Chapter 1

Origin–Destination Data Collection Technology

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ABSTRACT

Traditionally, the collection of origin-destination data through travel surveys has been a labor-intensive undertaking. Field researchers, armed with clipboards, stopped motorists as they traveled or visited residents in their homes to ask questions about the origins, destinations, purposes, and modes of travel. Technological improvements have led to more cost-effective survey methods that reduce the need to conduct intercept, in-person, and mail-based surveys. This chapter organizes and discusses recent trends in travel surveying based on whether they generate self-reported or observed travel data. The results suggest that these techniques are best used as a valuable supplement to traditional data generation methods or as a low cost alternative in situations where snapshots of travel activity will suffice. Future travel surveying efforts are likely to include a mix of traditional strategies and emerging technologies as the travel survey community continues to adapt to emerging technologies.

INTRODUCTION

Traditionally, the collection of origin-destination data through travel surveys has been a rather labor intensive undertaking. Field researchers, armed with clipboards, stopped motorists as they traveled or visited residents in their homes to ask questions about the origins, destinations, purposes and modes of travel. These surveying efforts often took place in the parking lots of retail establishments, government buildings, the shoulder of the freeway, or near freeway onramps. Over time, the cost of paying for field researchers, including the nebulous cost of time spent by travelers in answering these surveys, increased. These cost increases continued even after residential surveys moved to a telephone contact method. For the in-field surveys, cost increases were accompanied by an increase in safety concerns for the field researchers standing on the side of roadway facilities with much higher volumes of traffic. In fact, the Texas Department of Transportation ended the use of such intercept surveying practices in the 1990’s due to concerns about the delays they caused and safety concerns for travelers and researchers (Hard, et al., 2006, p. 33). Despite the rising costs and safety concerns,
the information obtained from these surveying efforts is critical to the development of local and regional travel demand models, which in turn play a crucial role in determining where constrained transportation investments are best allocated.

In an effort to reduce costs for origin-destination surveys, lower cost methods began to emerge. For example, planning agencies began to mail out surveys or postcards asking the public to provide information on their travel during a particular day. However, these types of efforts generally had lower response rates. In addition, those receiving the survey or postcard might not have clear recollections of their travel on the day in question. Finally, the approach would usually result in a non-random sample, which then limited the use of the data in the travel demand models.

The methods for conducting origin-destination surveys have evolved alongside technological advances. For residential interviews, the methods evolved from in-person/in-home interviews to telephone interviews in the 1970s. In the 1990s, the household travel surveys moved into computer-aided telephone interviewing (CATI) methods. Currently, this data is collected through telephone, Web, mail, and GPS technology, with methods being tested to use cellular phone traces as well. Non-residential origin-destination surveys have evolved from the in-person roadside method to the collection of license plate data electronically, first voice recording license plate numbers then using automatic license plate recorders. Today, the use of Blue Tooth technology is becoming more commonplace. Fortunately, technology is making the gathering of origin-destination data easier. Continued advances in location based technologies mean that many smartphones, tablet devices, and select vehicles become generators of location data that can be used to supplement and refine traditional paper-based and in-person collected travel surveys.

The purpose of this chapter is to provide a review of recent trends in technology that are reducing the need to conduct intercept, in-person and mail-based surveys. The information gathered through travel surveying efforts generally falls within one of two categories. The first category is self-reported travel data. Self-reported data are defined as the respondent recollecting, to the best of their knowledge, the various particulars of a given trip. The second type of data is observed data, wherein the actual travel of the person in question is observed, either passively or actively. This chapter organizes and discusses recent trends in travel surveying based on whether they generate self-reported or observed travel data. In general, technologies associated with the generation of self-reported data could be considered technologies that improve current methods (i.e., we automate methods that previously were manually performed but the methods remain generally intact). Technologies that generate observed travel data are those that have the potential to revolutionize origin-destination data collection methods (i.e., move methods into a new realm).

TECHNOLOGIES FOR SELF-REPORTED ORIGIN-DESTINATION DATA

The greatest advances in origin-destination data collection methods have come from the introduction of technologies that automate tasks previously conducted manually. This includes the use of the internet for surveys, and global positioning satellite tracking (GPS) and automatic license plate recognition technologies. With origin-destination surveys, the technology reduces respondent burden (i.e., makes it easier for the respondent to participate). And while the technologies advance the state of the practice, they also introduce new caveats to consider in their application for origin-destination surveys.

The first caveat in the use of any data collection technology is the issue of technology bias. Most survey designs include some type of bias, be it associated with the type of sampling employed