



STATISTICS INDONESIA

The Use of Mobile Phone Data for Tourism and Commuting Statistics

2nd International Seminar on Big Data

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China, 09 September 2021



Mobile Phone Data can be used as

Complement for other data sources

- ✓ Complement for immigration data (administrative data)
- ✓ Inbound tourism, when there is no immigration checkpoint, destination analysis
- ✓ Outbound tourism, to obtain country of destination and length of stay in each country

Replacement for other data sources

- ✓ Domestic tourism, replacement of household survey
- ✓ Commuting, replacement of household survey
- ✓ Inbound tourism, replacement of shuttle trade (cross border) survey
- ✓ Event analysis, replacement of survey or ticket sales



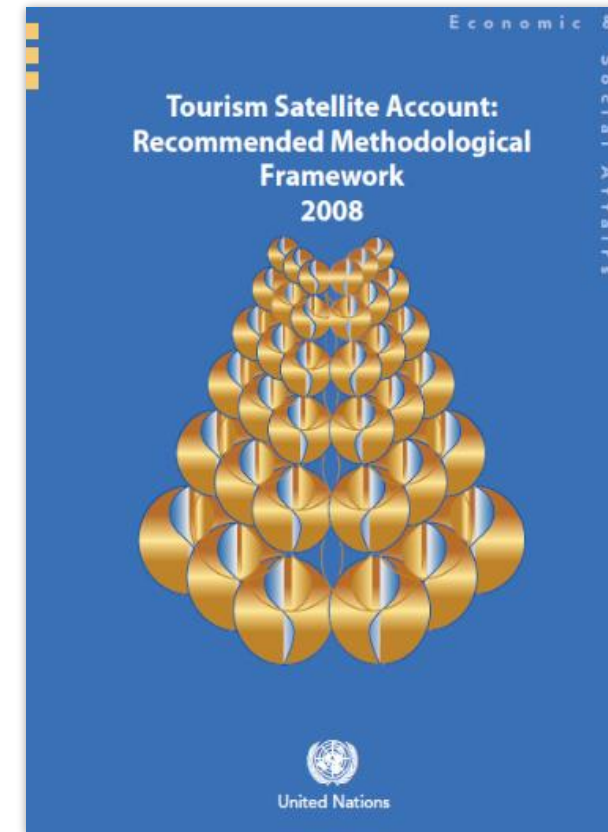
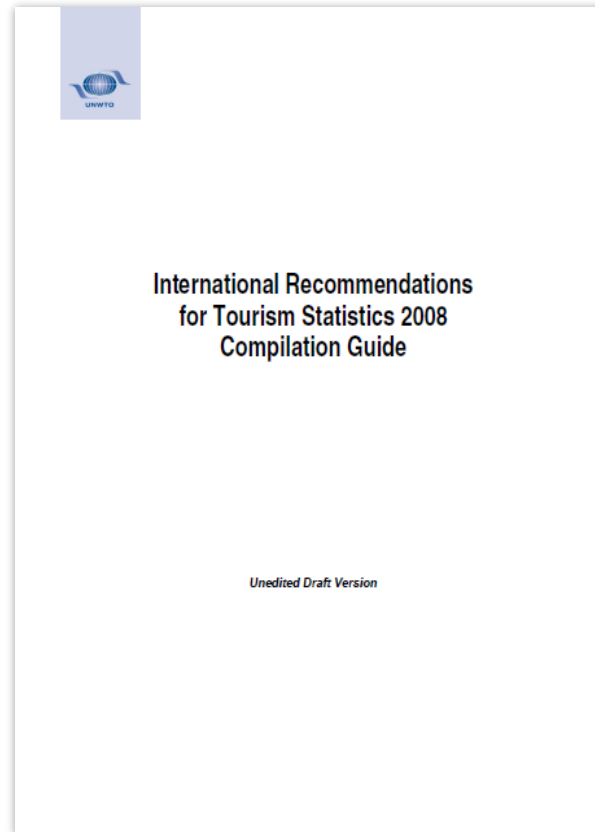
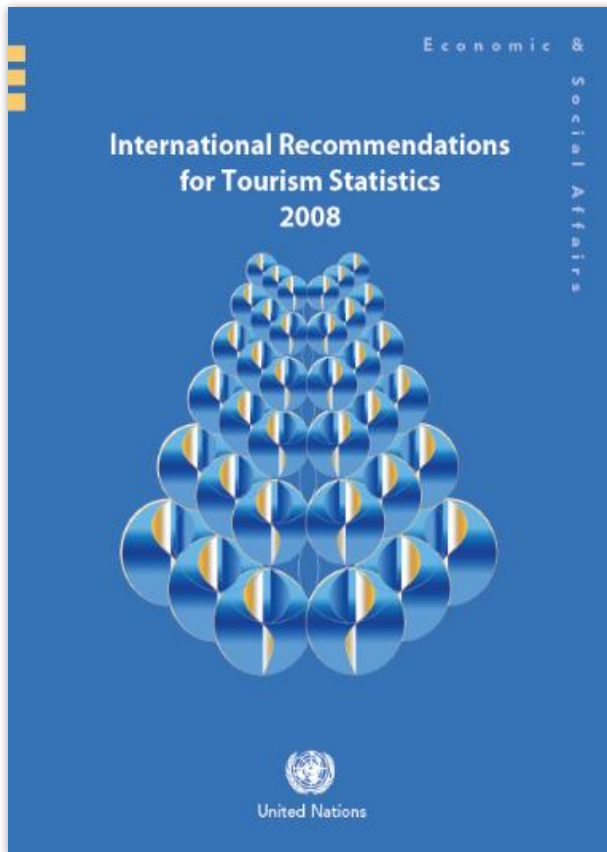
Use Cases in Tourism and Commuting Statistics

- ✓ Inbound Tourists (number of tourists, length of stay, place visited)
- ✓ Outbound Tourists (number of tourists, length of stay, country visited)
- ✓ Domestic Tourists (number of tourists, length of stay, place visited, O-D matrix)
- ✓ Event Analysis (number of visitors, venue visited)
- ✓ Commuting (number of commutes, O-D matrix)

