Managing the Order Picking Process for Click-and-Collect in Grocery Stores
Dale T. Masel, Ph.D. and Akhilesh Mesa
Ohio University
Athens, Ohio USA

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
  o Minimize cost of filling orders
  o 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

System Parameters
• 16 aisles in store
• Average order size = 4.2 lines
• Foodmart database

Utilized public Foodmart database
• http://pentaho.dlpage phi.integration.com/mondrian/mysql-foodmart-database

Simulation Results

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