Feasibility of Car-Sharing Service in Hangzhou, China
Project Members
Project Goals

- In depth feasibility study of launching a car sharing service in Hangzhou
- Provide possible ways of implementing a car sharing service in Hangzhou
## Timeline

<table>
<thead>
<tr>
<th>Phase 1 March 7\textsuperscript{th} - June 26\textsuperscript{th}</th>
<th>Phase 2 June 26\textsuperscript{th}- August 10\textsuperscript{th}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car-Sharing Research</td>
<td>Surveys</td>
</tr>
<tr>
<td>Zipcar Analysis</td>
<td>Interviews and site visits</td>
</tr>
<tr>
<td>Air Pollution</td>
<td>Feasibility Study</td>
</tr>
<tr>
<td>Boston – Hangzhou Comparison</td>
<td>Implementation Analysis</td>
</tr>
</tbody>
</table>
Outline

Feasibility Study
- Social Impacts
- Market Analysis
- Financial Study

Implementation
- Technological Aspects
- Location Analysis
- Advertisement
Social Impacts

- Environmental Impacts
- Oil Production
- Electric Cars
Environmental Impacts

- **Air Pollution**
  - Average car emits 2.3 tons of Carbon dioxide and 2,810,000 grams of other harmful greenhouse gases per year

- **Noise Pollution**
  - Automobiles produce 45-65 decibels

- **Natural Resources**
  - Demand for fuel increases fuel prices
  - Increases demand for car manufacturing materials (steel, aluminum, rubber, etc.)
Pure electric vehicles powered entirely on electricity, and even hybrid electric vehicles, can greatly reduce oil consumption for the automotive industry.

It is estimated that the traditional fuel vehicle from mining to energy use, has an average utilization rate of only 14%, while the hybrid vehicle energy is about 30%, greatly improving the utilization of the oil.
Impact of Electric Cars

- One electric car can reduce CO2 emissions 64%, assuming the electric car is 10% of all the cars in 2020. The electric cars can reduce about 9% of all the emissions of auto industry.

- Electric cars produce 10-15 decibels.

- Newer technology will increase the range of electrics car and their future impact will challenge the way the auto industry.
Market Analysis

- Features of car-sharing service
  - Needs better infrastructure facilities
  - Smooth road conditions
  - Membership system - social credit history
  - A new concept
  - Need driver’s license
Market Segmentation

- New city area
## City Comparison

<table>
<thead>
<tr>
<th>Cities</th>
<th>Population</th>
<th>ZipCars (estimate)</th>
<th>Buses</th>
<th>Subway</th>
<th>Bus to Population Ratio</th>
<th>Subway to Population Ratio</th>
<th>Zipcars to Population Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlanta</td>
<td>420,003</td>
<td>102</td>
<td>505</td>
<td>338</td>
<td>0.001</td>
<td>0.0008</td>
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<tr>
<td>Boston</td>
<td>617,594</td>
<td>1280</td>
<td>927</td>
<td>608</td>
<td>0.002</td>
<td>0.0010</td>
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<td>Chicago</td>
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<td>London</td>
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<td>40</td>
<td>8000</td>
<td>10000</td>
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<td>0.0013</td>
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<td>New York</td>
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<td>Philadelphia</td>
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<td>375</td>
<td>1183</td>
<td>395</td>
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<td>0.0003</td>
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<td>Portland</td>
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<td>660</td>
<td>127</td>
<td>0.001</td>
<td>0.0002</td>
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<td>San Francisco</td>
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<td>0.0002</td>
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<tr>
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<td>1618</td>
<td>159</td>
<td>0.003</td>
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<td>Toronto</td>
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<td>704</td>
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<td>0.0003</td>
<td>10013.124</td>
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<tr>
<td>Vancouver</td>
<td>578,041</td>
<td>110</td>
<td>1477</td>
<td>298</td>
<td>0.003</td>
<td>0.0005</td>
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<tr>
<td>Washington DC</td>
<td>601,723</td>
<td>550</td>
<td>1480</td>
<td>1130</td>
<td>0.002</td>
<td>0.0019</td>
<td>1094.041818</td>
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<tr>
<td>Hangzhou</td>
<td>8,700,000</td>
<td></td>
<td></td>
<td></td>
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<td>0.001</td>
<td></td>
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<tr>
<td>Total zipcars</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5810</td>
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<tr>
<td>Average zipcars to population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4656.470817</td>
</tr>
<tr>
<td>Possible Zipcars in Hangzhou</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1868.367771</td>
</tr>
</tbody>
</table>
Survey

- Place: West Lake, Wumart, Hangzhou Tower, Hubing Square, Wushan Square, Qingchun Road, Wensan Road, Yigao Digital Square, Huanglong Gym, Citizen Centre

- Total: 414 questionnaires
Survey Question 1 & 2

Male vs. Female
- Female: 42%
- Male: 58%

Age Groups
- 18-25: 45%
- 26-40: 46%
- 41-50: 6%
- >50: 3%
Survey Question 3 & 4

Have a License?

