

Freight Deliveries to Retail and Food Establishments in Singapore



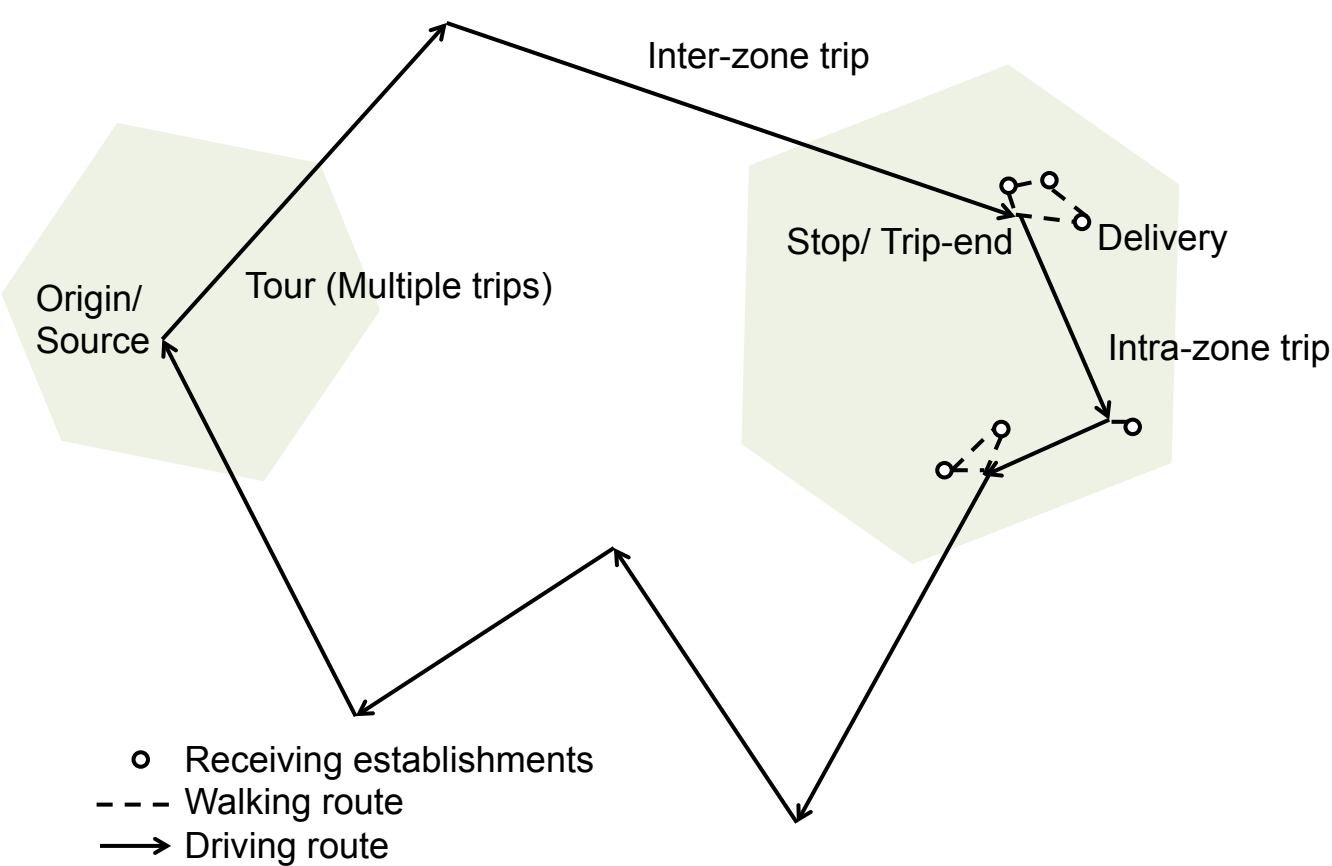
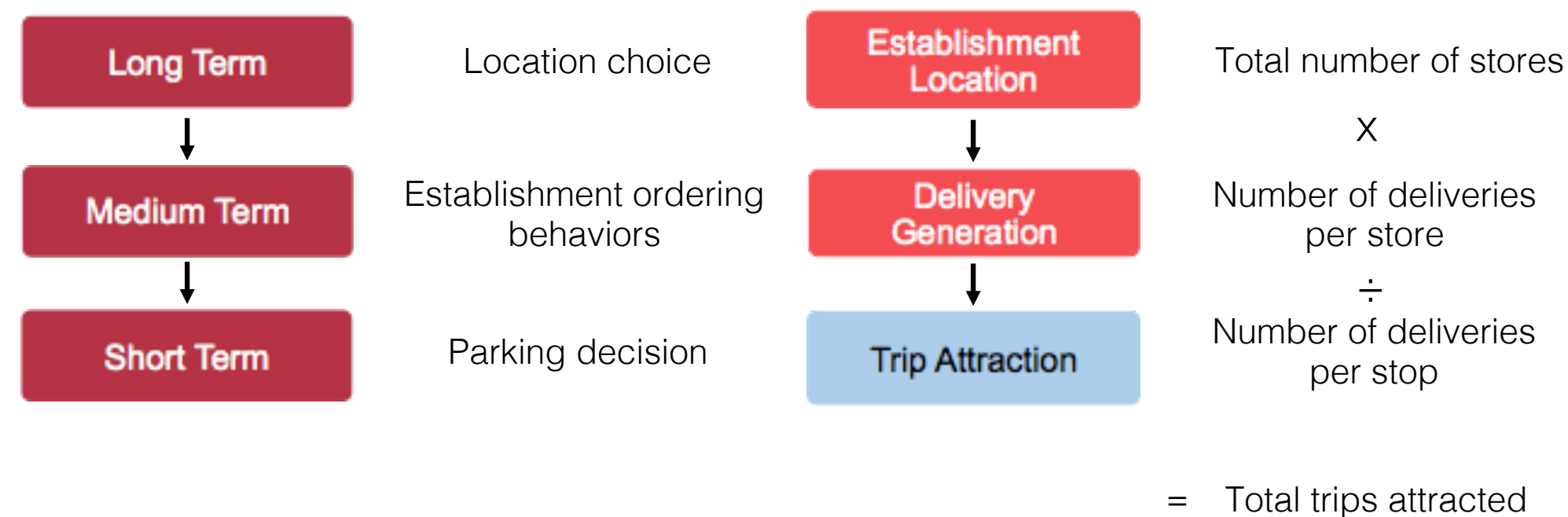
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Motivation / Background

