



SUPPLY CHAIN OPTIMIZATION

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PROBLEMS

Often easy to define, but not so easy to solve
e.g. Where should I stack each container to minimize moves?



SOLUTIONS

Many available, but hard to find the right one, understand, and deploy

Preprint
A New Hybrid Salp Swarm-simulated Annealing Algorithm for the Container Stacking Problem
February 2020
Authors:
Mohamed ElWak
Amr Eltawil
OR Spectrum
DOI 10.1007/s00291-006-0038-3
REGULAR ARTICLE
Rommert Dekker · Patrick Voogd · Eelco van Asperen
Advanced methods for container stacking

International Conference on Computational Logistics
ICCL 2014: Computational Logistics pp 93-111 | Cite as
A Fuzzy Logic Model for the Container Stacking Problem at Container Terminals
Authors
Jana Ries, Rosa G. González-Ramírez, Pablo Miranda
Conference paper

lage research



Optimizing the food supply chain for everyone's benefit

- ▶ SaaS platform to *solve* food supply chain issues (instead of giving insights)
- ▶ Nocode: requires no specialist AI, ML, or math skills to use
- ▶ Curated market of algorithms
- ▶ Joins optimizations into value-chains for holistic benefits
- ▶ Proven capability to save \$millions for critical processes



USE CASES

SWARM can be used to rapidly deliver value in your high-value process of choice. These projects require minimal services efforts – the customer defines the problem, and SWARM solves it using the latest algorithms.

We look for projects where customers spend time reviewing large or complex data patterns to make high value decisions – and reduce time & cost



LOAD PLANNING

- ▶ Goal: minimize freight costs while meeting customer requirements
- ▶ Problem: which sales orders to combine into each truck load
- ▶ Key factors: requested delivery dates, product types and quantity, inventory levels, and customer locations
- ▶ Constraints: pallet count, weight, driver hours, delivery windows
- ▶ Considerations: balance of internal fleet vs 3PL

FOOD PRODUCER #1
\$700K saving on \$2.2M spend

FOOD PRODUCER #2
Several hours work to 5 mins

FOOD DISTRIBUTOR
\$30M saving on \$140M costs



OUTBOUND LOGISTICS

- ▶ Goal: minimize operational costs of freight and site openings
- ▶ Problem: not all sites open, customers 'own' grain at named site
- ▶ Key factors: maintain ownership position & swap differentials while keeping both site and freight costs to a minimum
- ▶ Constraints: fumigation, grain standards/quality
- ▶ Considerations: how will ownership/demand change over season

SWARM Pilot project showed \$\$\$ multi-million savings, that were considered strictly company confidential



INBOUND LOGISTICS

- ▶ Goal: minimize total purchase cost of perishable items via suppliers
- ▶ Problem: varied demand, inventory, by product and location
- ▶ Key factors: transport costs by supplier to each distribution center, yield by product & distance, competing distribution centers
- ▶ Constraints: availability by product, esp. seasonal
- ▶ Considerations: min contractual purchase agreements

Cost savings of 5-8% shown on weekly purchases, resulting in an ROI of 5-8x



CONTROLLED ENVIRONMENT AGRICULTURE

- ▶ Goal: maximize product yield
- ▶ Problem: multiple variables (light, nutrition, soil, water, CO₂, heat)
- ▶ Key factors: balancing multiple variables (& cost) while achieving consistent results, choosing seed varieties, spacing, climate, etc.
- ▶ Constraints: minimum shelf-life, flavor, square ft available in germination/nursery/growing facility, growing days
- ▶ Considerations: env. differences between germination, nursery, etc.

Consistent production reduces culling by up to 50%

Yield increase of 5%+

95% forecast accuracy



S & OP

- ▶ Goal: balance supply and demand purchase with logistics
- ▶ Problem: purchase requires a 'spread' of quality, sale is for a specific quality
- ▶ Key factors: 40+ grades of quality, vary by region, international shipping with varied port-port logistics cost, competitive bid process for purchase
- ▶ Constraints: quality spread in region, availability of supply
- ▶ Considerations: min contractual purchase agreements

\$2 - \$5M (4%) savings on business with "razor thin margins"



How do we get started?

1-2 months elapsed time

- 1 We jointly identify a process to optimize, via a call/meeting.
 - 2 You share some historical data for the process (e.g. three months)
 - 3 Offsite, we run some benchmarks to show you potential savings
 - 4 If you like the results, we integrate live data, and benchmark on a daily or weekly basis versus actual decisions
 - 5 Based on your feedback, we refine the model until you see real-world results like those achieved in the benchmarks
- No Charge

SWARM is priced via a subscription fee, of approx \$250K per year. We look for a minimum of 4x ROI, targeting at least a \$1M cost saving per customer



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