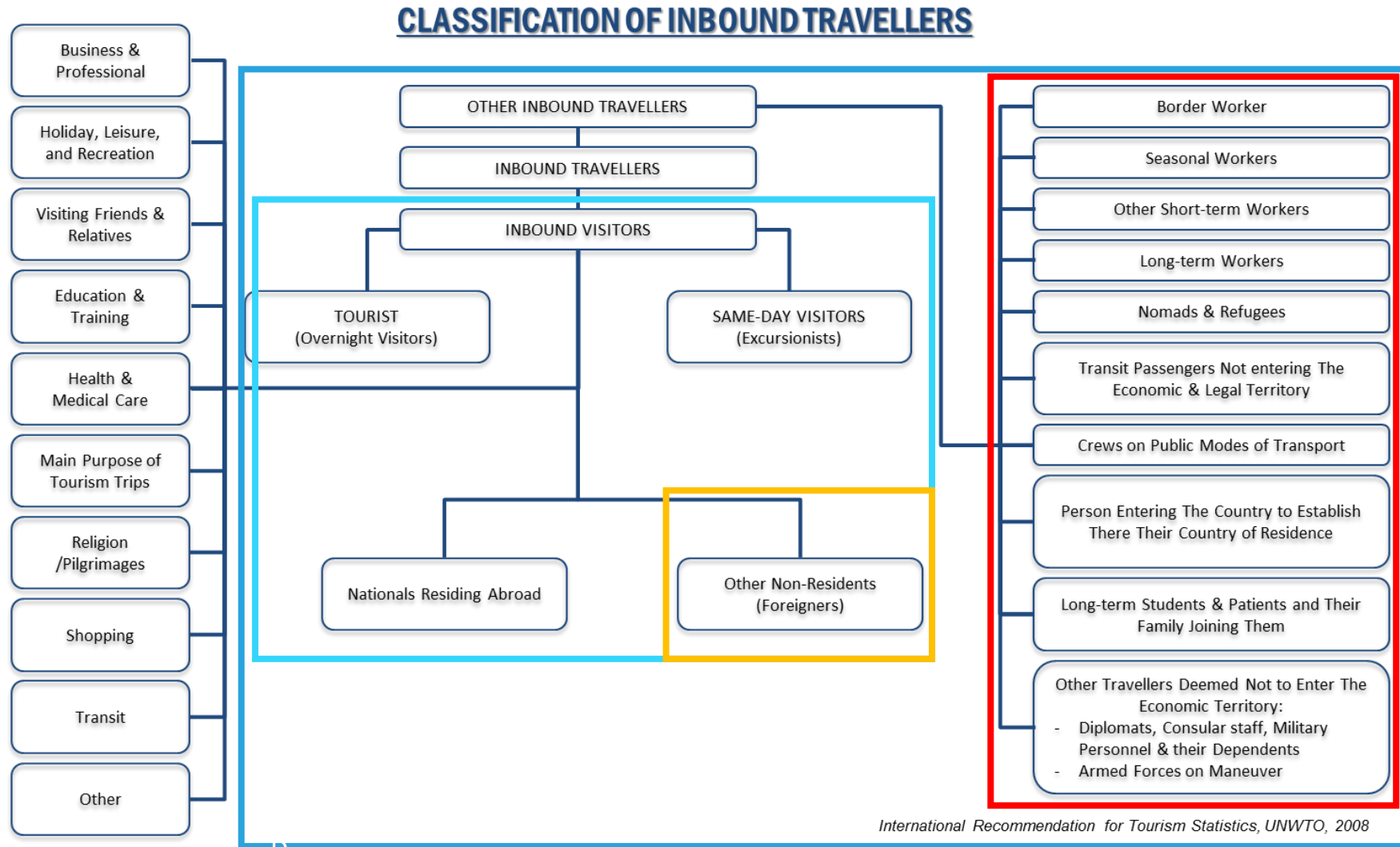




Tourism Statistics Manuals



How do we implement the tourism concept to mobile phone data



What data is used

Signalling (probe)

- ✓ Capture more data (very big, especially for domestic tourism)
- ✓ Good for tourism statistics and commuting
- ✓ Add noises (statistical and non statistical)

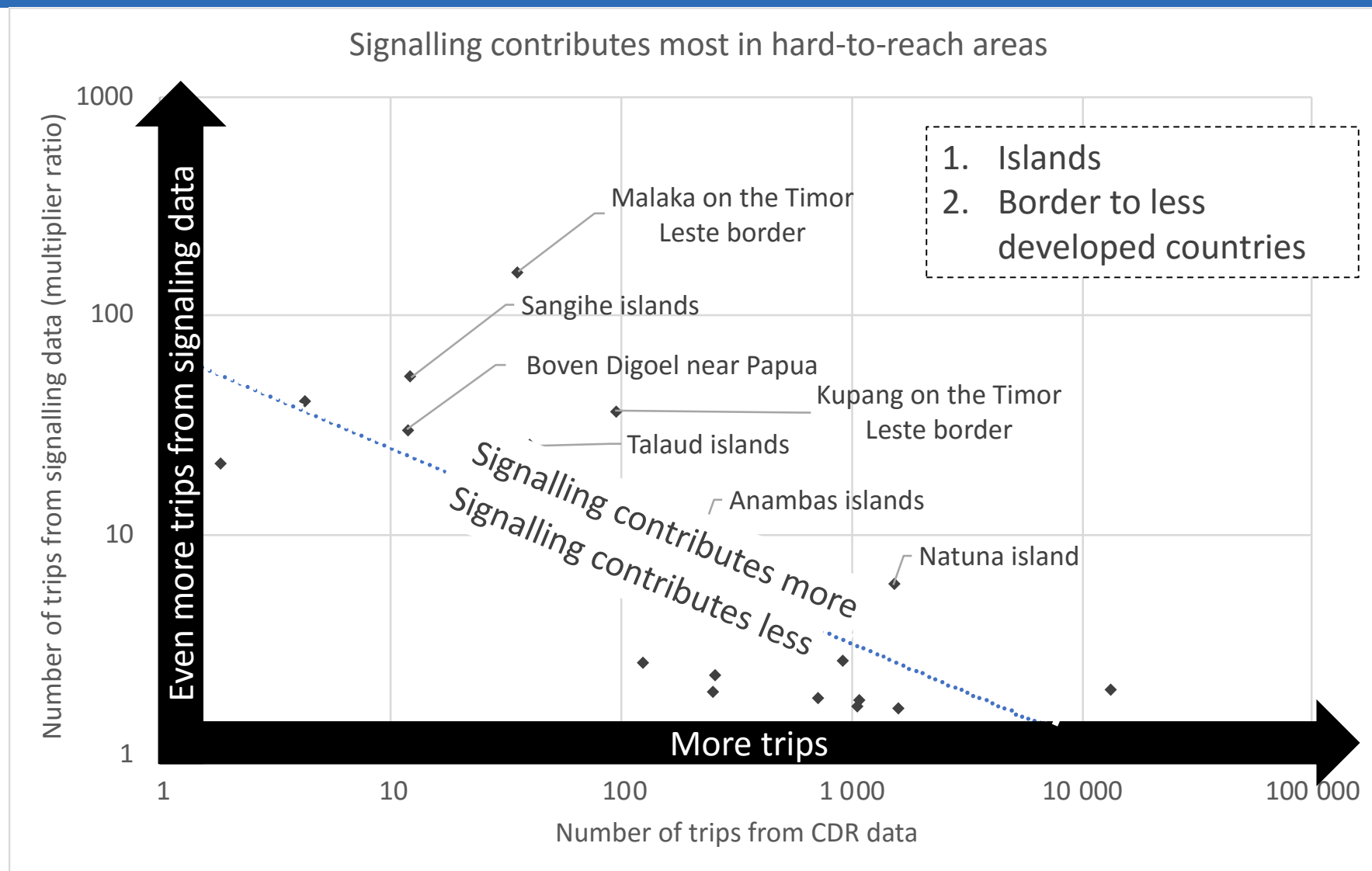
Call Detail Record (CDR)