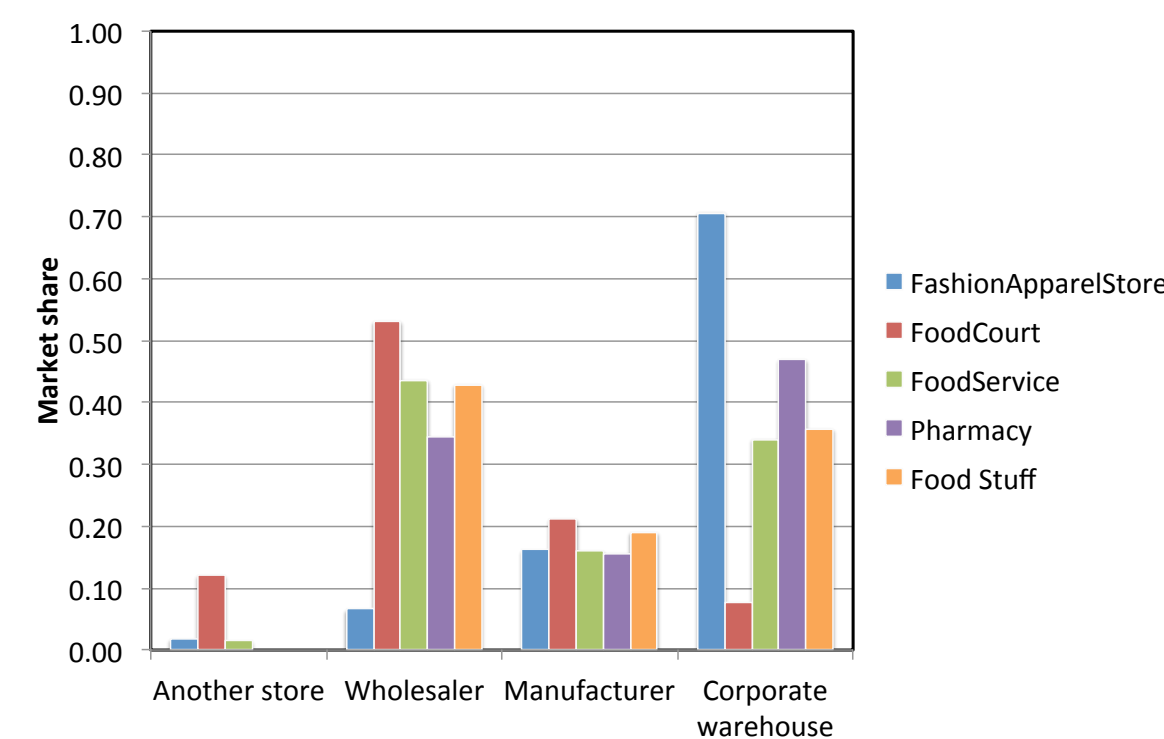
- A city generates about 300 to 400 truck trips per 1000 people per day, and each person consumes about 30 to 50 tons of goods per year. Urban freight takes up 10-15 percent of the total miles traveled on city streets and 3-5 percent of urban land.
- Urban traffic models mostly neglect freight activities due to lack of data. There is also lack of knowledge on how freight deliveries take place.
- Current trip generation models are static and aggregated → Not useful for policy evaluation.



