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Micro-Fulfillment Feasibility for Metro Trade Area Transformation

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Motivation / Background

Metro Trade Transformation

Consumer Behaviour

- 80% sales On-the-go
- Further disruption with Covid-19



Store Patterns

- Curbside pickup, DriveThru stores
- UberEats and Starbucks Delivers



Occupancy and Logistics Savings

- Small stores: Savings in occupancy, labour
- Microfulfillment to enable increased distribution and smaller storage



Key Question / Hypothesis

Can micro-fulfillment enable stores to maintain lower inventory levels and deliver savings in occupancy and labor costs and outweigh the corresponding increase in logistics costs?



Relevant Literature

- Ahire, S. L., Malhotra, M. K., & Jensen, J. B. (2015). Carton-Mix Optimization for Walmart.com Distribution Centers. *Interfaces*, 45(4), 341–357.
- Daganzo, C. F., & Newell, G. F. (1986). Configuration of physical distribution networks. *Networks*, 16(2), 113–132.
- Das, L. (2018). Backroom space allocation in retail stores (Institute Archives - Noncirculating Collection 3 Thesis IDSS 2018 Ph.D. THESIS).
- Sopha, B. M., Asih, A. M. S., Pradana, F. D., Gunawan, H. E., & Karuniawati, Y. (2016). Urban distribution center location: Combination of spatial analysis and multi-objective mixed-integer linear programming.



