

# CHANGES OVER TIME IN TRIP BASED SURVEY CONTENTS AND THEIR FUTURE IMPROVEMENTS: US AND JAPAN IN FOCUS

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## 1. Introduction

Trip based survey has been conducted for about half century to grasp the characteristics of personal travel and also to analyze trends of travel and the relative use of different mode of transportation. However, the advancement in technology and transportation system has changed the travel behavior which necessitated for not only new analysis methods but also for more comprehensive data. This paper analyzes how the emerging trend influences the content of original survey overtime and future considerations. Though the paper focuses on national level trip based survey of Japan and US, lower scale trends and their combination with that of national level is examined.

## 2. Changes in travel based survey data content over time.

Travel based survey has changed both in content and collection method overtime to meet the dynamic changes and need of more comprehensive data. It was in 1969 when the first of the four Nationwide Personal Travel Survey (NPTS) conducted in US. The data content was limited, thus the questionnaire was to the point and short and the focus was just on automobiles. In the superceding 1977 NPTS, the survey was extended to cover all the motor vehicle that owned by the household reflecting of greater mix of vehicle types in household based fleet.

Safety measures were the main change in content in 1983 NPTS which enables researchers to consider this aspect in their analysis.

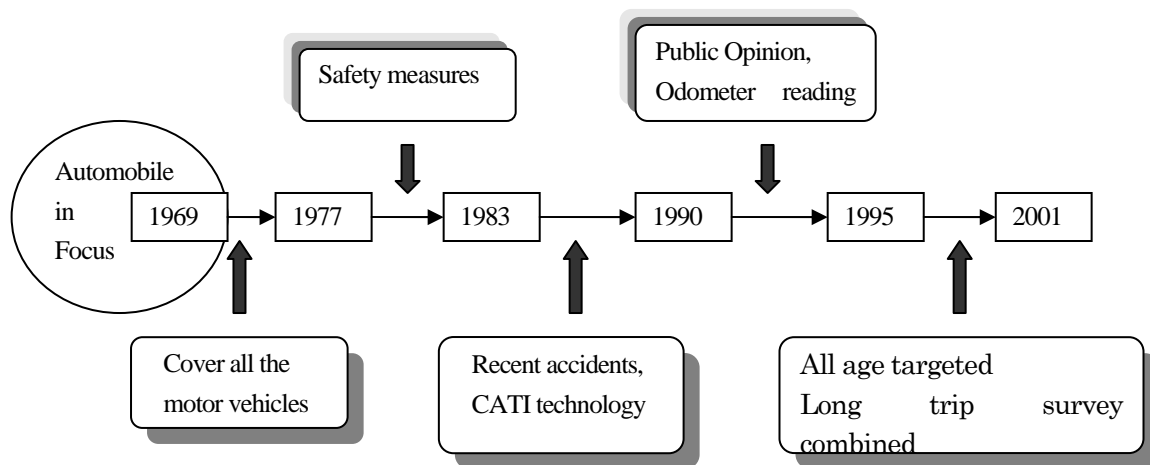


Fig.1: Main Data Content changes of National Personal Travel Survey of US

Key words: Personal Trip survey, improvement, emerging trend and issues

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Information about safety device usage and child safety topics is obtained. Computer assisted telephone interview (CATI) technology was applied in 1990 NPTS for the first time and this switch off was the main feature though there were some additional information like the data of recent accident (if with in the past five years. Wide recognition of the importance of attitude and perception as determinants of behavioral decision making caused the 1995 NPTS to include *public opinion*. Despite all this updates researchers kept looking for supporting data to meet their objective and often meet problem in combination. Last NPTS of 2001 combined with American Travel Survey (ATS) which is for long trip to overcome such obstacles and it was evaluated to be effective.

Though the first PT survey conducted in 1967 (*Hiroshima*), it was only in 1987 that took its national level. In 1999 national-wide person-trip survey has started officially after the second preliminary survey in 1992. Though in the fourth round of local surveys which is about one round ahead of the national one included some components about perceptions, stated preferences and needs, for TDM and mainly to improve public transport usage this is not true at the national level one. This part of the questionnaire is considered as the supporting data to address particular problems and might vary among the cities with their peculiarity.

