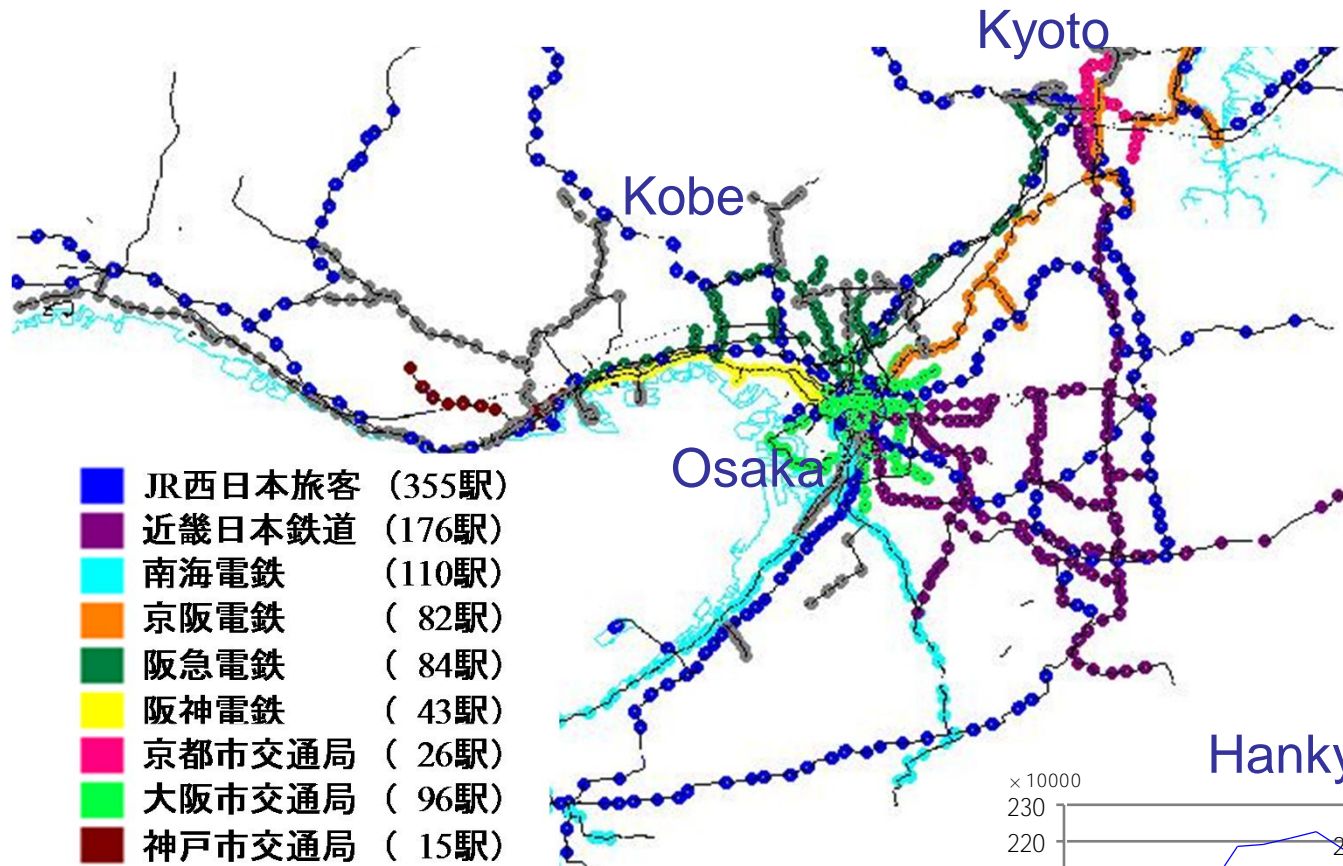# Empirical Analysis of the Interaction between Rail Travel and Town Development
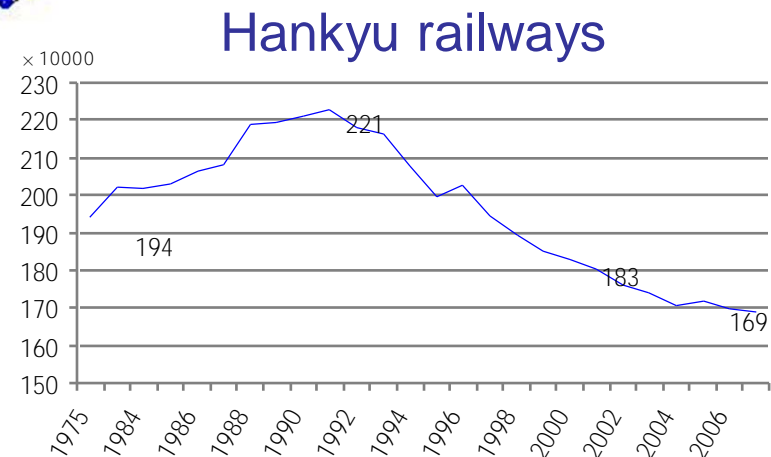
Takamasa AKIYAMA   Kansai University)
Masashi OKUSHIMA   University of Tokushima)