- ✓ Less data
- ✓ Possible under coverage, especially for inbound and outbound





Signalling vs CDR

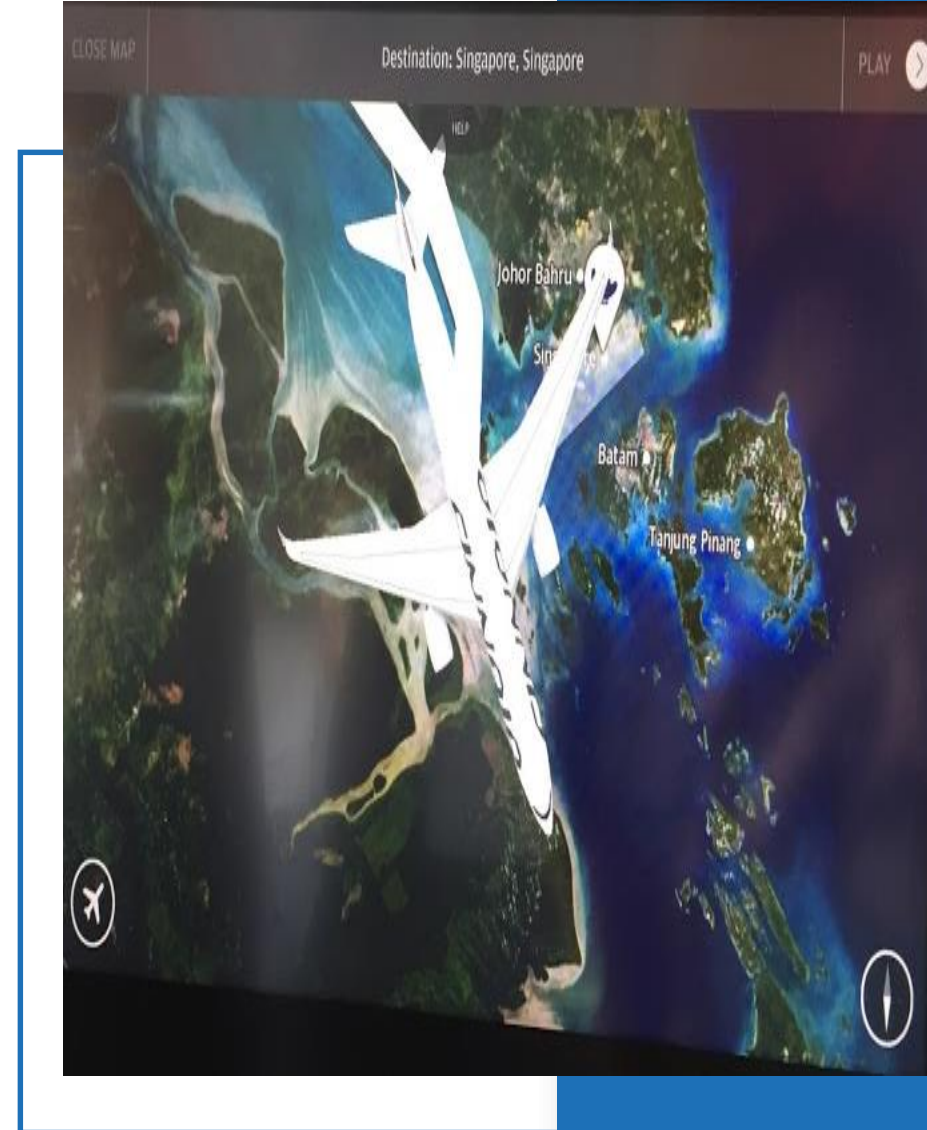


Statistical and Non Statistical Noises

- ✓ Fast fliers
- ✓ Seamen
- ✓ Accidental Roamers
- ✓ Other transit

Methodology is important

- ✓ Filtering method





MPD for Official Tourism Statistics

Press Release



Perkembangan Pariwisata dan Transportasi Nasional Juli 2021

A. Perkembangan Pariwisata

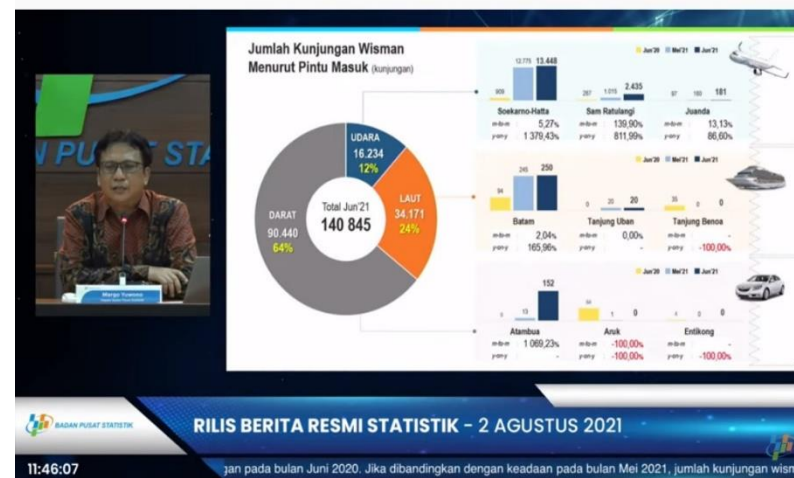
Jumlah kunjungan wisman ke Indonesia pada bulan Juli 2021 mencapai 138,97 ribu kunjungan. Sementara TPK hotel klasifikasi bintang mencapai 22,38 persen.

