

Analysis of the Recent Change in Commuting Time in Osaka

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Synopsis: It was attempted to analyze the recent change in the commuting time in Osaka Prefecture stimulated with the recent popularity of high quality urban flats or apartment houses located in the redeveloped districts with excellent accesses of public transports.

Recent trends in housing, population, commuting time by the person trip survey were analyzed and a simple survey for the residents of new urban flats or apartment houses was also attempted to cover the conscious side.

keywords : *Commuting time, Urban flat-type house, Population distribution, Person trip, Questionnaire survey*

1. Introduction

There was a continuing preference or desire to have a detached house for most people for a long time in Japan. But it is not easy to hold detached house mainly for the cost and distance from the central business district (C.B.D.) and other reasons, on the other hand, urban flat houses have been supplied for past several decades and become popular type of residence in place of the traditional low wooden flats.

Recently, private residential developers have been supplying considerable high quality urban flats or apartment houses in the redeveloped sites in place of closed factories or the deteriorated residential blocks with public transport accesses like in the vicinity of railway stations. These flats or apartment houses have been becoming popular, and located near the C.B.D. or railway stations for convenience of transport, and to reduce the commuting time. Nowadays flat houses are the more favorite type of residence for urban dwellers.

A simple survey by questionnaires was carried out to know the relation to the former residences of the new residents of the newly built urban flats or apartment houses. The questioned items are type and location of their former residence, reason of movement, change of the commuting time, etc..

There are periodical comprehensive person trip surveys among the fundamental transportation surveys executed in the major metropolitan areas in Japan. The commuting time and its recent change were analyzed using the person trip data.

2. Recent Change in the Distribution of Population and Residences in Osaka Prefecture

2.1 Population

The population of Osaka Prefecture within 50 km from the C.B.D. in Osaka are still increasing from 13.65 millions in 1970 to 16.35 millions in 1995, but the rates of population growth in recent years are decreasing year by year. Changes in shares of the population by distance range of 10 km belt are shown in Fig. 1, and there seems to be a typical trend that the population in Osaka City are moving into the suburban areas.

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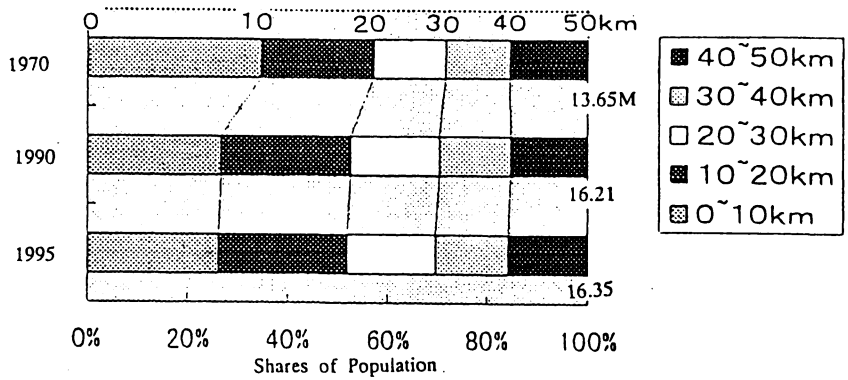


Fig. 1 Shares of population by distance range within 50km from the C.B.D. in Osaka

The inflows and outflows of the population in Osaka City are shown in Fig. 2. This figure shows that the outflows of population are greater than the inflows of population to Osaka, and both inflows and outflows are decreasing to an almost constant stable level.

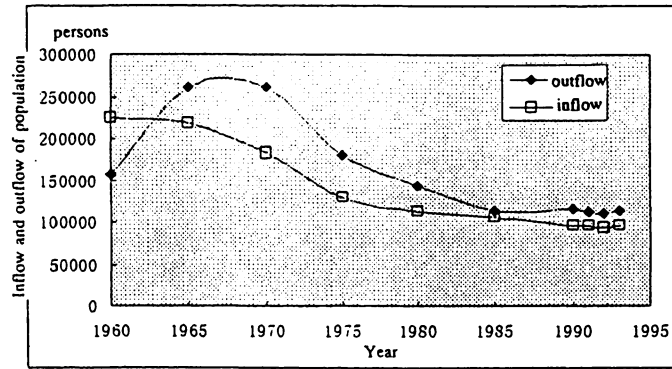


Fig. 2 Inflow and outflow of the population in Osaka City

The change of the gravity center (averaged distance from C.B.D. in Osaka) of the daily inflow population to Osaka are shown in Fig. 3, and the gravity center is still going outwards from C.B.D. in Osaka City. But level of the shift of gravity center is decreasing.

