Improving the ordering decision for daily fresh bread in supermarkets

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Current situation

- Supermarket chain with multiple stores
- Bread is 1 day fresh
- Ordering once per day at external bakery
- Fixed case pack sizes
- Some SKUs are dedicated as ‘NOOS’ (never out-of-stock)
- Company-wide norms for %Waste (at category level)

Goal: identify and evaluate improvement options for the current Automated Store Ordering system
Improvement options

1. More advanced ordering logic

2. Allowing ordering per piece
Improvement option 1: More advanced ordering

The objective of the company for fresh bread is: 
*Maximise sales revenue subject to a maximum %waste,*
i.e. total waste should not exceed a given target (e.g. 5% of demand for the total product category)

Three models were tested to solve this problem:
Model 1: assume demand is known and include case pack sizes in model
Model 2: assume demand is uncertain and in 1st step ignore case pack sizes
Model 3: assume demand is uncertain and include case pack sizes in model

Model 2 is a variation of the simple Newsboy model and Model 3 is a binary linear program
Results: 1. More advanced ordering

- Efficient Frontiers for bread department per supermarket allow informed choice of Waste and Revenue (e.g. small supermarkets should have higher waste targets).
- Model 3 performs best; benefits: 1%-5% higher revenue.

Figure 9: Visualization of the efficient frontiers of the three developed theoretical models and the performance of the current ordering logic (model 4) for store 1 and store 51.
Results: 2. Allow ordering per piece

- Allowing ordering per piece increases improvement potential of advanced ordering model (model 3)

**Figure 5:** Effect case pack size on efficient frontiers: demand uncertain and fixed case pack sizes (model 3), demand uncertain and ordering per piece (model 3b), and the current model (model 4)
Conclusion

• An Efficient Frontier for every bread department can be created if Advanced ordering is used. This allows to make an informed choice on targets for %Waste and Revenue per store.
• More advanced ordering gives 1%-5% extra revenue
• 7% extra revenue by applying advanced ordering and ordering per piece
• Trade-off between improvement potential, increased purchasing costs (due to ordering per piece) and added complexity is required