The Problem



Methodology

MARKET SEGMENTATION

- Market demographics
- Average commercial rent

SIMULATION

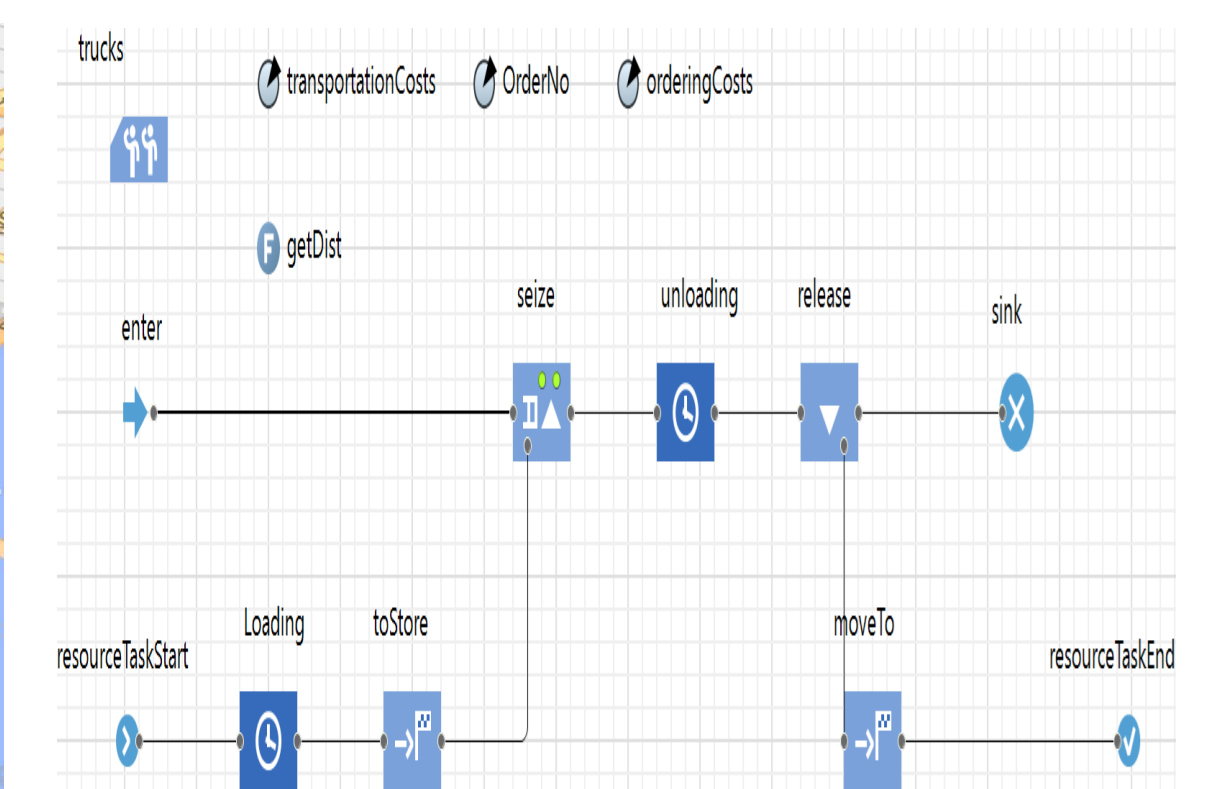
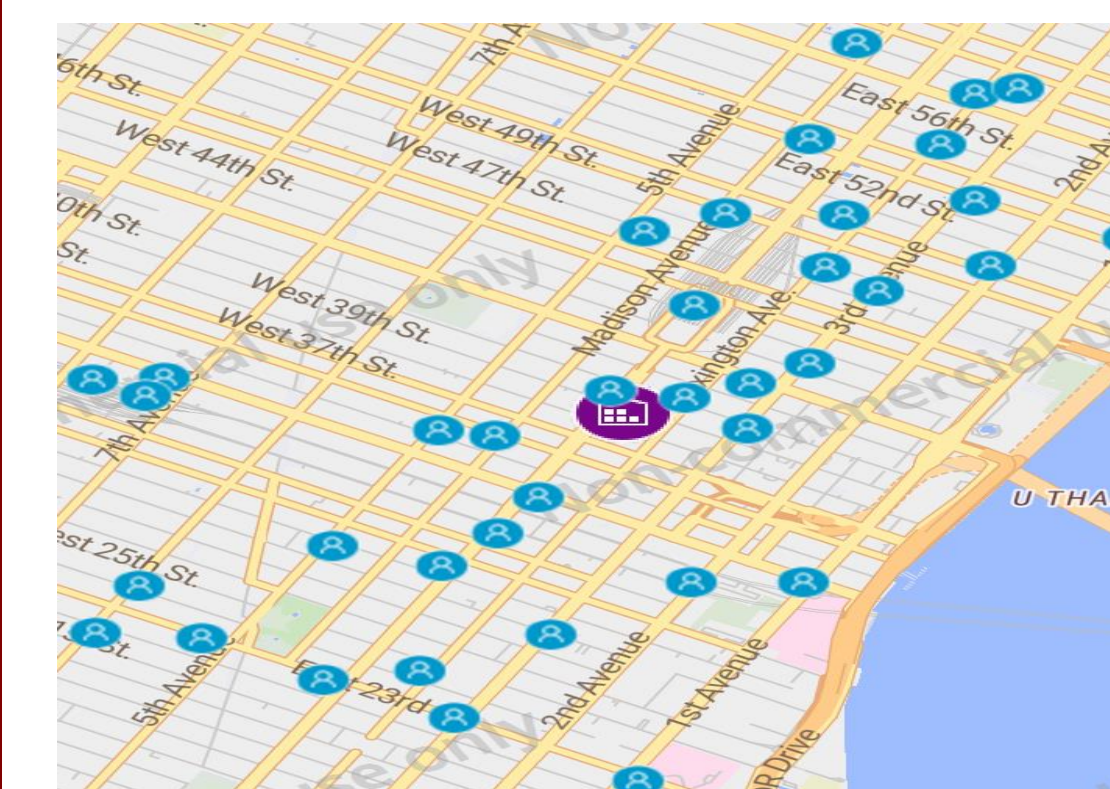
- Current distribution model
- Additional UDCs and transportation

ANALYSIS

- Scenario Analysis
- Feasibility

Initial Results

Area	%Pop	%Store	Stores/sq.mil
Chelsea, Clinton & Midtown Business District	7.9%	31.3%	23
Murray Hill, Gramercy & Stuyvesant Town	8.2%	20.4%	29
Lower Manhattan	20.3%	11.3%	10
Upper East Side	12.1%	10.0%	12
Battery Park City, Greenwich Village & Soho	8.2%	9.1%	7
Upper West Side & West Side	10.7%	8.7%	7
Chinatown & Lower East Side	8.9%	4.8%	6
Central Harlem	6.4%	2.2%	4
Washington Heights, Inwood & Marble Hill	10.8%	1.7%	1
East Harlem	6.4%	0.4%	0



Expected Contribution

- Quantitative sensitivity analysis to view the trade-off between occupancy and logistics costs
- Multiple scenarios with varying costs and benefits to aid decision making in the top management

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