- Jumlah kunjungan wisatawan mancanegara ke Indonesia pada bulan Juli 2021 turun sebesar 10,77 persen dibandingkan dengan jumlah kunjungan bulan Juli tahun sebelumnya. Sebaliknya, jika dibandingkan dengan bulan Juni 2021, jumlah kunjungan wisman pada bulan Juli 2021 meningkat sebesar 1,25 persen.
- Secara kumulatif (Januari–Juli 2021), jumlah kunjungan wisman mencapai 937,75 ribu kunjungan atau turun sebesar 71,42 persen jika dibandingkan dengan jumlah kunjungan wisman pada periode yang sama tahun 2020 yang berjumlah 3,28 juta kunjungan.
- Tingkat Penghulian Kamar (TPK) hotel klasifikasi bintang di Indonesia pada bulan Juli 2021 mencapai 22,38 persen atau turun 5,69 poin dibandingkan dengan TPK bulan Juli 2020 yang tercatat sebesar 28,07 persen. Jika dibandingkan dengan bulan sebelumnya, Juni 2021, TPK pada bulan Juli 2021 juga mengalami penurunan sebesar 16,17 poin.
- Rata-rata lama menginap tamu asing dan Indonesia di hotel klasifikasi bintang selama bulan Juli 2021 mencapai 1,82 hari, atau meningkat sebesar 0,16 poin jika dibandingkan dengan bulan Juli 2020 yang tercatat sebesar 1,66 hari.

Perkembangan Pariwisata dan Transportasi Nasional Juli 2021 1



badan pusat statistik

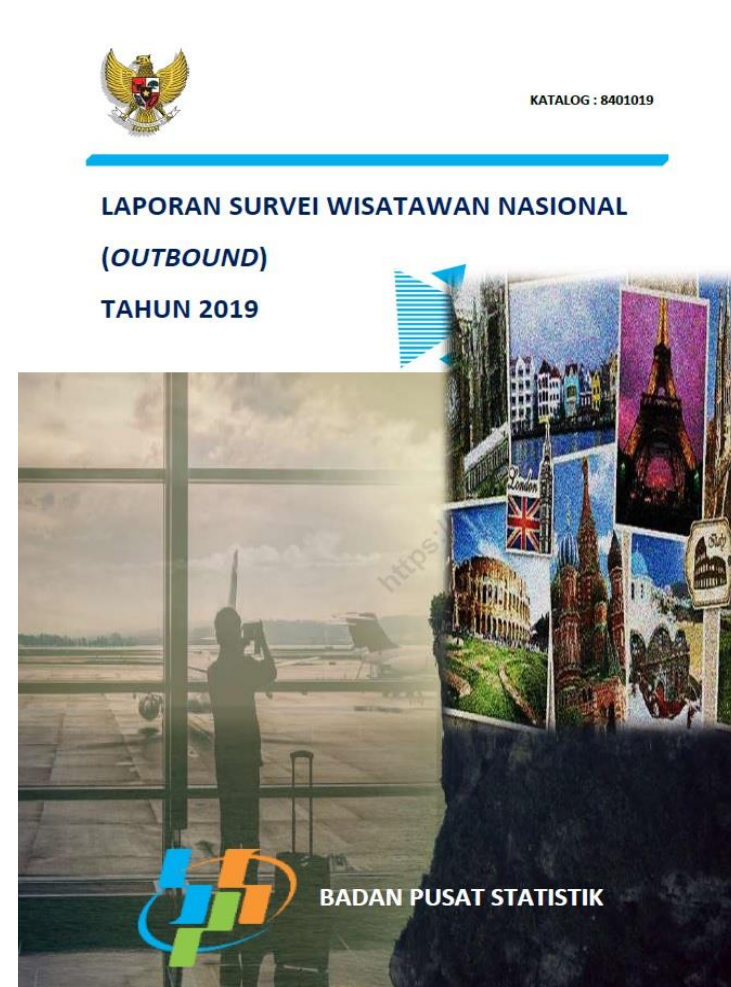


<https://www.bps.go.id/pressrelease.html>



MPD for Official Tourism Statistics

Publications



For Official Statistics

1

Quality Assurance

- *In line with UN-QAF, Big Data QAF, NSO's QAF*

2

Sound Methodology

- *Various methodologies*
- *Choose that reflect reality*

3

Privacy-Preserving Processing

- *Privacy protected*
- *Aggregate data*





Quality Assurance

Quality Assurance

- In-line with BPS QAF Handbook (for Census, Survey and Administrative data)
- In-line with UN QAF and Unece QAF for Big Data
- Quality check (Input, Throughput, Output)

Input Quality Checking (First gate)

- Data gaps
- Missing data
- Incorrect timestamps
- Duplicate record

Throughput Quality Checking (Second gate)

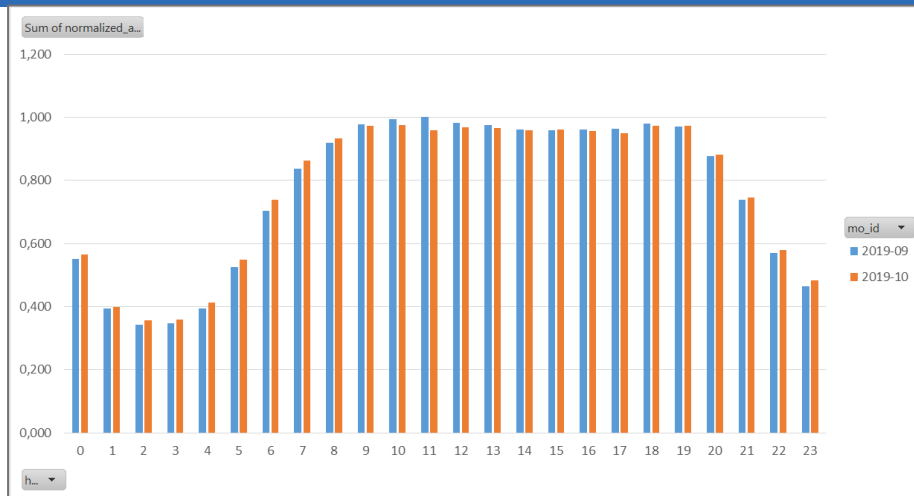
- Errors in data processing
- Overwrites