- Yes: 47%
- No: 53%

Are you a...

- Resident: 49%
- Tourist: 18%
- Other: 33%
Survey Question 5 & 6

If Tourist

- Car Sharing: 27%
- Taxi: 31%
- Rent Car: 9%
- Other: 33%

Transportation Expenses

- 100-150: 44%
- 150-300: 26%
- 300-450: 11%
- 450-600: 4%
- >600: 15%

If Tourist

- Car Sharing: 27%
- Taxi: 31%
- Rent Car: 9%
- Other: 33%

Transportation Expenses

- 100-150: 44%
- 150-300: 26%
- 300-450: 11%
- 450-600: 4%
- >600: 15%
Survey Question 7 & 8

- **Car Sharing Interests**
  - Yes: 70%
  - No: 8%
  - Don't Know: 22%

- **Primary Transportation**
  - Bus: 40%
  - Bicycle: 17%
  - Taxi: 14%
  - Walk: 13%
  - Car: 11%
  - Other: 5%
Survey Question 9 & 10

**How Much Willing to Pay?**
- <50: 61%
- 50-60: 28%
- 61-70: 8%
- 71-80: 2%
- >81: 1%

**Government Implement**
- Yes: 68%
- No: 8%
- Not Sure: 24%
Population Subdivision According to the Questionnaire

Whether the car users want to try car-sharing

- A willing to: 59%
- B not sure/not sure: 41%

Gender:
- Male: 57
- Female: 43

Young age structure:
- 18-25: 42%
- 26-40: 46%
- 41-50: 8%
- >50: 4%

You are:
- 52% A resident
- 17% B tourist
- 31% C other

Whether they use private car:
- 18% A yes
- 82% B no

Whether the car users want to try car-sharing:
- 59% A willing to
- 41% B not sure
The Feature of Target Customers

- Young
- More men than women,
- High levels of consumption
- Good credit record
- Hangzhou residents
Financial Aspects

- Car Sharing versus Private Car
- Car Sharing versus Taxi
- Car-Sharing versus Car-Rental
- Financial Plan
### The Yearly Costs of Private Car

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (¥)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depreciation</td>
<td>26,980</td>
</tr>
<tr>
<td>Insurance</td>
<td>4,000</td>
</tr>
<tr>
<td>Annual Inspection</td>
<td>150</td>
</tr>
<tr>
<td>Maintenance</td>
<td>1,200</td>
</tr>
<tr>
<td>Gas</td>
<td>6,160</td>
</tr>
<tr>
<td>Parking</td>
<td>1,800</td>
</tr>
<tr>
<td>Toll Fees</td>
<td>1,600</td>
</tr>
<tr>
<td>Total</td>
<td>41,890</td>
</tr>
</tbody>
</table>

### The Yearly Costs of Car Sharing Service

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (¥)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs of Car Sharing Service( 200hours and ￥40/h)</td>
<td>10,000</td>
</tr>
<tr>
<td>Other Increased Transportation Costs</td>
<td>2,500</td>
</tr>
<tr>
<td>Total</td>
<td>12,500</td>
</tr>
<tr>
<td><strong>Cost savings</strong></td>
<td><strong>29,390</strong></td>
</tr>
</tbody>
</table>
## Car Sharing versus Taxi

<table>
<thead>
<tr>
<th>Explanation</th>
<th>Total Cost of Car Sharing (¥)</th>
<th>Round Trip Cost Of Taxi (¥)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xiasha - Downtown</td>
<td>120</td>
<td>130</td>
</tr>
<tr>
<td>(One hour spent in downtown)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xiasha - Downtown</td>
<td>200</td>
<td>130</td>
</tr>
<tr>
<td>(Three hours spent in downtown)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xiasha - Xiaoshan Airport</td>
<td>80</td>
<td>180</td>
</tr>
<tr>
<td>(Picking up someone from the airport)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Car Sharing versus Car Rental

<table>
<thead>
<tr>
<th>Costs</th>
<th>Low Vehicle (Mazda)</th>
<th>Middle Vehicle (Volkswagen Passat)</th>
<th>Car-Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lease Cost</td>
<td>120/day</td>
<td>200/day</td>
<td>40/hour</td>
</tr>
<tr>
<td>Insurance</td>
<td>30/day</td>
<td>40/day</td>
<td>-</td>
</tr>
<tr>
<td>Gas Fee</td>
<td>150/day</td>
<td>150/day</td>
<td>-</td>
</tr>
<tr>
<td>Average Miles</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Other Fees</td>
<td>35/day</td>
<td>35/day</td>
<td>-</td>
</tr>
<tr>
<td>Total Hours</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Total Cost per Day</td>
<td>335</td>
<td>425</td>
<td>400</td>
</tr>
</tbody>
</table>
Financial Plan

