

1. Introduction

It is an urgent issue to achieve sustainable urban forms based on the balance of environment, quality of life and economy (Williams 2000). For this purpose, how to manage suburban development is an important subject, but the situations of suburbs vary across nations. With the world population prospects¹, for example, the UK and the United States will respectively have 12 % and 29% of population increase between 2000 and 2030. As for Japan, population will decrease 7 % during the same period. Suburbs in the former two countries are or will be hereafter under the pressure of sprawling caused by an explosion of city regions (Headicar 2000).

On the other hand, Japan has actually entered a depopulation process since 2004. Moreover people are moving to urban areas and are notably concentrated in city centers². Then suburbs, especially distant from city centers, are suffering depopulation (Fujii 2007). Suburbs in Japan are now standing at the beginning of a new phase of urban development. Some local governments, which have been endeavoring to revitalize city centers, expect such a “back-to-the-city movement” to dissolve a doughnut effect and likely to form compact city (Kitahara 2002). Japan is asked to make simultaneously city centers and their suburbs sustainable in a depopulated society.

Thus three countries need to seek their own sustainable forms of suburbs. Suburbs do not conflict with city centers. Sustainable suburbs can be achieved based on good relations with city centers and resultantly the relation as a whole can make sustainable urban forms. Planners, governments, and researchers have been advocating compact cities (e.g. Thomas et al 1996), urban villages (e.g. Franklin et al 2002), and new urbanism (e.g. Talen 2005) as effective measures to achieve such urban forms. Sustainable urban forms often ask people to change their modes of travel from cars to public transport and also expect them to live in townhouses or flats. However people have their own lifestyle preferences and hence should be guaranteed to live a community where they want as PPS3 (2006) insists. Policy makers must find ways to convince residents in suburbs that there are benefits to a more urban, compact style of living. However, they have very little evidence to determine whether suburban dwellers would be willing to shift their current residential preferences towards a more compact urban

¹ Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2005 Revision, <http://esa.un.org/unpp>, Friday, December 14

² The recovery of population in some larger cities has been reported in Europe and the United States (Bootsma 1999). However, it is questionable whether this trend of reurbanization can initiate a new round of urban growth (Champion 2001).

living pattern (Talen 2001). Discussions about sustainable forms generally center on definition, achievability and expected effects (Williams et al 2000a, Jenks et al 2000).

There are, in Japan, too, a lot of discussions as to compact city among researchers, planners, local and central governments. Some cities have already made plans or guidelines for community development including compact city and are partially practicing them. However, its concept and the way of forming it properly have some different from those of other nations (Suzuki 2007). Laws of community development were revised in 2007. One of the aims is to control the sprawl of large-size shopping centers and induce them in city centers. Thus discussions and practices are under way, but they target on activating the city centers of small and medium size cities. Thus there is little real consideration of compact city in suburbs (Kaido 2007). It probably reflects no agreements about how suburbs should be treated in an era of shrinkage of urban areas. In this sense, this study is a trial to give a controversial topic and then to encourage discussions about sustainable form of suburbs in Japan.

The reason why we took up Kobe City for this study is as follows. Kobe is a metropolis including large suburbs, where housing communities have been developed for many years. A “back-to-the-city movement” is observed in the old urbanized areas (referred to as the “old areas” hereafter), whereas the suburbs are recently, as a whole, losing their former power to draw population. Some areas are suffering rapid aging and depopulation. On the other hand, many blocks of high-rise flats have been recently built in areas nearby subway stations adjoining town centers, and are attracting people of all generations (Ueno 2007). Suburbs have been intentionally developed in order to meet the demand for cozy and affordable detached houses with a private garden. The situation above shows that people seek conveniences for their places of residence even in the suburbs, while they are enjoying amenities which are unavailable in the old areas. This suggests the birth of a new suburban lifestyle which is required for sustainable urban forms. Thus Kobe City is expected to give clues for the reconsideration of relations between suburbs and city centers in an aging and depopulated society.

This paper demonstrated how the town center of a new town has become a kind of compact town. Paying attention to the migration to a block of high-rise flats nearby a subway station, we analyzed why people were attracted to the flats and how they are evaluating their living environment after migration by means of a questionnaire survey. For this purpose, this study focused on residents’ personal lifestyle preferences. Then we suggested necessary conditions for building compact towns in suburbs and additionally showed some of them hold for other areas not only in Japan but also in other nations.