### 3. Travel behavior trend and data needs.

As indicated in previous section, the data content has changed over time to address some of the determinant factors that influence travel behavior. This section presents an overview of the recent main concerns of emerging travel behavior which affects the data collection and analysis, and it also looks for possible augmentations of conventional personal trip survey to grasp of the new trend in the short run and longer term considerations.

#### (1) Changes in travel behaviors

Demographic characteristics overtime are some of the main trend indicators with great potential of implications. Decrease in population, falling of fertility and increase of aged population are among the main features of this century

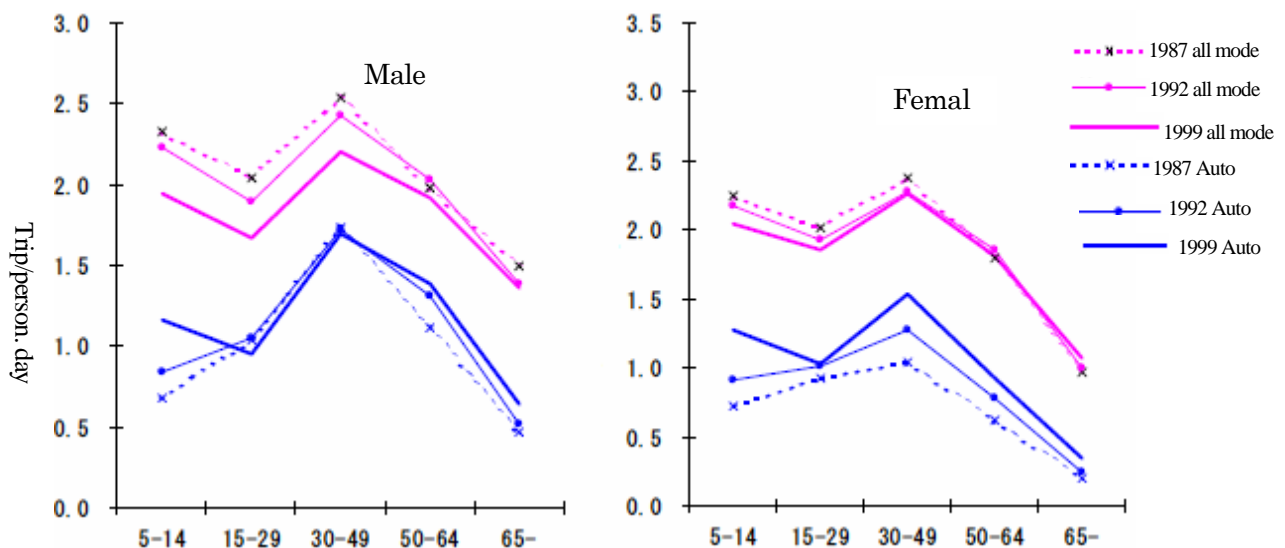


Fig.2. Week end trip trend by Gender and Age of Japan (Source: Institute of Behavioral Science IBS)

This phenomenon is believed to have a great implication on the travel behavior trend and mobility. The change is spectacular for the females and as shown in Fig.2 unlike the males, the trip by automobile has shown increase through out and relatively higher for those in 30<sup>s</sup> and 40<sup>s</sup> the source indicates same trend in the weekdays too. The economical independence of females and the decrease of fertility have greatly contributed to this change. The trips of aged population are increasing in weekdays as well as weekends for both genders with the exception of *all mode males* case trips. Relatively, there is increasing mobility in the weekends compared with weekdays in general, and continues decrease of the public transports.

