

XII Conference on Transport Engineering, CIT 2016, 7-9 June 2016, Valencia, Spain

Qualitative research in travel behavior studies

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Abstract

Qualitative methodology is extensively used in a wide range of scientific areas, such as Sociology and Psychology, and it is been used to study individual and household decision making processes. However, in the Transportation Planning and Engineering domain it is still infrequent to find in the travel behavior literature studies using qualitative techniques to explore activity-travel decisions.

The aim of this paper is first, to provide an overview of the types of qualitative techniques available and to explore how to correctly implement them. Secondly, to highlight the special characteristics of qualitative methods that makes them appropriate to study activity-travel decision processes. Far from been an unempirical or intuitive methodology, using qualitative methods properly implies a strong foundation on theoretical frameworks, a careful design of data collection and a deep data analysis. For such a purpose, a review of the scarce activity-travel behavior literature using qualitative methods, or a combination of qualitative and quantitative approaches, is presented.

The use of qualitative techniques can play a role of being a supplementary way of obtaining information related to activity-travel decisions that otherwise it would be extremely difficult to find. This work ends with some conclusions about how qualitative research could help in making progress on activity-travel behavior studies.

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Peer-review under responsibility of the organizing committee of CIT 2016

Keywords: Qualitative; Activity Travel Decision Processes; Transport Planning; Literature review

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1. Introduction

Methods of analysis based on qualitative approaches to develop travel behavior studies are increasingly used. These methods are sufficiently open to address complex subjects, and they are especially suited to analyze interactions of individuals in everyday life considering concrete contexts (Flick, 2014). The subjectivity of the qualitative researchers, which is usually criticized, becomes part of the research process, increasing the richness of the data (Madill, Jordan & Shirley, 2000; Madill, & Gough, 2008).

Qualitative methods applied to travel behavior studies focus on the subjective experiences of individuals related to travel. On the other hand, quantitative approaches are more interested in knowing frequency and distributions of trips. The former methods are especially appropriate for answering micro questions and the latter for answering macro questions. Nevertheless, both approaches can be used either as separate techniques or as multidisciplinary parts of a wider study (Grosvenor, 2000). Qualitative methods could be used for explaining the relations that quantitative methods find. They can also be used prior to a questionnaire administration, to determine the best way of stating the questions. Qualitative methods can be useful for example to focus more deeply on some answers through open questions added to quantitative questionnaires. So it is common to use both methodologies either one after the other or at the same time. Therefore both methods can be used together although they remain autonomous (i.e. Grosvenor, 2000; Niglas, 2000; Hesse-Biber, 2010).

Qualitative approaches are broadly classified on descriptive and interpretative studies. The former nearly do not present research results including interpretation or conceptualization (i.e. Ethnographies). The latter use research data to illustrate existing theories or concepts (Analytic Induction), or to derive those theories from the analysis of the data without any hypothesis (Grounded Theory) (i.e. Amezcua & Galvez Toro, 2002)

Content Analysis (Berelson, 1952) consists on a set of methods based on studying words, text meaning or context, which can be used in both descriptive and interpretative studies. It is a technique that systematically and objectively identifies specified characteristics of the material. It may transform the information into categories allowing the conversion of the information into quantitative data such as frequencies or ratings (Smith, 2000). Grounded Theory (Glaser and Strauss, 1967) generates concepts and hypothesis using inductive analysis. No prior research results, hypothesis or existing theoretical frameworks are used. It is defined by a number of characteristics that allow researchers to make sense a huge amount of data, develop or test their ideas about data (Charmaz, 1996). Analytic Induction (AI) (Znaniecki, 1934) uses empirical data to check existing theories, and the data is used to expand and generalized the results found. Taylor and Bogdan's (1984) methodology is an example of AI.