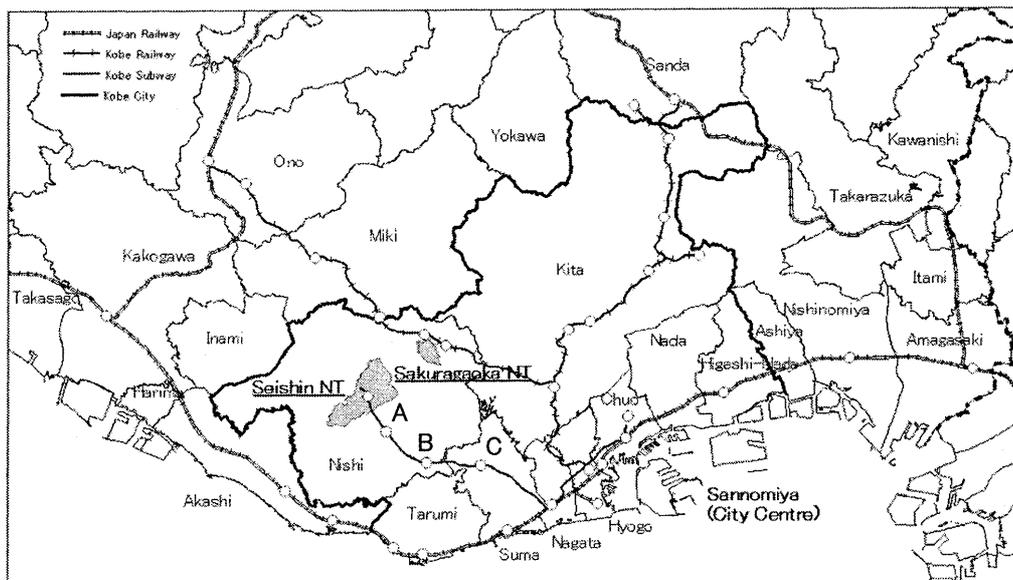


Fig 1 Kobe City and its surrounding areas

2. Population movement in Kobe City

Kobe City covers an area of 551 sq. km and has a population surpassing one and a half million. The city consists of nine wards (Fig 1). Their areas and population are shown in Table 1. Geographically, the city area is roughly divided into the old areas and the suburbs by a mountain range. The old areas had been already urbanized before the 1960s, comprised of Higashinada, Nada, Chuo, Hyogo, Nagata and South Suma³. The suburbs have been developed mostly after the 1970s, comprised of North Suma, Tarumi, Kita, and Nishi. The old areas occupy roughly 30% of the city area, but are home to 60% of the population. Kobe suffered massive damage, mainly in the old areas, caused by the Great Hanshin-Awaji Earthquake occurred in 1995. This resulted in wide changes in the city planning due to the urgent need to swiftly revive the devastated areas and hence a number of new redevelopment projects were carried out mainly in the old areas. They

Table 1 Area and population of nine wards comprising Kobe City

Wards	Area (sq. Km)	Households	Population
Total	552.2	651,738	1,525,389
Old areas	128.2	348,534	732,960
Higashinada	30.4	89,829	206,041
Nada	31.4	61,559	128,048
Chuo	27.8	63,221	116,602
Hyogo	14.5	53,896	106,987
Nagata	11.5	48,105	103,771
South Suma	12.6	31,924	71,511
Suburbs	424.0	303,204	792,429
North Suma	17.5	38,957	100,118
Kita	241.8	83,759	225,940
Tarumi	26.9	92,851	222,725
Nishi	137.9	87,637	243,646

Note) Suma ward is divided into South Suma and North Suma.

Source: The National Census on October 1 in 2005.

³ Suma ward is divided into South Suma and North Suma for the purpose of this study.

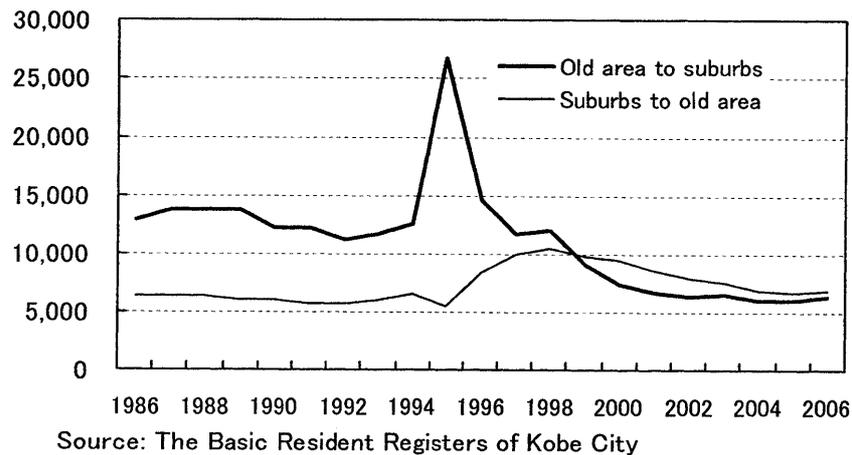


Fig 2 Population flow between the old areas and the suburbs

resultantly have induced population inflow to the old areas not only from the outside of the city but from the suburbs (HEMCRI 2002).

Fig 2 shows the population flow between the old areas and the suburbs. Before the earthquake, there had been a constant and large surplus of population inflow to the suburbs. As usually observed, people moved to the suburbs in order to seek a better living environment. Inflow to the suburbs suddenly rose up to a peak in 1995 and then quickly reversed, due to the swift comings and goings of refugees. It was in 1999, when the last temporary houses were removed, that the bidirectional flows negated each other. Since then, the surplus of inflow to the old areas has been gradually getting smaller. However, recovery to the level of inflow to the suburbs that existed before the earthquake is probably not expected. In other words, the pressure of sprawling has ceased in Kobe City.

