Bike Rio Sharing System: an exploratory analysis to understand users profile and trip patterns

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By 2017 there were around 900 BSS operating worldwide and numbers continue to rise rapidly.

Brazil currently leads the ranking in Latin America with BSS in 15 cities, behind China (17), North America (64) and Europe (165).
To make an exploratory analysis using data from Bike Rio (2013-2016) and them:

(a) analyze the user's profile regarding travel behavior;
(b) show the interactions between travel patterns and land use;
(c) identify priority areas for mobility management.
Bike Rio: users and trips

**Bike Rio User Profile**

- Year: 2013-2016
- Users = 468,922
- Trips = 4,397,412
- Age range = 20-40
- Cities (%) = RJ (47) SP (15) RS (7) MG (6)
Bike Rio Database

Steps
- Literature Review
- Data Prep
- Multiple Correspondence Analysis
- Data Visualization

Tools
- Scopus-Elsevier
- SPSS e Tableau
- SPSS
- QGIS

Results
[User Profile<>Land Use<>Trip Pattern]

Source: DeCastro, 2017
study area
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<td>836,809</td>
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Transportation planning: underlying premise

Land Use Patterns
Rio de Janeiro

Density
Diversity
Accessibility
Mobility

Supply
Bike Sharing System

Demand
User Profile

Source: interactions and spatio-temporal dynamics - DeCastro, 2017
CORRESPONDENCE ANALYSIS

Potential for a nonparametric analysis technique little used in transport research;

Based on a variety of metric and nominal variables which would be less easy to consider when using more standard multivariate techniques such as cluster analysis;

Also because not all the observation need to be forcibly classified;

Guidance to improve the results of a standard quantitative analysis, while keeping low computational complexity;

Source: DIANA, M. & PRONELLO, C. 2010 – Transport Policy 17, pp. 183-190
Source: SPSS Correspondence Map - DeCastro, 2017

**Correspondence Analysis**

**Deriving users profiles**

A = female; weekends occasional use; O=D; limited movement insight of RP; 30-60min average usage time

B = male; weekdays regular use; O#D; free movement insight of RP; lower average usage time (15 min)

C = occasional use; visitor; daily fee; higher average usage time (+60 min); age range (20-40)

D = regular use; O#D; monthly fee; middle average usage time (15-30 min); age range (40-60)
Source: Bike Rio Evolution of Demand per Year (2013-2016) - DeCastro, 2017
Source: Bike Rio Evolution of Demand per Week and Time (2013-2016) - DeCastro, 2017
Source: QGIS Total of Trip Generations by stations (2013-2016) - DeCastro, 2017
Source: QGIS Total of Trip Generations (O+D) by stations on weekdays (2013-2016) - DeCastro, 2017
Source: QGIS Total of Trip Generations (O=D) by stations on weekends (2013-2016) - DeCastro, 2017
Padrão de deslocamento do sistema Bike Rio na Zona Sul, Tijuca e Centro:

Gênero feminino

Gênero masculino

Legenda

- Verde: Malha ciclovíária existente
- Azul claro: Delimitação da área de estudo
- Cinza: Fluxo no dia útil
- Laranja: Fluxo aos finais de semana

Source: QGIS Female and Male Trip Patterns (RP South Zone, Tijuca and Downtown) - DeCastro, 2017
Padrão de deslocamento do sistema Bike Rio na Barra da Tijuca:

Gênero feminino

Gênero masculino

Legenda:
- Linha clara: malha ciclovíária existente
- Linha escuro: fluxo no dia útil
- Linha laranja: fluxo aos finais de semana
- Triângulo azul: delimitação da área de estudo
- Quadrado verde: estações de Bike Rio

Source: QGIS Female and Male Trip Patterns (RP Barra da Tijuca) - DeCastro, 2017
priority areas for mobility management

- Travel segmentation communication strategy
- Rebalancing challenges
- Better connectivity to public transportation
Comments and suggestions are welcome