Besides Content Analysis, other qualitative interpretation approaches include: Conversation Analysis that focuses on particular socio-linguistic phenomenon; Thematic Coding is a method for identifying, analyzing and reporting patterns (themes) within data; Analysis of Narrative Interviews, and Objective Hermeneutics, the focus is on conducting case studies; Discourse Analysis, data are analyzed at a macrosociological level, as social texts (Patton, 2005).

Using qualitative methods is not straightforward. It is necessary to justify its use in relation to the aim of the project. For a good practice and a better understanding of the reader it is essential define accurately all the stages that constitutes the qualitative process. Firstly the recruitment process of participants and the survey tools have to be described. In particular, it is important to mention any quality-related aspect of data collection. The data analysis process should be clear. Quality assurances in the research should be described and it is needed to summarize all findings and to draw practical consequences and discuss them. After that it is advisable to specify which qualitative method it is being used and how has it been carried out. As well as triangulation strategies used to verify data and avoid bias. Finally, it might provide a further understanding to itemize the coding process, the main themes, and the categories tree or the way they are related to each other. Intending to set examples and clarify the way in which the authors are understanding and handling data.

Qualitative approaches are well-established methods of analysis in areas such as Psychology and Sociology. Currently in Transportation Planning and Engineering, they are being increasingly used in road safety and public transportation service quality studies. Furthermore, since the reviews carried out by Grosvenor (2000) and Clifton and Handy (2003), many researches have also employed qualitative methods in travel behavior studies.

The main objective of this paper is to analyse the application of qualitative methods in travel behavior studies, published since 2001. We have not considered freight, road safety nor transportation service quality studies. We focus on behavioral studies, analysis of attitudes and perceptions, and the influence of the urban environment or social interactions on travel behavior.

2. Literature Review

In pursuing the aim of this work, we have carried out a literature review through mainly two databases, “Google Scholar” and “Web of Science”; the timespan was set from 2001 to 2016; and the key words used were in essence “qualitative”, “transport*” or “travel”. The research domains were defined excluding those not related with our theme study, as previously explained.

The following table (Table 1) summarizes the main features of the 42 papers found in the literature search. The authors’ names, and publication year, travel modes involved in the study, and the main objective of the study are presented. Regarding methodology, the qualitative data collection method or methods used in each study are included; the number of participants; if the study has combined qualitative with quantitative techniques or not; and whether computerized qualitative data processing software has been used any to analyze data.

Table 1 also includes the analysis technique employed, if it is specified in the text. Finally, we analyzed if each paper details the procedure of the data collection, and the application of the data interpretation technique, including coding and data analysis (see Table 1).

3. Analysis

In our review, we have detected an increasing interest in applying qualitative methodology in recent years. The number of qualitative articles published since 2010 is higher than in the previous years.

Regarding the travel modes involved in the study, a higher number of articles referring to topics related to cars (19 up to 42 studies); followed by articles that focuses on pedestrians ($n = 7$), bicycle issues ($n = 6$), various modes of transport ($n = 5$), general travel behavior ($n = 4$) and lastly public transport ($n = 3$). In recent years, there are more studies focuses on bicycles and pedestrians, or evaluation of different transport modes.

Among the major topics found in our literature review we can see the concern on reducing gasoline or diesel cars use for the benefit of other more sustainable travel modes like electric cars, cycling and walking. Other topics of interest are route choice and travel behavior controlling for demographics (age, immigrants).

About data collection methods, the interview is the most commonly used method. In-depth interviews have been used in nearly half of the articles reviewed, either face to face or over the phone. The following method is conducting focus groups, in which participants are encouraged to present and discuss their own points of view. They usually have a semi-structured discussion guide and a specific timing. In those focus groups, there are present two researchers, one leading or facilitating the group and the other controlling, supporting, or taking notes.

A point we would like to highlight is the use of other techniques to help focus groups. Researchers knows the benefits of the use of certain procedures or resources in order to get the best possible performance out of the focus

group. For example, we have found techniques like psycho-drawing, using verbatim notes from other people, playing video clips of driving situations, audiovisual recordings, showing photographs or travel scenarios.

