

8th International
Conference on
BIG DATA
& Data Science for Official Statistics

BILBAO 2024

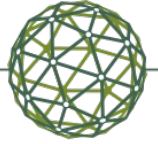
Informing Climate Change and
Sustainable Development Policies
with Integrated Data

BILBAO, SPAIN | **10-14 JUNE 2024** | **#UNBigData2024**

Leveraging Mobile Positioning Data for Indonesian Tourism Statistics

ALFATIAH RENO MAULANI
STATISTICS INDONESIA

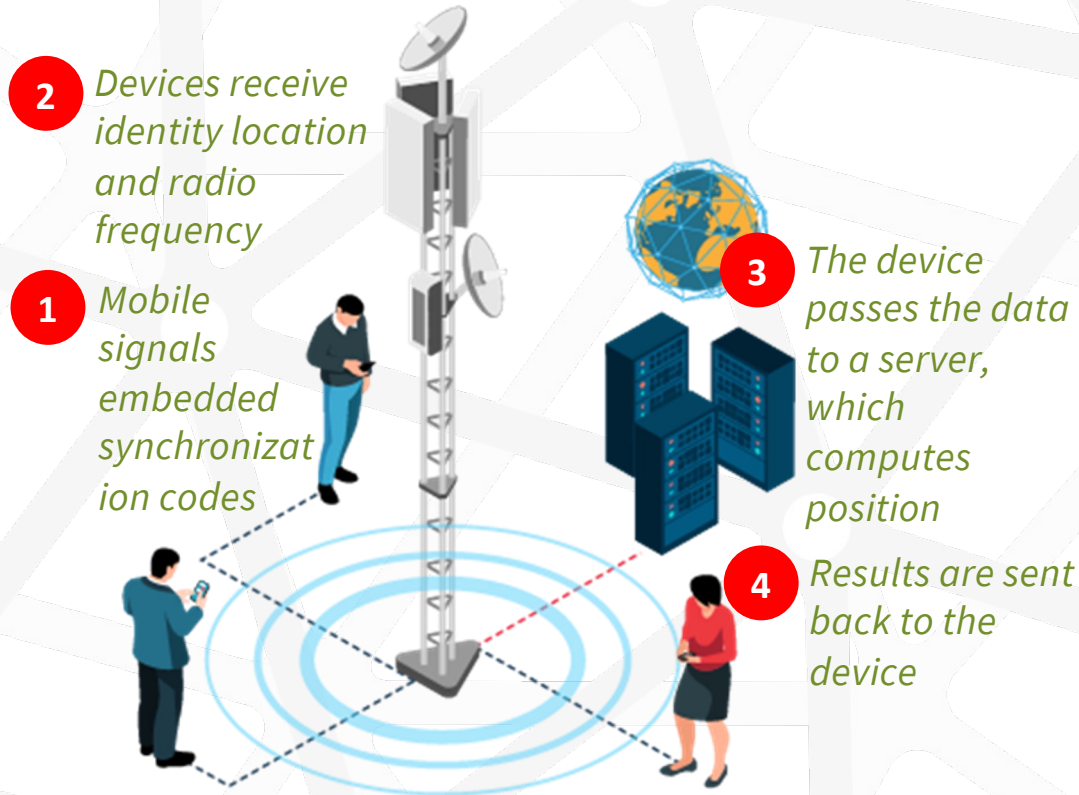




What is Mobile Positioning Data?

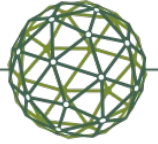


Mobile positioning data, also known as mobile phone data, is passive positioning data: location information is generated by using information derived from charging events.



The transaction leaves a log, log creates data.

The log data serves as a digital footprint, capturing the details of the transaction, including timestamps, user identifiers, and transaction specifics.



What and Why Tourism?

Tourist Concept (IRTS 2008)



Travel taking place **outside the usual environment**.



Traveling **across certain territorial boundaries** (foreign tourists: entering Indonesian territorial boundaries; domestic tourists: crossing district/city boundaries).



Not carried out routinely.



Travel time **less than 12 months**.



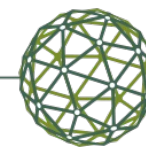
Not intended to obtain wages/salary from residents at the destination.



