Commuter Acceptance of TDM Measures in Hyderabad, India
- A post experimental focus group analysis

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6th ATINER Conference, Greece, June 1-4, 2020
Outline

• Introduction
• Concept
• Analysis
• Conclusion
• Outlook
Vehicle emission reduction strategies - India

• Vehicle emissions are increasingly becoming a concern in the Indian megacities

• Road transport contributes extensively to the vehicle emissions in the form of congestion-

• From planning perspective, city adopts two different approaches: a technical and a non technical

• The technical approach is the implementation of emission control measures, whereas non-technical approach is implementation of the supply based measures
Megacity, Hyderabad – problem of vehicle emissions

• The city has added over 3 million people to its ever growing population – from 7.7 million (as of 2011) to 10 million (2020)

• 1,200 new vehicles were registered every day (Telangana’s Road Transport Authority 2018)
  • 1,000 new two-wheelers and 200 four-wheelers

• Nearly 70% of pollution load in the form of vehicle emissions (Roy Chowdhury and Chattopadhyaya 2011)

Source: Telengana Today, Jan 2019
Introduction

Rush hour continues in the city

• Existing vehicle emission measures in Hyderabad – JNNURM and CPCB
  • PUC checks for two-wheelers and passenger cars
  • phasing out of older vehicles
  • setting emission standards
  • checking for fuel adulteration
  • improving fuel quality
  • introducing a multi-modal transport system

• The traffic congestion and associated vehicle emissions still intense in the city
• A way to improve the existing emission measures in the city is to implement non-technical demand based measures—TDM in the city
TDM Measures

• With limited investments, TDM measures increase the efficiency of transportation systems.

• To overcome the vehicle emissions and traffic congestion, many cities have attempted to reduce the demand for private-car usage by implementing private-car control policies—Travel Demand Management (TDM) measures.

• TDM strategies are aimed to reduce private car usage and to control private car ownership (Eriksson et al., 2006).

• Besides technological and legal problems, lack of commuter acceptance pose huge challenge for TDM implementation in the city.
Commuter acceptance (CA)

• CA is the key prerequisite for successful implementation of traffic measures in megacities like Hyderabad

• CA depends on the commuters’ problem awareness and perceived effectiveness of such measures (Schlag and Teubel 1997)

• Commuters participating in evaluation of traffic measures
  • **Perception of the problem**, i.e. they ought to understand and experience the problem of traffic congestion
  • **Perceived effectiveness** of traffic measures.
Mode based commuters

For instance, commuters’ aim to reach office in time or driving a car or taking a bus, depends on their attitudes that result in negative or positive evaluation of transport system services, such as congested route, polluted vehicle, pleasure ride, and convenient trip, etc.

• In this scenario, how does the commuter evaluate the traffic measures?
Aim of this study

• The main aim is to examine the associations between mode based commuters and subjective measures of commuter attitudes

• Assess the commuters' perception for the potential cause of traffic congestion in the city

• Evaluate the user satisfaction of public bus service

• Assess the users suitability of the various push-pull traffic measures (supply and demand based)
### Concept

**Commuter acceptance model**

- **Normative**
  - Intention to perform a task

- **Behavioural**
  - When behaviour intention is favourable and attitude is positive
  - When behavioural intention is unfavourable and attitude is negative

- **Control**
  - Cognitive Dissonance

- **Planned behaviour**

- **Evaluate positively the measures**
- **Evaluate negatively the measures or search for alternative measures**

- **Socio-economic description**
  - Individual aim and claim

- **Potential causes of traffic congestion**
  - Problem perception

- **Satisfaction of Public bus service**
  - Information about alternate option

- **Suitability of traffic measure**
  - Perceived effectiveness
Data

• The questionnaire survey was conducted in 2012/13 at Hyderabad, India

• Totally 204 respondents participated
  • Respondents had jobs and commuted between their home and workplaces several times a week.
  • Employees from public/private organization, research organization, students were participated in the survey
## Descriptive - Samples

