Sustainable Development and Transportation Decision Making: Embedding community preferences in Visualizations
Introduction
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Eight rungs on the ladder of citizen participation (Arnstein, 1969)
Overview

- The project objective is to evaluate visualization as a tool to assist in participatory decision-making processes for transportation projects.

- Holistic community involvement for project development is needed and mandated.

- Visualizations are effective and democratic means to convey design ideas to the public, empowering the whole process.

- Case study developed in the community in Mayaguez, PR.

Criteria identification
- Literature review

Criteria prioritization
- Survey, AHP

Visualizations design and evaluation
- Questionnaire

Geographical location of the case study area
Overview

Early involvement
- Solicitation of community values and needs
- Design criteria prioritization

Context-Sensitive designs
- Conjoint features based on preferences
- Five 3-D fly-through animations

Validation of preferences
- Visual preference surveys
- Feedback from community members

Criteria identification
- Literature review

Criteria prioritization
- Survey, AHP

Visualizations design and evaluation
- Questionnaire
**Design Criteria**

- **Fuel cost**: 17%
- **Traffic congestion**: 17%
- **Availability of public transportation**: 10%
- **Personal Security**: 10%
- **Pavement quality**: 7%
- **Not having bikelanes**: 6%
- **Pollution caused by vehicles**: 5%
- **Vehicle acquisition cost**: 5%
- **Loss of natural areas by the construction of highway**: 3%
- **Noise from traffic**: 4%
- **Safety**: 6%
- **Vehicle operating cost**: 3%
- **Parking**: 3%

**Figure:** Main issues affecting the quality of life Community of “Dulces Labios” (n=114)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Eigenvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation of employment and economic activity in the community</td>
<td>0.19</td>
</tr>
<tr>
<td>Reduction of air and water pollution</td>
<td>0.13</td>
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<tr>
<td>Safety Improvements of transportation infrastructure and operations</td>
<td>0.12</td>
</tr>
<tr>
<td>Infrastructure for bicycle pedestrian movement</td>
<td>0.1</td>
</tr>
<tr>
<td>Including greenery and landscaping</td>
<td>0.08</td>
</tr>
<tr>
<td>Ecologically friendly Infrastructure. (Recycled materials, Solar energy, etc.)</td>
<td>0.08</td>
</tr>
<tr>
<td>Preservation of cultural, historic and archeological elements</td>
<td>0.07</td>
</tr>
<tr>
<td>Reduction of vehicle operation cost</td>
<td>0.06</td>
</tr>
<tr>
<td>Self – Sustainable financial system</td>
<td>0.06</td>
</tr>
<tr>
<td>Reduction of travel time</td>
<td>0.05</td>
</tr>
<tr>
<td>Rapid construction of the infrastructure</td>
<td>0.05</td>
</tr>
</tbody>
</table>

**Table:** Hierarchy of selected evaluation criteria based on eigenvalues
Visualizations

- Humans are inherently visual.
- Visualizations are tools used to convey effectively complex characteristics of objects at appropriate and understandable scales.

Eleven Criteria

- Project alt. 01
- Project alt. 02
- Project alt. 03
- Project alt. 04


Validation of preferences

Figures: Preferred alternatives. Community of “Dulces Labios” and “Others” group
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Gracias