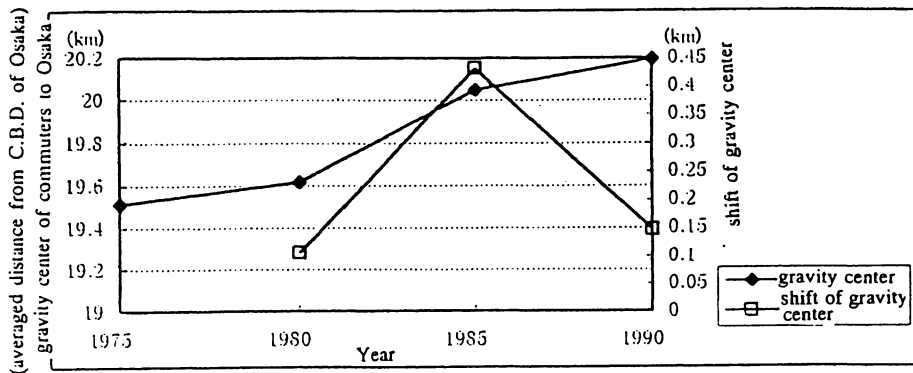


Fig. 3 Shift of the gravity center of commuting populations to Osaka City

2.2 Type and distribution of residences

Number of the residences in the 50 km range from the C.B.D. in Osaka are still increasing from about 2.0 millions in 1970 to 5.6 millions in 1993 by concentration of population to major metropolitan regions, steep rise in land prices urban redevelopment, decomposition of family with three generations, inner-city problems and so on. The detached house for a single family, and the flat-type residences are the two major types of residences, while the ordinary low wooden flats are decreasing.

In recent years, the flat-type residences has been the most popular type of residence in place of the detached type of residence in the former years accelerated by the high quality flat buildings built in the urban renewal program located at the sites with good public transport accesses (Fig. 4, Fig. 5).

