

International Steering Committee for Transport Survey Conferences

# Workshop Synthesis: Use of social media, social networks and qualitative approaches as innovative ways to collect and enrich travel data

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## Abstract

Transportation Planning and Analysis is living a new era in terms of new data sources. Traditional survey data is being enriched with information generated by the use of smartphones, smartcards, online social media and social networks, etc. However, these new data sources require the use of specific techniques to extract valuable information, and the use of inferring methods to be useful in the transportation context.

This workshop reviewed advantages and drawbacks of innovative travel data sources related to the use of online Social Media and Social Networks.

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*Keywords:* social media; social networks; qualitative approaches; travel surveys; understanding travel behavior

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## 1. Introduction

This paper presents a summary of the issues discussed in the workshop that took place during the 11th International Conference on Transport Survey Methods held at Estérel, Québec (Canada) in September of 2017. Participants in the

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workshop explored ways to enrich travel data through Online Social Media (OSM), and methodologies to identify social networks using both traditional and innovative travel surveys.

The workshop discussion was initiated by four paper presentations. Ainhoa Serna (Serna et al., 2017) presented methodologies to extract information from OSM about the perceptions of different travel modes. Juan Carrasco (Carrasco and Jirón, 2017) described strategies to combine qualitative and quantitative methods to collect information about personal mobility. Romain Crastes Dit Sourd (Calastri et al, 2017) presented the design and preliminary results of a survey to collect information on several dimensions of travel, including social networks. Finally, Jacqueline Arriagada (Munizaga and Arriagada, 2017), described their experience with studying data collected from a public transport application. Eight additional papers were presented in poster format. All papers are listed in the references.

The remainder of this paper is organized as follows. Section 2 presents key uses of social media in the context of travel analysis, and the main issues related to privacy and bias. Section 3 includes a review of social networks, methods to collect social network data and recent examples. Section 4 contains some considerations regarding the integration of social media and social network data to travel surveys and modelling. Section 5 describes future research issues emerging from the workshop.

## 2. Social media data and travel surveys

### 2.1. What is social media?

The workshop began by focusing on a definition of social media noting the following:

- The "social" part refers to interacting with other people by sharing information with them and receiving information from them.
- The "media" part refers to an instrument of communication, like the internet (while TV, radio, and newspapers are examples of more traditional forms of media).

Our discussions therefore differentiated between social media (SM) as any tool that facilitates information exchange and interaction among people with on-line social media (OSM) being a specific SM tool implemented on the internet.

SM is characterized by a level of interaction that can be very diverse, from broadcasting to direct contact between sender and receiver, which resembles a conversation. The number of senders and receivers can vary. SM data includes information that can be objective or subjective (perceptions, feelings, etc.), but usually differs from the information transmitted face-to-face in that it is less constrained by the social norms that develop through face to face contact.

The information included in SM can be publicly available or not. Examples of OSM that include publicly information are: Twitter, Facebook, Instagram, SnapChat, TripAdvisor, YouTube and other OSM where people can interact (forums), LinkedIn, Waze, Research Gate, Crowdsourcing and Amazon Mechanical Turk. Some are more ad hoc, e.g. TransApp in Santiago Chile. On the other hand, WhatsApp, Telegram (political) and email are examples of OSM that include private information. Most of the subsequent discussion in the workshop focused on Online Social Media (OSM).

### 2.2. Online Social Media as a recruitment method

OSM is a relatively easy tool to use for recruiting participants for travel surveys. It is particularly useful to target specific respondents such as students via Facebook (Brickman-Bhutta, 2012; Heilig et al., 2014) or via advertising on websites. It is also an alternative when there is no sampling frame (Alotaibi and Potoglou, 2017). Key limitations that have to be taken into account include the short-term nature of the posts, the fact that long formats do not work well on mobile phones, and, most importantly the population bias caused by different rates of interaction with social media by different people.

The combination of using OSM and an incentive to stimulate participation can work only if the population of study is interested in both the objective of the research and the incentive and use the OSM being used. Otherwise, selection bias can appear. In this regard, it is important to remember that incentives only work if they are paid before the

respondent participates in the research (Hsieh and Kocielnik, 2016). Some participants in the workshop described the difficulties in combining the use of OSM with snowball sampling to recruit participants (Calastri et al., 2017).

### 2.3. Other uses of online social media

Other uses of OSM include the following:

- Giving feedback to respondents in travel surveys;
- As an input to sentiment analysis;
- Using Social Network Analysis to analyse OSM data can shed light on the extent to which travel is used as a social activity;
- As a tool for giving information in the context of Travel Behavior Change programs;
- To improve the way results of data analysis are presented;
- For mapping locations (e.g. Twitter, turning on ‘follow’ in TripAdvisor [private], Waze);
- As a complementary travel data collection tool, to increase response rates; to facilitate the collection of data across different geographic boundaries, and to identify some discretionary trips.

The collection of data across different areas and cultures is important because it is difficult to extrapolate results, i.e. it is not necessarily possible to learn from the experience of other cultures and geographies. Therefore, it is necessary to test, and complement data with information from other sources in all cases.

