Exploring the Feasibility of Mobility as a Service (MaaS) in Small Urban and Rural Communities: Lessons from a Case Study

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Xinyu Liu (Presenter), Jie Yu, Shamsi Trisha, Edward Beimborn
Department of Civil and Environmental Engineering
University of Wisconsin-Milwaukee
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Introduction
What is MaaS (Mobility-as-a-Service)?

MaaS is an on-demand, real-time platform that can include any combination of different transport modes such as public transit, cars, taxis, and bike sharing, through a unified gateway that creates and manages the trip, which users can pay for with a single account.

Benefits

**Government**
- Less owners, more users
- Less parking shortage, congestion, emissions
- Public health, social equity
- Better urban-urban, urban-suburban, urban-rural connectivity

**Transport providers**
- Improved efficiency
- Increased users
- Filling up gaps, e.g. reliability + flexibility
- New business opportunities

**Travelers**
- Lower prices, better service
- Tailored transportation service
- Safe & secure
- Instant feedback
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Research and Practice about MaaS

**Literature**

- **User demand** (Sochor et al., 2016; Matyas and Kamargianni, 2017; Sochor and Sarasini, 2017; Ho et al., 2018)
- **Business models** (Aapaoja et al., 2017; Konig et al., 2016; Wong et al., 2019; Kamargianni and Matyas, 2017)
- **Future bus contracts** (Hensher, 2017)
- **Service attributes and opportunities of transportation modes in MaaS** (Wells et al., 2019)

**Applications**

- **Commercialized MaaS projects in Europe**
  - Whim in Helsinki, Finland
  - Kyyti in major Finnish city regions
  - Mobility Shop in the Great Hanover Area of Germany
  - Moovel in Düsseldorf, Hamburg, Karlsruhe and Stuttgart, Germany
  - My Cicero in most important cities of Italy
- **Pilot MaaS projects in Europe**
  - Gothenburg, Sweden (UbiGo), Vienna, Austria (SMILE)
- **Early stages of MaaS applied in the U.S.**
  - Transit, Citymapper, Moovit, TriMet

Big cities/ Metropolitans ✔
Small urban and rural areas ?
Research and Practice about MaaS

Big cities/ Metropolitans ✔
Small urban and rural areas ?
Different in...
• Service span
• Public transit service
• User acceptance
• .......

Literature
• MaaS in rural Finland (Eckhardt et al., 2018)
  Discussed the challenges and solutions from a national perspective.

Applications
• Ylläs Tikett in Lapland, Finland (Anttila, 2018)
  Benefits from the high demand of tourism in Ylläs.
• MinRejseplan in Northern Denmark (Hvid et al., 2018)
  Developed on the basis of the well-developed digital technology of the country and an existing nationwide accessed MaaS application.

This study aims to...
• Identify critical issues in small urban and rural areas
• Propose response strategies for each issue
Research Overview
Study Area

- 12 Urbanized Areas (UA)
- 1860 Small Urban and Rural Areas (99% of the land area)
  - 344 Urban Clusters
  - 1516 Rural Areas

**Small urban and rural communities:**
Population < 50,000 (U.S. Census Bureau)

Source: https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/2010-urban-rural.html
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Research Procedure

Phase I: Background Analysis
- Socio-demographic trends
- Economic challenges
- Technological advances

1st Advisory Committee Meeting

Phase II: Problem Identification
- Concept development
- Policy & planning
- Implementation issues

2nd Advisory Committee Meeting

Phase III: Strategy Development
- Local governments
- Transportation service providers
- MaaS integrators

3rd Advisory Committee Meeting

Public Meeting

Advisory Committee
- State/Local government: 1
- Transit agency: 2
- Transportation planner: 1
- State/Local public transportation association: 1
- Shared-ride taxi provider: 2
- Bikeshare provider: 1
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Background Analysis

Statistics of Demographics, Economics, Technology, and the Usage of Public Transportation in Urbanized, Small Urban and Rural Areas of Wisconsin

Source: U.S. Census 2010; ACS 2013-2017
Key Findings
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Identification of Critical Issues

Concept Development
- Aging population
- Lack of public transport travel experience
- Limited smartphone service availability

Policy & Planning
- Municipal boundaries
- Funding

Implementation
- Staff availability
- Limited capacity
- Technical capabilities
Identification of Critical Issues

1. Aging population

• Young elderly (ages 65-84) **almost double**, “Old elderly” (ages 85 and over) nearly increase **one and one-half**.

• Northern counties are projected to have **more than 3 out of every 10 residents over 65 in 2040**.

Source: Wisconsin Department of Administration Demographic Services Center, 2013
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Identification of Critical Issues

2. Lack of public transport travel experience

- Residents in suburban and rural communities of Wisconsin have little access to fixed route transit but more chances to use shared-ride taxi.

3. Limited smartphone service availability

- High percentages of households with smartphones mostly lie in urbanized areas.

Source: ACS 2017 5 Year Estimates; Hubbuch, 2018
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Identification of Critical Issues

4. Municipal boundaries

- Travel demand are across county borders to reach job destinations, healthcare providers, shopping, and other activities.
- Public transportation services are limited to county borders.

5. Funding

- Local governments have limited funding resources.
- Many local elected officials do not have the experience of using public transit.

“We are inherently conservative because it isn’t our money (public money); We don’t want to waste anything; we cannot be the first person to buy an electric bus; we are really conservative to try something new and have to follow someone else who will take the first step.”
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Identification of Critical Issues

6. Staff availability
   • Staff overloaded with multiple functions
     “I have to pick up phones, schedule, and dispatch vehicles all by myself.”
     “With increasing demand for shared ride taxi there is a request for increased service. However, increased service demand cannot be freely implemented due to the constraints.”

