STATISTICS AUSTRIA
The Information Manager

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Measuring tourism flows with mobile data in Austria – an ongoing project

Interim Report

Background

- **Symplifying the world:**
  - *Assumption 1: Every inbound traveller has a cell phone in his pocket.*
  - *Assumption 2: Every inbound traveller spends a night at a rented accommodation establishment.*
  - *Assumption 3: The cell phone remains stationary in a cell of a domestic „Mobile Network Operator“ (MNO) during the night (active usage is not required).*
- **Two independent methods measure the same phenomenon:**
  - *Accommodation statistics count the number of nights spent by inbound travellers.*
  - *MNOs collect the number of „nights“ by foreign SIM cards.*
- **Main idea:**
  - *Find out if MNO data can lead to a better and more efficient compilation of data by comparing the number of counted nights spent by inbound travellers with the collected number of „nights“ by foreign SIM cards.*
  - *Evaluation of:*
    - *Quality*
    - *Timeliness*
    - *Completeness*
    - *Geographical granularity*
    - *Comparability*
    - *Reduction of respondent burden/sample size*

Steps of the project (1)

A project to use data from MNO was started by Statistics Austria mid 2018. - The project is split in a number of **project components** (PCs)

PC1: Get access to MNO data
PC2: Define data set
PC3: Develop algorithm to determine “tourism”
PC4: Aggregate data
PC5: Refinement of algorithm/parameters
PC6: Evaluate unweighted results
PC7: Set up estimation procedure
PC8: Analyze estimated results
PC9: Draw conclusions

- These PCs are planned to be achieved within a 1-year-period.
- By now, we have run half way!

Steps of the project (2)

- **PC1: Get access to MNO data**
  - *Getting access to the data will be accomplished by reaching an agreement between Statistics Austria and at least one MNO on mutual willingness of cooperating concerning a data exchange. A data request will be specified by the tourism unit and methods department of Statistics Austria.*

- **PC2: Define data set**
  - *The requested data set has to meet certain criteria based on the needs of tourism statistics related output variables. Technical issues concerning the data source have to be considered.*

- **PC3: Develop algorithm to determine "tourism"**
  - *The MNO will be confronted with detailed specifications on how the data has to be extracted (including algorithm to determine "usual environment" to identify tourism relevant nights) and aggregated.*

- **PC4: Aggregate data**
  - *The MNO produces output based on the specifications in PC3.*

Steps of the project (3)

- **PC5: Refinement of algorithm/parameters**
  - *The aggregated data will be examined and by applying different parameters (e.g. concerning frequency or duration) the variations in the number of identified nights spent will be analyzed and the algorithm/parameters refined.*

- **PC6: Evaluate unweighted results**
  - *The unweighted results will be evaluated based on other data sources such as the accommodation statistics.*

- **PC7: Set up estimation procedure**
  - *Adjustment of the unweighted result with the help of additional data sources.*

- **PC8: Analyze estimated results**
  - *General analysis of the adjusted output and comparison of the results with other data sources such as the accommodation statistics.*

Steps of the project (4)

- **PC9: Draw conclusions**
  - *The lessons to be learned will put the strengths and challenges with mobile data in perspective with current methodological deficiencies – and as a consequence answer the question if the use of MNO data can lead to a more efficient collection and compilation of data in Austria and better Austrian tourism statistics.*
  - *Once being tested on an existing data source such as the accommodation statistics MNO data might help to overcome gaps in the existing data collection process, deliver new indicators as well as giving the possibility to minimize sample size for reducing the costs of existing data collection methods.*
  - *The quality of the results will be evaluated according to proposed frameworks in other international projects.*

What was achieved by now?

Achievements and status of the project by March 2019 (1)

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➢ **By now the project fully achieved PC1 and PC2**

- Statistics Austria got **access** to one of Austrians biggest MNO (market share of 1/3).
- Agreement to exchange data on a regular basis.
- "Non disclosure agreement" guarantees confidentiality and safeness of data and the respective outcomes.

- For inbound related data a "tourism night" was defined as following:

"Number of foreign SIM cards which remain stationary in a cell of the MNO network between 02:00am and 06:00am"

This definition – in theory - allows to filter out movements of foreign SIM cards that do not correspond with the overnight tourism concept eg:

- Same-day visits
- Transit
- Border noise

Achievements and status of the project by March 2019 (2)

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- **The challenge with PC3 and PC5**
  - ID is deleted after 24 hours - limits specification of usual environment!
  - The aggregated data (received on municipality level) received by the MNO does not only include tourists.
  - The data includes several non-touristic subsets such as:
    - Short and long term students
    - Seasonal workers
    - Nursing staff (usually from CEE countries)
    - Freight transit
    - Border noise
    - Austrian residents using foreign SIM cards
  - Methodological challenge of defining usual environment with 24 hour restriction is still outstanding.

Achievements and status of the project by March 2019 (3)

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- **First evaluation of the outcomes**

  - The aggregated data from MNO was compared with data from accommodation statistics.

  - In theory, the number of nights calculated by the MNO should be comparable with the number of nighs counted in the accommodation statistics.

  - First results show, over- AND under-coverage!

  - At this stage:
    - No common pattern of deviation that allows to refine the algorithm.
    - Data cannot be used to get information on a regional level or to display a single foreign country of origin.

  - BUT: PC 7 still outstanding (eg weighting based on market share of MNO vs 1/3)

…not just worries but also positive aspects...

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Despite the challenges to accurately filter out tourists by using MNO data some positive aspects were detected:

- On a national level the distribution of countries of origin looks quite reasonable.
- Though there are deviations that do not allow to directly compare the two completely different data sources, both deliver quite a similar quantity structure.
- Being aware of the causes of deviations is a necessary first step. The next step is to find ways of quantifying the extend of deviations.

The need for thinking creatively

The most positive aspect is the awareness that MNO data do include the target subset of „overnight tourism“.

Now the task is to develop a method to separate our target subset from all disturbing factors.

Mobile data in perspective with current methodological deficiencies

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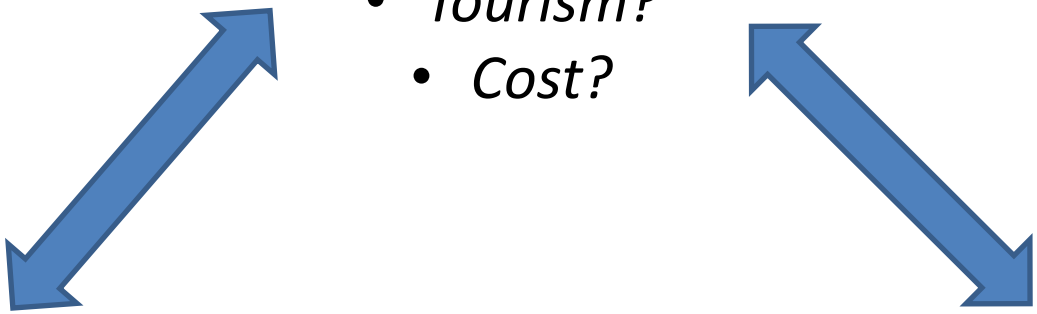
Mobile data:

- *Quality?*
- *Tourism?*
- *Cost?*



Accommodation Statistics:

- *Count*
- *Very good quality*
- *„Tourism“*
- *Expensive*

Outbound Statistics:

- *Sample survey*
- *SE high for many destinations*
- *„Tourism“*
- *Expensive*

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