Table 2 exhibits population movement among four wards comprising the suburbs. North Suma and Tarumi have large negative inflows. They are suffering an excess of migration to almost all other areas, especially to Nishi and the old areas within the city. On the other hand, Nishi generally shows a large net inflow. It is pulling in people from other areas within the suburbs as well as from outside of the city, and pushing people out to the old areas. Kita shows a positive inflow in total, but is rather weak in attracting population compared to Nishi. Thus, there are great differences in the population movement within the suburbs. Nishi is as a whole relatively prosperous and many blocks of

Table 2 Annual average net population inflow to wards in the suburbs for five years (2002–2006)

	North Suma	Kita	Tarumi	Nishi
Total	-937	243	-1069	1071
From inside of the city	-571	-46	-894	589
Old area	-249	-127	-372	-178
Suburbs	-322	81	-522	767
North Suma	-	15	9	299
Kita	-14	-	-70	4
Tarumi	-9	70	-	464
Nishi	-299	-3	-462	-
From outside of the city	-366	289	-175	482

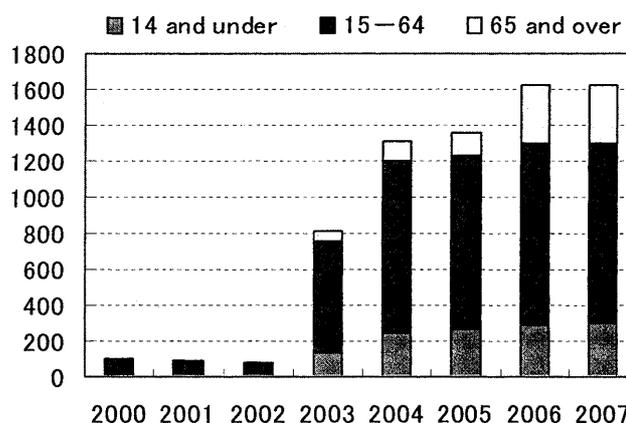
Source: The Basic Resident Registers of Kobe City

flats have been built nearby subway stations these years.

3. Change of a town center

In this study we took up a town center⁴ of Seishin Newton (referred to as Seishin NT). The new town has an area of 634 ha and had 53,500 inhabitants in 2005. It is located 25 km northwest of the central district of Kobe, or the busiest zone in the old areas. It takes about 30 minutes by subway to the central district. The town center used to be an ordinary complex of facilities not only for residents of the new town but for those of neighboring areas and hinterlands. However it has changed to a kind of compact town since a block of fifteen-story flats was built at the site of a bank's building in 2003. It has 305 houses and annexes a nursery. Afterward two blocks of flats were built on other locations in the town center. One was built at the site of a business building in 2004. It is a block of fourteen story flats and has 192 houses designed to ease aged people's physical handicaps. The other was built at a municipal reserved land for commercial uses in 2006. It is a block of sixteen-story flats and provides 209 houses with life care services. The change in land use was out of the original town planning. It was induced by restructuring in business and financial difficulties in Kobe City.

As shown in Fig 3, residents have been increasing in number and then 1,620 residents are living in 706 households in 2007. The three blocks of flats are different from each other in facilities for living and hence are creating diversity of inhabitants. This is one of the ambitions of the Urban Village Campaign (Thompson 2000). The town is like a small island bordered by busy roads and hence is hindered from unification with surrounding housing communities⁵. It has an area of 22.8 ha and a high population density of 71 dwellings per ha. The town has a large square in its center, a subway terminal station, a bus terminal, a big hotel, a medical center, a shopping mall, a department store, a supermarket, a municipal library, a municipal branch office and so on. 3,829 employees were working at 242 establishments and across



Source: The Basic Resident Registers of Kobe City

Fig 3 Population of the compact town

⁴ This is identical to "town center" in the typologies described in PPS6 (2005).

⁵ The town is connected with neighboring areas by two pedestrian bridges over busy roads.

various industrial classifications (Fig 4). The town is connected with large public parks and foot passes via vehicle-free promenades over busy roads. Residents can utilize on foot all the facilities for amenities as well as conveniences.

The town is a kind of accidental product. It is not always applicable to other suburbs in Japan. The size is very small compared to, for example, a notional area of 40 ha for an urban village (Thompson 2000). In addition it is not nearsightedly surrounded by green areas, but by housing communities. Therefore, the town never cannot follow the ideal achievement of urban forms. However, compact city has by no means a fixed definition and there is controversy regarding achievability or expected effects (Jenks et al 1996). None the less, some common-held features are extracted; compactness, mix of uses and interconnected street layouts, support by strong public transport networks, environmental controls, and high standards of urban management (Williams et all 2000b). PPS 6 (2005) aims to create vital and viable town centers and then regards housing as an important element in most mixed-use and multi-story development. The compact town indeed has controversial aspects about high standards of urban management, considering the unintended change in land use. Nevertheless, the town generally has all other common-held features above. Thus it is fair to say that the town center has substantially works as a compact town and also follows the advocacy of PPS6 (2005). Then we expect to draw some clues for compact town from an analysis of residents' evaluation of living environment.