Tourism is a wide range of tourist activities and is supported by a variety of facilities and services provided by the community, entrepreneurs, the Government and Regional Government. (RI Law Number 10 of 2009 concerning Tourism)

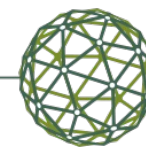
Why Tourism is Important?

1. Economic Growth
2. Infrastructure Development
3. Cultural Exchange and Preservation
4. Social Benefits for Local Communities



Benefits of Mobile Positioning Data in Tourism

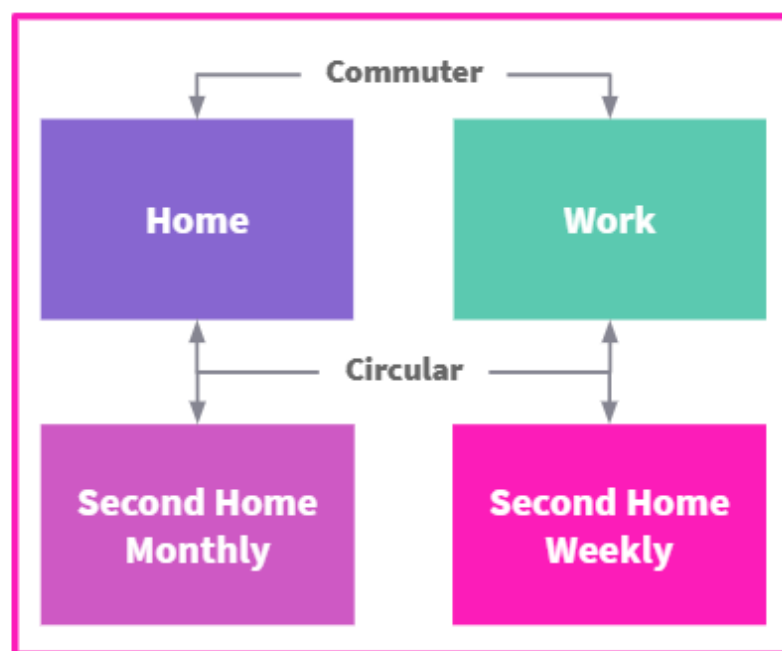
No	<i>MPD Approach</i>	<i>Household Approach (Conventional)</i>
1	Estimates for smaller areas: districts/cities	Estimates up to the provincial level
2	Monthly data period	Yearly data period
3	No surveyors needed	The number of surveyors needed depends on the number of samples
4	With a more detailed level of estimation, the required budget is only around IDR 15 billion	To conduct a conventional domestic tourist survey, a budget of around IDR 30-40 billion is needed (based on the 2018 and 2019 conventional domestic tourists survey budget).
5	It has the potential to be able to generate statistics for domestic tourists monthly	Can only generate statistics for domestic tourists on annually
6	The solution for collecting data for domestic tourists during the covid-19 pandemic, no door-to-door interviews needed	The Covid-19 pandemic condition limits conventional data collection activities
7	MPD can be used for other statistical calculations	One activity is only used for one type of statistical calculation



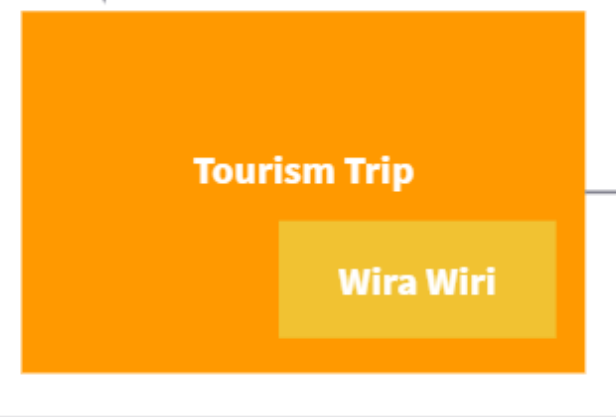
Building Case: Tourism Statistics

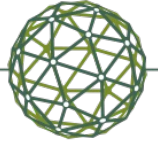
The initial purpose of using MPD in Indonesia is for tourism statistics, where the definition of a tourism trip is a trip outside the usual environment. The basic concept used by Statistics Indonesia in its usual environment is the city where you live/where you do your daily activities. So, the trips we calculate are trips between cities.

