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 worldwide.

2. Every mobile phone user leaves a digital footprint that we can learn about the pattern.
BPS’ initiatives
With Big Data for Official Statistics

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Foreign Tourists at Cross Border Posts</td>
<td></td>
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<tr>
<td>Domestic Visitors</td>
<td></td>
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<tr>
<td>Commuting Statistics</td>
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<tr>
<td>Event based analysis</td>
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<tr>
<td>• Asian Games</td>
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<tr>
<td>• IMF-WB annual meeting</td>
<td></td>
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</tbody>
</table>
Foreign Tourists at Cross Border Posts

CROSS BORDER

DAY 1 – 19

INTERNATIONAL VISITOR

Telkomsel ROAMING

celcom

Digi

maxis

mobile
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 circulair actors

Sumber: Saluveer, 2018
### Algorithm to identify The Commuters

1. **Start**
2. Generate staypoint from raw data
3. Predict “home” and “work” location based on historical data
4. Remove another location information outside "home" and "work" from the staypoint data
5. 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
6. Determine the threshold of count days
7. **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 local administrative units (LAU), we can know the movements between regions.

Using date and time, we can measure duration of the movements.
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>
Measuring Commuters Using Mobile Positioning Data

Commuter Estimation Comparison using Survey vs MPD
Using Mobile Positioning Data

Commuter Estimation Comparasion using Survey vs MPD

Commuter Survey vs MPD
Commuter Estimation Comparasion 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 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?
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”