<table>
<thead>
<tr>
<th>Category</th>
<th>n=204&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years): Mean (SD&lt;sup&gt;2&lt;/sup&gt;)</td>
<td>31 (9.95)</td>
</tr>
<tr>
<td>Education level: Graduate: count (%)</td>
<td>173 (88.717%)</td>
</tr>
<tr>
<td>Job status: Employees: count (%)</td>
<td>145 (71.428%)</td>
</tr>
<tr>
<td>Monthly income: &gt;=16 000INR: count (%)</td>
<td>120 (69.767%)</td>
</tr>
<tr>
<td>Vehicle ownership: private vehicles&lt;sup&gt;3&lt;/sup&gt;: count (%)</td>
<td>124 (60.784%)</td>
</tr>
<tr>
<td>Gender: Male: count (%)</td>
<td>145 (71.078%)</td>
</tr>
<tr>
<td>Household: &gt;=3 Nos.: count (%)</td>
<td>161 (78.921%)</td>
</tr>
</tbody>
</table>

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### Analysis

<table>
<thead>
<tr>
<th>Gender</th>
<th>Car</th>
<th>TW</th>
<th>Cycle</th>
<th>Bus</th>
<th>Walk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>7.0</td>
<td>10.6</td>
<td>8.5</td>
<td>7.5</td>
<td>8.0</td>
</tr>
<tr>
<td>Male</td>
<td>30.2</td>
<td>12.6</td>
<td>12.1</td>
<td>8.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>

<sup>1</sup>n=204<sup>1</sup> includes all participants who provided sufficient data for analysis.

<sup>2</sup>SD: Standard Deviation

<sup>3</sup>Private vehicles include cars, two-wheelers, cycles, and buses.
The following shows potential causes of the traffic jams in Hyderabad. What do you think is the impact of the listed factors on traffic jam?

1: Very low impact
5: Very high impact

- Too many cars on the road: 4.07
- Too many two-wheelers on the road: 3.38
- Lack of public bus: 3.49
- Narrow roads: 4.18
- Parking cars on the road: 4.26
- Improper driving behaviour: 4.14
- Construction works on roads: 3.91
- Poor traffic signals timing: 3.63
Perception about causes of traffic congestion in Hyderabad (2/2)

<table>
<thead>
<tr>
<th></th>
<th>Too many cars</th>
<th>Too many tws</th>
<th>Lack of public bus</th>
<th>Narrow roads</th>
<th>Parking cars on road</th>
<th>Improper driving behaviour</th>
<th>Construction works on roads</th>
<th>Poor traffic signals timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>4.2</td>
<td>3.0</td>
<td>3.4</td>
<td>4.4</td>
<td>4.2</td>
<td>4.1</td>
<td>4.1</td>
<td>3.4</td>
</tr>
<tr>
<td>Tw</td>
<td>4.1</td>
<td>3.3</td>
<td>3.7</td>
<td>4.3</td>
<td>4.2</td>
<td>4.2</td>
<td>3.9</td>
<td>3.6</td>
</tr>
<tr>
<td>Cycle</td>
<td>4.0</td>
<td>3.3</td>
<td>2.7</td>
<td>2.8</td>
<td>3.4</td>
<td>3.8</td>
<td>2.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Bus</td>
<td>4.0</td>
<td>3.6</td>
<td>3.3</td>
<td>4.2</td>
<td>4.4</td>
<td>4.1</td>
<td>4.0</td>
<td>3.8</td>
</tr>
</tbody>
</table>

1: Very low impact
5: Very high impact
User satisfaction on public transport system in Hyderabad

How much do you agree or disagree with the following statements about the public bus system in Hyderabad?

![Graph showing user satisfaction scores for various aspects of public transport in Hyderabad.]

