Process Flow Analysis of the Final 50’ of the Goods Delivery System

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5-Step Approach

1. Select 5 prototype buildings and obtain permissions
2. Recruit and train data collection team
3. Collect data using a customized application
4. Create a process flow map
5. Quantify delay & find opportunities for improvement
Step 1 – Select 5 Prototype Buildings

<table>
<thead>
<tr>
<th>Building Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Tower</td>
</tr>
<tr>
<td>Retail Building</td>
</tr>
<tr>
<td>Hotel</td>
</tr>
<tr>
<td>Office Building</td>
</tr>
<tr>
<td>Historical Building</td>
</tr>
</tbody>
</table>
Step 2 - Recruit and Train Data Collection Team

Building Type: Office Tower
Office Tower

• January 30 – February 17, 2017
• 9:00 am – 4:00 pm

• Building managers:
  • Posted an announcement at every entrance notifying carriers that they would be monitored
  • Informed their staff
  • Provided security badges for the data collectors
Building Configuration for other four buildings

Retail Building

Hotel

Historical Building

Residential Tower
Step 3 – Collect Data Using a Customized Application

<table>
<thead>
<tr>
<th>App Button</th>
<th>Time Stamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security Check-In Start</td>
<td>01-30-2017 9:26:06 AM</td>
</tr>
<tr>
<td>Security Check-In End</td>
<td>01-30-2017 9:29:10 AM</td>
</tr>
</tbody>
</table>

- SCTL developed an app that records a time stamp for each goods delivery process step
- Students entered the data into the app as they walked behind delivery people
- The app transmitted info to a database in real time
The Data Collection App Also Records:

- Name of the:
  - Building
  - Data collector
  - Delivery company
- Types of delivery truck and goods being delivered
- Number of delivery people engaged in the delivery
- Additional notes
Step 4 – Create a Process Flow Map
<table>
<thead>
<tr>
<th>Percent of Total Time</th>
<th>Enter</th>
<th>Deliver</th>
<th>Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>35%</td>
<td>Mean: 7 min sd: 3 min Range: 2 - 15 min</td>
<td>Mean: 8 min sd: 8 min Range: 2 - 34 min</td>
<td>Mean: 5 min sd: 3 min Range: 2 - 15 min</td>
</tr>
<tr>
<td></td>
<td>1. Park in freight bay</td>
<td>5. Take elevator to receivers’ floor</td>
<td>9. Take elevator back to freight bay</td>
</tr>
<tr>
<td></td>
<td>2. Get clearance from security guard</td>
<td>6. Deliver/pick up goods on receivers’ floor</td>
<td>10. Return security device to guard</td>
</tr>
<tr>
<td></td>
<td>3. Unload goods on to cart</td>
<td>7. Repeat process steps 5-6 for multiple deliveries</td>
<td>11. Load hand cart onto truck</td>
</tr>
<tr>
<td></td>
<td>4. Wait for freight elevator</td>
<td>8. Wait for elevator to return to truck</td>
<td>12. Maneuver truck out of freight bay</td>
</tr>
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</table>
Can a Locker System Cut 61% of Total Delivery Time?

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1. Park in freight bay
2. **Get clearance from security guard**
3. Unload goods on to cart
4. **Wait for freight elevator**
5. **Take elevator to receivers’ floor**
6. Deliver/pick up goods on receivers’ floor
7. Repeat process steps 5-6 for multiple deliveries
8. Wait for elevator to return to truck
9. **Take elevator back to freight bay**
10. **Return security device to guard**
11. Load hand cart onto truck
12. Maneuver truck out of freight bay
Buildings' Delivery Policies Drive Dwell Time

Retail Building
(n = 38)

Mean: 28 min
sd: 24 min
Range: 3 - 107 min

Residential Building
(n = 41)

Mean: 8 min
sd: 6 min
Range: 1 - 23 min
Types of Delivery Goods by Building Type

<table>
<thead>
<tr>
<th>Retail Building (n = 38)</th>
<th>Residential Building (n = 41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food (41%)</td>
<td>Food (37%)</td>
</tr>
<tr>
<td>Furniture (6%)</td>
<td>Furniture (5%)</td>
</tr>
<tr>
<td>Mail (9%)</td>
<td>Groceries (5%)</td>
</tr>
<tr>
<td>Office Supplies (6%)</td>
<td>Parcel (54%)</td>
</tr>
<tr>
<td>Parcel (19%)</td>
<td></td>
</tr>
<tr>
<td>Event Supplies (3%)</td>
<td></td>
</tr>
<tr>
<td>Retail Supplies (16%)</td>
<td></td>
</tr>
</tbody>
</table>
Lessons Learned:

- Delivery time can be improved by:
  - Better communication methods between carriers and receivers
  - The location of receiving goods
  - Building policies

- Process Flow Map visualizes the components and gaps in delivery
  - Provide time measures for each process steps
  - Find areas for improvements in terms of total delivery time
  - Performance of new system can be measured by time data before and after

- Process Flow Map shows % of first failed delivery
  - Discover characteristics of failed delivery
  - Propose solutions to improve the current system with data
Thank you!

Any Questions?

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