Inter-regional Passenger Demand Surveyed By Repeated Web Questionaire

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In Japan, Net Passenger Transportation Survey (NPTS) gives detailed information of inter-regional passengers including not only travelling route or mode but passengers personal attributes. On the other hands, seasonal variation of net passenger distribution can not be estimated form the survey, since the survey is conducted only in a day. In order to overcome the above limitation, repeated web survey at home-base was conductetd for inter-regional passengers. Since the questionnaire items includes trip frequency to each destination, the observation in this survey is comparable to conventional NPTS or observed at major links. The survey clarified a characteristics of passengers and seasonal variation of intger-regional demand.

Key Words : *web survey, seasonal difference in passenger demand, trip frequency*

1. INTRODUCTION

Net Passenger Transportation Survey (hereafter, NPTS) has been conducted since 1990 in every five years in Japan. NPTS is a composite survey to integrate multiple sources such as gross passenger flow and link-based traffic observed at several major links with on-site questionnaire survey to the passenger. The purpose of NTPS is not only to get "true" origin and destination distribution consistent with link-based traffics, but also to estimate a passenger demand model in trip distribution or modal split or route choice, which are essential information to plan a new services in inter-regional passenger transportation.

While NPTS has provided for basic information for domestic network design, the survey was often criticized in terms of an difficulty to measure a demand variation since on-site survey is only made in a day. In 2005 (4th NPTS survey), the survey started to observe the passenger demand in holiday and in weekday, which enebles to differently design transportation capacity for holidays, or for weekdays, respectively. Another major limitation of conventional NPTS was not to observe seasonal demand cgange. For handling with this problem, Isono *et. al* (2010) tried to modify the existing demand table by referring to gorss passenger demand observed for major links. Even their trial is valuable, but it is difficult to check the varidity of the estimated demand. A critical limitation of on-site survey to observe travelling passengers is not to obsrve passenger's trip frequencies. Trip frequency of passengers is important information for service suppliers, for example, frequent fighyer's program in air users or Shinkansen users are already provided. Furthermore, passenger's trip frequency is also important to determine trip generation rate required in converting population characteristics into on-site passenger traffic. Therefore, another approach to measure the seasonal variation and trip frequency should be developed.

In order to tackle to the above problems, this study conducted home-based web survey for inter-regional passenger trips, including trip frequency questions. This survey is repeated for evey 3 months in order to clarify the seasonal demand variation. Section 2 shows the summary of the survey and Section 3 shows an brief aggregation results of the survey.

2. SUMMARY IN SURVEY

We designed a repeated home-based web survey. The outline of this survey is shown in **Table 1**. This is a panel survey with four waves to observe the inter-regional trips made in the latest three months. The target trip purposes are business, sight seeing, relative visiting and others, not to include commuting or

schooling. In order to measure an annual inter-regional passenger demand based on the look-back questionaire, the survey was repeated four times in a year in each three month in July, October in 2015, and January, April in 2016, to cover the latest three months (therefore, the records with no-trip in past three months appear in the samples). The target is the persons with over 20 age who have willingness to join the above repeated panel survey. The respondents with their own internet connection are preliminarily registered as monitor in a survey company. In order to keep number of samples, exhausted samples were newly filled in each wave.

The survey items are the personal attributes (Sexuality, age, home address, occupa-tion, annual income; questioned at the first join to the survey) and detailes of inter-regional trip in the latest 3 months. Considering respondent's fatigue, the trips to ask in the questionnaire was up to 3 different destinations, but the frequency to visit in past three months in each trip was asked. Other trip details were rip generation timing, the departures area, visited destination or representa-tive site or facilities,modes used in the trip.

3. DATA AGGREGATGION

In this survey, the collected samples in each wave was around 9000, who are collected form the monotors in private company living in South Kanto area. Since the destination of trip was answered in text, we prepare the conversion list from "text" destination into the area defined in NPTS survey. For simplicity, the samples with oversea's destinations are omitted. For simplicity in this aggregation, unit of destination in the following graphes is prefecture level, but the conversion list is prepared for 194 sub regions exept remort islands like Okinawa (the definition of subregions follows NPTS). Note that the difference in surveyed site will strongly influence on obtained sample. In NPTS, on-site travelling people is observed so then the trip frequency issues in each individual was not observed. Therefore, the simple observation share of trip in our home-based survey may be biased from on-site observation. A modification from home-base to on-site survey is to count on trip frequency to the same destination as an weight to each sample. To compare the effect of trip frequencies,we will show some aggregation weighted with trip frequency and with no weight.