The third method used by researchers is making surveys or questionnaires with open-ended questions. Similarly, this method allows building an integrated analysis and obtaining at the same time qualitative and quantitative data. In other cases it allows getting responses to very specific questions.

We have found other methods to collect data, like, diaries, ethnographies, grid completion exercises by triads, video recording and even individual cartoons. It deserves also special mention those methods related to data extracted from online social media.

In addition, nearly half the studies reviewed use several methods simultaneously to collect information, such semi structured questionnaires with open-ended questions and focus groups; or diaries followed by focus groups or individual interviews.

Different methods for recruiting participants are used. For example, purposive sampling, which consists on selecting individuals or cases that represent the population average, or extreme (deviant) or disconfirming cases (negative) (Devers & Frankel, 2000). Other method is snowball sampling, which is a technique consisting in the recruitment of subjects by other subjects already in the study because they are relatives, colleagues or acquaintances (Goodman, 1961). Convenience sample, in which the subjects are selected because of their convenient accessibility and proximity to the researcher (Farrokhi & Mahmoudi-Hamidabad, 2012).

Only one third of all papers reviewed combined qualitative and quantitative methodologies of analysis. Some of them use qualitative prior to quantitative analysis (i.e. video observation and posterior ratio analysis). Others use qualitative after the quantitative is undertaken (i.e. first they collect data from a survey and then they make focus group or follow-up interviews). In addition, others use qualitative to complement quantitative findings (i.e. interviewing key persons, or using case studies to deepen the results).

18 up to 42 studies declare using some software to categorize data. 11 of them use QSR International's NVivo qualitative data analysis Software. Two of them use Atlas.ti. And others used MAXQDA and LEXIMANCE, or video observation software.

Regarding to the data analysis technique used in the study, nine of them refers to us Inductive Analysis and three Deductive Analysis, although the latter also used inductive analysis. The most commonly used technique is Thematic Analysis (13 articles). This technique examines and search for patterns or themes within the data (Braun & Clarke, 2006). The following more used technique is Grounded Theory (Glasser & Strauss, 1967); where the data is clustered in the following order into codes, concepts, categories finally a theory. Seven of the articles use Case Studies where a person or a group is studied over time. Four articles use Content Analysis, which consists on selecting the unit of analysis, creating categories, and establishing themes (Cho & Lee, 2014). Two of the studies perform a video observation. Finally, Ethnographic Descriptive analysis and Template Analysis are also utilized. Noteworthy, there are seven articles that do not specify explicitly the data analysis technique that they are using.

In order to increase consistency, clarity and congruence, the methodological qualitative analysis needs to be carefully described in any paper. In most of the papers reviewed, the data collection methods is explained at length, in 14 cases thoroughly explained and in 16 cases there is a properly explanation. However, there are cases in which they do not provide any detail about how they carried out the interviews or focus groups, what kind of questions they used, how was the timing structured, and a number of other related issues.

In just over a third of the articles (n =14) the coding and the analysis process is explained (n =7) or thoroughly explained (n =7). In 9 articles it is superficially explained and in two there are hardly any information. But more

remarkable is that in 15 of papers reviewed the data analysis process is not mentioned at all. Sometimes, a schematic explanation of how they arrived to the results is given. But it is not enough to understand the process followed.

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Table 1. Literature review qualitative travel behavior.