Railways in Keihanshin Area

Kyoto

Kobe

Osaka

■ (blue)	JR西日本旅客 （355駅）
■ (purple)	近畿日本鉄道 （176駅）
■ (cyan)	南海電鉄 （110駅）
■ (orange)	京阪電鉄 （ 82駅）
■ (green)	阪急電鉄 （ 84駅）
■ (yellow)	阪神電鉄 （ 43駅）
■ (pink)	京都市交通局 （ 26駅）
■ (light green)	大阪市交通局 （ 96駅）
■ (dark red)	神戸市交通局 （ 15駅）

Motorization
Aging society with a falling birthrate

Hankyu railways

× 10000

230
221
220
210
200
194
190
183
180
170
169
160
150

1975 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006

The railway city
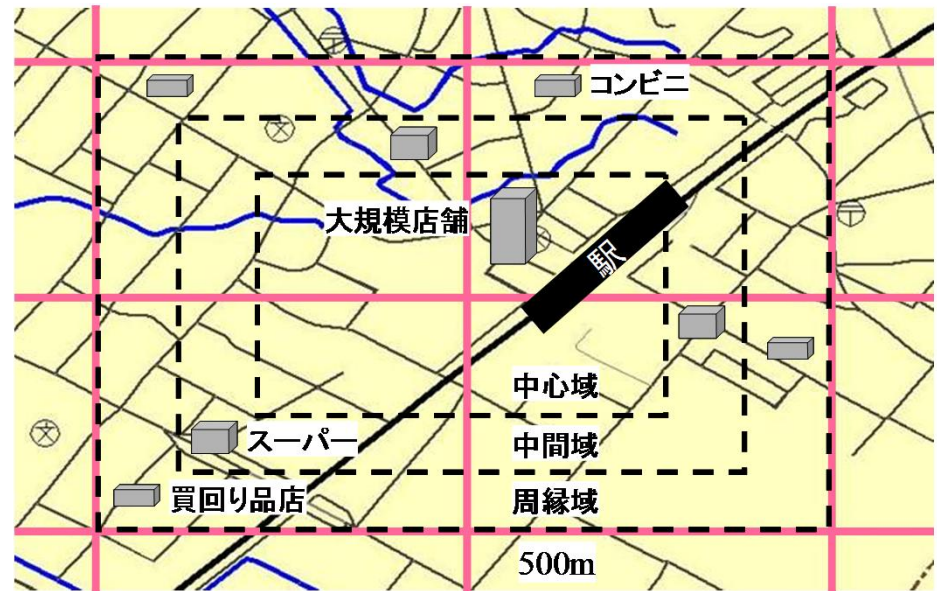
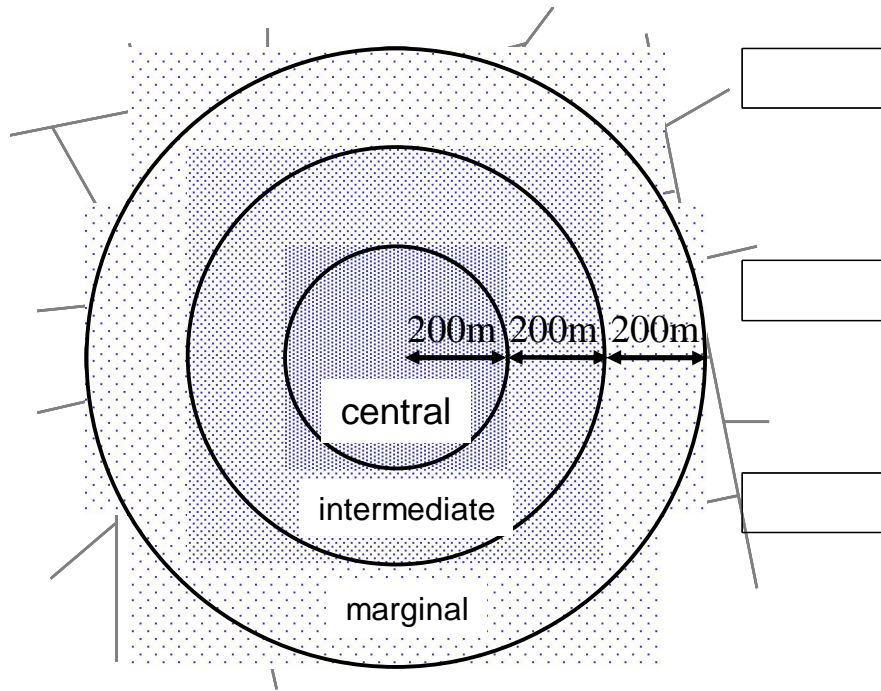Edited and written by
Professor Kitamura