Fig. 1 shows the share of male and female. As hwn in this figure, trip frequency weight has an effect to increase male share. Fig. 2 shows the trip purposes. Even the share of relative visit, private and others are not changed, the share of business is increaserd while

Table 1 A repeated web survey for inter-regional passengers

| Survey type	Panel survey with full respondent's ID
Surveied trip duration	Four waves in each three months : for the trips made in April to June in 2015 at 1st wave, for the tripsn in July to September in 2015 at 2nd wave, for the trips in October to December in 2015 at 3rd wave and for the trips in January to March in 2016 at 4th wave,
Target trip purposes	Business, sightseeing, relative visiting and others (excluding commuting and schooling)
Target respondents	Over 20, male and female with address in Tokyo, Chiba, Saitama and Kanagawa
Survey monitor	Intage Co-ltd. in Japan
Screening condition	Prior to the first survey, monotor's willingness to attend a series of surveys was confiemed. The panel exhaustion is filled up for each wave.
Items: -Personal attributes -Trip related items	Sexuality, age, home address, occupation, annual income at the initial join for a respondents to the survey Frequency of inter-regional trip in the latest 3 months*, *Details in the past three trips (trip generation timing, the departures area, visited destination or representative site or facilities,all the modes used in each trip, accompanied person)*
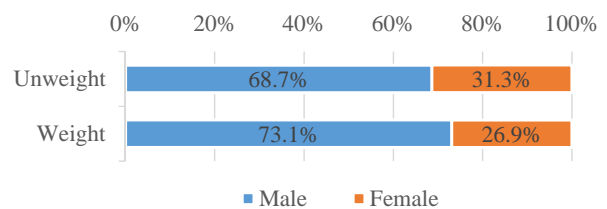
Fig.1 Male / Female
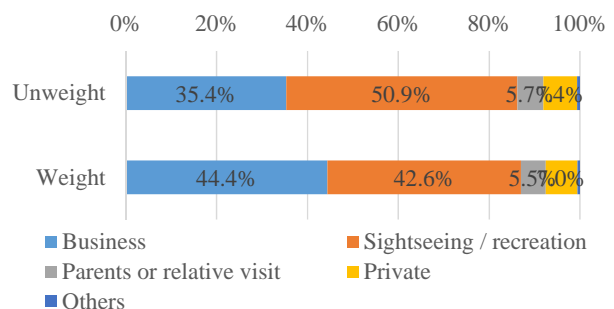
Fig. 2 Trip purpose