Authors	Year	Travel Mode	Objective	Data collection methods and Participants	Method of analysis	Software	Data Analysis Technique	Methodological Description of Qualitative Analysis
Handy, S.L., & Clifton, K.J.	2001	Car	Reduce car using	Household travel survey 6 Focus groups (Unknown n° participant)	Mixed	-	Not specified	Not explained
Seedat, M., MacKenzie, S., & Mohan, D.	2006	Pedestrians	Pedestrian behaviors	19 Interviews	Qualitative	-	Phenomenological approach An integrated eight step data collection and analytical approach	Data collection Coding and analysis thoroughly explained
Beirao, G., & Sarsfield-Cabral, J.A.	2007	Public transport	Perception of public transport	24 In-depth interviews.	Qualitative	NVivo 2.0.	Grounded theory Approach	Data collection explained Coding and analysis superficially explained
Gardner, B., & Abraham, Ch.	2007	Car	Reasons to commute by car	19 Semi-structured interviews	Qualitative	-	Grounded theory analysis	Data collection explained Coding and analysis superficially explained
Baslington, H.	2008	General travel behavior	Route choice	555 questionnaires and travel diaries 22 interviews and 4 key person Interviews	Mixed	-	Case study Content Analysis	Data collection thoroughly explained Coding and analysis not explained
Farag, S., & Lyons, G.	2008	Public transport	Use of pre-trip public transport information services	12 Face-to-face in-depth interviews 62 people in 6 Focus groups (with two travel scenarios and strategy cards)	Qualitative	-	Not specified	Data collection thoroughly explained Coding and analysis not explained
Lovehoy, K., & Handy, S	2008	Car	Car use and immigrants	102 focus-group participants, in five focus groups	Qualitative	-	Not explained	Not explained
Hannes, E., Janssens, D., & Wets, G.,	2009	General travel behavior	Mental map travel behavior	A qualitative travel survey (20 respondents) In-depth interviews.	Qualitative	ATLAS.ti.	Descriptive, Explorative analysis Grounded Theory. Cross-case analysis	Data collection coding and analysis thoroughly explained
Papinski, D., Scott, D.M., & Doherte, S.T.	2009	Car	Route choice	31 individuals; 21 vehicle based trips, Audio recording, Diaries, Route planning, Route choice survey, Open ended questions, Rank ordering, and Follow-up questions	Mixed	-	Not specified	Coding and analysis superficially explained

Table 1. Literature review qualitative travel behavior (continuation).

Authors	Year	Travel Mode	Objective	Data collection methods and Participants	Method of analysis	Software	Data Analysis Technique	Methodological Description of Qualitative Analysis
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Fleiter, J.J., Lennon, A., & Watson, B.	2010	Car	Social influence on driving speeds	67 people in unknown number of focus groups, with semi-structured interview format using open-ended questions	Qualitative	-	Thematic analysis	Data collection explained Coding and analysis barely explained
Daley, M., & Rissel, C.	2011	Bicycle	Perception of cycle	70 participants in unknown number of Focus groups	Qualitative	NVivo7	Thematically analyzed. Template analysis	Data collection thoroughly explained and coding explained
Kopnina, H.	2011	Car	Children´s attitudes toward cars and environment	69 children completed Writing Assignments 9 follow-up interviews	Qualitative	MAXQDA	Case study Content analysis	Data collection and coding explained
Lovehoy, K., & Handy, S	2011	Car	Car use and immigrants	5 Focus Group (102 participants)	Qualitative	-	Content for analysis	Not explained
Mote, J.E., & Whitstone, Y.	2011	Car	Exploring slugging, carpooling	12 In-depth semi structured interviews	Qualitative	-	Not specified	Coding and analysis explained
Salomon, I., & Singer, R.	2011	General travel behavior	(Cartoons and transport)	43 cartoons about transportation humor (Various collections and artists)	Qualitative	-	Inductive thematic analysis	Data collection explained Coding and analysis superficially explained
Schneider, R.J.,	2011	Bicycle and Walking pedestrians	and cycling for routine travel	1.003 Survey respondents 26 Follow- up telephone interviews	Mixed	-	Thematic analysis	Coding and analysis not explained
Wilton, R.D., Páez, A., & Scott, D.M.	2011	General travel behavior	Social contact and telecommuting	32 Semi-structured interviews.	Qualitative	NUD_IST	Inductive and deductive analysis Mixed method: grounded theory and case study and ‘selective coding’ approach	Coding and analysis not explained
Fishman, E., Washington, S., & Haworth, N.	2012	Bicycle	Perception of cycle and bicycle share	5 Focus groups (30 people)	Qualitative	-	Inductive analysis Thematic analytic. (A process similar to the first two stages of Grounded Theory was employed)	Data collection coding and analysis thoroughly explained
Graham-Rowe, E., et al.	2012	Car	Perception of electric cars	40 Semi-structured interview open-ended questions	Qualitative	-	Inductive analysis Grounded theory analysis	Data collection coding and analysis thoroughly explained
Bartle, C., Avineri, E., & Chatterjee, K.	2013	Bicycle	Perception of cycle	Observation of website interactions (Cycology, 23 people) 21 Semi-structured In-depth interviews	Qualitative	NVivo	Case study Holistic and Thematic analysis (Horizontal and vertical respectively)	Collection coding and analysis explained