The railway city

Mortorization
Suburbanization
Commodification

Large scale shopping center
In central district does not
produce interesting life.

The activity in the downtown

The thee districts are assumed in interesting city.

200m 200m 200m		
central		
intermediate		
marginal		

コンビニ

大規模店舗

駅

中心域
中間域
周縁域

スーパー

買回り品店

500m

Central district   commercial zone, daytime activity
Intermediate district   nighttime activity, dual activity
Marginal district   mixed activities

Different types of activities produce interesting city.

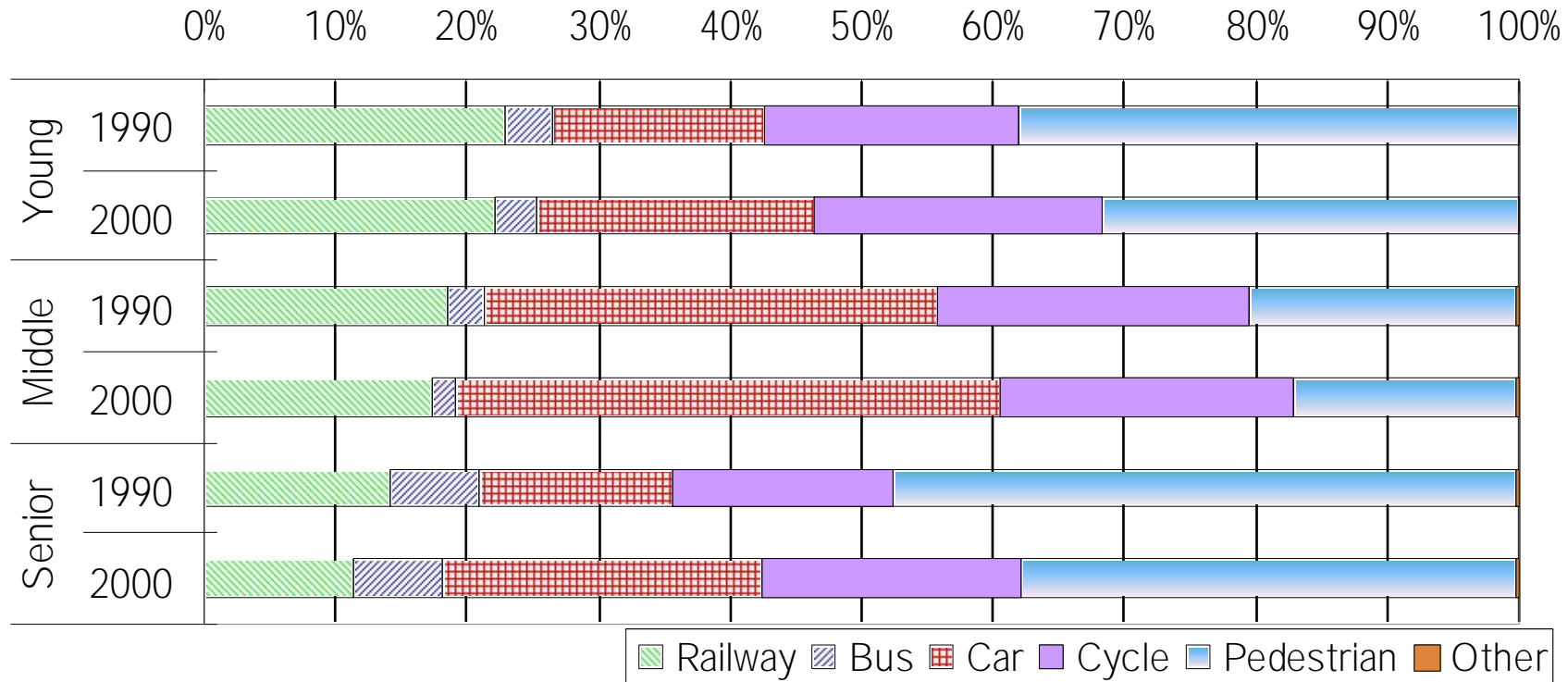# Population by age group for Keihanshin Area
