Mobile positioning as an innovative tool in visitor management and monitoring

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Tourism has become one of the world's leading industries and an integral part of people's lives today. The increase in the importance of tourism sector has been accompanied by changing of tourism itself. There is increasingly less "classical" tourism and tourists that are defined by one activity or one destination (Framke 2002; Esu & Ebitu 2010). More and more people travel for several purposes, the purposes are often interwoven. Researchers have admitted that tourists increasingly find it hard to determine the reason for their visit in surveys – there are several of them. For example, business tourists are often very important consumers of traditional attractions and services. They have money for taking part in expensive attractions and eating in exotic restaurants. Also, one of the important factors influencing the motivation of conference tourists for participation is often "visiting friends and relatives", i.e. "VFR tourism" (Breen, et al. 2001; Brida et al 2013). The reason for this, however, is today's transnational lifestyle – people's social networks are globally diffused and possibilities for visiting loved ones are taken into account when contemplating travelling decisions. Changes in tourism have been accompanied by an increase in spending nights at non-traditional accommodation establishments as well as changes in the spectrum of services. The changing of tourism today leads to the need for new types of tourism statistics, because traditional statistics cannot measure and understand this new and mobile society and tourism to the full extent (Buhalis 2000; Crompton & Mackay 1994; Nilbe et al 2014).

The aim of this presentation is to introduce the possibilities for using mobile positioning-based statistics in measuring and studying tourism. Mobile positioning-based tourism statistics have been used in tourism at least since 2004 in Estonia (Ahas & Mark 2005). The databases of Mobile Network Operators (MNO) make it quite easy to compile statistics on which countries the "roaming" phones that have visited a destination are registered in, how long they stayed at the destination, and which places they have visited. This is also called passive mobile positioning data, because there is no special inquiry made to find the visitors, but information already recorded by the operator is used instead (Ahas et al 2008). Since there is a huge amount of data, it can also be called BIG data. Mobile positioning data are, however, not "almighty", there are several shortcomings. But they do enable to solve some important problems in measurement and scientific research of tourism. Next, I am going to present some of the most important aspects.

First, mobile data enables to obtain information about mobility of people and tourism in the world with open borders. Due to opening of borders, border-crossing statistics are no longer collected in many regions of the world, including European Union countries. Thus, a very reliable tourism statistic has been lost. Passive mobile positioning enables to document the visits of people (phones) from all other countries easily and accurately.

Second, mobile data enable to obtain more information about foreign visits than traditional accommodation statistics. Today's tourism is diverse and there are more and more one-day-visits, transit, and alternative forms of accommodation (e.g. VFR, nature tourism). These are not reflected in accommodation statistics, but leave a trace in mobile databases.

Third, many tourism statistics methods were developed "in the middle of the last century". Also, the WTO and EU definitions phrased in the middle of the last century do not enable to measure all aspects of today's vital and virtual tourism contextually.

Fourth, however, mobile data have significant benefits arising from their digital nature: a) they make data collection and processing large amounts of data easy; b) enable to collect data longitudinally, i.e. once permits have been obtained and software developed, statistics can be collected in the course of a long period of time, which makes it possible to study people's travelling behaviour completely differently than it has been studied so far (Roorda & Ruiz 2008; Schönfelder & Axhausen 2004); c) the data are more geographically accurate, which enable to see the movements of tourists at the destination and differentiate the behavioural patterns of different visitor segments.

Fifth, the data are behavioural, i.e. the actual visits and presence of visitors is registered, not people's preferences or desire to travel somewhere. Studying tourism, which can be characterised by a complex deliberation process, researchers have stressed the need to base studies more on the behavioural data that register actual visits (Oppermann 2000).

Sixth, information and communication technology (ICT) based mobile data enable to connect traditional mobility studies of tourists with the virtual aspects of tourism. Increasing amounts of tourism-related information and transactions occur in computers and smartphones. Studying virtual tourism is the frontier of today's studies.

Yet, mobile data are not almighty. The first important shortcoming of mobile data is the complexity of access to the data. It is influenced by privacy and data protection regulations, the attitude of the public, and the issue of the business secret of mobile operators. For example, the Eurostat feasibility study (Positium LBS 2014) shows that, in 2014, the only European Union countries to use mobile data as tourism statistics were Estonia, Czech Republic, and Holland. France, Portugal, Spain, Austria, and Ireland have started to use the data. In 2014, further 8 EU countries expressed interest in and initiative for obtaining the data, using such data will probably become "common" in the course of the next 5 years.