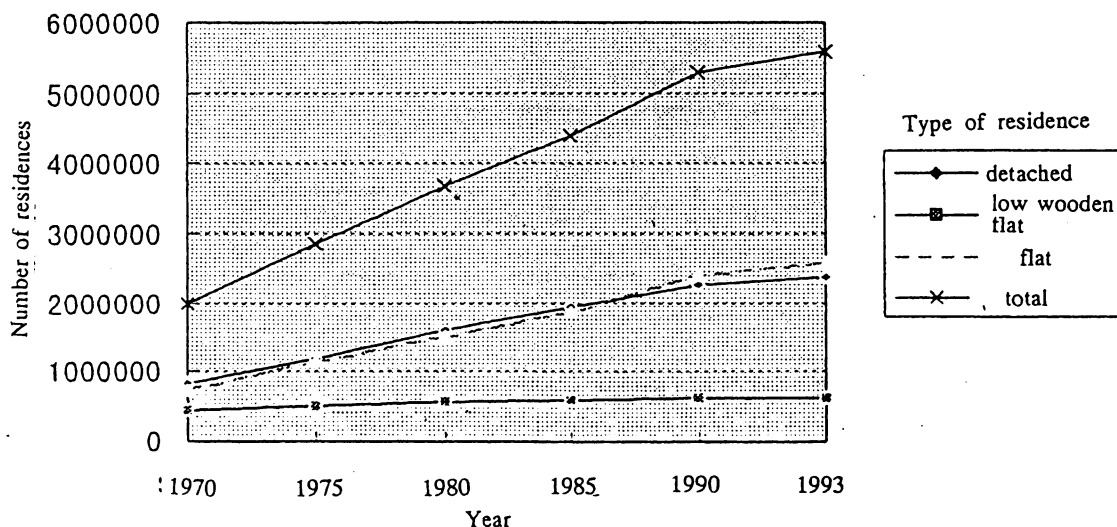


Fig. 4 Increase of residences by type within 50km range from C.B.D. in Osaka

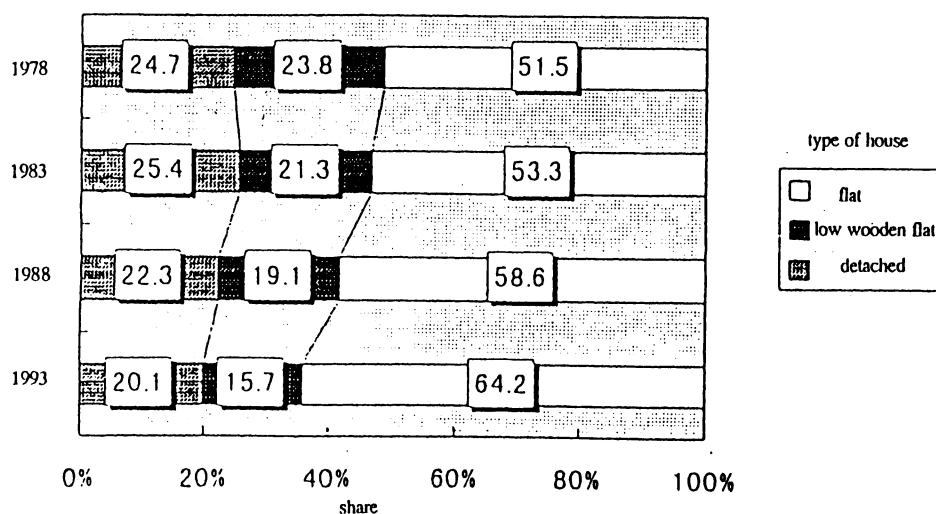


Fig. 5 Transition of the share of residence type in Osaka City

3. Survey of residence for the urban-flat residents

3.1 Some details of the survey

Several statistics of housing or intra-urban immigration in metropolitan area are obtainable from

census data or several periodical surveys. To get the individual feelings for housing, location, and its relation to the work place, a simple survey was planned by distributing questionnaires to the mailboxes of urban-flat residents by hand, and by recovering them by mail.

The delivered number of questionnaires and their recovery are shown in **Table 1**. The regional distribution of the questionnaires is shown in **Table 2**, which shows unbiased sampling of the suburban area of Osaka City. **Table 3** shows the age distribution of the respondents of the survey. **Table 4** shows the distribution of years of residence at present house, which indicates that the majority of respondent are new comers because considerably new urban-flat house buildings were selects for sampling

Table 1 Number of delivery of questionnaire to each mailbox.

No. of delivery	1497
No. of returns	272
Rate of return	18.2%

Table 2 Regional distribution of questionnaires

Region	Cities	No. of Samples	Regional sector
Hanshin	Amagasaki, Nishinomiya	27	Northern Osaka (22%)
Northern Osaka	Ibaragi, Hirakata, Minoh	32	
Osaka City	Osaka	96	Osaka City (35%)
Eastern Osaka	Higashi-Osaka, Ikoma	31	Eastern Osaka (23%)
Southern Kawachi	Kawachinagano, Tondabayashi	32	
Senboku	Sakai, Izumi	30	Southern Osaka (20%)
Sennan	Kishiwada, Izumisano	24	
Total		272	

Table 3 Age distribution of respondents

Age group	Percent's
20-29	11%
30-39	36%
40-49	26%
50-59	17%
60-69	7%
Other	3%

Table 4 Year distribution of residence

Years of residence	Percent's
Less than 1 year	41%
1-2 years	23%
2-3 years	14%
More than 3 years	22%

3.2 Results of the survey

(1) Before and after comparison of house location

Present house locations were compared with their former locations, and it appeared that the movements in the same region were more popular, followed by the movements from neighboring regions. In this survey, the inflow (34.6%) to Osaka City was slightly greater than the outflow (31.2%) from Osaka City.

Major reasons of movement are environmental quality, movement in business position or office location, convenience of work, marriage and so on.

Major reasons of choice for housing location distribute on house price, distance to work place, convenience of transportation, convenience of general living condition.

(2) *Commuting time*

Mean value of the commuting time of the respondents is 40.5 minutes and 75 percents of the respondents' commuting time are less than one hour. These are shown in **Fig. 6** by regional sector.