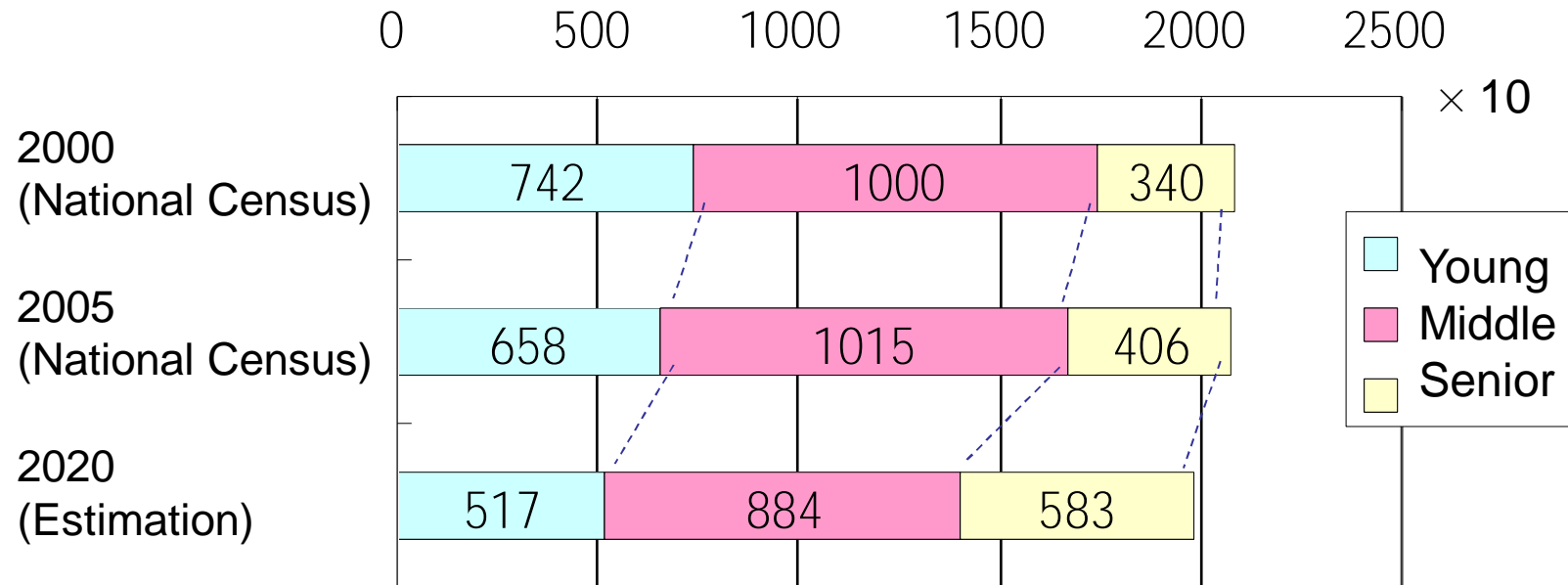
Definitions:
Young   - under the age of 30
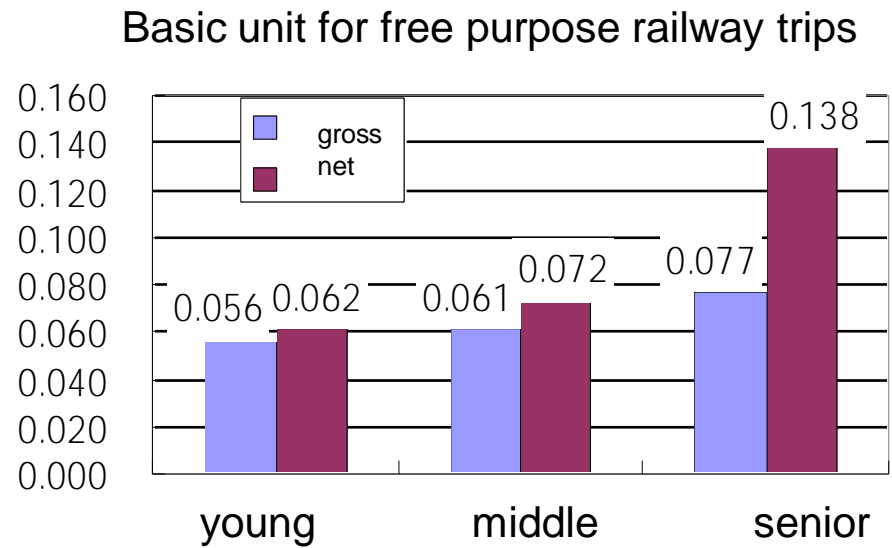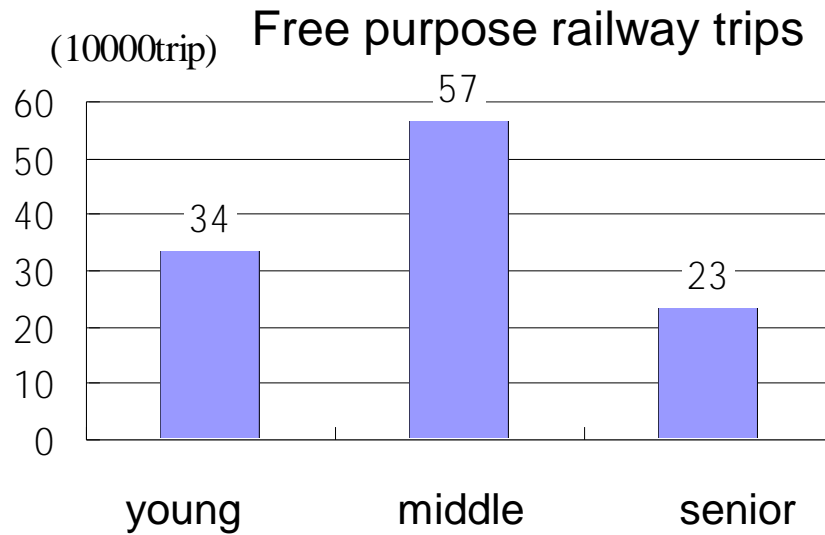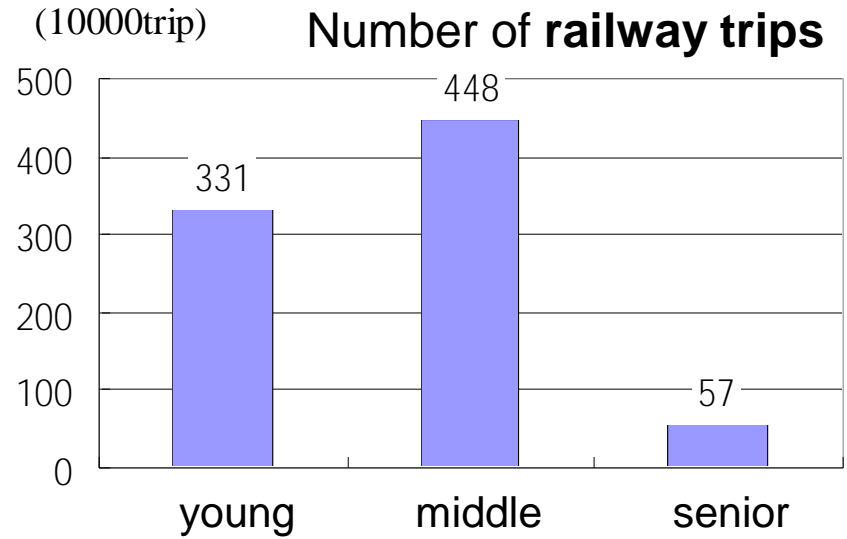Middle - between 30 and 64
Senior - aged 65 or over

