COSTS OF MULTIPLICITY IN PUBLIC HEALTH SUPPLY CHAINS IN BURUNDI

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Jeet Shah & Trevor Thomas

Thesis Advisor: Jarrod Goentzel
Burundi
Agenda

- Structure of Supply Chain
- Inventory Costs
  - Current Province-Based
  - Proposed District-Based
- Transportation Costs
  - Pick-up
  - Delivery
- Conclusions
- Recommendations
Map of Burundi
Structure of the Current Province-Based System

Level 1 (Central)
Level 2 (Provincial)
Level 3 (Service)

Primary Distribution Channel

CAMEBU
17 BPS
487 CDS
Issues in the Current System

- Pickup mode of distribution
- Vertical programs with independent channels
- Long reimbursement delays
- No data collection plan
Structure of the Proposed District-Based System

- **Level 1** (Central)
- **Level 2** (District)
- **Level 3** (Service)

Primary Distribution Channel:
- CAMEBU
- BDS
- CDS (mission-based)
- CDS (public)

Counts:
- CAMEBU: 44
- BDS: 487
- CDS: 487
Existing District-Based System
Inventory Considerations of Province-Based System

- Erratic Replenishments
  - Frequent emergency orders
- Low Demand Visibility
  - No separation information/material flows
- Low Service Levels to BPS
  - Frequent Stock-outs
- Risk Pooling Benefits
  - Most inventory held at CAMEBU
Difference Between Supply Chain Structures

CAMEBU

BPS Management

BDS

CDS
Proposed District-Based System
Inventory Considerations of District-Based System

- System Inventory increased by 60%
  - “Square Root Law”
- Good Demand Visibility
  - Separation material/information flows
- Less Risk Pooling Benefits
- Ability to Stagger Shipments
- Longer Lead-Time/Better Service to BDSs
Transportation Costs in Pickup mode

**Trips by Province**

- Buja mairie: 4 trips, Distance: 4 km, Cost per trip: 4,083, Annual Costs: 16,331
- Buja rural: 40 trips, Distance: 40 km, Cost per trip: 40,828, Annual Costs: 163,312
- Bururi: 212 trips, Distance: 212 km, Cost per trip: 216,388, Annual Costs: 865,554
- Gitega: 200 trips, Distance: 200 km, Cost per trip: 204,140, Annual Costs: 816,560
- Karuzi: 316 trips, Distance: 316 km, Cost per trip: 322,541, Annual Costs: 1,290,165
- Ruyigi: 340 trips, Distance: 340 km, Cost per trip: 347,038, Annual Costs: 1,388,152
- Bubanza: 86 trips, Distance: 86 km, Cost per trip: 87,780, Annual Costs: 351,121
- Cankuzo: 432 trips, Distance: 432 km, Cost per trip: 440,942, Annual Costs: 1,763,770
- Cibitoke: 122 trips, Distance: 122 km, Cost per trip: 124,525, Annual Costs: 498,102
- Kayanza: 188 trips, Distance: 188 km, Cost per trip: 191,892, Annual Costs: 767,566
- Kirundo: 394 trips, Distance: 394 km, Cost per trip: 402,156, Annual Costs: 1,608,623
- Makamba: 334 trips, Distance: 334 km, Cost per trip: 340,914, Annual Costs: 1,363,655
- Muramvya: 96 trips, Distance: 96 km, Cost per trip: 97,987, Annual Costs: 391,949
- Muyinga: 398 trips, Distance: 398 km, Cost per trip: 406,239, Annual Costs: 1,624,954
- Mwaro: 132 trips, Distance: 132 km, Cost per trip: 134,732, Annual Costs: 538,930
- Ngozi: 252 trips, Distance: 252 km, Cost per trip: 257,216, Annual Costs: 1,028,866
- Rutana: 276 trips, Distance: 276 km, Cost per trip: 281,713, Annual Costs: 1,126,853

Total: 3,822 trips, Total Cost: 3,901,115, Total Annual Costs: 15,604,462
Transportation Costs in Delivery mode

<table>
<thead>
<tr>
<th>From Cost Model</th>
<th>Distance (in km)</th>
<th>Duration (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range Low</td>
<td>Range Nom</td>
<td>Range High</td>
</tr>
<tr>
<td>2</td>
<td>86</td>
<td>171</td>
</tr>
<tr>
<td>172</td>
<td>257</td>
<td>341</td>
</tr>
<tr>
<td>342</td>
<td>427</td>
<td>512</td>
</tr>
<tr>
<td>513</td>
<td>598</td>
<td>682</td>
</tr>
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</table>

Cluster Distance Days Transport Cost Per diem Cost Total Annual Cost
---|---|---|---|---|---|---|
1 | 271 | 2 | 806,225 | 70,000 | 876,225 | 3,504,900 |
2 | 460 | 3 | 1,368,500 | 105,000 | 1,473,500 | 5,894,000 |
3 | 435 | 3 | 1,294,125 | 105,000 | 1,399,125 | 5,596,500 |
4 | 332 | 2 | 987,700 | 70,000 | 1,057,700 | 4,230,800 |
5 | 142 | 1 | 422,450 | 35,000 | 457,450 | 1,829,800 |
6 | 370 | 3 | 1,100,750 | 105,000 | 1,205,750 | 4,823,000 |

Total 2,010 14 5,979,750 490,000 6,469,750 25,879,000
Transportation Conclusions

- From transportation perspective, current system in delivery mode may be most cost-effective

<table>
<thead>
<tr>
<th>System</th>
<th>Current</th>
<th>Reformed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mode</strong></td>
<td>Pickup</td>
<td>Delivery</td>
</tr>
<tr>
<td><strong>Scenario</strong></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Distance (km)</td>
<td>15,288</td>
<td>8,040</td>
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<tr>
<td>Total Duration (days)</td>
<td>124</td>
<td>56</td>
</tr>
<tr>
<td>Transport Costs (F Bu)</td>
<td>15,604,462</td>
<td>8,206,428</td>
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<tr>
<td>Perdiem Cost (F Bu)</td>
<td>4,060,000</td>
<td>1,960,000</td>
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<tr>
<td>Total Annual Costs (F Bu)</td>
<td>19,664,462</td>
<td>10,166,428</td>
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<tr>
<td>% Change</td>
<td>0%</td>
<td>-48%</td>
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</table>
From inventory perspective, current system with delivery may be optimal.

<table>
<thead>
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<th>Current</th>
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<th>Reformed</th>
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<tbody>
<tr>
<td></td>
<td>Pickup</td>
<td>Delivery</td>
<td>Pickup</td>
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<tr>
<td><strong>Mode</strong></td>
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<td></td>
</tr>
<tr>
<td>Scenario</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Ability to Risk Pool</td>
<td>3</td>
<td>4</td>
<td>2</td>
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<tr>
<td>Demand Visibility</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Service Level</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Ease of Management</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>8</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td><strong>% Change</strong></td>
<td>2.00</td>
<td>3.50</td>
<td>2.00</td>
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</tbody>
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Rankings are from 1-4 where 4 is the highest.
Recommendations

- Transition to delivery mode of distribution
- Share assets between CAMEBU and vertical programs
- Improve cash flow
- Justify transition to district-based system
- Develop data collection plan
Acknowledgements

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