Ecotourism by Green Transport
-Travel Demand Forecast for Seamless Public Transport Service in the Rural Areas of Southern Taiwan

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Background

• The situation of ecotourism in Taiwan
  • Tourism Bureau R.O.C. statistic data showed that there were more than 10,000 foreign tourists came to Taiwan to engage in ecotourism related activities in 2010.
  • The proportion of domestic tourists, who engaged in eco-tourism related activities also rose from 2.4% in 2004 to 4.3% in 2010.

• Transport is a fundamental component of the tourism industry and is a precondition for travel (Stephen J. Page & Joanne Connell, 2006: 149).
The concepts of ecotourism include (Hetzer, 1965):

1. Minimum environmental impact
2. Minimum impact on-and maximum respect for-host cultures
3. Maximum economic benefits to host country’s ‘grassroots’
4. Maximum ‘recreational’ satisfaction to participating tourist
• However,
  • Transportation typically accounts for the majority (in some cases >90%) of energy consumption in tourism (e.g., Jennifer Reilly et al., 2010; Gössling et al., 2005; Kelly & Williams, 2007b; Peeters & Schouten, 2006; Tabatchnaia-Tamirisa, Loke, Leung, & Tucker, 1997)
  • The majority, about 65 percent, of tourists in Taiwan tend to go to these destinations by private car (from 2010 Survey of Travel by R.O.C Citizens Report)
  • Causing a lot of CO₂ emission

• Alternatives
  • Green Transport
  • Sustainable Mode
Research Motive

• Most of the attractions for eco-tourism usually lie in rural areas
• The usage rate of public transport is low
• Tainan city government will implement policy of seamless public transport network

• This research aims to:
• Evaluate intermodal integration strategies which could provide door-to-door passenger journey in ecotourism destinations
• Provide public and/or private sector for ecotourism transport planning in order to improve the quality and the operational efficiency of public transport service and to increase their number usages.
In reality, definitions of ecotourism can be considered as lying in a position somewhere within a range that lies inside these polar extremes (Orams, Mark B., 1995).
• Seamless public transport is a way to reduce the cost of intermodal and provide door-to-door passenger journey in order to increase the number of passenger and to achieve the goal of sustainable transport (Hine, 2000a)

• Feeder services may arise gaps and they can be summarized as the following five dimensions (Cheng-Min Feng, 2011):
  • Space Connecting Gap
  • Transport Information Gap
  • Timetable Connecting Gap
  • Transport Service Gap
  • Transport Financial Gap
In order to achieve intermodal seamless connection, it is important to integrate transport and land use planning, besides the integrated planning of transfer information, timetable and fare between different public transports (Hine, 2000b).

Previous studies, which researched the modes transfer behavior mainly focus on some factors (see table 1).
<table>
<thead>
<tr>
<th>Method Use</th>
<th>Author</th>
<th>Year</th>
<th>Subject</th>
<th>Research Area</th>
<th>Analysis model</th>
<th>Factors Invested</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revealed preference</td>
<td>Zhan Guo et al.</td>
<td>2011</td>
<td>Assess the perceived transfer cost and differentiate the cost by sources and locations.</td>
<td>London Underground (LUL)</td>
<td>MNL</td>
<td>Travel path, travel time and transfer environment</td>
<td>Improving transfer experience could significantly benefit public transport.</td>
</tr>
<tr>
<td></td>
<td>Yi-ting Hsu</td>
<td>2008</td>
<td>Before and after high speed rail operating, the passenger’s transport mode choice change in western Taiwan.</td>
<td>Taipei– Kaohsiung, Taiwan</td>
<td>MNL</td>
<td>Total travel time, connection time from origin, and connection time to destination.</td>
<td>Time value is an important factor. Middle and long-haul trips for intercity passengers were impacted mostly after high-speed rail operated.</td>
</tr>
<tr>
<td>Stated preference</td>
<td>Jennifer Reilly et al.</td>
<td>2010</td>
<td>Choice behavior of interchange at the tourism destination.</td>
<td>YVR– Whistler, BC Canada</td>
<td>MNL</td>
<td>Travel time, frequency, cost, origin/destination, and road conditions</td>
<td>The structure of long-haul transportation to and from a destination has the potential to be directly impacted by destination policy and planning decisions.</td>
</tr>
<tr>
<td></td>
<td>Ching-shu Chiu</td>
<td>2004</td>
<td>The urban commuter’s mode choice behavior.</td>
<td>Taipei, Taiwan</td>
<td>MNL、NL、MXL</td>
<td>Parking fee, fare and travel time.</td>
<td>Travel time and comfort result in private mode commuters not choosing public transport.</td>
</tr>
<tr>
<td>Combined model</td>
<td>Hung-yen Chou et al.</td>
<td>2007</td>
<td>Analyze the effects of access services on intercity mode choice after high speed rail operated.</td>
<td>Tainan, Taiwan</td>
<td>NMNL</td>
<td>Connection time, connection cost, waiting time, delay time, walking distance and parking fee.</td>
<td>Connection cost and connection waiting time are important factors to influence mode choice.</td>
</tr>
<tr>
<td></td>
<td>Raquel Espino et al.</td>
<td>2006</td>
<td>Analyze mode choice behavior for suburban trips between urban and interurban corridors.</td>
<td>Grand Canary, Spain</td>
<td>NL</td>
<td>Travel time, parking cost, travel cost, bus frequency and comfort.</td>
<td>The subjective value of time decrease as comfort is improved. The WTP for improvements in comfort increase with travel time.</td>
</tr>
</tbody>
</table>
This paper uses the field survey method to evaluate people’s opinions toward the factors that could increase their willingness in using public transport for transfer.