that of sightseeing is decreased. However, even in such correction, the share of sightseeing seems higher than NPTS survey. Such the tendency would be due to easiness to recall sightseeing activities rather than business trip. Fig. 3 shows the age segments. The modification increase 50 to 59 passenger, while other
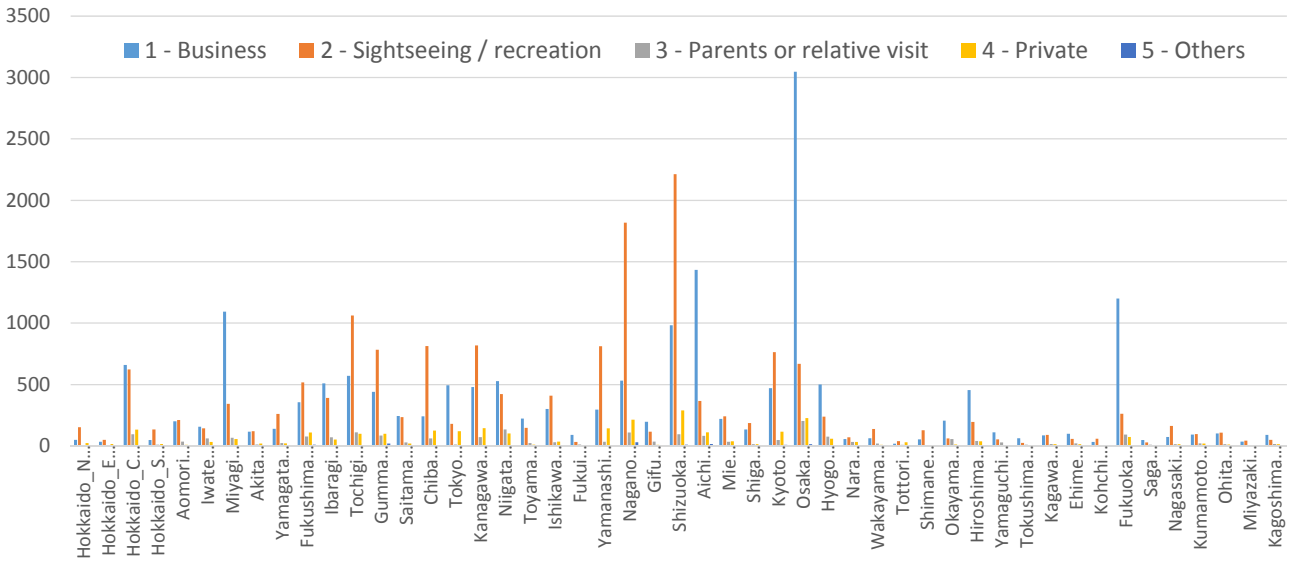
Fig. 8 Distribution of destinations (weighted) by trip purposes
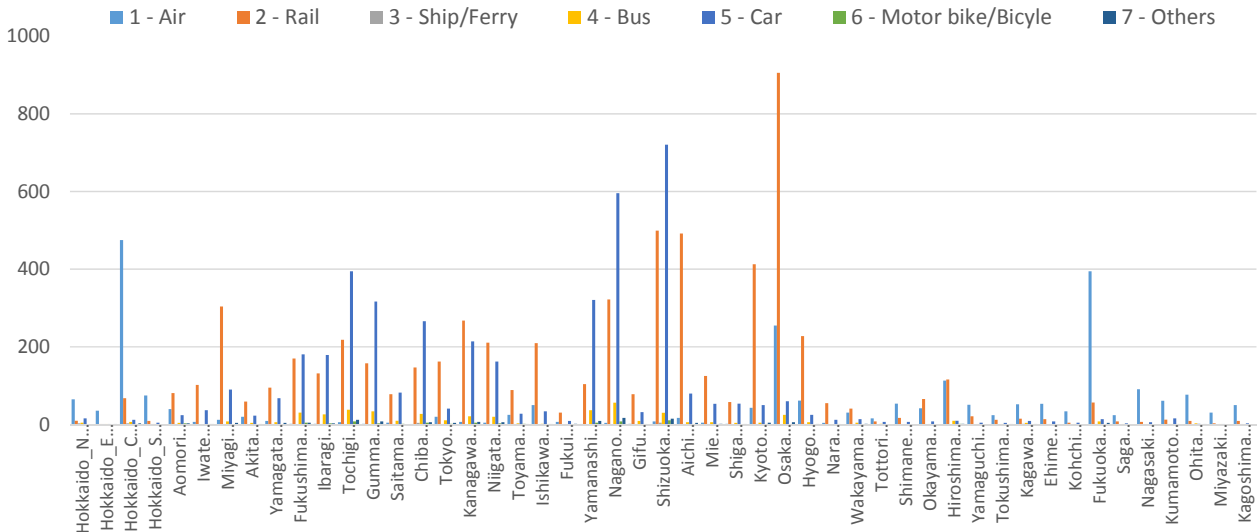

Fig. 9 Distribution of destinations (weighted) by representative mode

age segments are decrased. The age distribution in this survey also affected by web-survey.

Fig. 4 and Fig. 5 show the household income distribution for unweighted samples and weighted samples respectively. Comparison in these grahps tells that a person with higher income hosehold shares more in the frequency based aggregation. Fig.6 shows the modal share of representative mode on trip. The definition of modal shaer follows that in NPTS; i.e. setting the priority of mode among the trip makes used such as air (first), rail (second), etc.The trip frequency weight on modal share effects to slightly increase air and rail , but to decrease car and others. As shown in the above comparison, trip frequency weight will affects on sample characteristics distribution. Therefore, it should be carefully treated in the data aggre-

gations. For simplicity, the graphes shown in the fillowing section is limited to the weighted ones.