The number of senior citizens is increasing rapidly.

Modal change by age group in Keihanshin Area

The railway passengers and pedestrians decreases.
The car users increases even for senior citizens.

Different Characteristics

Rate of going out

	young	middle	senior
	91%	85%	56%

Number of **railway trips**

(10000trip)

	young	middle	senior
	331	448	57

Free purpose railway trips

(10000trip)

	young	middle	senior
	34	57	23

Basic unit for free purpose railway trips

gross
net

	young	middle	senior
gross	0.056	0.061	0.077
net	0.062	0.072	0.138
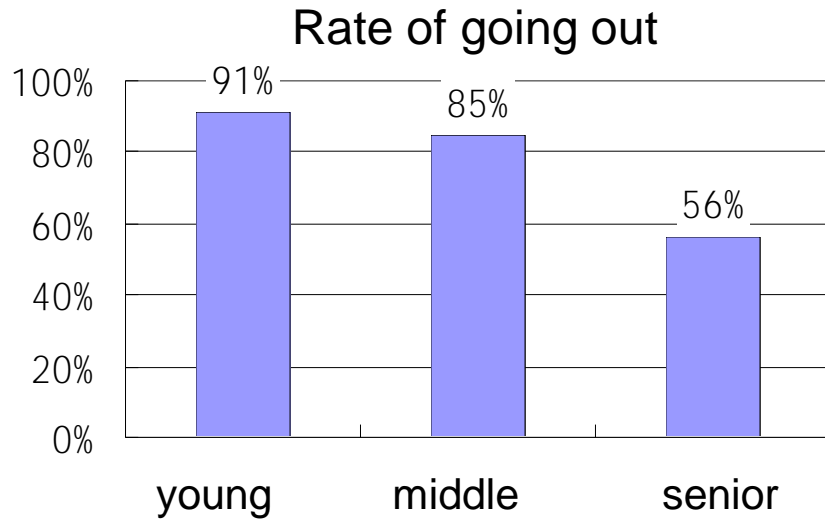
Characteristics of trips by age group

