A Guidance in Logistics and Safety Investments through Logistics Activity Center (LAC) Development Criteria Analysis

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Introduction
Efficient freight movement affects a geographic area’s economy, public safety and overall quality of life. Previous studies found that freight and logistics investments in Logistics Activity Centers (LAC) fuel economic development and keep this logistics activity in a specified region increases public awareness and safety. To help guide the appropriate investments for successful LAC development, this research focused on the determination of optimized location criteria for LAC development potential.

Methodology
A list of primary strategic location factors that contribute to successful LAC development and site selection were determined and analyzed under four sub-sections:

1. Buffer distance criteria selection
2. Buffer weight selection
3. Availability of utilities
4. Land cost consideration

Buffer Distance Criteria Selection
Strategic location criteria availability and/or proximity of:
• Seaports (land access)
• Intermodal yards (land access)
• Cargo airports (land access)
• Florida’s Strategic Intermodal System (SIS) Roads (Access Points/Interchanges)
• State and US roads (major truck routes)
• Rail tracks

Data were obtained using spatial analysis/GIS for the FDOT D7 region. Each of the facility types was assigned a specific buffer distance which, when entered in the GIS tool, resulted in raster maps with overlapping areas (Figures 2 & 3).

Buffer Weight Selection

<table>
<thead>
<tr>
<th>Buffer Type</th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail (Linear)</td>
<td>528</td>
<td>357</td>
<td>216</td>
</tr>
<tr>
<td>Rail (Intermodal Yards)</td>
<td>216</td>
<td>144</td>
<td>72</td>
</tr>
<tr>
<td>SIS Roads (Access Points)</td>
<td>72</td>
<td>48</td>
<td>24</td>
</tr>
<tr>
<td>State and US Roads (Major Truck Routes)</td>
<td>24</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Cargo Airports (Land Access)</td>
<td>8</td>
<td>5.6</td>
<td>3.5</td>
</tr>
<tr>
<td>Seaports (Land Access)</td>
<td>3.5</td>
<td>2.4</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Land Cost Consideration
• Land cost is also a very important aspect for successful LAC development (Table 3).
• Any location that was indicated as having high LAC potential, but having a high land cost, was normalized using a penalty of 0.5 (high cost) and 0 (moderate to low cost) out of 100 possible weight points, making them less desirable for LAC development.
• The addition of 1 to the lower land cost areas was designed to boost their heat designation and therefore making them more desirable for LAC development.
• The pixels used for analysis in Figure 4 correspond to a square that is 0.1 mile (528 ft.) on each side. This correlates to an area of 0.05 square miles (approx. 0.4 acres)

Table 2. Land Cost Weighting Criteria

<table>
<thead>
<tr>
<th>Class</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1-5</td>
</tr>
<tr>
<td>Moderate</td>
<td>5-15</td>
</tr>
<tr>
<td>High</td>
<td>15-25</td>
</tr>
</tbody>
</table>

Results/Validation
• Once the location criteria for LAC development potential were finalized to include strategic location, utility availability, and land cost, an LAC development potential heat map was generated to analyze the FDOT D7 area in terms of the potential of each heat category.
• The final LAC development potential spots were finally classified into five major groups as mentioned below.

Select References

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This research would not be possible without the funding received from the Florida Department of Transportation District 7 Office and the support of Mr. Brian Hunter and Mr. Ming Gao.