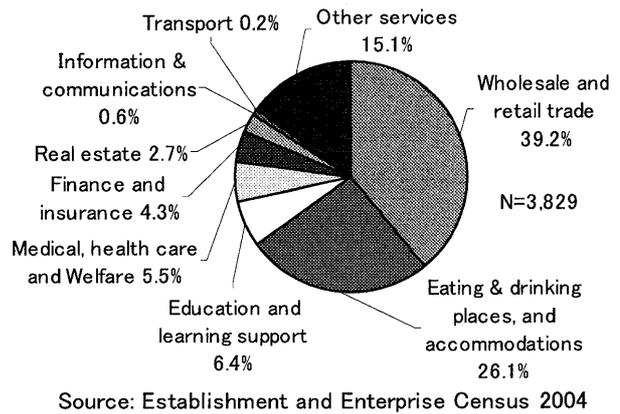


Fig 4 Composition of employees by industrial classifications

4. Preparation for analysis

4.1 Two types of lifestyles

Lifestyle has two aspects in assessment of residential locations. Bell (1968) regards lifestyle as the orientation of households with respect to behavior from a long-term perspective. Michelson (1970) insists that each household is assumed to choose the living environment which best suits its lifestyle. They consider lifestyle from a household viewpoint. On the other hand, Ge et al (2006) define residential lifestyle as the way of life related to residence features such as consumption of time, space and money. The

degree of satisfaction with a place of residence depends on how it eases the practice of one's own lifestyle (Garling et al 2002). Thus each household member usually has a different assessment of the living environment due to their different lifestyle preferences. Residential locations are generally determined by household lifestyles and consequently family member more or less compromise on their lifestyle preferences. This paper focused on personal assessment of the living environment and then looked at a personal lifestyle.

We took up amenities and conveniences as fundamental factors to characterize residential locations⁶. People want to live in places blessed with both factors. However there are few places as such and then ordinary households, to some extent, often have to compromise on their choice of residential locations. Lifestyle is again defined as the way people achieve their life values by using various resources (Ueno 2006). The practice of preferred lifestyle is closely related to which factor people seek more for residential locations. Then, two types of lifestyles were defined. One is a suburban lifestyle that seeks amenities. The other is an urban lifestyle that seeks conveniences. Amenities here correspond to the quality of environments such as public parks, promenades, landscape, natural views, and so on. Conveniences here correspond to accessibility to urban services, such as job opportunities, shopping, medical treatment, public transport, and so on. Houses also provide coziness of living. But such coziness is not shared by residents and hence houses were not included in amenities as such. They were treated as another factor comprising living environment.

Those who prefer a suburban lifestyle are described to be "S-LS", and those who prefer an urban lifestyle "U-LS". In the questionnaire, respondents were asked to choose one preference among three possible responses; "visiting city centers in order to get urban services when demanded, while living in an area with many amenities.", "visiting suburbs or the countryside in order to enjoy amenities when demanded, while living in an area with many conveniences." and "neither". The first two choices correspond to S-LS and U-LS, respectively.

4.2 Two kinds of conveniences

The two lifestyles are opposite. S-LS generally prefer to live in suburbs and so do U-LS in city centers. However popularity of the flats suggests that the both are living in the same location and even in the same households. In other words, the flats provably

⁶ Community environment is also an important factor comprising living environment. However it can not be fully accessed before migration and then was not taken up here.

provide living conditions which satisfy both S-LS and U-LS. Thus it is the main theme of this study which lifestyle is dominant among dwellers and how they are different from each other in the evaluation of their living environment. Since residents moved to a place nearby a subway station and a bus terminal, both lifestyles certainly make much of convenient public transport. Then we set two kinds of conveniences. One is whether they can easily utilize facilities in the town center. The other is whether they can easily go somewhere, such as to city centers by subway, to compensate for the lack of facilities there. They are hereafter referred to as “convenience 1” and “convenience 2”, respectively. Their items are shown in Table 10. S-LS and U-LS are supposedly different from each other in making use of two conveniences. Moreover whether residents can live their preferred lifestyles depends much on whether they can utilize conveniences 1 and 2 properly to get necessary services in the town center or city centers.

With the definition of lifestyle, we considered the following hypotheses. If S-LS are living their preferred lifestyles, they are satisfied with amenities and do not expect convenience 1 to be enough. Because, S-LS think they can compensate for the lack of convenience 1 by means of convenience 2. Then convenience 2 is an important condition for S-LS to live their preferred lifestyles. Meanwhile as to U-LS, they are satisfied with convenience 1, and further they can utilize more facilities for urban services by taking advantage of convenience 2. Thus convenience 2 is essential in practicing a suburban lifestyle and also in more enjoying an urban lifestyle. Therefore S-LS are expected to have higher demand standards than U-LS as to conveniences 2. Needless to say, adequate convenience 1 and amenities support the role of convenience 2. In summary, it enables the flats to attract various people that the two lifestyles can utilize conveniences 1 and 2, or the town center and the central district properly well in different ways as they like, and hence they can live their preferred lifestyles in a household as well as the same town.

4.3 Questionnaire survey

Two questionnaire surveys were carried out at two sites in February 2004. One site is a block of eighteen-story flats built in 2003 described above and is hereinafter called “site1”. The other site is a detached housing community, which is hereinafter called “site2”. It is located in Sakuragaoka Newtown (referred to as Sakuragaoka NT), which has an area of 135 ha and had 9,800 residents in 2005. This site verges on its town center⁷ Site2 is located 6 km northeast of Seishin NT. It takes approximately 60 minutes by bus and railway from site2 to the central district of Kobe. This study regarded site1 as a new

⁷ This is approximately corresponds to “local center” by the typologies described in PPS6 (2005).

type of residential place in the suburbs, and site2 as a traditional one in the suburbs. Site2 was used as an object of comparison to define the characteristics of site1.

