36 (150 km); US\$ 46.24 (100 km); US\$ 34.68 (70 km) and US\$ 23.12 (50 km). The cost

per cubic meter of timber harvesting activity was of US\$ 22.75. The revenue was characterized by timber commercialization placed in the mill. Based on the costs and revenues was determined the economic indicators Net Present Value (NPV); Internal Rate of Return (IRR) and Equivalent Periodic Value (EPV). It was adopted interest rate of 8.09% per year.

These indicators of economic viability were considered as output variables, being used to assess the risk related to forest enterprise. The indicators showed unfeasible only for the transport distance of 150 km. The software @ Risk determined the following risk probabilities: distance of transport 150 km (100%); distance of transport 100 km (19.8%); distance of transport 50 km (0.00%) and timber harvested and transported activity by the company, with price paid to the forest owner (standing tree) of US\$ 15.43/m³ (0.00%).

The results showed great importance in the monitoring of transport distance for economic sustainability of forest enterprises. According to sensitivity analysis by Top Rank software, the variable that influenced positively the indicators of economic viability was the price paid per cubic meter of timber. The variables that influenced negatively were timber harvesting and wood transportation costs.