In USA too aging population and women's increased economic independence are among the main demographic trend of

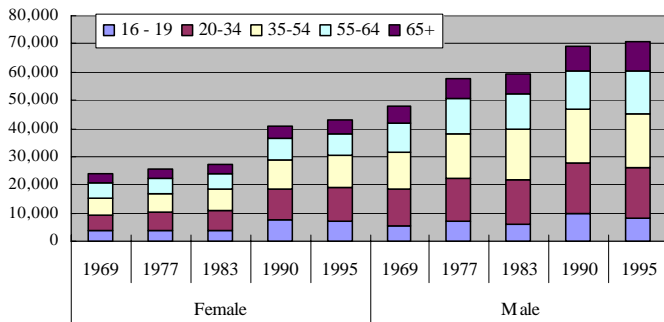


Fig3. Average Annual Miles per Licensed Driver by Driver Age and Gender  
(Data source: NPTS of USA)

particular relevance with travel behavior. Baby boomers, those who were born in Post-war, have been demographic engine driving social changes. Women of this generation were the first to go to college like men, join labor force and licensed to drive will carry greater mobility into old age. As shown in Fig.3, the annual per licensed driver of women aged 35-54 which include early baby bombers have increased by 99.97%.

The aging baby boom, decrease in fertility and increase of senior citizens (*kouresha shakai*)<sup>1</sup> with the increase of economical independency of women have changed in such a way that it evidently affects their future

mobility. It is noted that any of these trends alone have potential implication on transportation.

In recent past the impact of information and communication technology (ICT) has been focused on with the increase of mobile technology (See Fig.3). The new technology has enabled diversity array of activities to be undertaken through personal computers and wireless technologies, like e-commerce and tele-commuting. Decision process of an activity may change as individual can plan and execute without advance preparation. In the long term it may redefine the conventional geographic accessibility. There is a potential for ICT to affect in residential and business location choices which will have a shorter-term impact on car ownership and activity and travel decisions of households.

After all the need for additional analysis to grasp the new trend of travel behavior is obvious. Activity based analysis, time space interaction, understanding attitudes, values and perception, ICT impact on travel and probing of behavioral process and dynamics are among the new analysis tools which drawn attention .

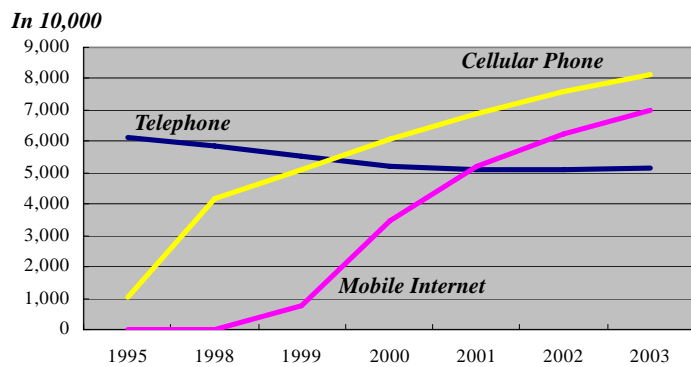


Fig.3 Subscriptions and contracts to Information and Communication Services (Japan Bureau of Statistics)

**(2) Data requirements to address the emerging issue**

**(a) Changes in progress**

Original travel surveys are conducted to collect data on how people traveled, including number of trips, choice destination and choice of mode. But the new survey methods to address such a new trend don't only need more detailed of how people travel, but also behavioral information's on peoples` choices of whether, when, and how they would travel in certain conditions. Trip based surveys have been augmented overtime to address some of the emerging challenges. Table.1 shows some of the main contents in the last US national survey which was conducted in 2001 and that of 1999 in Japan is added for comparison.

**Table.1 Some of The items of the 2001 NHTS with their potential and 1999 JNPT**

Items in NHTS	Potential	Japan NPT survey
All distance (Daily and long distances)	Analyze all kinds of trips	daily
Diary	Increase the so far underestimated/ignored short trips	`recalling`
Perception	As feed back and for TDM	---
Internet Use, cell phone and home phone	The impact ICT	---
All age	Complete trip as include KG and trips with outsiders	5 year and above
Conducted over a year	Consider seasonal variation	Two months
All over the week	Balance and analyze daily variation	a weekday ad a week end

Enriched NHTS has attracted local and regional planners to understand more of travel behavior of their area. Out of 69,817 sampled household in 2001 only 26,038 was national while remaining 62% were "add-ons", a system which allows to purchase more household samples. The Des Moines Metropolitan area used NHTS *add-on* samples in calibrating and validation process of MPO's Demand Model [1], in New York area integrated NPTS for comparative analysis of weekday and weekend travel analyses [6]. It has been used also in modeling where there is no better data is available either as default, add-on or using transferable rate, The Wisconsin Experience is a good example[1].