Fig. 8 shows the occupation share. Manager and salaryman shares most, but housekeepers shares following to the top 2 categories. Fig.8 shows the trip destination distribution in each prefectures. Since the respondents are limited into South Kanto Area, the destination is skewed to Eastern japan. Comparing business and sightseeing, trip distribution difference is quite obvious. In terms of business, trips concentrates on majour cities by air, while in terms of sightseeing, the destinations are widely spread around the Eastern Japan and local areas. Comparing to private and relative visit, these two share seems to almost same for all destinations. Fig. 9 show the trip destination distribution by representative modes. In this
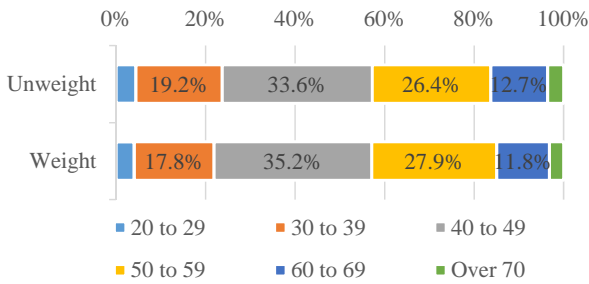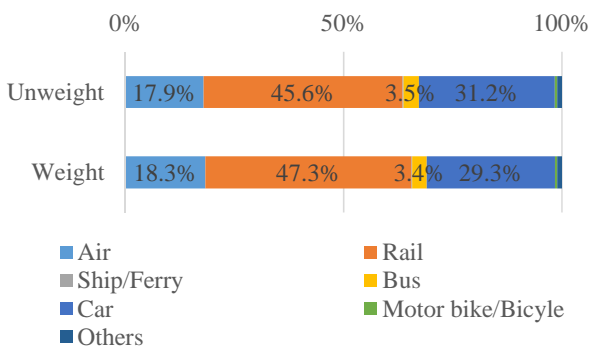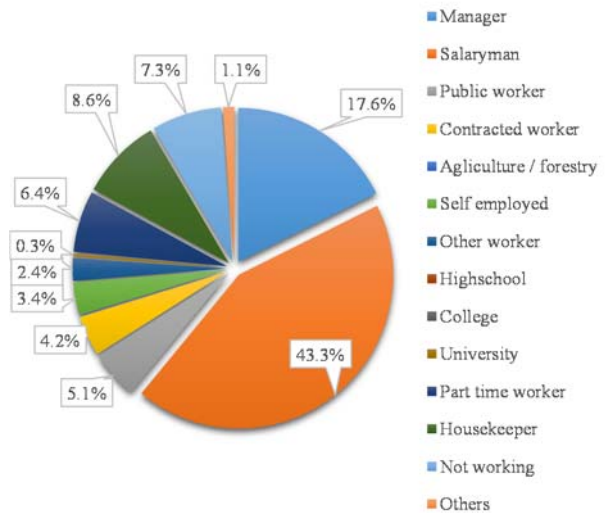
Fig. 6 Modal share

Fig. 3 Age segments
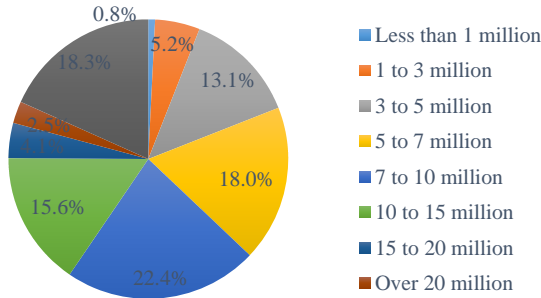
Fig. 4 Household Income (Unweighted)
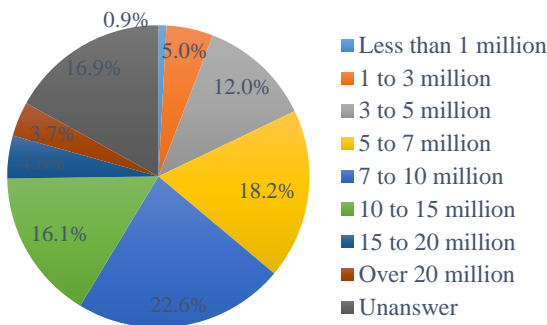
Fig. 5 Household Income (weighted)

Fig. 7 Modal share

figure, car seems to be majour mode for the destination up to 200 to 300 km range. Following to car, middle distance (up to 600 to 700 km range) is covered by rail and further range is covered by air.

4. SUMMARY

This paper reports on the brief aggregation results in home-based web survey for inter-regional passengers. Comparisons in different waves and model analysis will be reported at the presentation.

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