Output Quality Checking (Third gate)

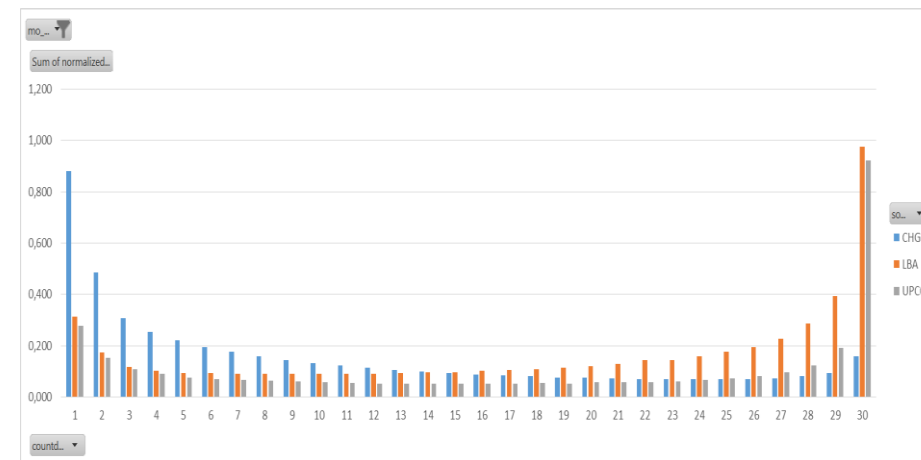
- Anomalies checking
- Coherence with other data
- New phenomena can be explained
- Passed Calibration/Comparison with other data