		young	middle	senior	senior (I	senior II
Trips	population	5,982,628	9,271,093	3,041,981	1,880,308	1,161,673
	number of people making trips	5,439,650	7,874,418	1,700,347	1,211,923	488,424
	Ratio of people who go out	91%	85%	56%	64%	42%
	number of trips	14,945,885	25,938,221	5,033,504	3,713,887	1,319,617
	number of rail use trips	3,314,144	4,480,229	571,528	460,451	111,077
	number of free purpose trips	335,872	569,217	234,114	178703	55411
	share rate of rail	22%	17%	11%	12%	8%
	basic unit for rail trips (gross	0.554	0.483	0.188	0.245	0.096
	basic unit for rail trips (net	0.609	0.569	0.336	0.380	0.227
	basic unit for free-purpose rail trip gross	0.056	0.061	0.077	0.095	0.048
	basic unit for free-purpose rail trip net	0.062	0.072	0.138	0.147	0.113
others	average number of transfer	0.355	0.375	0.269	0.279	0.228
	average rail use distance	16.8	16.4	13.5	13.9	12.2
	average rail user time spent sopping (min)	33	28	34	35	32
	average rail user time spent recreation (min)	62	59	62	62	62

Senior (I) aged 65-74
Senior (II) aged 75-over

Trip pattern by age group for Keihanshin Area

large   small

[1]HB/rail
no free

[2]visitor/rail
free

[3]HB/rail
free

[4]OB/rail
no free

[5]OB/rail
free

[6]visitor/rail
no free

HB

S₂ S₁

HB

OB

OB S₁

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

|	rail use no free activity	O rail use no free activity	Vistor rail use no free activity	rail use free activity	O rail use free activity	Vistor rail use(free activity
young	151	147	5	31	20	29
middle	191	27		54	28	52
senior	25	7	3	12	1	23

173

X1,000,000 persons

Future tendency

According to estimation of future population, number of young trip makers becomes smaller than that of senior citizns.
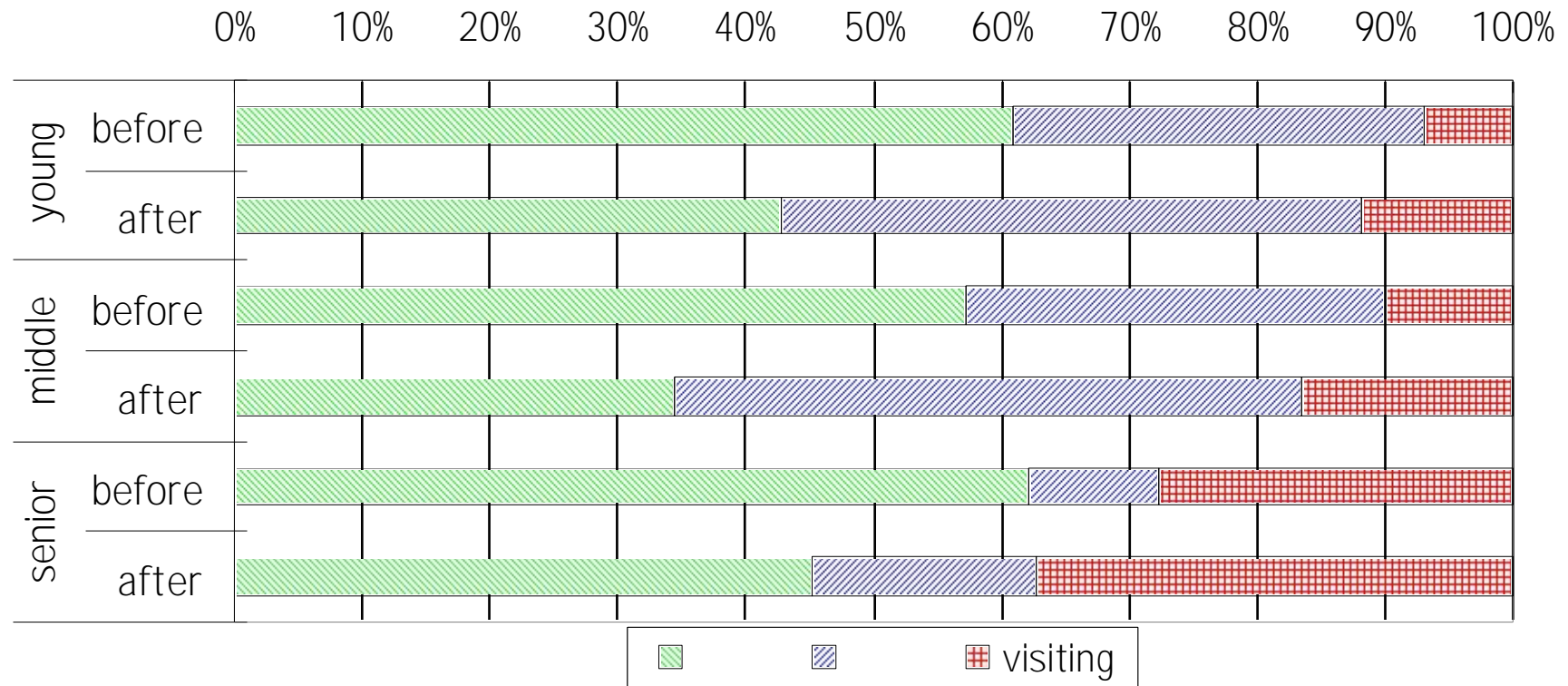
The empirical study