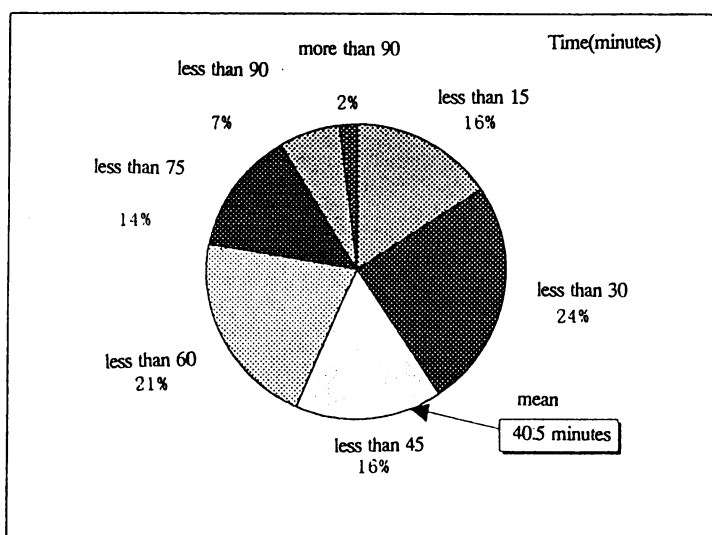


Fig. 6 Commuting time of respondents

These are considerable low compared to the mean value of commuters in the Osaka metropolitan area mainly because the detached houses have not been sampled in the survey. The major transport modes of commuting of the respondents are rail (58 percents) and car (22 percents) as shown in **Fig. 7**.

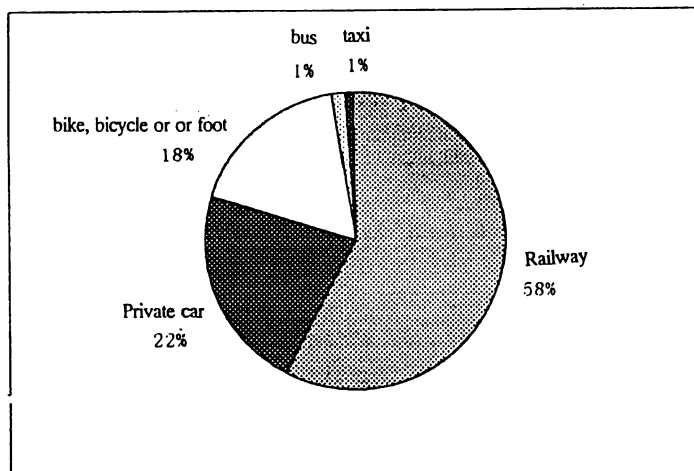


Fig. 7 Transport modes of commuting of respondents

On the change of the commuting time of the respondents who moved by reason of work office change, about half of the respondents selected the location of new house to reduce the commuting time than before as shown in **Fig. 8**.

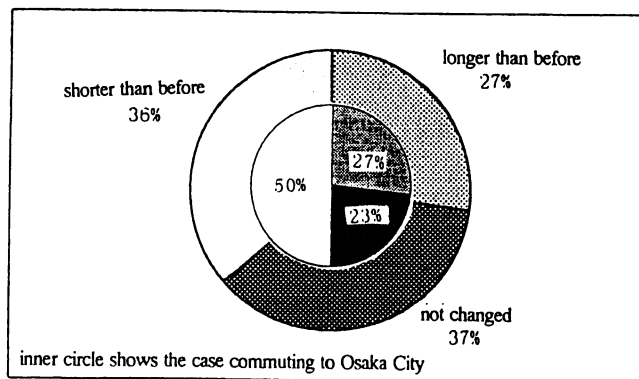


Fig. 8 Comparison of the commuting time with that of the former residence

Desirable commuting time of the respondents answered is 30.8 minutes in average (about 10 minutes shorter than present average), with 70 percents of respondents ranging between 15 minutes and 45 minutes. This means that the residence location is not desired to be the possibly nearest to the work place, but to be separated with considerable distance necessary to use public transport in short time which is not considered to be so far generally.

4. Analysis of transition of commuting time by the person trips survey data

4.1 The person trips survey data

Major metropolitan regions are covered with periodical transportation surveys in Japan. Among them, the person trips surveys are carried out every ten years. In the Keihanshin metropolitan region which contains cities of Kyoto, Osaka and Kobe with their environs, person trips surveys were made in 1970, 1980, 1990 by nearly three percents sampling of the residents in the region to obtain the personal trip records with their origins and destinations, trip purposes, transport modes, travel distance and time, and others.

