KEY IDEAS ON URBAN LAST MILE
Key Ideas on Last Mile Logistics

Presented at:

Urban Logistics & Land Transportation Management Workshop
- Innovations in Urban Last Mile

Leader’s Workshop
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Surabaya, Indonesia
The Last Mile

The "Last Mile" (or "Last Kilometer" or "first mile" in the case of collections/returns) is a little addressed but common logistics collection/distribution problem in built-up (urban) environments. Nearer to the aggregated or single demand (or origin) point a higher capacity and up to then a relatively efficient supply chain traversing through several chain links may face significant fulfillment (last/first mile) constraints, higher social, environmental and economic costs and increased complexity in maintaining its prior designed-in economies of scale in meeting expected service levels.
Key Challenges

1. Exploring effective sustainable time managed solutions to freight traffic congestion

2. Addressing the implicit and explicit complexity of last mile logistics and the associated system level dynamics

3. Coordinating multiple parties (agents) for overall system efficiency and cost effectiveness

4. Harmonizing data and dynamic analytics for real-time decision support

5. Rationalizing urban freight movements in the context of urban developments

6. Integrative synchronization through a public/private e-marketplace
Introduction

The last mile: the transit of urban freight from the final delivery centre to the customer’s door. It is costly. It may amount to between 13% to 75% of the total logistics costs.

It is essential for the economic development but also harmful to the environment and human health.

Key Concerns in Last Mile Logistics:

* How to handle increasing demands?

* How to reduce costs? How to utilize truckloads?

Source: Google, Temasek Holding, 2016

Source: Land Transport Authority, Singapore
Impact of E-Commerce on Last Mile Logistics

E-Commerce rapid growth is becoming the key driver of the changes in logistics, especially in the last mile logistics.

E-Commerce Logistics Characteristics

- Highly fragmented demand and supply
- Highly variable demand
- Shorter fulfilment lead times
- Shorter delivery windows
- Smaller quantities
- More diverse products
- Mobile destinations
- Less repeat purchases

E-Commerce Logistics Processes

Adapted from Rodrigue J.P. et al., The Geography of Transport Systems, 2017. Available at: https://people.hofstra.edu/geotrans/eng/ch5en/conc5en/ecommercelog.html

Warehouse / Hub / Fleet

Technology

Employees / Public / Regulators
E-Commerce Logistics Challenges

1. Heterogeneous and time-consuming custom processes

Source: Duty Calculator; A.T. Kearney Analysis

2. Poor-transport infrastructure

Source: Jones Lang LaSalle; A.T. Kearney Analysis

3. Warehouse readiness for e-commerce

Source: Singapore Department of Statistics, 2016

4. Inefficient Last Mile Deliveries

Unconsolidated deliveries | High delivery failure rate | Low utilization
---|---|---
Delivery failure rate is more than: 15% *

* Based on our interviews with several Logistics Service Providers (LSP) in Singapore

Low truck utilization
Low elevator utilization
E-Commerce Logistics versus Conventional Logistics

<table>
<thead>
<tr>
<th>Package size</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Consolidated Packages</td>
<td>Small Packages</td>
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</table>