70,000m² Large scale shopping center
Nishinomiya Gardens has been opened in 2008

http://nishinomiya-gardens.com/index.html
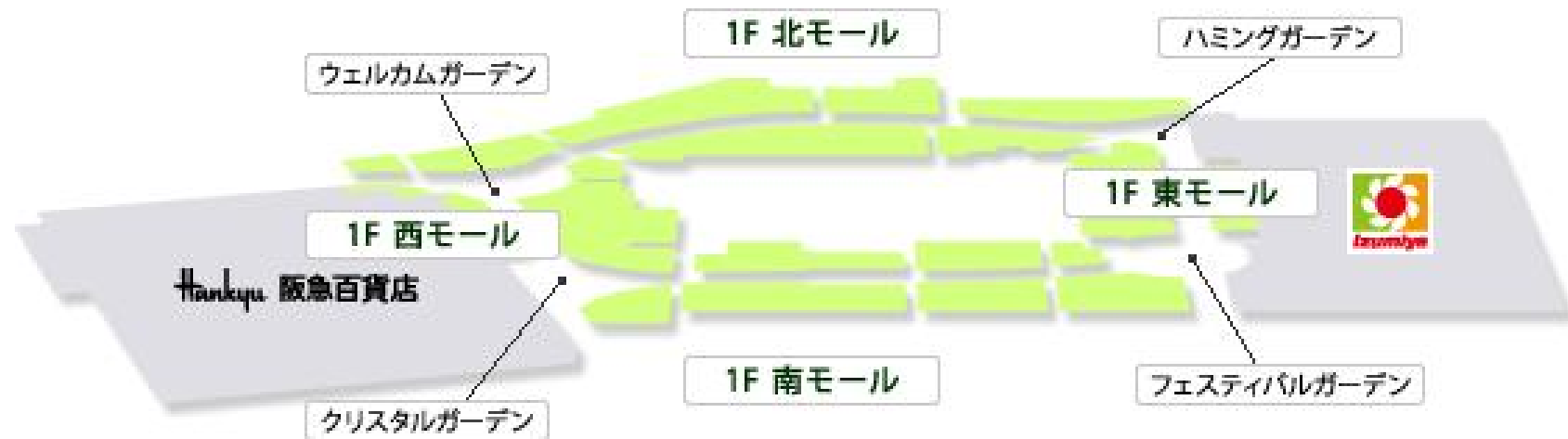
Trip pattern estimation model is constructed by neural network.

The railway trip patterns for age groups

In young and middle   trip pattern increase.
In senior   Vistors increase.
About 40 % of trip pattern of senior citizens is visitor type.

Findings from the teachings

As Professor Kitamura suggested;

1) Variety of trip pattern can be observed in terms of railway use and trip around the city.

2) Senior citizens travel behabiour would be analyed to develop the city in future.

3) Large scale shopping center produces OB trips of young and middle. Visiting Senior citizens increase.

THANK YOU