Table 1. Literature review qualitative travel behavior (cont.).

Authors	Year	Travel Mode	Objective	Data collection methods and Participants	Method of analysis	Software	Data Analysis Technique	Methodological Description of Qualitative Analysis
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Chatman, D.G., & Klein, N.J.	2013	car	Car use and immigrants	6 Focus groups (55 participants)	Qualitative	Yes but not specified	Inductive and deductive codes Iterative process employing	Data collection explained Coding and analysis superficially explained
Lo, S.H., van Breukelen, G.J.P., Peters, G.J., & Kok, G.	2013	Various modes	Determinants of work-related travel behavior	18 Semi-structured Interviews to Key informants 33 interviews to Employees 6 Focus Group (31 participants)	Qualitative	NVivo 8	Thematic analysis	Data collection coding and analysis thoroughly explained
Pooley, C.G., et al.	2013	Bicycle and pedestrians	Travel decision and walking and cycling	Postal questionnaire survey sent to 15,000 80 interviews with households individuals 20 household ethnographies	Qualitative	ATLAS.ti.	Case study Ethnography study	Coding and analysis not explained
Schneider, R.J.	2013	Bicycle and pedestrians	Incrementing pedestrian and bicycle transportation	172 Survey participants 26 In-depth interviews	Qualitative	-	Not specified	Coding and analysis not explained
Delbosch A., & Currie, G.	2014	Car	Perception of the youth about cars and license acquisition	3 Focus group Asynchronous discussion forum (33 people)	Qualitative	-	Thematic Analysis.	Data collection thoroughly explained Coding methodology not explained
Krishen, A.S., Raschke, R.L., Kachroo, P., Mejza, M., & Khan, A.	2014	Car	Analyzing public commentaries toward potential Vehicle Miles Traveled (VMT)	Transcription of public comments of 14 public meeting 182 NDOT VMT study Internet communications comments and emails 97 Newspaper article comments From 293 different individuals	Qualitative	Leximancer	Inductive qualitative-analysis technique Content analysis and media mode analysis	Data collection, coding and analysis explained
Miralles-Guasch, C., Martínez, M., & Sardà, O.	2014	Car	Reasons for car commuting	34 In-depth interviews	Mixed		Grounded theory	Not explained
Sherwin, H., Chatterjeem K., & Jain, J.	2014	Bicycle	Perception of cycle	61 Interviews	Qualitative	NVivo	Thematic analysis. Systematic approach	Coding and analysis superficially explained
Simons, D., et al.	2014	Various modes	Factors influencing transport mode	6 Focus groups (36 participants)	Qualitative	NVivo 9	Grounded theory was used to derive categories and subcategories	Coding and analysis not explained

Table 1. Literature review qualitative travel behavior (cont.).

