EXPLORING FACTORS AFFECTING BICYCLE COMMUTING IN DAR-ES-SALAAM, TANZANIA
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CYCLING IN THE NETHERLANDS

- 16 mln people
- own 16 mln bicycles
- ride 16 mln bicycle trips/day
CYCLING IN THE NETHERLANDS

27% of trips are by bicycle, 19% by walking, and increasing

Modal split in the Netherlands, period 2004-2008

Source: Mobility Survey Netherlands
SUCCESS FACTORS OF DUTCH BICYCLE POLICY

1. Cultural and political
2. Geography and spatial development
3. A high level of bicycle infrastructure, also parking
4. Good integration with public transport
5. A strong and innovative industry
6. Effective traffic safety policies and legislation
7. High level of knowledge and experience in spatial and transport planning and the ability to apply this in practice
CYCLING: THE SUSTAINABLE TRANSPORT MODE

- Cycling is part of the transport system in high motorized countries
- Cycling contributes to livelihood, to urban quality and the economic vitality of cities:
  - Active and healthy
  - Efficient, particularly at the short to medium distances
  - Door-to-door (home – school, work – home)
  - Relatively cheap
  - Cycling is an important feeder (access and egress) for public transport
  - Zero-emission
- The social, economic and environmental benefits of cycling are therefore high

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CYCLING IN AN AFRICAN CITY CONTEXT

This also applies to cycling in the context of African cities:

- Cycling provides better access to urban services and facilities that society considers vital for survival
- Cycling can assist to overcome transport financing constraints ([it is expensive to be poor!])
- Cycling creates job opportunities and access to job opportunities ([for the most vulnerable urban population])
- Cycling can enhance the maintenance of social networks ([very important in African societies])
- Etc.

But despite all these benefits ……
Cycling has remained an unrecognised and inferior mode in most African cities:

- due to the association of cycling with poverty and rurality
- due to lacking or no facilities to cycling safe and comfortably
- etc.

(JICA, 2008; Olvera et al., 2008; Nkurunziza et al., 2010)

Which is resulting in very low modal shares in many large African cities:

- e.g. Dar-es-Salaam ~5%,
- Nairobi <2%
DAR-ES-SALAAM, TANZANIA

- Largest commercial city
- Population: 4 million in 2010
- Population: growth rate per year > 4%
- 70% informal settlements

Modal share (JICA, 2008):
- PMV: 10%
- Public Transport: 60%
- Cycling: 5%
- Walking: 25%
RAPID URBANIZATION DAR ES SALAAM

1945: ~65,000 inh
1963
1967
1975: ~400,000 inh
1978
1982
1982
1998: ~2,300,000 inh

Source: Dr. S. Amer, University of Twente - ITC
URBAN TRANSPORT CHALLENGES OF DAR-ES-SALAAM

- Urban sprawl and informal development
- Increased automobile/motor bike ownership and use
- Heavy traffic congestion
- High levels of air pollution
- Traffic unsafety
- Lack of quality road infrastructure
- Lack of, or poor, infrastructure for walking and cycling (NMT)

→ Transport-related social exclusion, particularly for the urban poor population

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BRT AS AN OPPORTUNITY TO PROMOTE CYCLING

The introduction of the BRT system (DART) and other transport projects in Dar es Salaam have created a favourable environment to relook at the potential of cycling

Integrated with high quality cycling facilities along the corridors and beyond

(Nkurunziza et al., 2012a;2012b)
RESEARCH NEED

There is a need to examine how people can be influenced to change their travel behaviour towards bicycle use

- Analysis of *attitudes and perceptions* of daily commuters towards bicycle use may provide useful information for designing *targeted travel behaviour change strategies*

Keeping in mind that people behave differently as:

- They are driven by different travel needs
- They are motivated by different factors
- Experience different impediments to change
- Are affected in different ways by transport and urban policy

(Anable, 2005; Shiftn, Y. et al, 2008)
WHAT INFLUENCES TRAVEL CHOICES?

- Often interventions geared towards changing travel behaviour do not target people in their different stages of change of cycling behaviour.
  - *someone who cycles is in another stage of cycling behaviour than someone who ever cycled, but does not cycle anymore, or someone who never cycled!*

- Travel choices are influenced by:
  - Personal/individual factors such as social economic factors (income, age, gender etc.) as well as psychological factors (attitudes, norms, beliefs etc.)
  - Social environmental factors (e.g. culture, social norms etc.)
  - Physical environmental factors (e.g. topography, infrastructure, climate, land use characteristics etc.)