On the other hand, Japan Nation Wide Personal Trip Survey (JNPTS) conducted on 35,000 households from 70 cities in 1999[3] a sample about 34% higher to that of US. However, it is by far less comprehensive and lack the trend oriented diagnostic nature of NHTS, in fact, there is no tangible and apparent difference both in content and in detailing to the typical local ones with the exception of including weekend (see Table-1). At local level, however, there is effort to understand more of emerging travel behavior. Beside the main conventional survey they are conducting supplementary surveys. Kofu City Area Personal Trip Survey conducted at the end of 2005 is a typical example. Beside the main PT survey, there were two supplementary surveys: about actual public transport usage and automobile usage to address the increasing automobile dependency and decreasing public transport users. Designing the JNHTS with more complementary and integrated way like introducing "add-on system" would not only help in its objective but also alleviate the burden on the local ones and could give opportunity new areas to participate.

#### **(b)Future Considerations**

New models developed to grasp travel behavior from the elementary level need more detail and accurate data on behavioral processes, decision making-making behavior and interactions among agents. These are implications for activity-based approach as personal trip-based survey can't be full fledged to cover all this data but there is possibility to improve it to give deeper understanding. Adding longitudinal components may be useful in analyzing dynamics in behavior in short-term and long-term as well. A set of questions in the cross-section can be designed to give an insight of the decision process. Though technology could help in simplifying collecting such bulk data it is hard to grasp travel behavior without considering constraints and opportunities that shape individual travel behavior, hence heading toward activity-based approach.

#### **4. Conclusion**

Trip-based survey content has been changing overtime to meet emerging issues. This is particularly true for NHTS which is more detail and comprehensive to the local ones. This complementary aspect of the survey and the "add-on" system has motivated local levels to use in various ways. On the other hand, JNHTS is less comprehensive and lack the diagnostic nature exhibited by NHTS and the content is basically very similar to the local ones with the exception of covering the weekend travel behaviors.

Though socio-economic and demographic characteristics have their own share in shaping travel behavior, however, the new models to address the new trend don't only need more detailed of how people travel, but also behavioral information's on peoples' choices of whether, when, and how they would travel in certain condition. Though it is impossible to cover all such detail activity based data in trip based survey there are possible improvements to boost it so that it can be used to derive a greater and deeper understanding of activity and travel choices.

#### **References**

- 1) TRB Survey Method Committee (2005) Data for Understanding our Nation's Travel Behaviour.
- 2) US NHTS/NPTS Files (1995-2001): <http://nhts.oml.gov/2001/index.shtml>
- 3) The Institute of Behavioural Science(IBS) of Japan: <http://www.ibs.or.jp/>
- 4) US. Department of Transportation, US. Environmental Protection (1996) Travel Survey Manual
- 5) Dr. Kelly J. Clifton, Dr. Kevin J. Krizek (2004) .The Utility of NHTS in Understanding Bicycle and Pedestrian Travel
- 6) New York Metropolitan Transportation Council New Jersey Transportation planning Authority (2000) Comparative Analysis Weekday and Weekend Travel with NPTS integration: [http://www.njtpa.org/planning/rthis/documents\\_rthis/NR000309.pdf](http://www.njtpa.org/planning/rthis/documents_rthis/NR000309.pdf)
- 7) Baltimore Metropolitan Council (2005)2001 House Hold Travel Survey: Baltimore Region Analysis
- 8) Statistics Bureau of Japan: <http://www.stat.go.jp/english/index.htm>
- 9) Kimon E. Prousaloglou ,Yasasvi D. Popuri, Bruce A. Aunet and David M. Cipra.(2004).Enhancing State and and MPO Transportation Planning Using NHTS add-on Data