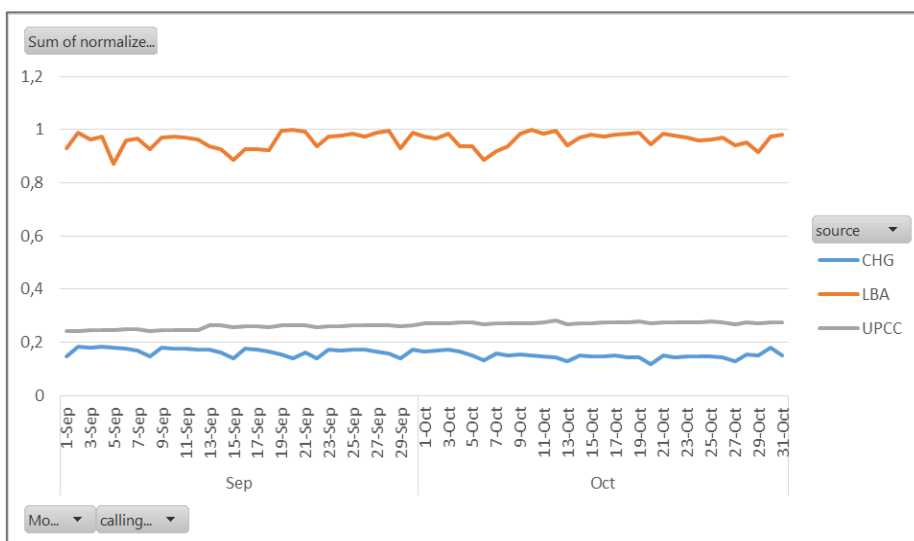
Some Quality Assurance Results



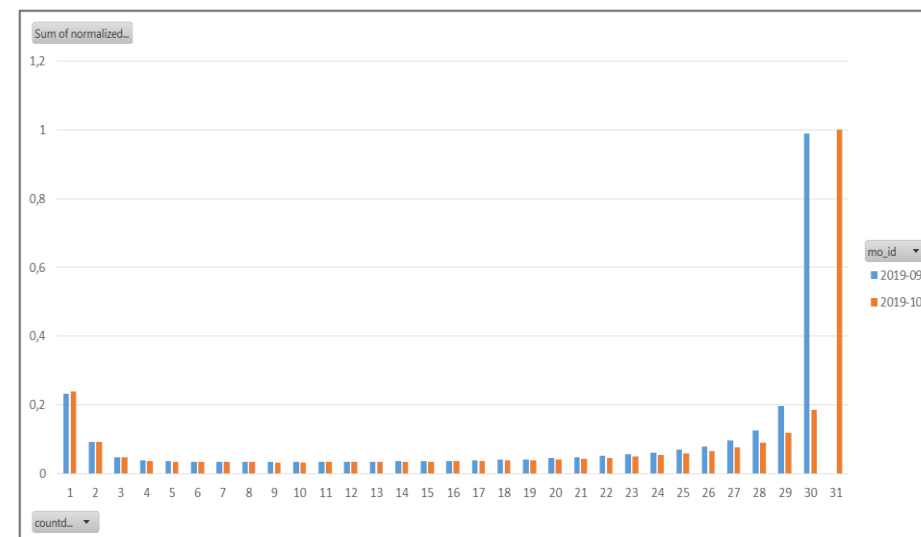
Natural hourly rhythm



Logical daily present



Steady data flow

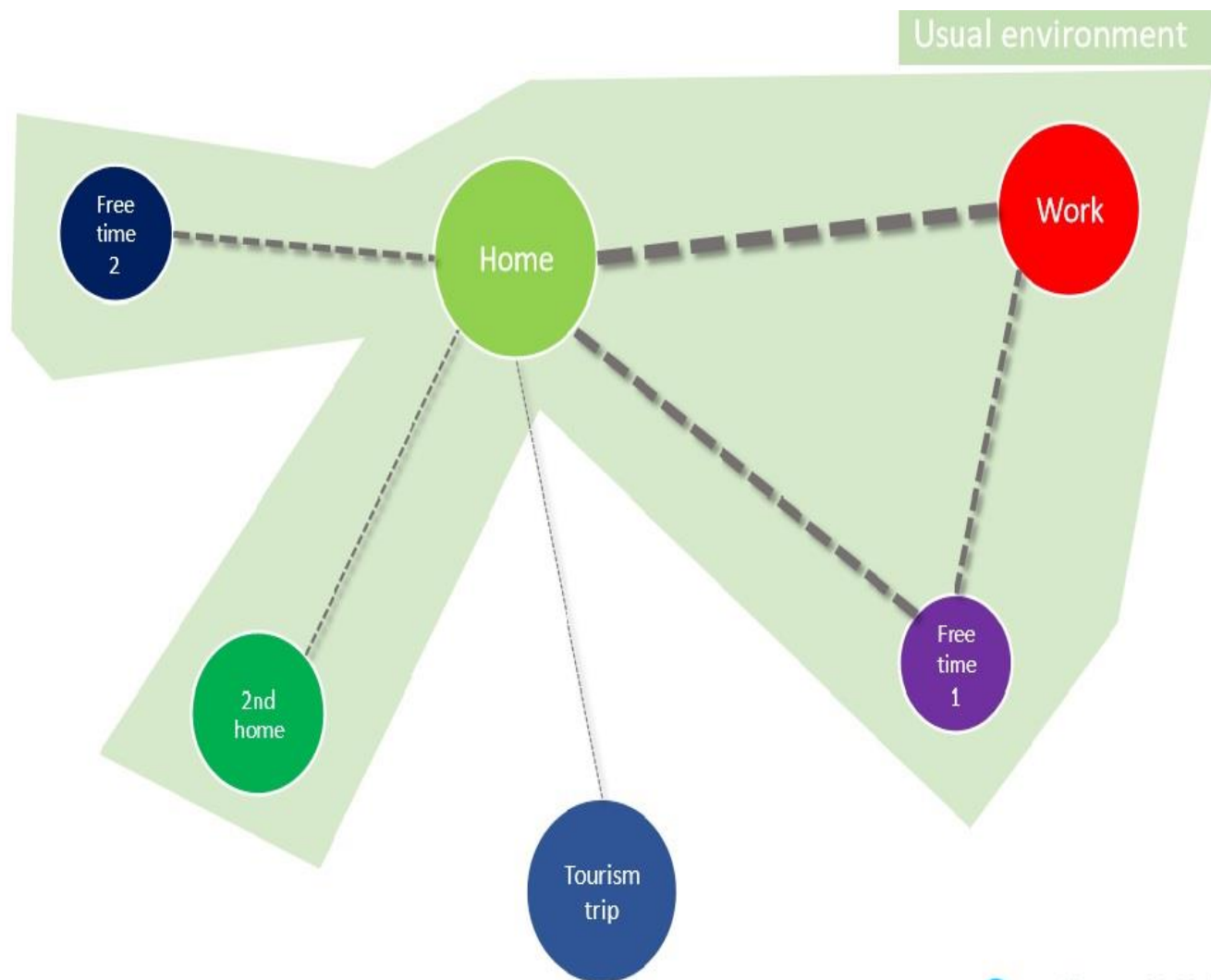


Logical daily present





Usual Environment



- ✓ Outside usual environment, tourist
- ✓ Home-work, commute
- ✓ Changing home, over a year, internal migration

Privacy Protected through Pseudonymization and k-Anonymity

```
lbs.limit(5).toPandas()
```

	datetime	hashed_msisdn	source	latitude	longitude	id_prov	id_kab	id_kec	node	calling_date
0	2020-01-27 01:15:32	-6280891885648479061	LBA	-6.24991	106.60868	36	03	051	3G	2020-01-26
1	2020-01-26 19:15:23	-6280891885648479061	LBA	-6.24991	106.60868	36	03	051	3G	2020-01-26
2	2020-01-26 16:15:19	-6280891885648479061	LBA	-6.24991	106.60868	36	03	051	3G	2020-01-26
3	2020-01-26 03:49:04	8422727271182682645	UPCC	-6.48370	107.68290	32	13	120	4G	2020-01-26
4	2020-01-27 06:53:55	8422727271182682645	LBA	-6.48378	107.68292	32	13	120	3G	2020-01-26

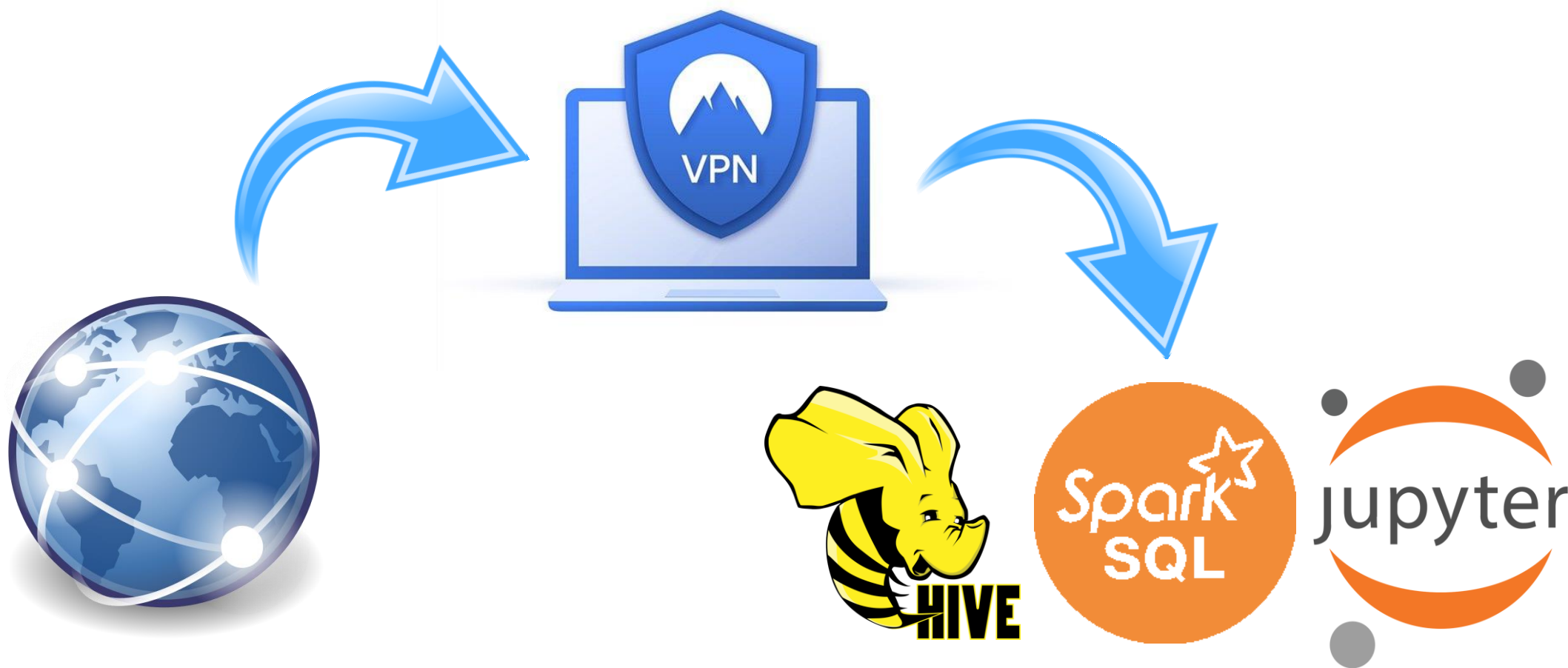
- ✓ The subscribers is masked with hash, when data scientists processed
- ✓ The data produce is aggregate data (tables)





