DISPATCH OF EMPTY PACKAGINGS @ RENAULT, A BALANCE BETWEEN INVENTORY AND TRANSPORTATION
My Pack Confidential C

SCOPE

1400 suppliers – 30 POOL packages
50 plants – 10 crossdocks

EUROPE / TURKEY / MOROCCO
CUSTOMER EXPECTATIONS

Suppliers expectations:

- Replenishments flexibility based on suppliers constraints
- 100% supply of usable packaging
- WASHING & REPAIRING SERVICES
- TRANSPORTATION

Renault expectations:

- Reduce losses, control inventory level and traceability
- Reduce substitution packaging
- Cost effective solution
- Make users accountable in using packages
- Ensure a high level of packaging delivery service

CONTROL TOWER

PMS PROJECT

STOCKS

USERS

SERVICES
Production line → Release of empty packagings

Production line → Release of empty packagings

Stock

Large supplier’s stock

Dispatch of empty packagings

departure day + leadtime supplier

Stock

departure day + leadtime crossdock

Smooth crossdock dispatch in the week

Crossdock stock

Stock

departure day + leadtime crossdock + leadtime supplier

Small supplier’s stock

Stock

departure day + leadtime supplier

Stock

departure day + leadtime crossdock

Production line

Production line

Time horizon

Transportation constraints / preferences

Planned routes
Fill rates min on routes
Dispatch min on dynamic dispatch
Freq min/max on dynamic dispatch
Max nb trucks for dynamic dispatch

Decision: dispatch(day+2, plant, supplier, pack, qty)

Decision: dispatch-dynamic (day+2, plant, supplier, pack, qty) or dispatch-route (day+2, route, plant, supplier, pack, qty)

Balance between high stock levels at the suppliers vs high dispatch frequency

Out of scope: definition of « good » planned routes / definition of global qty of packagings

BEFORE: 7 planners / AFTER: one global optimization run + 30 parameters files
Extra features

Balance between UK suppliers and Continental European plants. Idem for Morocco suppliers

PULL dispatch for external suppliers (vs PUSH dispatch for RENAULT suppliers)

Dynamic milk runs within clusters of suppliers (heuristic)

Dispatch of dedicated packagings (2D bin packing optimization)
Optimization model

Lexicographic multi-objective optimization
1. min nb supplier/packs in shortage (service level rate)
2. min qty of packs in shortage
3. min qty packs*km if dynamic dispatch, min qty packs otherwise
under constraints
  • stock max at suppliers
  • minimal fill rates for planned routes
  • maximal truck capacity for every planned route (volume and weight)
  • minimal dispatch volume plant->supplier for dynamic dispatch
  • maximal number of trucks departing from a plant every day

Serialized optimizations with LOCALSOLVER

Scope of successive optimizations
1. PULL suppliers
2. Crossdocks downstream
3. High priority suppliers
4. UK and Morocco suppliers
5. All other suppliers
6. Turkey

Types of dispatchs
1. Dispatch with planned routes
2. Dynamic dispatch
Service level rate

Utilization rate of planned routes vs dynamic dispatch
Feedback

- Optimization tool go live in Dec 2020 … and it is still running 😊

- One optimization run everyday (45 minutes) / results analysis only by a packaging expert

- Unstable context : COVID and electronic components shortages => unplanned closures of plants

- At the start, too many business constraints

- Issues on data reliability, especially suppliers’ stocks and plants’ release

- 2 stakeholders (packaging and transportation) with different viewpoints 😁

- Explainability issues on isolated dispatch decisions

- Only 60% of the tool’s decisions are executed by the transportation department (oups)

- Work still in progress!
Thank you