Authors	Year	Travel Mode	Objective	Data collection methods and Participants	Method of analysis	Software	Data Analysis Technique	Methodological Description of Qualitative Analysis
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Skippon, S.M.	2014	Car	Vehicle performance	48 participants. Initial discussion of vehicle performance (by triads) using various stimulus materials Repertory grid completion exercise	Mixed	-	Inductive phenomenological analysis Thematic analysis at a semantic level Cohen's Kappa test"	Data collection, Coding and analysis thoroughly explained
Thomas, G.O., Walker, I., & Musselwhite, C.	2014	Various modes	Different modes for work commuting	6 Focus groups (27 participants)	Qualitative	-	Grounded Theory	Coding and analysis explained
Aarhaug, J., & Elvebakk, B	2015	Public transport	Accessibility of public transport	1.912 surveys were distributed in the before study and 1.361 in the after study 17 case studies (before study) with an observer accompanying and 6 (after study) and Interviews	Mixed	-	Not specified	Data collection explained Coding and analysis not explained
Aldred, R., & Woodcock J.	2015	Bicycle	Perception of cycle	300 Interviews	Qualitative	NVivo	Thematic analysis	Data collection, coding and analysis explained
Grisolía, J.M., López, F., & Ortúza, J.D.	2015	Car	Factors to accept congestion charging	10 Focus groups (81 participants) Questionnaires Likert scales Stated choice (SC) (206 respondents)	Mixed	-	Content analysis	Data collection explained. Coding and analysis barely explained
Haupt, J., van Nes, N., & Risser, R.	2015	Car	Route choice	Video recording observation analysis (20 participants)	Mixed	Cameras and not specified data reduction software	Video observation analysis	Data collection thoroughly explained Coding and analysis superficially explained
Kaparias, I., Bell, M.G.H., Biagioli, T., Bellezza, L., & Mount, B.	2015	Car	Pedestrians and drivers behavior	Video observation of vehicle-pedestrian interaction 2008 - 2011 and coding. This has also been complemented by vehicle traffic and pedestrian crossing counts.	Mixed	Video observation software not specified	Case study Video observation, behavioral analysis method introduced consists of three steps	Data collection Thoroughly explained Coding superficially explained

Table 1. Literature review qualitative travel behavior (cont.).

Authors	Year	Travel Mode	Objective	Data collection methods and Participants	Method of analysis	Software	Data Analysis Technique	Methodological Description of Qualitative Analysis
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Nielsen, J.R.; Hovmøller, H., Blyth, P.L., & Sovacool, B.K.	2015	Car	Exploring carpooling	5 Focus groups (roughly 50 participants) Semi-structured research interviews	Qualitative	-	Inductive analysis Grounded theory analysis and a qualitative version of factor analysis	Data collection explained Coding and analysis not explained
Nostilari, D.	2015	Various modes	Transportation needs of various population groups	One-week travel diary (GPS recorder, travel form, and images) Semi-structured interviews (15 participants)	Qualitative (and GPS data)	-	Case study	Data collection explained Coding and analysis superficially explained
Spotswood, F., Chatterton, T., Tapp, A., & Williams, D.	2015	Bicycle	Cycling as a social issue	Study 1: 3885 online survey (quantitative) Study 2: 10 depth interviews and 9 focus groups (60 participants) that included a 'psycho-drawing' exercise.	Mixed Quantitative and Qualitative	Vvivo	Thematic analysis	Data collection thoroughly explained Coding and analysis not explained
Ferrer, S., Ruiz, T., & Mars L.	2015	Pedestrians		Focus groups (With photographs showed to focus groups) 23 participants	Qualitative	NVivo 10	A thematic analysis of the data	Data collection, Coding and analysis explained
Cass, N., & Faulconbridge, J.	2016	Car	Shifting from car to other more friendly transport mode	101 Semi-structured interviews	Qualitative	NVivo	Grounded Theory Approach Analytic approach combining inductive and deductive techniques	Data collection explained Coding and analysis not explained
Karndacharuk, A., Wilson, D.J., & Dunn, R.C.M.	2016	Various modes including pedestrians	Shared streets, points of view pedestrian and vehicles	360 On-street perception surveys and 40 responses of a control site that remained as a traditional street survey 15 Expert interview surveys	Mixed Quantitative and Qualitative	-	Not specified	Data collection explained Coding and analysis not explained