Usual Environment



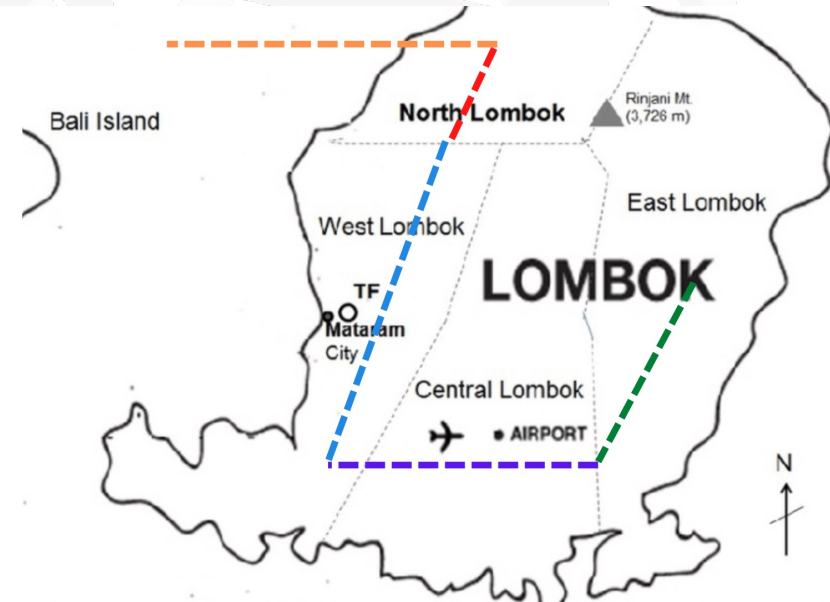
Mobile Positioning Flow



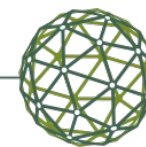


Understanding Subscriber Mobility

time	longitude	latitude	province	city	district	signal
2021-05-22 19:27:57	106.909	-6.252	DKI Jakarta	Kota Jakarta Timur	Makasar	3G
2021-06-01 4:02:22	106.6628333	-6.120416667	Banten	Kota Tangerang	Benda	3G
2021-06-01 6:04:06	106.6628333	-6.120416667	Banten	Kota Tangerang	Benda	3G
2021-06-01 7:20:33	116.0411778	-8.463713889	Nusa Tenggara Barat	Kab. Lombok Utara	Pemenang	3G
2021-06-01 7:20:48	116.0411778	-8.463713889	Nusa Tenggara Barat	Kab. Lombok Utara	Pemenang	3G
2021-06-01 7:25:17	116.1602222	-8.669177778	Nusa Tenggara Barat	Kab. Lombok Barat	Kuripan	3G
2021-06-01 7:28:32	116.1602222	-8.669177778	Nusa Tenggara Barat	Kab. Lombok Barat	Kuripan	3G
2021-06-01 7:28:54	116.30575	-8.747777778	Nusa Tenggara Barat	Kab. Lombok Tengah	Praya Tengah	3G
2021-06-01 7:33:58	116.30575	-8.747777778	Nusa Tenggara Barat	Kab. Lombok Tengah	Praya Tengah	3G
2021-06-01 7:34:21	116.2739167	-8.761777778	Nusa Tenggara Barat	Kab. Lombok Tengah	Pujut	3G
2021-06-01 12:31:17	116.2739167	-8.761777778	Nusa Tenggara Barat	Kab. Lombok Tengah	Pujut	3G
2021-06-01 13:06:02	116.5207583	-8.646419444	Nusa Tenggara Barat	Kab. Lombok Timur	Selong	4G
2021-06-03 15:10:36	116.5207583	-8.646419444	Nusa Tenggara Barat	Kab. Lombok Timur	Selong	4G
2021-06-03 18:29:17	106.9013333	-6.24925	DKI Jakarta	Kota Jakarta Timur	Makasar	3G