Site1 has 305 households. The period of residence for all was eight months at that time. On the other hand, site2 has 443 households. About 70% of them had lived longer fifteen years. The questionnaire was put in all households' mail boxes, one part for the household as a whole and another part for the householder and his/her partner, or the householder and one other household member aged 20 years or older to answer separately. Responses were anonymous. The survey at site 1 resulted in the collection of 119 effective cases for households with a response rate of 39.0%, which included 202 effective cases of family members. The survey at site 2 resulted in the collection of 176 effective cases for households with a response rate of 39.7%, which included 303 effective cases of family members.

Table 3 Sex, age and occupation

	Site 1	Site 2
No. of cases	202	302
Sex		
Male	43.1	46.0
Female	54.5	52.3
N.A.	2.5	1.7
Total (%)	100.0	100.0
Age		
20-39	<u>37.6</u>	6.3
40-49	<u>20.8</u>	7.6
50-59	15.3	<u>28.8</u>
60 and over	23.8	<u>56.0</u>
N.A.	2.5	1.3
Total (%)	100.0	100.0
Occupation		
Full time employees	<u>41.6</u>	21.5
Part timer	7.9	10.9
Full time housewife	25.2	28.1
Unemployed	15.8	<u>25.5</u>
Others	4.5	11.3
N.A.	5.0	2.6
Total (%)	100.0	100.0

Note) Underlined percentages are larger than the corresponding ones at a significance level of 5%. This holds for Tables 4-8 as well.

5 Analysis of survey data

5.1 Profile of respondents

Main attributes of respondents, sex, age, occupation and family composition are shown in Tables 3-4, respectively. Older people are more dominant at site 2 than at site 1. This probably causes gaps in the proportion of “full-time employees” and “unemployed” between the sites. “Couple” and “couple & children” are dominant at both sites. Table 5 shows the percentage of respondents with different lifestyle preferences at each site. The share of S-LS at site 2 is larger than at site 1. The share is reversed for U-LS. Realization of lifestyle is shown in Table 6. There is no significant difference in the percentage between the two lifestyles at site1. “Enough” and “somewhat” make up about 70% of the total. On the other hand, S-LS give far more affirmative responses than U-LS at site 2. Table 7 exhibits combinations of respondents' lifestyle preferences within the same household, which gave two responses. Site 1 shows a better balanced composition of different lifestyle preferences than site 2. The share for S-LS×U-LS at site1 is much

Table 4 Family composition

	Site 1	Site 2
No. of cases	119	176
Single	7.6	8.0
Couple	39.5	35.2
Couple & Children	43.7	38.6
Couple & Parents	3.4	3.4
Couple, Children & Parents	1.7	5.1
Others	1.7	1.7
N.A.	2.5	8.0
Total (%)	100.0	100.0

Table 5 Lifestyle preferences

	Site 1	Site 2
No. of cases	202	302
S-LS	37.1	<u>73.8</u>
U-LS	<u>53.0</u>	13.6
Neither	8.9	10.6
N.A.	1.0	2.0
Total (%)	100.0	100.0

Table 6 Realization of preferred lifestyles

	Site 1		Site 2	
	S-LS	U-LS	S-LS	U-LS
No. of cases	75	107	223	41
Enough	21.3	26.2	<u>40.4</u>	7.3
Somewhat	52.0	43.9	<u>44.4</u>	24.4
Not at all	4.0	6.5	6.7	<u>61.0</u>
Neither	5.3	5.6	2.2	4.9
N.A.	17.3	17.8	6.3	2.4
Total (%)	100.0	100.0	100.0	100.0

Table 7 Combination of lifestyles

	Site1	Site2
No. of cases	86	124
S-LS × S-LS	23.3	<u>65.3</u>
U-LS × U-LS	<u>38.4</u>	4.8
S-LS × U-LS	<u>23.3</u>	12.1
Others	15.1	17.7
Total (%)	100.0	100.0

Note1) Cases are households with two respondents.

Note2) Others are a combination including "neither"

Table 8 Former places of residence

	Site 1	Site 2
No. of cases	119	176
Suburbs	<u>69.7</u>	40.3
(Seishin NT)	(26.9)	-
Old areas	9.2	<u>22.2</u>
Outside of the city	18.5	<u>29.5</u>
N.A.	2.5	8.0
Total (%)	100.0	100.0

Table 9 Rankings of the reasons why households

	No. of cases	119
Very near to a subway station and a bus termina		9.11
Convenience for medical treatments		7.55
Convenience for shopping		7.54
Convenience for going to work and school *		5.88
Well maintained neighborhood and quietness **		5.50
Convenience for visiting the central district		5.38
Adequate security services		4.88
Living on the same floor		3.47
Good educational environment for children		2.95
Relatives are living nearby		2.50
A nursery school is annexed		1.23

Note1) Figures are mean scores. 10, 5, 3 and 0 were respectively allocated to the five responses; very important, important, somewhat important, and unrelated.

Note2) Missing values were replaced by a mean.

Note3) * shows that the reason has a larger score for households of U-LS × U-LS than for those of S-LS × S-LS and ** shows the reverse at a significance level of 5%.

larger than that at site2. This agrees with the results in Table 5. Site 1 likely has conditions for both lifestyles to live as they please and hence demonstrates a new way of living in the suburbs, whereas site 2 shows a traditional way of living for S-LS as expected by town planners.