Selects **Guan-Zi-Ling**, which is located in Baihe District of Tainan City, Taiwan, to be the research scope and then applies **stated preference approach (SP)** and **multinomial logit model (MNL)** to construct the travel demand model.

Due to its characteristics of Karst topography, Guan-Zi-Ling has beautiful geological, terrain, landscape resources and rare mud spring in the world and becomes an important ecotourism area in Taiwan.
• Guan-Zi-Ling
Research Scope

- The public transport to Guan-Zi-Ling
  - Xinging Bus (between Xinging train station and Guan-Zi-Ling)
  - Chiayi Bus (between Chiayi train station and Guan-Zi-Ling)

- Daily schedule
  - Xinging Bus: 7
  - Chiayi Bus: 11

- Based on the statistics, the number of passengers decreased by 13%~15%
• **Questionnaire**
  • Visitors’ travel behavior information & social-economic characteristic
  • Stated preference of visitors
• **Factors:** Travel Time, Waiting Time, Fare, and Walking Distance
• **Bus company operation type:**
  • Current bus operation
  • Bus services, which stop at passenger’s call in mountainous areas
  • Integrate timetables between bus company and Taiwan railways
  • Integrate ticket prices between bus company and Taiwan railways
Investigation

- **Face-to-Face Interview**
  - To avoid the respondent’s wrong filling due to misunderstanding of the questions

- **Time & Location**
  - The intercept surveys were conducted systematically at various times and strategic locations in Guan-Zi-Ling from September to December in 2012.

- **Sample Size**
  - Distributed questionnaire: 181
  - Valid questionnaire 168
  - Valid response rate: 92.8%
• It reveals that when people go to Guan-Zi-Ling to engage in tourism related activities, they choose private modes mainly rather than public modes.

<table>
<thead>
<tr>
<th>Actual travel mode</th>
<th>Frequency</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>8</td>
<td>4.8%</td>
</tr>
<tr>
<td>Private transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>139</td>
<td>82.7%</td>
</tr>
<tr>
<td>Scooter</td>
<td>21</td>
<td>12.5%</td>
</tr>
<tr>
<td>Taxi</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Total sample</td>
<td>168</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
The symbols of factors are minus, except for travel time in operation mode 1 and walking distance in operation mode 3.

Table 3 Stated preference mode choice

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Stated preference mode choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operation Type 1 Coeff. (t-value)</td>
</tr>
<tr>
<td>Travel time (min)</td>
<td>0.0106 (0.21)</td>
</tr>
<tr>
<td>Waiting time (min)</td>
<td>-0.0320 (-1.03)</td>
</tr>
<tr>
<td>Fare (NT dollars)</td>
<td>-0.0241 (-7.33)*</td>
</tr>
<tr>
<td>Walking distance (m)</td>
<td>-0.0039 (-1.59)</td>
</tr>
<tr>
<td>LL(0)</td>
<td>-184.567</td>
</tr>
<tr>
<td>LL(\beta)</td>
<td>-139.407</td>
</tr>
<tr>
<td>\rho^2</td>
<td>0.245</td>
</tr>
<tr>
<td>Sample size</td>
<td>168</td>
</tr>
</tbody>
</table>
• It means that the more travel time, waiting time, fare and walking distance of one transport mode, the less willingness people have.

• Also, the result shows that the fare is the key factors to affect the intermodal transport mode choices in this paper and the goodness of fit of the operation type 4 is the best, comparatively to the other types.
• The empirical results show that **fare** is the most important factor to influence the tourists’ intermodal choice behavior in Guan-Zi-Ling area.

• The operation type 4 (Bus company and Taiwan railways cooperate to integrate their ticket prices and to provide passengers with free tickets) has the best explanatory power. It reveals that if public sector focuses on price integration of intermodal to implement seamless public transport policy, it could increase the passengers’ willingness of bus usage.
References


Thanks for your attention.😊