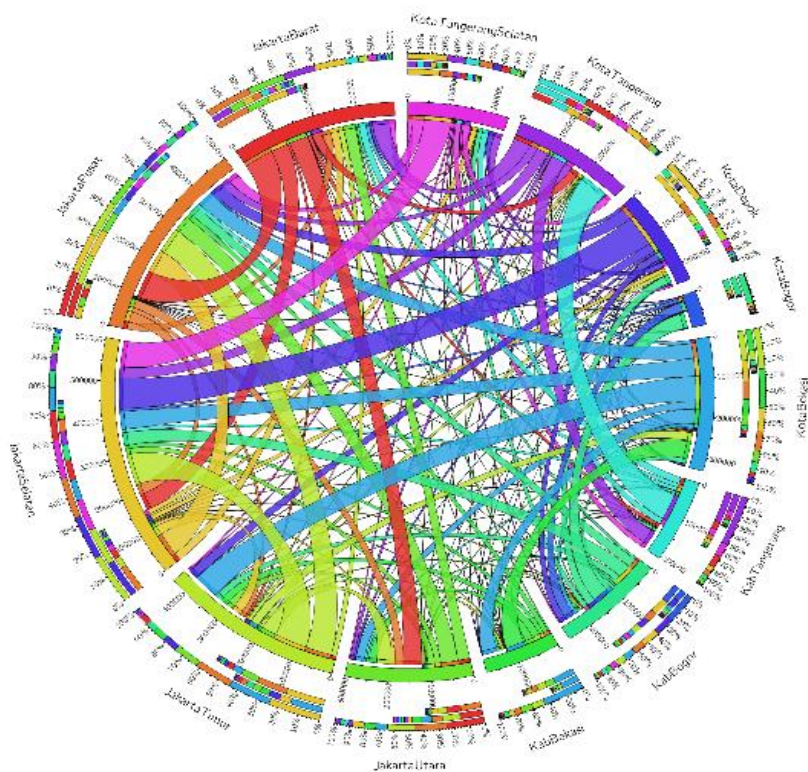
Data Architecture of Sandboxing

For Mobile Positioning Data

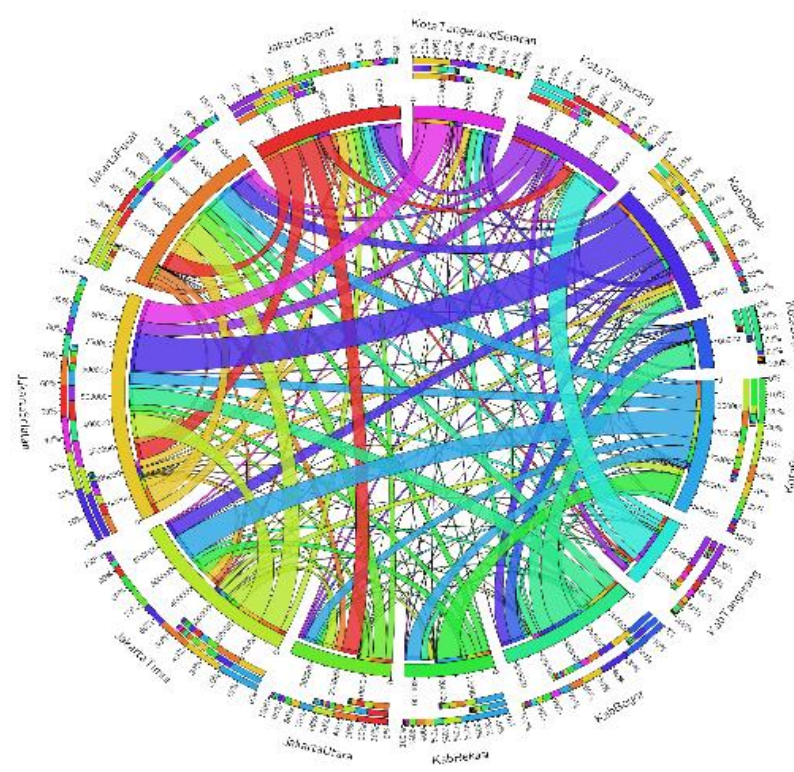




MPD vs Conventional Survey Result (at Jakarta Greater Area)



MPD
(2019)



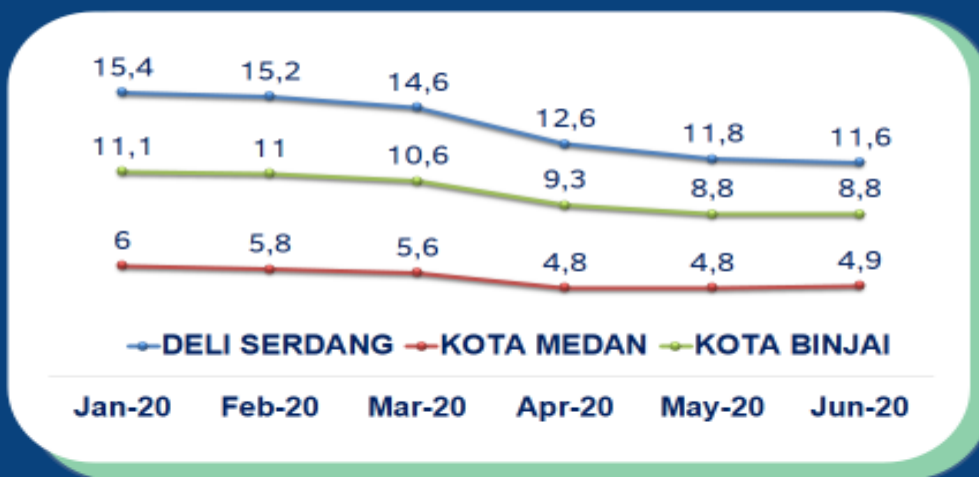
Commuter Survey
(2019)