- ...and differ between people in different stages of change of cycling...
MAIN RESEARCH QUESTIONS

- How to identify and characterize potential cycling market segments to target cycling policy and promotion in Dar-es-Salaam?

- What are the factors that can potentially influence bicycle commuting in Dar-es-Salaam?
IDENTIFYING AND CHARACTERIZING CYCLING MARKET SEGMENTS

Segmentation done using the stages of change model of *Prochaska and Di Clemente* (1984; and further), also called the transactional model of behaviour change

- The model deals with intentional changes in behaviour
- In an attempt to change behaviour, an individual typically moves through different stages of change

(Prochaska and Diclemente, 1984)
TARGETED CAMPAIGNING, EXAMPLE: SMOKING

Table 2
Stages of Change in Which Change Processes Are Most Emphasized

<table>
<thead>
<tr>
<th>Processes</th>
<th>Precontemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conscientious raising</td>
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<td></td>
<td>Dramatic relief</td>
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<td></td>
<td>Environmental reevaluation</td>
<td>Self-reevaluation</td>
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<td>Self-liberation</td>
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<td></td>
<td>Contingency management</td>
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<td></td>
<td>Helping relationship</td>
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<tr>
<td></td>
<td>Counterconditioning</td>
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<td></td>
<td>Stimulus control</td>
<td></td>
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</tbody>
</table>

(Prochaska and Velicer, 1997)
TARGETED CAMPAIGNING, EXAMPLE: PHYSICAL EXERCISE

Denmark campaign

“You won’t believe it… you’re safer on the bicycle than on the sofa!”

“Lack of daily exercise is harmful to your health, while physical activity keeps your body healthy. Cycling extends your life – daily exercise for a minimum of 30 minutes extends your lifespan by up to five years.”
STUDY AREA AND DATA COLLECTION

Data were collected from individual *commuters* who travel to their daily activities on a regular basis *along* the proposed BRT corridors.

Also locations with lots of cyclists.

Around 600 data samples (long personal questionnaires) were collected and analyzed:

1. Socio-economic/demographic information
2. Travel behavioural information
3. Attitudes and perceptions towards bicycle use

with help of DCC, Uwaba, ward leaders, DART Agency, UDSM, Ardhi.
### ATTITUDINAL-VARIABLE STATEMENTS

<table>
<thead>
<tr>
<th>Statement shown to respondents</th>
<th>Corresponding stage of behaviour change</th>
</tr>
</thead>
<tbody>
<tr>
<td>I never really think about and not even consider cycling to my daily activity</td>
<td>Pre-Contemplation (PC)</td>
</tr>
<tr>
<td>I never used a bicycle but sometimes think about cycling to my daily activity</td>
<td>Contemplation (C)</td>
</tr>
<tr>
<td>I rarely or sometimes cycle and seriously consider riding to my daily activity</td>
<td>Prepared for Action (PA)</td>
</tr>
<tr>
<td>I have fairly often cycled to my daily activity</td>
<td>Action (A)</td>
</tr>
<tr>
<td>I cycle regularly to my daily activity</td>
<td>Maintenance (M)</td>
</tr>
<tr>
<td>I no longer cycle to my daily activities</td>
<td>Relapse (R)</td>
</tr>
</tbody>
</table>
IDENTIFIED STAGES OF CHANGE SEGMENTS OF CYCLING BEHAVIOUR IN DAR-ES-SALAAM

Classification of the data sample by stages of change

13% Pre-contemplation
7% Contemplation
9% Preparedness to Action
18% Action
6% Maintenance
6% Relapse

(Nkurunziza et al., 2012c)
### Main Perceived Motivational Factors for Cycling by Segment