- Very old: 3.824
- Low frequency: 3.358
- Low comfort: 3.574
- High ticket price: 2.672
- Often arrive late: 3.755
- Often overcrowded: 4.480
- Often do not stop: 3.127
- Not well-connected: 3.343

1: Fully disagree
5: Fully agree

- Very old
- Low frequency
- Low comfort
- High ticket price
- Often arrive late
- Often overcrowded
- Often do not stop
- Not well-connected
Acceptability of traffic measures in Hyderabad

How useful or useless do you think are the following traffic measures when implemented in Hyderabad for reducing traffic congestion?

1: Not suitable
5: Highly suitable
### Acceptability of traffic measures in Hyderabad (2/3)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Car</th>
<th>Tw</th>
<th>Cycle</th>
<th>Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>High parking fee</td>
<td>2.6</td>
<td>2.6</td>
<td>2.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Prohibiting private vehicles</td>
<td>3.0</td>
<td>3.5</td>
<td>2.4</td>
<td>3.2</td>
</tr>
<tr>
<td>Odd-Even number plate</td>
<td>3.2</td>
<td>2.9</td>
<td>2.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Constructing flyovers</td>
<td>1.7</td>
<td>1.5</td>
<td>2.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Widening existing roads</td>
<td>1.7</td>
<td>1.3</td>
<td>2.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Increasing bus frequency</td>
<td>1.3</td>
<td>1.5</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Reducing ticket fare</td>
<td>1.7</td>
<td>1.4</td>
<td>1.7</td>
<td>1.8</td>
</tr>
<tr>
<td>Providing separate bus lanes</td>
<td>1.2</td>
<td>1.4</td>
<td>1.8</td>
<td>1.4</td>
</tr>
<tr>
<td>Increasing fuel price</td>
<td>3.7</td>
<td>3.8</td>
<td>3.2</td>
<td>3.7</td>
</tr>
</tbody>
</table>

1: Highly suitable  
5: Not suitable
1. Model findings: mode users versus causes of traffic congestion

- Cycle commuters find **too many cars** on road as higher impact, but **narrow roads** as lower impact.

- Bus commuters are find **too many two wheelers on road** as high impact for congestion while **car commuters** find it as no impact for congestion.

- Two wheelers find **lack of public bus** as higher impact for congestion.
2. Model findings: mode users versus acceptability of traffic measures

- Car commuters are more likely not accepting – restrictive demand measures such as odd-even number plate, but they find provision of bus lanes highly suitable for the city.

- Two wheeler commuters are more likely not accepting – restrictive demand measures such as prohibiting private vehicles and reducing ticket fare, but they support supply measures – road widening.

- In contrast, bicycle commuters are more likely support reducing ticket fare, but they do not find road widening measures suitable for the city.
Conclusions

• Two wheelers/car commuters exhibit the **planned behaviour** towards the acceptance of supply-based traffic measures and less likely accept the demand based measures

• The ‘**cognition discomfort**’ concept of TCD highlights the state of dissonance experienced by the cycle and bus commuters due to the problem of traffic congestion

• This acts as a motivational drive to alter the existing situation by accepting demand-based traffic measures

• This provides an insight to the policy approach towards increasing the overall commuter acceptance of demand management measures from both supply and demand sides
Outlook

• Study addressed the key user perception, acceptance barriers associated with TDM measures. This may serve as a policy input for transportation planning authorities seeking to increase commuters’ acceptance of the TDM measures.

• Findings indicate that it is necessary to promote (private motorised) commuter acceptance of the TDM policy, because lower acceptance will lead to more negative reactions towards the policy, which may weaken its effectiveness in controlling private vehicles.

• The study finds its potential to extend towards diversity and equity analysis of potential commuter platform users regarding age, gender, income level.
To know more about this project


• B. Chidambaram, “A comprehensive integrated framework linking vehicle emissions and traffic simulation complemented with social- institutional analysis,” *Int. J. Energy Environ.*, vol. 5, no. 6, pp. 733–743, 2011. DOI: [10.18452/17963](https://doi.org/10.18452/17963)
Questions?

For further research cooperation and queries please contact:

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