4.2 Analysis of the commuting time to Osaka within 50 km radius

(1) Population

Population of the Osaka metropolitan area within a radius of 50 km from the central business district (C.B.D.) of Osaka, has increased about 20 percents from 1970 to 1995 and is still increasing at the gradual reduction of growth rate. Population in the inner belt within 10 km radius was decreased to about 91 percents of the level in 1970, continuously in the recent quarter of the century, while populations in every outer suburban belts of 10 km width were increased about 21% at least and 47% at most in the same period. But these trends in population movement are vanishing gradually (Table 5).

Table 5 Rate of population increase in 50 km range in Osaka Prefecture

Distance belt	Rate of population increase (%)					Index of population in 1995 (base year 1970)
	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	
Total	9.0	3.6	3.0	2.0	0.9	119.8
0- 10 km	-3.4	- 3.7	-0.7	-0.7	-1.1	91.0
10-20 km	20.2	7.6	1.2	1.2	-0.3	135.5
20-30 km	20.6	8.5	4.9	4.9	0.9	147.3
30-40 km	12.7	8.0	4.0	4.0	2.2	136.7
40-50 km	6.6	3.0	3.1	3.1	4.8	121.4

(2) Commuting time

Two major transport modes of the commuters to C.B.D. (central three wards) of Osaka City are railway (the share is about 90%), private car (about 8%), and others as shown in **Table 6**.

Table 6. The commuting trips to the C.B.D. (the central three wards in Osaka) and their modal share from Osaka Prefectural area

Transport mode	Commuting trips and modal share	
	1980	1990
Railway	320,084 trips (89.9%)	403,982 trips (90.6%)
Private car	28,876 (8.1%)	36,238 (8.1%)
Others	7,063 (2.0%)	5,607 (1.3%)
Total	356,023 (100.0%)	45,827 (100.0%)

Averaged commuting time to Osaka City from the area of Osaka Prefecture is still increasing slightly from 53.9 minutes in 1980 to 54.1 minutes in 1990 by the person trip survey data. The averaged commuting times of the longer trips more than 20 km ranges from C.B.D. in Osaka are slightly decreasing caused by transport improvement, while that of the shorter trips are increasing, as shown in **Table 7**.

Table 7. Number of commuter trips and mean time by distance range to Osaka City from Osaka Prefectural area

	~10Km	10-20	20-30	30-40	40km~	Total
1980 No. of Trips (thousands)	875.6	601.2	556.4	406.7	156.4	2,596.4
mean commuting time (minutes)	32.5	48.6	61.3	82.9	92.7	53.9
1990 No. of Trips (thousands)	886.4	669.2	595.1	422.1	169.0	2,741.7
mean commuting time (minutes)	32.8	49.4	61.0	81.4	91.8	54.1
Trip growth rate(%)	1.2	11.3	6.9	3.8	8.0	5.6
Difference in mean commuting time (minutes)	0.3	0.8	-0.3	-1.5	-0.9	0.2

Source : Person Trip Surveys

5. The Summary

The summary of analyses are described as follows.

①The distribution of population in Osaka Prefecture is still spreading with the reduction of population in inner area of Osaka. The gravity center of the commuters to Osaka is also moving outwards at the decelerated pace.

②There is a gradual change in preference for residence type from the detached type to the urban flat, though in very slow pace, in Osaka Prefecture, and this trend has a possibility of reducing trip length

and commuting time, though not appeared clearly.

③From the questionnaire survey for the residents of newly built urban flats or apartment houses, mean commuting time is about 40 minutes and this is considerably shorter than the averaged values for the commuters in Osaka obtained from the person trip survey data. The answer shows that they select residence location to become nearer to their work places if possible.

④The averaged commuting time to Osaka City from Osaka Prefectural area is still increasing from 53.9 minutes in 1980 to 54.1 minutes in 1990 by person trip survey data, but this difference is very small.

Population, residences, averaged trip length etc. are almost ceased to grow, but the reduction of commuting time has not appeared yet in averaged value. From the considerably shorter commuting time of the urban flat resident obtained by the questionnaire survey, there will be any possible reduction of commuting time in near future by the progress of the urban renewals.

Reference

1. M. Nishimura and T. Nishimura, Recent Trends of the Residential Development in Relation to the Land and Transportation Condition, *Memoirs of the Faculty of Engineering*, Vol. 37, pp. 79-84, 1996