# DISPATCH OF EMPTY PACKAGINGS @ RENAULT, A BALANCE BETWEEN INVENTORY AND TRANSPORTATION



| DIGITAL TRANSFORMATION- TECHNOLOGICAL DPT REDACTOR APPLIED AI - OR

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1400 SUPPLIERS - 30 POOL PACKAGES 50 PLANTS - 10 CROSSDOCKS EUROPE / TURKEY / MOROCCO



#### PMS PROJECT CUSTOMER EXPECTATIONS









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

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## 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)



Lexicographic multi-objective optimization

- min nb supplier/packs in shortage (service level rate) 1.
- 2. min gty of packs in shortage

3. min gty packs\*km if dynamic dispatch, min gty packs otherwise under constraints

- stock max at suppliers ٠
- minimal fill rates for planned routes ٠
- 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 ٠

## Serialized optimizations with LOCALSOLVER

1.

Scope of successive optimizations

- **PULL** suppliers 1.
- 2. Crossdocks downstream
- 3. High priority suppliers
- 4. UK and Morocco suppliers
- 5. All other suppliers
- 6. Turkey

Х

Dispatch with planned routes 2. Dynamic dispatch

Types of dispatchs





#### Service level rate



Utilization rate of planned routes vs dynamic dispatch



% camions protocolés , % camions OT – date\_depart 🛛 😂

## 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 !

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Thank you