MOBILE POSITIONING DATA: A NEW DATA SOURCE FOR MEASURING Population Mobility

Edi Setiawan
Population and Labor Mobility Statistics Division
BPS-Statistics Indonesia
Feasibility on using Big Data for Official Statistics
1. 96.4 per 100 inhabitants mobile phone subscription world wide.

2. Every mobile phone user leaves a digital footprint that we can learn about the pattern.
BPS’ initiatives

With Big Data for Official Statistics

- Foreign Tourists at Cross Border Posts
- Domestic Visitors
- Commuting Statistics
- Event based analysis
  - Asian Games
  - IMF-WB annual meeting
Foreign Tourists at Cross Border Posts
Origin of Domestic Tourist to Surabaya

- Others: 51%
- Bangkalan: 4%
- Probolinggo: 4%
- Jember: 4%
- Sidoarjo: 6%
- Kota Malang: 5%
- Lamongan: 4%
- Probolinggo: 4%
- Kediri: 2%
- Pasuruan: 2%
- Gresik: 8%
- Malang: 9%
BPS’ initiatives
With Big Data for Official Statistics

MIGRATION STATISTICS

- Foreign Tourists at Cross Border Posts
- Domestic Visitors
- Commuting Statistics
- Event based analysis
  - Asian Games
  - IMF-WB annual meeting
Mobile Positioning Data (MPD)
3 Quick Facts of Mobile Positioning Data (MPD) in Indonesia

- 350M active mobile phone number
- Real time
- All numbers have to register based on Single Identification Number as in the personal ID Card
Data Sources

**Location Based Service (LBS):**
Based on geo-data to calculate the presence of cellular subscriber in particular area

**Call Detailed Record (CDR):**
Based on geo-data to calculate all transactions of cellular subscriber in particular area

- MoU
- Buy the services
MODEL ORIGIN-DESTINATION

Trip in usual environment used to identify the commuter and circular actors

Sumber: Saluveer, 2018
Algorithm to identify The Commuters

Start

Generate staypoint from raw data

Predict “home” and “work” location based on historical data

Remove another location information outside "home" and "work" from the staypoint data

Count the number of days when person is detected at home in the morning, works during the day, and returns to home at night every month

Determine the threshold of count days

End
QUALITY ASSURANCE

- Validation for trip identification results
- Validation using volunteer data
- The validation result used to improve the methodology
Using Mobile Positioning Data

Using latitude longitude data, we can measure distances of origin and destination.

Using date and time, we can measure duration of the movements.

Using local administrative units (LAU), we can know the movements between regions.
After usual environment identification, we can measure the distance between these points and measuring travelling time, we can predict vehicle type.
## Comparison of Survey & MPD

<table>
<thead>
<tr>
<th></th>
<th>Survey</th>
<th>MPD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Region</strong></td>
<td>Bandung Regency</td>
<td>Bandung Regency</td>
</tr>
<tr>
<td><strong>Period</strong></td>
<td>June, 2017</td>
<td>December, 2017</td>
</tr>
<tr>
<td><strong>Unit Sample</strong></td>
<td>Household Survey</td>
<td>Telkomsel Subscriber</td>
</tr>
<tr>
<td><strong>Sample size</strong></td>
<td>16.572</td>
<td>~ 2 million?</td>
</tr>
</tbody>
</table>
Using Mobile Positioning Data

Measuring Commuters

Commuter Estimation Comparison using Survey vs MPD

Kabupaten

KOTA BANDUNG
SUMEDANG
KOTA CIMahi
BANDUNG BARAT
GARUT
lainnya
Using Mobile Positioning Data

Commuter Estimation Comparison using Survey vs MPD

Commuter Survey vs MPD
Commuter Estimation Comparison using Survey vs MPD
Future Action Plans using MPD

- Focus Group Discussion under coordination of ministry of planning
- Continuing the cooperation and agreement with Telkomsel
- Signing MoU with Positium – Estonia
- Coordination with Ministry of Telecommunication and Information for gathering data from all provider and making data access free of charge
Transnationalism VS Migration

*Transnationalism refers to a situation where a person has close ties to or is active in several countries (Schiller et al 1995)
1. How many transnational people are there originating from Indonesia?
2. How do they travel and who are they?
3. How should this new information on transnationalism be understood from the point of view of nation-state and territoriality?

Tracking Transnationalism with Mobile Telephone Data
**ADVANTAGES**
1. MPD can describe movements between times
2. The longer the data series the better the accuracy produced
3. Near real time data

**LIMITATIONS**
1. Boundaries issue
2. Privacy issue
3. Data authorization
4. Need to adjust concepts and methodologies with the characteristics of big data
Together
WE
Achieve
More

“TERIMA KASIH
Thankyou”