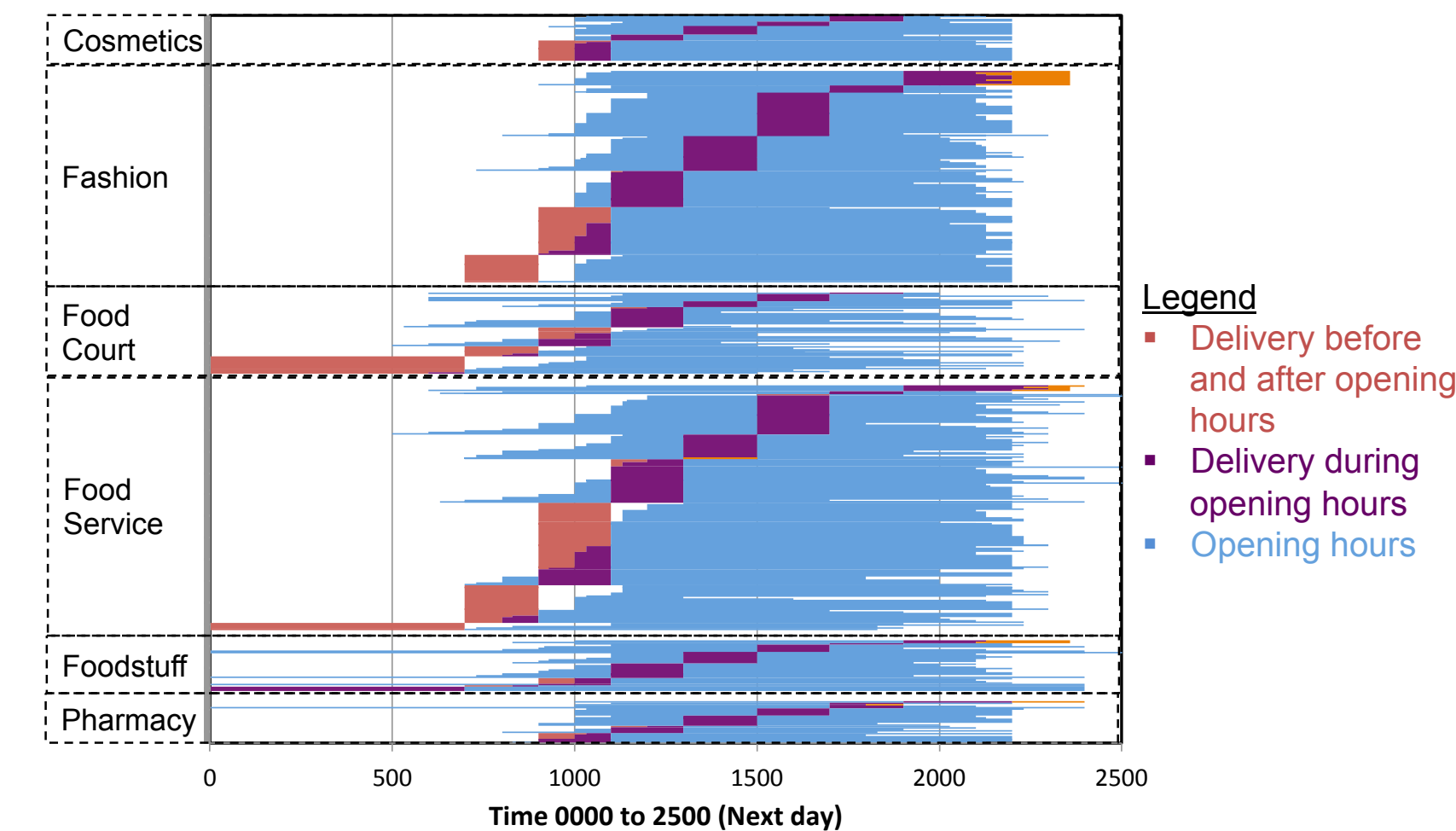
- Models based on store manager replenishment behavior can predict delivery frequencies and size, and supplier type. These variables can influence fleet size, vehicle size and origin.
- Better freight behavioral models can improve traffic simulations under different regulation scenarios.