<table>
<thead>
<tr>
<th>Packing Requirement</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
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<tbody>
<tr>
<td>Bundle packing</td>
<td>Storing, packing, re-labelling, consolidation</td>
<td></td>
</tr>
<tr>
<td>Individual packing</td>
<td>In addition to storing, loading and loading space, it needs sufficient space for packaging and handling the increasing volume of express deliveries</td>
<td></td>
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<table>
<thead>
<tr>
<th>Main logistics facility functions</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary storage facility for distributions</td>
<td>Storing, packing, re-labelling, consolidation</td>
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<table>
<thead>
<tr>
<th>Logistics facility requirement</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
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<tbody>
<tr>
<td>Need sufficient space for storing, loading and unloading activities</td>
<td>In addition to storing, loading and loading space, it needs sufficient space for packaging and handling the increasing volume of express deliveries</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Delivery Process</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
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</thead>
<tbody>
<tr>
<td>End node for the delivery is retailers/distributors in specific and concentrated locations; the customers purchase and pick-up directly from the retailers</td>
<td>End node for the delivery is the customers in a more widespread locations</td>
<td></td>
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<table>
<thead>
<tr>
<th>Delivery cycle</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
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<tbody>
<tr>
<td>Weekly</td>
<td>Daily, hourly</td>
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<table>
<thead>
<tr>
<th>Delivery reliability</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
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<tbody>
<tr>
<td>Effecting the goods' availability</td>
<td>Effecting customers' satisfaction</td>
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<table>
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<tr>
<th>Delivery Failure</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
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<tbody>
<tr>
<td>Minimum failed delivery</td>
<td>High delivery failure rate</td>
<td></td>
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<table>
<thead>
<tr>
<th>Delivery time</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
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</thead>
<tbody>
<tr>
<td>Static schedule that rarely changed, more flexible time windows; May involved long-term schedule planning</td>
<td>Dynamic schedule, tight time windows; No long-term planning involved</td>
<td></td>
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<table>
<thead>
<tr>
<th>Truck Size</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
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<tbody>
<tr>
<td>Large Size Truck with full truck loads</td>
<td>Smaller vehicles</td>
<td></td>
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<table>
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<tr>
<th>Delivery Tracking System</th>
<th>Conventional Logistics</th>
<th>E-Commerce Logistics</th>
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<tbody>
<tr>
<td>Delivery tracking may not be required.</td>
<td>Online delivery tracking that can be accessed by end-customer is required.</td>
<td></td>
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STRATEGIES IN LAST MILE LOGISTICS
Strategy I: Understanding The Last Mile

Predicting counter-intuitive effects of congestion reduction and urban sustainability policies for last mile efficiency

- Sustainable urban transportation is a multi-faceted issue, a full understanding of which requires complex analysis based on quantitative and qualitative measures of different related factors.

- System Dynamic can be used to analyse the factors, its counter-intuition relationship and its impact.

- Using causal loop diagram (CLD), System Dynamic shows the relevant high-level elements of the urban transport system and how their interactions form reinforcing (+) and balancing (-) effects and loops thereof.
Demand clustering consists in the generation of a number of independent clusters based on optimization, such as minimizing cost to serve, maximizing service level, or a combination of both. It is particularly useful in cases of delivering low value items and low-priority customer segments. An optimum grouping of customers in combination with appropriate allocation of transportation assets can enhance **cost effectiveness** of deliveries in the last mile.

**Benefit**

- Reduced Transportation Costs, due to:
  - Optimized routing between distribution centers (DCs) and clusters, and within clusters;
- Increased Service Level;
Strategy III: Self Collection Mechanisms

Achieving greater efficiency in the last mile via Self-Collection mechanisms

Key learnings:

- Setting up self-collection stations at strategic locations in combination with dynamic shipment plan has high potential to reduce significantly both fixed costs [manpower (logistics) and fleet] and variable costs [fuel].
- E-commerce sales in Indonesia are projected to grow from 2016 to 2021 at an average rate of 20%. Self-collection strategy might be considered as a valuable asset for online channel.
- Predictive analytics can enable high service level and “instant pickups”.

To use self-collection mechanism in combination with dynamic shipment plans resulting in:

✓ Fewer number of delivery points;
✓ Optimized truckload due to consolidation of orders, and reduced number of trips;
✓ No waiting time to collect cash at stores;
✓ Minimization of uncertainties (i.e. store opening hours etc.).
Strategy IV: 4\textsuperscript{TH} Party Milk Run
Unlocking revenues while increasing vehicle utilization

The 4th Party Milk Run concept leverages the available capacities from a LSP that has existing routes and networks along the pick-up and delivery locations of the deliveries.