Second, mobile data are dependent on the use of phones. Different societies and visitor segments use mobile phones to various extents and these differences must be taken into account. This requires comparison and development of traditional data and new types of data.

Third, digital mobile data contain various "new types" of data errors. For example, mobile networks reach over state borders and the phones located in the vicinity can show that one is in the neighbouring country without an actual visit. The technical specifications of the mobile phones used in different regions are also different; certain types of phones have no signal in some regions (older CDMA phones in Europe) or leave disproportionate traces of visits due to differences between contracts. For example, the availability and quality of mobile data are significantly influenced by whether data roaming is switched on or off when travelling, which in turn depends on the price of the service.

Therefore, I will be introducing the important concepts of destination marketing and the possibilities for using the statistics generated on the basis of mobile data by realising those (Kuusik et al 2011).

In the era of BIG data, there are also significant changes occurring in marketing due to the new possibilities of the "new" and digital data. I would like to highlight three aspects here. First, the data are in digital form, which makes the collection and processing of the data faster and analysis of the data more varied. Second, there is a lot of data, which changes the vertical and horizontal grounds supporting the analyses. Third, the collection of the digital and voluminous BIG data is automatic and fast, which enables to develop new types of marketing analyses and products. The actual benefits of BIG data in marketing are, however, developing along with applications in social media and communication networks. The new data are naturally also accompanied by various methodological problems.

Yet, there are several important developments in the measurement and scientific research of tourism occurring due to the new type of ICT-based tourism data (passive mobile positioning, photo sharing, internet use, etc.). I will be describing some interesting approaches here.

With respect to collection of statistics, there have been "automatic" data collection systems developed, which enable to obtain quick overviews of visitors on the basis of the roaming data of a Mobile Network Operator. An important keyword here is "timeliness". Border crossing surveys and accommodation statistics arrive on the desks of researchers, marketers, or the industry very slowly, it usually takes more than 3 months, in the case of the transportation census, however, more than a year. The data obtained so "late" is of no use to many end-users (e.g. the industry, management) and thus the data is not used very much. Mobile data that arrive in real time, however, become useable for the industry and administrators in making daily decisions. The Eurostat Feasibility study showed that several groups of consumers agree to use the data if they enable to direct marketing operatively. The same applies to directing tourism on the national level. Such digital and automatically obtained data enable to develop automatic monitoring systems and other similar tools (Tiru et al. 2010).

Second, the greater-than-before temporal and geographical accuracy of tourism statistics (there are more points about a person's movement) makes it possible to thoroughly study movements at the destination, visiting of attractions, and much more (Saraniemi & Kylanen, 2011). Much more detailed segmentation of visitors and destination management will also be possible. Earlier statistics were mainly "black box"-type – we were quite well aware of entries to and exits from a country, but knew much less about what happened to the tourists inside the black box.

Third, longitudinal data (we are aware of the visits and behaviour of one person in the course of a longer period of time) make it possible to start studying various aspects of the behaviour of visitors – destination loyalty, changing of preferences in time, relationship between domestic and foreign tourism (Buttle 2004; Dick & Basu 1994; Morais & Lin 2010). Longitudinal data enable to find causal relationships between a person, institutions, and environmental factors better than before. One example that can be given here is studying the relationships between longitudinal behavioural data and genetic information in the field of tourism.

Fourth, the existence of more accurate and longitudinal data enables to start looking for new approaches to some classic tourism statistics issues. How to define and measure transit? How to measure the "usual environment", which is essential from the perspective of domestic tourism? What options are there for narrower defining of a destination (destinations in destination)? What are the thresholds of determining destination loyalty?

Conclusively, it can be said that the world has changed, tourism has changed, and studying tourism has changed. All new and interesting approaches to studying tourism require attention and careful methodological evaluation. There is no one universal and "almighty" database or method. All data and methods need to be evaluated critically and used in the right form. Here, we can pose three questions regarding mobile data:

a) To what extent they enable replacement of traditional statistics?
b) To what extent they enable complementation of traditional statistics?
c) To what extent they provide new information about the "new forms" of tourism?

Our Estonian experience of mobile positioning-based studies is the only one of the approaches. I would also like to mention the most important publications for getting acquainted with this subject.

Taking new data into use is naturally also accompanied by the need to evaluate the corresponding methods and the feasibility of the data. The Eurostat Feasibility study concluded in 2014 is one step

towards developing new solutions. New and digitalised data are also accompanied by the need to address the issues of privacy and data protection, which arise more sharply here.

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