INDONESIA’S EXPERIENCE OF USING SIGNALING MOBILE POSITIONING DATA FOR OFFICIAL TOURISM STATISTICS

By

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(BPS – Statistics Indonesia and Positium LBS)
BPS rely on the Immigration Record and Border Survey for Inbound & Outbound Tourism Data

Visits from neighbouring countries only 7% of tourism

Under Coverage:

→ Not All Border Gates have 24/7 Immigration service
→ Not All Borders have border gates
→ Border Survey is too Expensive
In line with UN Recommendation “A World that Count”

Big Data
- Can be compiled automatically
- Real Time
- Less Manual Labour

Data Revolution For Sustainable Development

The integration of these new data with traditional data to produce high-quality information that is more detailed, timely, and relevant for many purposes and users, especially to foster and monitor sustainable development.

MPD as one of the Most Promising ICT Data Sources

To measure the mobility of people, including mobility of tourists. The digital footprint left by the users is very sensitive, but also highly valuable, as it provides new possibilities to measure and monitor the spatio-temporal activities of the population.
CDR – records of active use of mobile phones

Signalling – all signals of mobile phones captured by the BTS (mobile antenna), even with no call/text

Indonesia uses signaling data due to its precision - it captures more trips than CDR.

- Signaling data detected more roamers than CDR (on average 3.47 times).
- So, it overcomes undercoverage issues, especially in less mobile BTS-dense area.
Signalling contributes most in hard-to-reach areas

1. Islands
2. Border to less developed countries

**Graph**: Signalling data vs CDR

- More trips
- Even more trips from signalling data
- Signalling contributes more
- Signalling contributes less
- Trendline

**Data Points**:
- Natuna island
- Talaud islands
- Anambas islands
- Kupang on the Timor Leste border
- Boven Digoel near Papua
- Malaka on the Timor Leste border
- Sangihe islands

**Axes**:
- Number of trips from signalling data (multiplier ratio)
- Number of trips from CDR data
Statistical and Non Statistical Noise

- Fast fliers
- Seamen
- Accidental roamers
- Other transit
MPD Error (RMSE) decreases significantly after adjustments.

MPD all trips in Bintan vs main port immigration data, rough adjustment with Positium methods.

Total improvement in RMSE: 5x, 8x, 11x.
IMMIGRATION DATA VS MPD

With and without filters: Tourism arrivals in Bintan

- MPD original
- MPD wo LOS1+seamen+fast flyers
- Immigration
Implement MPD Data since October 2016.

Data provided by MNO → aggregate table.

Oct-Dec 2016: MPD was applied to 19 districts, since January 2017 became 25 districts.

Filtering using a simple 7/20 formula (until Dec 2017), neighbouring countries.

Since January 2018, Filtering MPD has already been using a new formula.

Now BPS has an MoU with the biggest MNO in Indonesia, so we can have a sandbox to process MPD.

From 2019, automatic system of processing tourism statistics with all the necessary algorithms to remove noise.
\[ AT = \frac{MPD}{X_{roam}} \times P \times (1 - P_w) \times \left( \frac{1}{1 - P_{nr}} \right) - WCI \]
RESULTS

Number of additional Tourists Jan-July 2018

MPD significantly increases the coverage of inbound tourism in Indonesia.
Before MPD use (2015)

<table>
<thead>
<tr>
<th>Indonesia</th>
<th>Other countries</th>
</tr>
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<tbody>
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<td>7%</td>
<td>30-60%</td>
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Indonesia currently already has draft of Methodology Concept and QAF handbook for the use MPD in Cross Border Inbound Tourism
THANK YOU