Observations

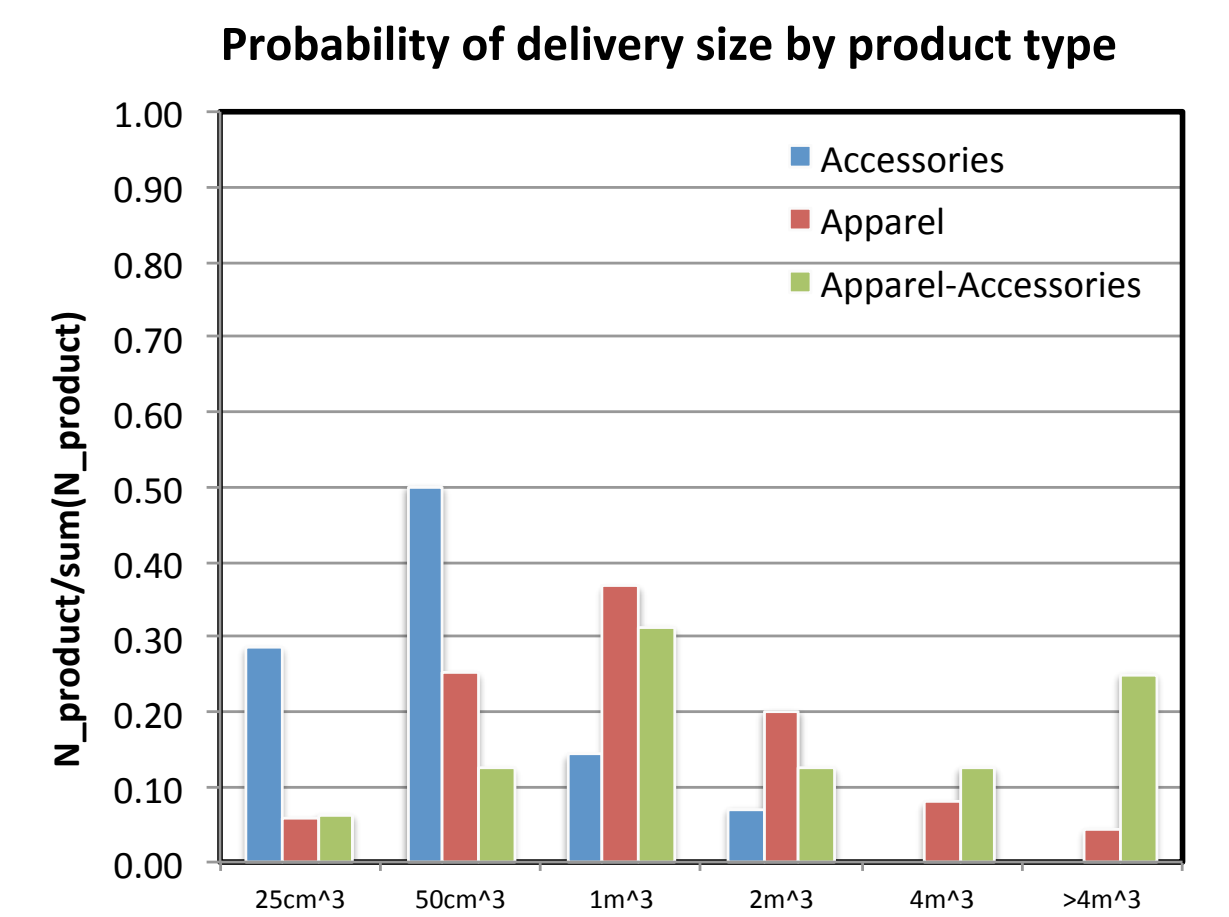
Food services and fashion establishments have high chance of being supplied by corporate warehouse. The chances are 34% and 71% respectively, compared to 8% for food courts.



Most deliveries took place from 11am to 3pm. However food deliveries can take place before 7am, and dip between 11am to 1pm.