7. Limited capacity
   • Limited service capacity due to funding limitations
     “Standard wait time is somewhere between 30 minutes or more. This is due to the limitation of the number of vehicles on the road - limited resource.”

8. Technical capabilities
   • Limited capabilities to deal with complex problems
   • Few eligible businesses to contract out to
Response Strategies

**Critical Issues**
- Aging population
- Lack of public transport travel experience
- Limited smartphone service availability
- Municipal boundaries
- Funding
- Staff availability
- Limited capacity
- Technical capabilities

**Key Strategies**
- Collaboration among stakeholders
- Tailored service package
- User Interface design
- Pilot project
Response Strategies

Collaboration among stakeholders

Targeting Issues
- Aging population
- Municipal boundaries
- Funding
- Staff availability
- Limited capacity
- Technical capabilities

Business Models

• Public-Private-Partnerships (PPP, P3s)
  Enough funding to implement MaaS
  Lack a driving force due to no market competition

• Public-Private-People-Partnerships (PPP, P4s)
  Reduce costs of governments
  Risks and concerns due to incomplete legislative protection

• Shared-ride taxis
  Serving as a skeleton of MaaS in suburban and rural areas

Reference: Aapaoja et al., 2017; Konig et al., 2016
Collaboration among stakeholders

Collaborations among governments
- Establish ad hoc funding programs to satisfy special groups
e.g., Funding programs from Wisconsin DOT (Department of Transportation) and DHS (Department of Health Services) for Older adults

Operational agreements
- Create agreements for cross-county-boundary MaaS systems
e.g. Geographical scopes of operation, obligations, data exchange, and revenue allocations
Response Strategies

Tailored service package

Targeting Issues
- Aging population
- Lack of public transport travel experience

- Information provision
  - Providing customized information
  e.g., Health centers and community activities to older adults; Shopping discounts and park & ride lots to people having few public transit experiences

- Customized trips
  - Consistent with users’ preferences
  Cost, accessibility, reliability, speed, presence of caregivers, etc
  e.g., Volunteer/paid transportation service, health care trips, cross-boundary trips, paratransit service for older adults; park and ride, shared-ride taxi, and carsharing for people not familiar with transit

- Service bundling strategies
  - Monthly, yearly membership
  - Free trail
Response Strategies

User interface design

Targeting Issues

- Aging population
- Limited smartphone service availability

- Household-based access V.S. Individual-based access
  - Booking, payment and rating
  - Real-time tracking and updates

- Elderly & disabled-friendly App
  - Vision, hearing, mobility, cognition difficulties
  - Icons, pictures, sounds, interactive elements, and reminders friendly to older adults

- Telephone customer service & Website
Response Strategies

- **Pilot project**

**Targeting Issues**
- Aging population
- Lack of public transport travel experience
- Limited smartphone service availability
- Municipal boundaries
- Funding
- Staff availability
- Limited capacity
- Technical capabilities

- **Customer investigations**
  - Older adults
  - Households without smartphones
  - Travelers lack of public transport travel experience

- **Projects involving components of MaaS**
  - Collaborations among stakeholders, tailored service packages, user interface design, etc.

- **Follow-up surveys**
  - Test the effectiveness of MaaS services in small urban and rural areas.
  - **Opportunities V.S. Risks?**
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For more info...

Figure IV: System Architecture for MaaS in Wisconsin

<table>
<thead>
<tr>
<th>Strength</th>
<th>Weakness</th>
</tr>
</thead>
<tbody>
<tr>
<td>• User Flexibility</td>
<td>• Technology investment requirement</td>
</tr>
<tr>
<td>• User Convenience</td>
<td>• Equity</td>
</tr>
<tr>
<td>• Transparency</td>
<td>• Funding</td>
</tr>
<tr>
<td>• Personalization</td>
<td>• Ease of Use</td>
</tr>
<tr>
<td>• Promoting sustainable and health lifestyles</td>
<td>• Wireless Connectivity Issues</td>
</tr>
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Figure III: SWOT Analysis

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
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<tbody>
<tr>
<td>• Sustainable and intermodal travel options</td>
<td>• Partnership establishment uncertainties with transportation service providers</td>
</tr>
<tr>
<td>• Young talent to Wisconsin</td>
<td>• Hard to change travel patterns and behavior</td>
</tr>
<tr>
<td>• Complimentary services</td>
<td>• Subscription model</td>
</tr>
<tr>
<td>• Equity</td>
<td>• Privacy concerns</td>
</tr>
<tr>
<td>• Cross-boundary solutions</td>
<td>• Government Approval Requirements</td>
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Figure V: Roadmap for implementing Mobility as a Service in Wisconsin
Thanks!

Jie Yu (Corresponding Author), yu22@uwm.edu
Xinyu Liu, liu288@uwm.edu; liu_xinyu@tongji.edu.cn

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Advisory Committee Members
(In alphabetical order by last name):
James Davies, Senior Director of Operations and Planning, Bublr Bikes;
Brian Engelking, Transit Manager, Waukesha Metro Transit;
Lynn Gilles, WIPTA chair/Transit manger, City of Fond Du Lac;
Kevin Muhs, Executive Director, SEWPRC;
Ian Ritz, Chief of Transit Section, Wisconsin DOT;
Justin Running, General Manager, Running Incorporated
Jeff Sponcia, Transit Manager, MCTS;
Jason Wittek, Transit Superintendent, Ozaukee County