Commuting Statistics



Commuters Before and After the Covid-19 Pandemic



Percentage of Commuters in MA - Mebidang



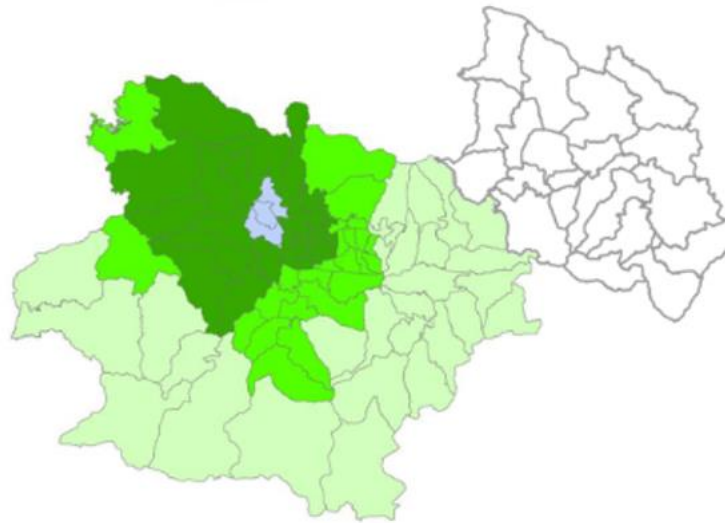
Percentage of Commuters in MA - Jabodetabek



Scenario 1



Scenario 2



Scenario 3



Central City



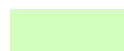
Threshold 5 percent



+



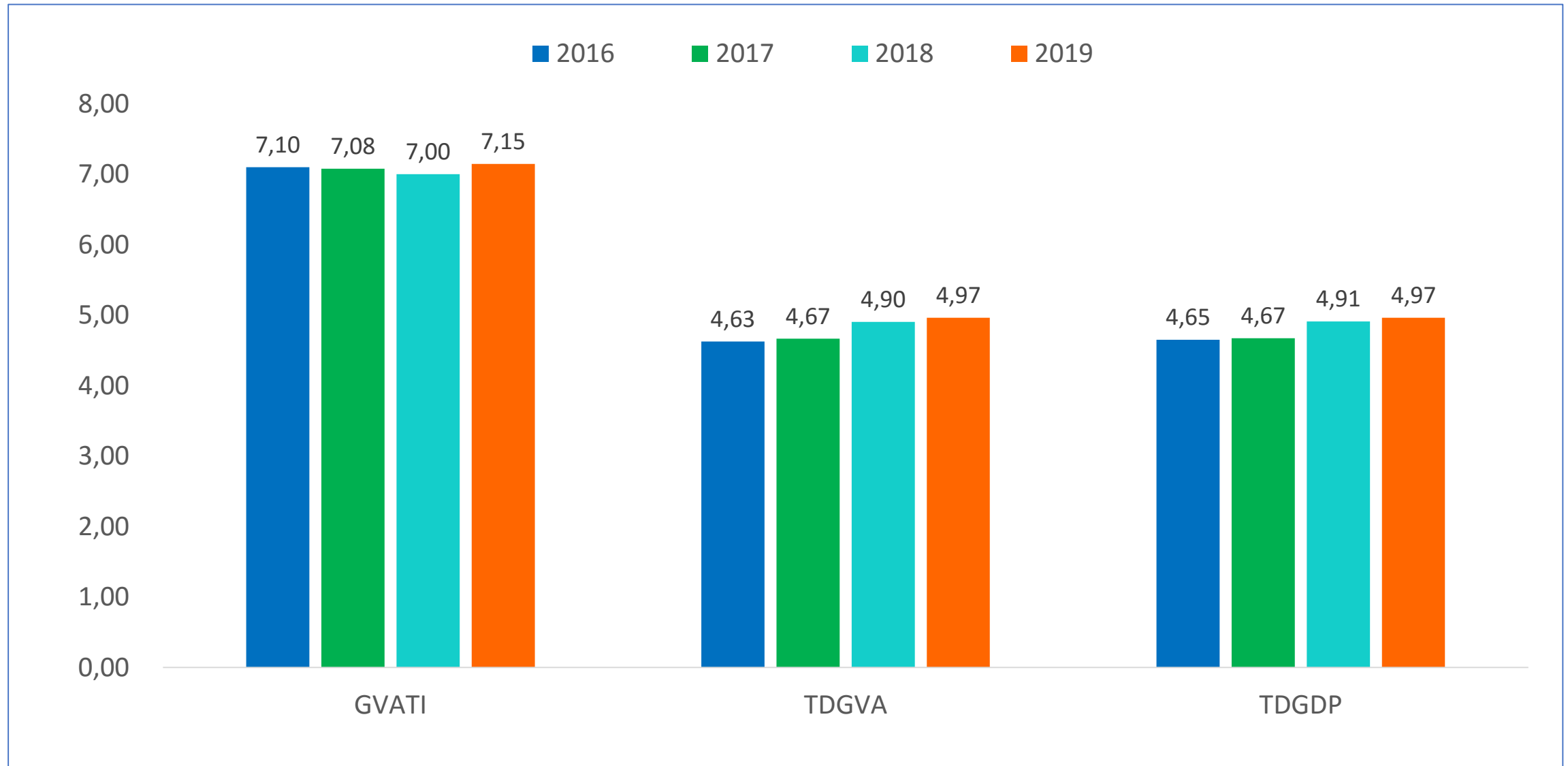
Threshold 1,5 percent



Presidential Regulation No. 4 of
2018

MPD for MA Delineation
on Cekungan Bandung

Contribution of Tourism in Indonesia, 2016 - 2019





MPD for Tourism Satellite Account



- ✓ SDG Goal 8 (Indicator 8.9.1)
- ✓ MPD give better coverage than household survey, better match with supply side



THANK YOU