Table 8 shows the former place of residence of households. The share for the suburbs is 69.7% at site 1, much larger than the 40.3% at site 2, but is the reverse for the old areas and outside of the city. In other words, short distant migration is dominant at

site1 and Seishin NT remarkably occupies 26.9% of the total at site 1. Site 1 symbolizes the latest change in the relation between the old areas and the suburbs, showing stiff competition for migrants among residential locations within the same town as well as the suburbs. Table 9 shows the reasons why households migrated to site1. They reflect household lifestyle to choose a residential location. “Very near to a subway station and a bus terminal” is ranked highest. This symbolizes the great dependence of residents’ lives on public transport. Conveniences for several urban services follow it. “Well maintained neighborhood and quietness”, and “convenience for visiting the central district” are ranked relatively high. This also indicates site1 provides not only conveniences but also amenities. Using a t-test, “convenience for going to work and school” has a larger score for the households of U-LS×U-LS than for those of S-LS×S-LS. “Well maintained neighborhood and quietness” shows the reverse. The other reasons show no differences between them. In summary, households as a whole migrated to site1 seeking mainly conveniences. However the U-LS×U-LS relatively make much of convenience for travel and so do the S-LS×S-LS amenities in the neighborhood. Thus the households with opposite lifestyle preferences moved to the same site. These confirm that site1 is a new type of residential location in the suburbs.

5.2 Living environment of the flats

Twelve conditions were adopted for assessment of living environment. They were grouped into five factors⁸; houses, convenience 1, convenience 2, amenities and community environment. Moreover livability was taken up as a synthetic measure of evaluation of living environment. Table 10 shows respondents’ evaluation⁹ of living environment by different lifestyles at the two sites. Table 11 indicates that there is no substantial difference in attributes between the two lifestyles at each site. At site1 U-LS show higher scores in livability and community environment, whereas so do S-LS in “convenience for leisure activities” at site 2. Site 1 is more livable for U-LS than S-LS, although each level of livability is very high. Site 2 shows the reverse. It is notable that convenience 2 has negative levels of satisfaction for both lifestyles at site 2, while amenities have generally equal and positive levels of satisfaction independent of lifestyles and sites. This suggests the flats are fairly blessed with conveniences and amenities and hence livable for the both lifestyles. There is a difference in the level of

⁸ Eleven conditions, exclusive of houses, were in advance grouped into four factors by a cluster analysis. Sites 1 and 2 had the same factors.

⁹ They were measured using a five-point scale; “satisfied”, “somewhat satisfied”, “neither”, “a little unsatisfied” and “unsatisfied”. Scores of 2, 1, 0, -1 and -2 respectively were allocated.

Table 10 Evaluation of the living environment by lifestyles at two sites

No. of cases	Site 1			Site 2		
	S-LS	U-LS	t-value	S-LS	U-LS	t-value
	75	107		223	73	
Livability	1.44	1.68	-2.936 **	1.27	0.92	3.680 **
Houses	1.04	1.17	-1.033	1.09	1.06	0.286
Convenience 1	1.17	1.21	-0.461	0.35	0.03	1.765 +
Convenience for shopping	1.61	1.69	-0.780	0.68	0.52	1.034
Convenience for leisure activities	0.75	0.87	-0.845	0.22	-0.27	3.391 **
Convenience for medical treatments	1.11	1.04	0.445	0.18	0.06	0.797
Convenience 2	1.18	1.32	-1.264	-0.59	-0.70	0.673
Access to working places and schools	1.05	1.24	-1.405	-0.49	-0.54	0.355
Use of public transport	1.30	1.42	-0.824	-0.50	-0.69	1.256
Access to the central district	1.01	1.18	-1.177	-0.57	-0.78	1.426
Amenities	1.01	0.95	0.641	1.07	1.08	-0.137
Maintenance of neighborhood and quietness	0.87	0.88	-0.089	1.10	1.00	0.968
Neighboring parks	1.11	0.92	1.661	1.04	0.90	1.373
Natural environment in the vicinity	1.07	1.05	0.176	1.06	0.96	0.983
Community environment	0.07	0.30	-2.608 **	0.58	0.53	0.435
Community activities	0.05	0.27	-2.339 *	0.45	0.33	1.128
Neighborhood human relationships	0.13	0.36	-2.230 *	0.70	0.58	0.997

Note1) Figures were measured by a five-point scale; "satisfied", "fairly satisfied", "neither", "a little unsatisfied" and "unsatisfied". Scores of 2, 1, 0, -1 and -2 respectively were allocated. Missing values were replaced by a mean in calculation.

Note2) **, * and + denote a significance level of 1%, 5% and 10%. This holds for the following table.

satisfaction with community environment between lifestyles at site 1, whereas no difference as such at site 2. This likely stems from a difference in the period of residence between two sites. Community environment needs enough time to mature. Hence such difference in the satisfaction at site 1 may be due to that U-LS prefer premature community relations to matured ones, while the reverse for S-LS.