Accessories are delivered in smaller packages while apparels are in larger packages. This can affect vehicle size.



Perishability of food is a strong determining factor to delivery frequency.

	Delivery frequencies
Prepared	5.01±2.76
Fresh food	4.40±2.23
Mix food	4.14±2.25
Frozen	3.39±2.42
Cosmetics	2.29±2.05
Dry food	2.28±2.09
Apparel-Accessories	2.26±2.61
Pharma	2.24±2.40
Apparel	2.11±1.77
Accessories	1.75±1.14

Hypothesis generated

- Centralize distribution increase delivery size.
- Centralize distribution do not affect delivery frequency or size.
- Perishability the most powerful predictor of delivery frequency.
- Except for congestion pricing there are little regulations pertaining to freight in Singapore, and we observe that deliveries mostly took place during off peak periods.
 - Delivery takes place when the operation cost is lowest.

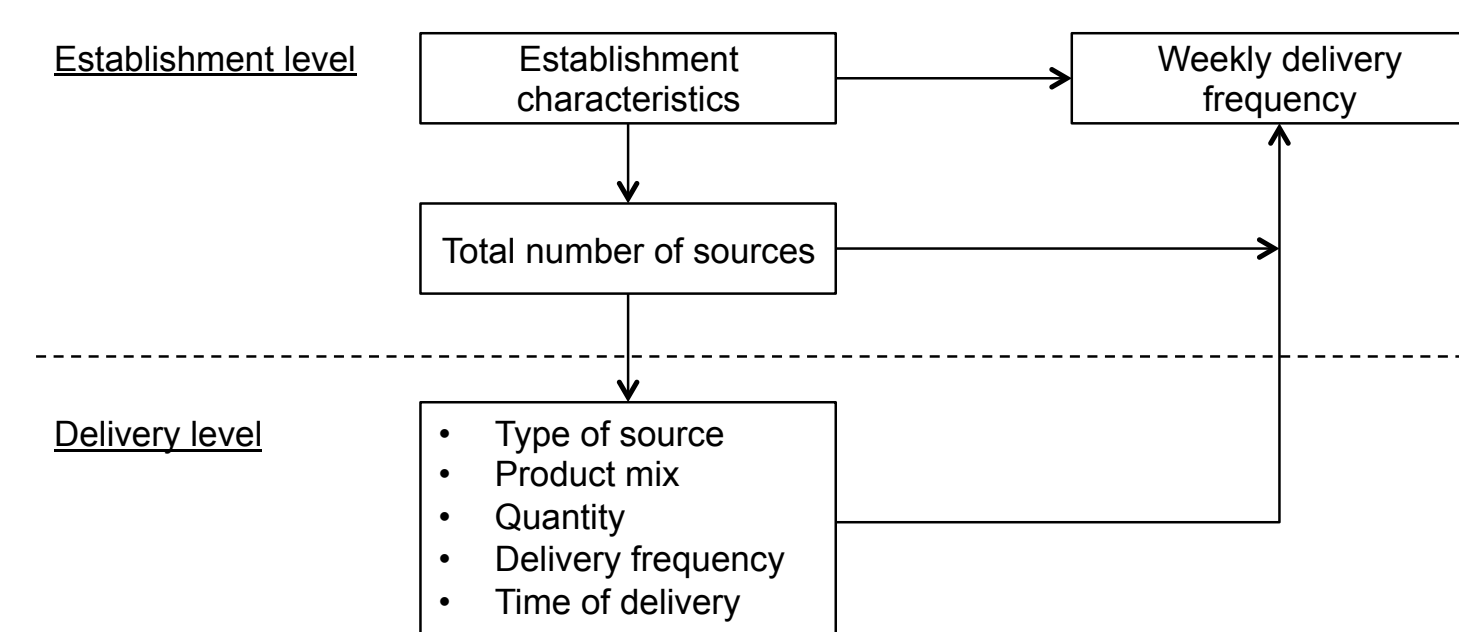
Limitations and Conclusion

There is a lot of variation in delivery frequencies that is not fully explained by industry types and product types.

Econometrics models will be used to test hypothetical relationships between the variables.

Data collection

Interview surveys asked questions on two levels



Multistage sampling

- First stage: Representative zones in the city.
- Zones with The Most retail and food service outlets (SPH, 2013) in each cluster was selected.
- Second stage: Proportional sampling of establishments by industry types
671 surveys collected.