Benefits

**Logistics Service Providers**
- Greater transportation capacity utilization (vehicle fill rate)
- Assets (storage/ transportation) optimization with reduction on fixed cost
- Manpower optimization

**Consumers:**
Greater visibility over deliveries

**Manufacturers**
Cheaper deliveries

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[Map of delivery routes]
Strategy V: Optimizing Routes
Achieving greater efficiency in the last mile via routes Optimization

- Based on considerations upon time, costs, and risk of disruptions (e.g. congestion) best routes can be computed and visualized in a GIS environment;

- The best routes (in term of time, cost and disruption) from different LSPs that may fulfil the areas of interest can be overlapped and opportunities for synergies be identified.

- Optimization of transportation assets (fleet) in terms of both size and number of vehicles
Strategy VI: Redesigning Supply Chain Network

Last mile infrastructure planning to prepare for potential economic integration (ASEAN Economic Communities)

Competitiveness of ASEAN Member State

The impact of carrier’s rated cost modification on total costs.

Integrated Platform for Last Mile and E-Commerce Logistics

Retail Precinct Management

1. Order
2. Order tracking
3. Visualization and analytics for freight flow
4. Real-time delivery with multi-objective optimization
5. Multi-party loading dock coordination
6. In-mall delivery consolidation
7. In-mall carriers

Logistics asset providers

1. Order fulfillment with collection schedule, delivery schedule and delivery volume
2. Resource availability & bidding for loading docks
3. Collection and delivery schedule and route & auction winner
4. Loading dock availability and pricing
5. Auction winner

Shopping Malls

Retail Shops

E-commerce customers

1. E-commerce delivery consolidation
2. Dynamic delivery scheduling and real-time tracking
3. Multi-party delivery coordination
4. Multiple Collection and Delivery Points Planning
5. Delivery location point and confirmation
6. Time windows

Suppliers

1. Order consolidation and suppliers
2. Order fulfillment
3. Collection schedule

Logistics asset providers

1. Resource availability and pricing
2. Collection and delivery assignment and schedule
3. Delivery Recipients
Integrated Platform for Last Mile and E-Commerce Logistics

Presented strategies are not mutually exclusive but rather interconnected. Deriving a comprehensive strategy which leverages on the benefits of each sub-strategy is the key to achieve greater performances in last mile logistics.

Also, to overtake the rampant challenges of e-commerce logistics, firms need to revitalize, re-structure and modernize their strategies, distribution network, and processes.
Integrated Platform for Last Mile and E-Commerce Logistics

A GIS visualization of logistics data (routes, locations, travel times, cost, real-time disruptions, etc.) at the micro (city), meso (regional) and macro (global) levels can be developed to support dynamic scheduling and tracking.

Micro View
In last mile delivery perspective, dynamic scheduling and routing helps to optimize the fleet travel time while fulfilling customer’s demands and requirement.

Consideration:
- Pick-up location and time window
- Delivery location and time window
- Real time traffic congestion
- Road accidents

Meso View
Extendable to analyse long haul transportation from one area to another area (via highway, domestic corridors, etc.) and explore a recirculation strategy.

Consideration:
- Long haul transportation
- Highway, domestic corridors

Macro View
Extendable to analyse cross-border transportation via existing trade lanes

Consideration:
- Cross-border via existing trade lanes
- Custom processes
Integrated Platform for Last Mile and E-Commerce Logistics

Distribution network analysis helps to identify gaps in the existing distribution network and propose a robust solution for changing demands.
Key Messages

• Poor infrastructure availability and intermodal transportation remain a key challenge in Indonesia. Decision makers should focus their efforts on strategic planning of logistics operations, as to enable cost savings of great significance.

• Reducing the number of drop-off points through self-collection mechanisms and store clustering can be helpful to tackle inefficiencies in the last mile delivery. A similar approach can be applied in the context of e-commerce.

• An orchestration of existing transportation assets can unlock revenues and bring a number of tangible and intangible benefits to all stakeholders of the supply chain.

• Delivery routes can be selected by considering concurrently time, costs, and risk of disruptions, bringing significant benefits to logistics providers;

• E-Commerce logistics brings in a new set of challenges compared to its offline market counterpart. New approaches, tools, and procedures will be needed to meet the ramping customers expectations. Combination of strategies might be the way to create an actual breakthrough.
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