

Aligning Profitability with Sustainability Through Supply Chain Optimization



As the largest pulp manufacturer in the world, one of the largest paper producers in Latin America, and the leader in the toilet paper segment in Brazil, Suzano is dedicated to the development of sustainable, innovative, and renewable paper products.

Location: Americas

Use Cases: Supply Chain Optimization, Logistics

Website: www.suzano.com.br

Results

- R\$76 million in opportunities identified based on flexible scenarios
- 60% less time spent on data handling

“Gurobi has an outstanding performance even when compared to other commercial solvers. And when you compare it to the best open-source solvers, it’s usually 10-20 times faster.”

Bruno Scalia

Senior Data Scientist, Suzano

With Gurobi, Suzano has transformed their supply chain logistics to unlock roughly R\$76 million in new opportunities, while also furthering their commitment to sustainability.

As the world’s largest pulp producer, Suzano oversees an intricate supply chain that demands meticulous logistical planning.

Their innovative products, made from renewable eucalyptus trees that the company plants and harvests itself, are sold in over 100 countries.

Because Suzano is deeply committed to environmental sustainability, they evaluate all optimization and technology initiatives based on their alignment with the company’s sustainability goals.

Managing a Complex Supply Chain

Roughly 90% of the pulp Suzano produces in Brazil is exported, which means the company manages a very complex supply chain.

“We’re talking about thousands of tons of pulp being exported each month to ports around the world,” explains Mariana Tagliani, S&OP Digital Transformation Coordinator at Suzano. “We start by looking at what needs to be produced and delivered in the long-term, say a year ahead. We also must plan the shipments in a way that is optimized for cost. Then we go even deeper to the operational level, to decide what needs to be produced every day and sent from the mill to the port for exportation. So, we have three levels with millions of variables here.”

Many real-world optimization problems have multiple, competing objectives. Suzano’s model is no different. The main challenge they face here is deciding how to manage the trade-offs between those objectives. Among the constraints and objectives that Suzano must consider

when planning out their supply chain logistics are:

- Capacity limits of ships, mills, and terminals
- Production and demand constraints
- Different SKU and quality constraints
- Batch sizes and setup of the mills
- Shipping routes with corresponding costs and transit times
- Transportation contracts

In order to create flexible logistics plans that account for these constraints while minimizing costs and environmental impact, Suzano relies on mathematical optimization powered by Gurobi.

Finding Optimal, User-Friendly Solutions

“I believe optimization plays a major role in our planning processes,” says Bruno Scalia, Senior Data Scientist at Suzano. “We start with a very strategic view, and then our solutions unfold to more tactical or operational databases to not only optimize, but to guarantee reliable results and mitigate risks due to inconsistencies in operational data.”

The sales and operations planning team uses the following inputs to formulate a multi-objective, mixed-integer linear programming model, which Suzano refers to as “SnOPy” (Sales & Operations Planning in Python):

- Demand (+ revenues)
- Stock policies

- Production cost
- Logistic cost
- Customer contracts
- Take-or-pay contracts

In some cases, Suzano can integrate objectives at the same level, such as when CO2 emission costs are well-defined through international carbon credit exchanges and directly combined with other financial costs.