### 2.4. Social media data issues

#### 2.4.1. Privacy

One of the main issues concerning the use of OSM data is related to privacy. Participants in the workshop agreed on the following recommendations:

- It is necessary to check the regulations concerning the use of OSM data of each country;
- It is highly recommendable to assure participants that researchers are going to be fair (i.e. it is important to get so-called social license for using the data);
- It is important to be transparent and show ethical responsibility by showing what will be done with the data;
- Anonymization methods, clearly described to respondents, help to overcome privacy concerns.

#### 2.4.2. Bias in response

As in any kind of travel survey data, the information obtained from OSM is potentially biased. While the responses probably tend to represent those people who have access to these OSMs, not everyone has access to Twitter or Facebook. And some people are more willing to participate in surveys through OSM than others. Additionally, participants identified a major problem termed “bias of extremes”. For example, information from Twitter tends to be negative, while information from TripAdvisor tends to be positive.

## 3. Social network data and travel surveys

### 3.1. What is a social network?

It was agreed that a social network (SN) includes a set of people and the existing relationships (formal and informal) between them. The characteristics of an individual’s SN usually has a strong influence on their travel behavior. Therefore, it is theoretically important to collect information about the characteristics of individuals’ SNs along with data of their travel behavior. Doing this requires very long surveys.

Information on both SN and travel behavior means that activities and trips can be characterized according to interaction and interdependence, an area of interest that is of increasing importance in a sharing economy.

Additionally, information on social networks makes it possible to study how individuals react to the behavior of others, a highly important input to the design of more effective travel behavior change programs.

The design of the questionnaire to collect information related to SNs needs to be based on appropriate sociological theory. Pilot testing becomes very important because the nature of SNs depends on the type of the tie between individuals and their contacts.

### 3.2. Methods of collecting SN data

In travel behavior analysis, the study of SNs is usually based on the egocentric approach: the characterization of the people (*alters*) who currently have any type of relation (*tie*) with an individual (*ego*) (Carrasco and Jirón, 2017). Participants in surveys are asked to describe the people who are close to them, sometimes in a specific context. A name generator protocol is usually used in this context. Alternatively, respondents are asked to provide information about with whom they carry out each activity or trip. This last approach is in line with the so-called Contact Diary method, which consists of reporting all persons with whom the respondent has any type of contact during a period of time. Participants in the workshop agreed that questionnaires designed to identify SNs need to include as many perspectives as possible (sociological, anthropological, etc.). Social activity intensity can be measured by asking about memberships in social groups (sports, literature, parents etc.).

Some attempts have been made to infer characteristics of SNs from call data records (Picornell et al. 2015) and smart card data use of public transport and other services, though these methodologies present potential biases that need further research.

### 3.3. SN data examples

Recently, a SN and travel behavior survey was carried out by participants in the European Cost Action TU1305. Students from different universities were recruited by email and OSM. Data related to travel, last social activity, and number of friends by mode of interaction, were collected.

In another study in the USA, a survey collected an aggregate representation of SNs to analyze emergency evacuations. The particular objective of the project was to study the influence of social networking on behavior. Sociologists were involved in the preparation of the survey and they used surrogate aggregate measures (length of residence, cultural aspects of neighborhood).

In the UK, a SN and travel behavior survey of general population was recently carried out integrating different data collection modes (Calastri et al., 2017). Data collected included long-term choices, SN and travel diaries.

## 4. Integration of online social media and social network data with travel surveys and modelling

Traditional household travel surveys are already collecting information on a SN: household members. However, the importance of considering SN characteristics when studying travel behavior justifies the collection of basic data related to SNs in any travel survey. These specific questions could easily be implemented using the framework of the ‘satellite survey’: basic questions included in a core survey, and a dedicated SN survey implemented with a subsample of respondents. In this context, participants in the workshop reported successful experiences of recruiting participants for a SN survey from a travel survey.

OSM and SN data have not been used very much in past modelling exercises but should be increasingly investigated. The data can be very valuable in modelling, particularly in choice modelling and individual activity-based research.

## 5. Future research issues

A number of issues and research questions remain regarding the use of OSM and SN:

- How to combine OSM and traditional travel surveys?
- How to introduce other perspectives (sociology, anthropology, etc.) in the design of questionnaires to identify SNs?
- Improvement of visualization methods to present results to decision makers.

- How to integrate quantitative and qualitative methods to capture the role of social interactions in travel behavior?
- How to integrate SN methods with current travel survey methods?
- How to validate the information regarding SNs provided by respondents in travel surveys?
- How to identify SNs from data in OSM?
- How to correct or weigh data that is gathered using social media?

## 6. Conclusion

This paper presents a summary of the issues discussed in the workshop that took place during the 11th International Conference on Transport Survey Methods held at Estérel, Québec (Canada) in September of 2017. Participants in the workshop described issues related to the use of online social media in the context of travel surveys, and problems related to privacy and bias. Participants in the workshop also described methods of collecting social network data in the context of travel analysis and recent examples of related data collection efforts. The importance of integrating social media and social network data was emphasized. Finally, some future research questions were formulated.

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