5.3 Characterization of the two lifestyles

Table 12 shows the difference in the evaluation of living environment between the levels of realization of preferred lifestyles, and also in the evaluations as such between the two lifestyles practicing "enough" their preferred lifestyles. If "enough" has a higher score in a condition than "somewhat" at a lifestyle, the condition can be regarded as a necessary condition for realization of the lifestyle. Otherwise, it is independent of realization. On the other hand, if one lifestyle has a higher score in a necessary condition than the other lifestyle at the level of enough, the lifestyle can be regarded to have a lower level of expectation than the other lifestyle.

As to S-LS, conveniences 1 and 2, and amenities have larger scores for "enough" than for "somewhat".

Table 11 Pearson's contingency coefficients between lifestyles at two sites

	Site1	Site2
Sex	0.094	0.119 +
Age	0.160	0.077
Occupation	0.238 +	0.123

Table 12 Comparioson of the evaluation of living environment between the levels of realization of preferred lifestyles, and of the evaluations as such between the two lifestyles practicing “enough” their preferred lifestyles.

	S-LS			U-LS			Enough		
	Enough	Somewhat	t-value	Enough	Somewhat	t-value	S-LS	U-LS	t-value
No. of cases	16	39		28	47		16	28	
Livability	<u>1.75</u>	1.36	2.771 **	<u>1.96</u>	1.62	4.054 **	1.75	<u>1.96</u>	-1.826 +
Houses	1.31	0.93	1.424	<u>1.54</u>	1.02	3.071 **	1.31	1.54	-1.140
Convenience1	<u>1.33</u>	1.03	1.878 +	1.46	1.22	1.436	1.33	1.46	-0.646
Convenience2	<u>1.41</u>	0.94	1.874 +	<u>1.68</u>	1.19	3.670 **	1.41	<u>1.68</u>	-1.821 +
Amenities	<u>1.25</u>	0.89	2.377 *	<u>1.46</u>	0.80	3.878 **	1.25	1.46	-1.141
Community environment	0.12	-0.01	0.677	<u>0.74</u>	0.19	3.408 **	0.12	<u>0.74</u>	-2.705 **

Note) The Pearson’s Chi-square test showed no significant differences in the compositions of sex and age between compared groups.

These are necessary conditions to realize S-LS at site1. As to U-LS, houses, convenience 2, amenities and community environment are necessary conditions as well. Convenience 2 and amenities are shared by two lifestyles. Therefore high levels of the two conditions are indispensable for the compact town to attract both lifestyles. In addition, S-LS have a lower score in convenience 2 than U-LS, while no difference is observed in amenities. Then S-LS have a higher level of expectation towards convenience 2 than U-LS, and amenities are enough for the both to realize their preferred lifestyles.

Convenience 1 is a necessary condition for S-LS, but not for U-LS. The reverse is as for community environment. There is no difference in convenience 1 between S-LS and U-LS at the level of “enough”. It is likely U-LS are by and large satisfied with the current convenience 1. On the other hand, U-LS have much larger score than S-LS in community environment, but the score is much smaller than those of other conditions. It is likely that S-LS prefer close community relations and then evaluated community environment low, whereas U-LS don’t so and then evaluated it high. Houses are a necessary condition for U-LS and not for S-LS. Furthermore there is no difference in the score of houses between the tow lifestyles as to “enough”. This suggests the quality of private space is very important for U-LS. This corresponds to their preferences for a little distant community environment. It agrees with a common attitude generally observed among residents in flats in Japan. Meanwhile S-LS need not a detached house with a private garden and likely prefer matured community environment. In this point, S-LS epitomize a new lifestyle in the suburbs.

Those who are less satisfied with convenience 1 expectedly more often visit the central district. Table 13 shows the relation between the frequency of visiting the central district and the evaluation of conveniences by those who are enough and somewhat practicing their preferred lifestyles. As for S-LS, high frequency visitors assess

Table 13 Evaluation of conveniences by those who are enough or somewhat practicing their preferred lifestyles as to the frequency of visiting the central district

	High		t-value	S-LS		t-value
	S-LS			High		
No. of cases	24	30		24	30	
Convenience 1	0.93	<u>1.28</u>	-2.343 *	0.93	<u>1.46</u>	-3.478 **
Convenience 2	0.81	<u>1.31</u>	-2.204 *	0.81	<u>1.51</u>	-3.417 **
	U-LS		t-value	Low		t-value
	U-LS			Low		
No. of cases	30	45		30	45	
Convenience 1	1.46	1.21	1.520	1.28	1.21	0.413
Convenience 2	1.51	1.28	1.633	1.31	1.28	0.197

Note1) The central district is the destination for shopping and leisure. Then convenience 2 does not include "Access to working places and schools".

Note2) "High" indicates those who visit the central district more than once a month and so does "Low" does those who visit there once a month or less.

Note3) The Pearson's Chi-square test showed no differences in the compositions of sex and age between compared groups.

conveniences 1 and 2 lower than low frequency visitors. This is likely because of the following. S-LS who evaluate convenience 1 low have a higher necessity to visit the central district often. It is well known that users of subway often complain that the thirty-minute' ride is too long for the distance of 22 Km to the central district. This causes S-LS to evaluate convenience 2 severely, resulting in lower assessment than U-LS as shown in Table 12. This indicates that S-LS's visits are a means to compensate for the lack of urban services at the town center. As for U-LS, there are no differences in evaluation of conveniences 1 and 2 between high and low frequency visitors. Moreover, as to high frequency visitors, U-LS evaluate conveniences 1 and 2 higher than S-LS. It is likely that high frequency visitors of U-LS visit the central district in order to increase their use of the urban services they enjoy, and then they are not so dissatisfied with access to the central district as S-LS. Thus the motives of visits to the central district are different between S-LS and U-LS. The both can live their lifestyles thanks to convenience 2.