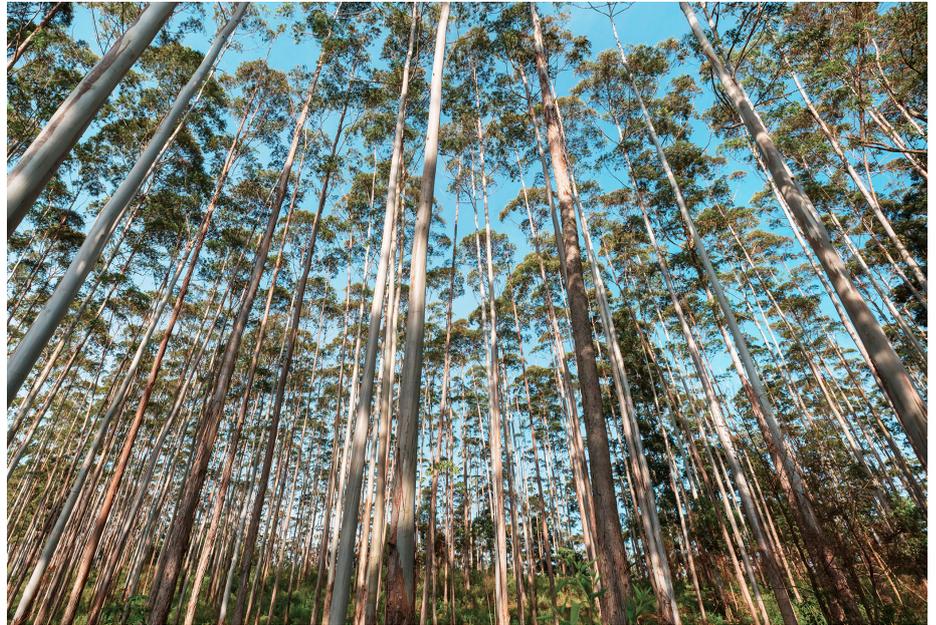
“Our SnOPY model allows us to think more strategically about changes we can make to our practices or agreements,” explains Filipe Alves, Data Science Coordinator and Lead Data Scientist at Suzano. “For example, how can we redefine shipping routes to decrease the number of voyages per year to a given destination port, or change the origin port that will ship products to a specific region of the globe to reduce the freight cost per ton?”

The model is then solved with Gurobi to create an optimized production plan with specific recommendations organized by product family, in a way that is easy for business analysts and other key decisionmakers to understand.

Suzano also has plans to implement a tactical model, which they will call “Compass.” An operational model, which they call “Tangram,” has already been deployed. These models focus on shorter-term, one to three-month plans under distinct granularity planning levels.

Together, the SnOPY, Compass, and Tangram models form an integrated trilogy of optimization products for Suzano’s commercial planning. Although aspects of Compass and Tangram are still in development, the financial and operational gains of the product trilogy are already being realized.

“Our solutions have positively impacted the company by improving our processes and usability,” shares Scalia. “For example, we were able to replace a commercial product with our own tool, SnOPY, making it easier to create input files, run scenarios, and analyze outputs. For our short-term optimizer, we replaced a manual and fragmented process in a way that centralizes information from separate sources, automates processes, and enhances human analysis. This shift



has allowed our team to test multiple scenarios daily with greater efficiency.”

Unlocking New Opportunities and Efficiencies

By running their optimization models on Gurobi, Suzano has identified R\$76 million in new opportunities based on flexible scenarios. Of this amount, R\$10 million have already been captured, and R\$25 million have been deducted from the 2025 budget, as those opportunities are considered feasible. Suzano has also cut time spent on data handling by 60%.

In addition, with optimized shipping routes, Suzano is able to lower their fuel consumption and, consequently, their emissions. Plus, with minimized production campaign transitions, they’re able to reduce chemical usage in industrial operations.

The team has also introduced new strategies for exploring model decomposition and restricted column subsets, which allows them to solve complex scenarios.

This ability to simulate many different scenarios and identify the best solutions has helped Suzano improve their operations and explore economies of scale—something Scalia says is a clear competitive advantage.

“With more efficient operations, we’re able to provide more competitive prices, better products, and better customer service,” he explains. “In operational planning, we’ve reduced the time needed to create

consistent plans from eight hours to something between 20 minutes and one hour. Although the exact financial impact is still being measured, we expect improvements in vessel demurrage, production, and operational costs.”

In addition, the Suzano team has found that Gurobi consistently outperforms other solvers.

“I believe Gurobi has an outstanding performance even when compared to other commercial solvers. And when you compare it to the best open-source solvers, it’s usually 10-20 times faster,” says Scalia. “So if you have larger problems and need to make complex decisions, then Gurobi is the way to go.”

Experience Gurobi for Yourself

Our 30-day evaluation license includes:

- Free benchmarking services
- Free model tuning services
- Free access to our world-class technical guidance and support

Visit gurobi.com/free-trial to get started!

Academics: You may qualify for a free, full-featured Gurobi license. Explore our academic program at gurobi.com/academia.