- Assumptions
- Variable Costs
- Fixed Costs
- Price Scheme
- Revenue

Financial Plan
## Scenarios

<table>
<thead>
<tr>
<th>Number of Members at the End of the First Year</th>
<th>Number of Cars</th>
<th>Revenue</th>
<th>Variable Costs</th>
<th>Internal Rate of Return (5 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>50</td>
<td>2,062,500</td>
<td>1,920,000</td>
<td>18%</td>
</tr>
<tr>
<td>1000</td>
<td>100</td>
<td>4,125,000</td>
<td>3,840,000</td>
<td>96%</td>
</tr>
<tr>
<td>2000</td>
<td>200</td>
<td>8,250,000</td>
<td>7,680,000</td>
<td>169%</td>
</tr>
</tbody>
</table>
Implementation of Car Sharing in Hangzhou

- Technological Aspects
- Location Analysis
- Marketing Analysis
Technological Aspects

- Central database
- User interfaces
- Communication system
- On board vehicle system
Central Database

- Member applications
- Account information
- Vehicle data
- Reservations
- Time and mileage data
- Employee data
User Interface

- Internet interface
- Online reservations
- Automated voice-activated phone reservations
- Live operators
Communication System

- Wireless communications
- Global Positioning System (GPS)
- Connection between vehicles and the central database
On Board Vehicle System

- Card readers
- Radio Frequency Identification (RFID)
- On-board computer
Location Analysis

- Key qualities for locations
  - High population density
  - A mix of land uses
  - Good transit access
  - Low-vehicle ownership
  - Inconvenience of other alternatives
  - Financial sustainability
Location Analysis

- 7 downtown locations, 3 suburban locations
Location Analysis in Hangzhou: Downtown

- High density
- Great number of nearby destinations
  - Tourist attractions
  - Restaurant, shopping mall, and more.
- Target customers: tourist, residents who do not own a car, business employees and government offices
- Average income is high
- Safer area than suburban districts
Downtown Location: Qingchun Square

- **Location:**
  - Center of Hangzhou
  - North of Qingchun Road
  - East of the West Lake

- **High Density:**
  - Permanent population: 1,000,000
  - Floating population: 380,283

- **Mix of Land use:**
  - Residential
  - Employment
Location Analysis: Suburban Areas

- Dense urban neighborhoods
- Mixed-use development
  - Universities
    - 200,000 university students
  - Business: office buildings
  - Residential Communities
- Scarce parking
  - Parking cost is cheaper than in downtown
- Good transit
Suburban Area Location: Xiasha

- **Location**
  - 18 km east of West Lake
  - Eastern part of Hangzhou
- **Population:** 310,733

- **Target customer:** university students
  - 200,000 students
- **‘Special niche’ for car-sharing**
- **Good transit access**
Advertisements

- 电视：TV advertising
- 报纸：Newspaper advertising
- 网络：The Internet
- 电台：Radio
- 户外广告牌：Outdoor billboard
- 宣传册：Brochures
- 现场直播：Broadcast live on advertising
<table>
<thead>
<tr>
<th>Type</th>
<th>Cost</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV advertising 电视</td>
<td>80,080</td>
<td>A week</td>
</tr>
<tr>
<td>Newspaper advertising 报纸</td>
<td>42,000</td>
<td>A year</td>
</tr>
<tr>
<td>The Internet 网络</td>
<td>Free</td>
<td>No limit</td>
</tr>
<tr>
<td>Radio 电台</td>
<td>136,500</td>
<td>15 days</td>
</tr>
<tr>
<td>Outdoor billboard 户外广告牌</td>
<td>300,000</td>
<td>A year</td>
</tr>
<tr>
<td>Brochures 宣传册</td>
<td>2,000</td>
<td>A year</td>
</tr>
<tr>
<td>Broadcast live 现场直播</td>
<td>50,000</td>
<td>Half hour</td>
</tr>
</tbody>
</table>
Recommendations

- Risks of car sharing
- Partnerships
- Future work
Risks of Car-Sharing

- Over commit to customer demand
- Electric vehicles
- One-way trips
- Picking the wrong location
- Competition with taxi and private cars
Partnerships

- Public organizations
- Private organizations
- Benefits of partnerships
Future Work

- Future of electric cars
- Detailed analysis on locations
- Accurate financial information
- Questionnaires
Thank You!

- Delta Investment Consulting
- Omnipay
- Hangzhou Dianzi University
- Advisors