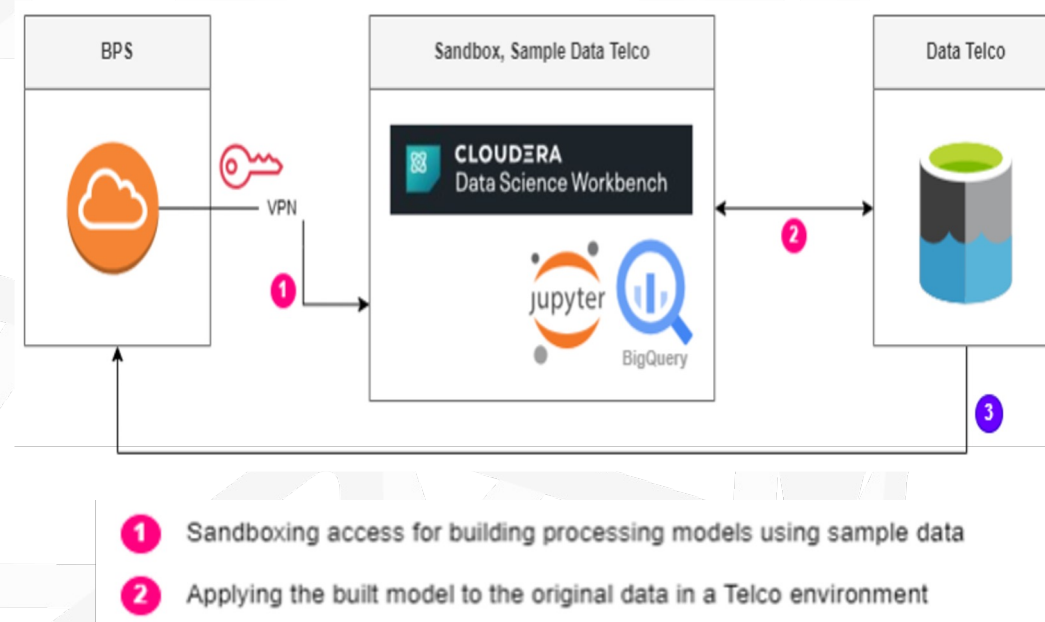


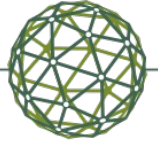
A trip is considered as a journey from the usual environment to another. During a trip, several locations might be visited, but identifying the primary destination is crucial. Be aware that there are **anomalies in the data**, such as instances of rapid movement, which could influence your analysis. Therefore, it is essential to perform data cleansing.



Confidentiality Concerns in MPD

- In response to privacy concerns, MNOs employ a secure sandboxing approach for the confidential handling of raw data. To protect individual privacy, shared data undergoes a hashed mechanism, specifically applied to MSISDN.
- Statistics Indonesia establishes a secure processing model within the sandbox environment using sample data, ensuring the integrity of the data handling process.
- To guarantee data quality, Statistics Indonesia utilizes volunteer data acquired with explicit consent. Then, the volunteers will provide self-enumerated details, such as mobility and location. These details were carefully compared to the calculations to ensure the accuracy of the processing model.





FAQ: From Mobility Subscriber to Population

Indonesia's national socio-economic survey in 2023: **67,29%** of the population aged 5 years and over, have used cell phones.

In the national socio-economic survey, we added questions about the use of communication devices. The results will be used in estimating the actual number with the customer mobility data we obtain from MPD.

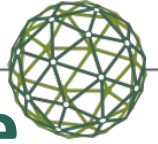
We asked, in the last 3 months:

- have you used a cell phone?
- have you owned/controlled a cell phone?
- how many active SIM cards were used on all devices and which operator?

- what about those who do not use the phone?
- what about multiple sim cards?
- what about other MNO's?



Issues & Challenge in Using MPD as a Data Source



Dimensions	Issues/Challenges
Policies and standard setting	The absence/overlapping of law and regulations
Data storage	Cost for accessibility is prohibitively high
Communication and data management	Inter-ministerial advocacy is required
Measure and monitor quality	The nature of big data
Identify organizations structure	Urgency to create a special unit for big data analysis
Optimize and compute	Methodological challenge
Stakeholders selection	Effective stakeholder management
Big data scope	Determine the scope or priority

thanks
Dank
mercíBeaucoup grazas
grazieMille
GRACIAS
gracias
gràcies
esker



#UNBigData2024