<table>
<thead>
<tr>
<th>Stage of change segment</th>
<th>Perceived motivational factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
<td>Separate bicycle paths (52%)</td>
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<tr>
<td></td>
<td>Cycling training and education on traffic rules (15%)</td>
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<td></td>
<td>Public awareness on cycling (10%)</td>
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<td></td>
<td>Other factors (23%)</td>
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<tr>
<td>Contemplation</td>
<td>Special bicycle infrastructure (45%)</td>
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<td></td>
<td>Cycling training and education centres (20%)</td>
</tr>
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<td></td>
<td>Reduction of bicycle prices (13%)</td>
</tr>
<tr>
<td></td>
<td>Enforcement of road safety rules (10%)</td>
</tr>
<tr>
<td></td>
<td>Other factors (12%)</td>
</tr>
<tr>
<td>Prepared for action</td>
<td>Access to bicycle loans (57%)</td>
</tr>
<tr>
<td></td>
<td>Enforcement of road safety rules (20%)</td>
</tr>
<tr>
<td></td>
<td>Reduction of bicycle prices (15%)</td>
</tr>
<tr>
<td></td>
<td>Free bicycles (8%)</td>
</tr>
<tr>
<td>Action</td>
<td>Reduction of bicycle prices (65%)</td>
</tr>
<tr>
<td></td>
<td>Enforcement of road safety rules (20%)</td>
</tr>
<tr>
<td></td>
<td>Traffic laws and road safety rules should be designed in favour of cyclists (10%)</td>
</tr>
<tr>
<td></td>
<td>Other factors (5%)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Reduction of bicycle prices (57%)</td>
</tr>
<tr>
<td></td>
<td>Educating car drivers to change their attitude towards cyclists (35%)</td>
</tr>
<tr>
<td></td>
<td>Other factors (8%)</td>
</tr>
<tr>
<td>Relapse</td>
<td>Special bicycle infrastructure (60%)</td>
</tr>
<tr>
<td></td>
<td>Enforcement of road safety rules (25%)</td>
</tr>
<tr>
<td></td>
<td>Shorter travel distances (11%)</td>
</tr>
<tr>
<td></td>
<td>Other factors (4%)</td>
</tr>
</tbody>
</table>
CHARACTERISTICS OF MARKET SEGMENTS

🌱 Pre-contemplators (*negative to cycling)*:
- middle/high income male working predominantly in government and private offices, and uses private car and public transport
- (-) distance, status of cycling, safety
- opportunity: infra, cycling training and enforcement, but less likely to work

🌱 Contemplators (*positive attitude to cycling)*:
- low income, secondary school students and women
- (-) fitness to cycling, cultural barriers, access to bicycle
- opportunity: personal guidance in cycle route testing if infrastructure is there

🌱 Prepared to cycle (*very positive attitude to cycling)*:
- both male/female, no vehicle ownership, low/medium income, aware of benefits of cycling and cost saving
- (-) access to bicycles, infrastructure, safety
- opportunity: develop specific action plans to remove critical constraints
CHARACTERISTICS OF MARKET SEGMENTS

- **Action** (*actually cycling, but irregularly*)
  - male dominated, low education, bicycle ownership, bicycle is an alternative
  - (-) infrastructure, enforcement and safety
  - opportunity: combating feelings of loss, re-iterate long term benefits

- **Maintenance** (*actually cycling*)
  - regular bicycle commuters, male, income generating cycling, bicycle means more accessibility
  - (-) other traffic
  - opportunity: positive feedback, social support and reminders of good behaviour

- **Relapse** (*stopped cycling*)
  - medium/high education, both male/female, vehicle owners
  - (-) no dedicated infrastructure, lack of enforcement
  - Opportunity: re-assess motivation and barriers to cycling, stronger coping strategies

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Social-ecological framework (Sallis and Owen, 2002) to reveal key-motivational factors for the segments that show behavioural change intention and manifestation.
SUMMARIZING KEY MOTIVATORS - I

Policy-related factors:

- Low bicycle price (access to bicycles)
- Quality of bicycle
- Cycling training
- Exemption of import tax on bicycles

are the major potential influencing (key motivators) of bicycle commuting
SUMMARIZING KEY MOTIVATORS - II

Individual (personal) factors:

- Social (in) security
- Social status
- Not being comfortable on a bicycle
- Safety on the road

have the most negative impact on bicycle commuting
SUMMARIZING KEY MOTIVATORS - III

 Physical factors:
  - Weather (tree shade)
  - Lack of cycling infrastructure & facilities (safe parking, showers etc)

have a negative impact on bicycle commuting

 All three sets of key motivators seem equally important

 Interestingly enough most key motivators resemble the key success factors of Dutch cycling-inclusive urban policies
CONCLUSION AND FURTHER RESEARCH

- Individual commuter perceptions and attitudes can help in understanding bicycle commuting behaviour.
- Addressing physical barriers alone is likely to have little impact on bicycle commuting promotion.
- The stage of change model can indicate the target market and the potential for modal change.
- Determining key motivational factors specific to users groups can guide cycling promotional strategies.
- Further develop segment based policy recommendations and promotional strategies now the climate for talking about cycling in Dar-es-Salaam is good.
- Need to investigate life changing/social events to better understand the large group of relapse users.
THANK YOU!

- More information
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  - Mark Zuidgeest
    - zuidgeest@itc.nl

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FURTHER READING


