Managing the Order Picking Process for Click-and-Collect in Grocery Stores

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Introduction

Click-and-Collect (C&C) Process

1. Customers place their grocery order online
2. Grocery store workers pick the products
3. Customers collect the order at the store

Challenges of Click-and-Collect

- Popularity of C&C service is increasing
- Retailers are struggling to determine the best way to fulfill C&C orders
  - Minimize cost of filling orders
  - Provide customers with expected level of service

Research Objective

Evaluate how Pick Time and Ready Time are affected by the batching strategy

Pick Time: Time spent by a worker to retrieve the items for an order
Ready Time: Time from when a customer is received until it is ready for pickup

Batching Strategies

Order-Based Batching (OBB): Release a batch for picking when a fixed number of orders have been received

Time-Based Batching (TBB): Release a batch for picking when a fixed time has elapsed

Assumptions

- Order picker is always available when a batch is ready
- C&C service operates for 9 hours/day
- Items are assigned to aisles by product category
- Order pickers follow a traversal path
- Travel begins and ends at staging area

Routing Strategy

Model

Distance Traveled = Travel from/to staging area + Travel through aisles with items to pick + Travel to last aisle with items (and return)

Queue Time = Time an order waits from arrival until picking starts

Pick Time = (distance traveled / speed) + (extraction time / # items)

Ready Time = Queue Time + Pick Time

Travel Calculations

• System Parameters
  - 16 aisles in store
  - Aisles are 100 feet long

• Utilized public Foodmart database
  - Average order size = 4.2 lines

Simulation Results

OBB per Batch

OBB per Order

OBB varying Arrival Rate

TBB per Batch

TBB per Order

TBB varying Arrival Rate

Comparing OBB and TBB

Conclusions

The performance of Click-and-Collect in a grocery store is highly dependent on the batching strategy used. The recommended strategy depends on a store’s goals for their C&C operation:

- For shorter mean Ready Time: OBB → Queue Time = 0 for last order
- For less picking labor cost: TBB → More orders per batch
- For more consistent Pick Time: OBB → Consistent batch size

2018 International Material Handling Research Colloquium
Savannah, Georgia USA, July 23-26, 2018