In order to clarify the difference in the evaluation structure of livability between the tow lifestyles at site1, regression analyses were carried out with explanatory variables as houses, convenience 1, convenience 2, amenities, community environment, and constant dummies of sex and age. An age dummy was made based on three age groups: 20-39, 40-59, and 60 and over. Results in Table 14 roughly show contrastive characteristics of each lifestyle. The two dummies were not significant. Then sex and age proved to have no influences on the two regression structures. Conveniences 1 and 2, and amenities have a significant and positive coefficient for S-LS. Houses and community environment do

Table 14 Comparison of the regression structure between the two ifestyles

	S-LS		U-LS	
	Standard coefficient	t-value	Standard coefficient	t-value
No. of cases	70		95	
Sex dummy	0.15	1.654	0.01	0.080
Age dummy (40-59)	0.19	1.018	-0.13	-0.751
Age dummy (60 and over)	-0.18	-0.958	0.06	0.339
Houses	-0.11	-0.961	0.42	4.846 **
Convenience 1	0.25	2.053 *	0.08	0.895
Convenience 2	0.40	3.372 **	0.52	5.521 **
Amenities	0.33	2.914 **	-0.05	-0.423
Community environment	-0.05	-0.539	0.00	-0.056
Adjusted coefficient of determination	0.44		0.53	
F-value	7.793	**	13.995	**

Note) Reference groups are male in the sex dummy and 20-39 in the age dummy.

not. On the other hand, so do houses and convenience 2 for S-LS. But convenience 1, amenities and community environment do not. In other words, S-LS make much of living conditions in the neighborhood for livability, whereas U-LS do private space and access to other areas. S-LS seem to concern about the neighborhood more than U-LS. This corresponds to that S-LS likely prefer close community relations, but U-LS don't. As for S-LS, the conditions influencing livability agree with the necessary conditions to realize the lifestyle as shown in Table 12. As for U-LS, so are houses and convenience 2, while amenities and community environment are necessary conditions but they have no influence on livability.

These results are summarized in Table 15. Conveniences 1 and 2, and amenities are necessary conditions to live enough S-LS, and simultaneously to improve livability. Meanwhile, houses, convenience 2, amenities and community environment are necessary conditions to live enough U-LS and so are the first two items to improve livability. In addition, convenience 2 has the largest influence on livability as to both lifestyles. Thus convenience 2 notably plays an important role for both S-LS and U-LS to live happily in a household as well as the same location. That is, high level of convenience 2 can make residents to utilize the town center and the central district properly based on their preferred lifestyles. Beyond that, houses, convenience 1 and amenities are necessary conditions for one or two lifestyles and have scores nearly or over 1, or "fairly satisfied"

Table 15 Results in summary

	Realization of preferred lifestyles		Improvement of livability	
	S-LS	U-LS	S-LS	U-LS
Houses		○		○
Convenience 1	○		○	
Convenience 2	○	○	○	○
Amenities	○	○	○	
Community environment		○		

as shown in Table 10. These conditions are also contributing much for the compact town to be attractive.

6. Conclusion

6.1 Summary of results

- 1) The surplus of population flow from the suburbs to the old areas in Kobe has been gradually getting smaller. In this, the suburbs make up about 70% of the location of former places of residence at site 1, and Seishin NT accounts for about 27%. Residential locations are competing for migrants with each other within the same town as well as the suburbs.
- 2) Site 1 is generally blessed with conveniences and amenities, while site 2 with amenities. Hence site 1 is a residential location suitable for those who prefer suburban or urban lifestyles, whereas site 2 for those who prefer suburban lifestyle. Migration to site 1 was mainly induced by seeking conveniences. Thus site1 demonstrates a new way of living in the suburbs in an aging and depopulated society.
- 3) Conveniences 1 and 2, and amenities are necessary conditions to live enough S-LS and simultaneously factors to influence livability. Meanwhile, houses, convenience 2, amenities and community environment are necessary conditions to live enough U-LS and the first two conditions are factors to influence livability.
- 4) S-LS make much of living conditions in the neighborhood for livability, whereas U-LS do private space and access to other areas. S-LS seem to concern about the neighborhood more than U-LS. This suggests S-LS prefer close community relations, but U-LS don't.
- 5) The motives of visits to the central district are likely different between S-LS and U-LS. S-LS visit the central district to compensate for the lack of convenience 1, while U-LS visit there to increase their use of the urban services they enjoy. Then S-LS likely evaluate convenience 2 lower than S-LS.
- 6) S-LS and U-LS are utilizing the town center and the central districts properly well, based on their lifestyle preferences, and then are living together happily in a household as well as the same site. Convenience 2 plays an essential role for that. Needless to say, the role is supported by adequate convenience 1 and amenities, and cozy houses. This suggests convenience 2 is generally an essential factor for building compact towns in suburbs.

Thus the hypotheses considered in 4.2 were generally certified. With the results of this study, we can show some necessary conditions for a town center to become a

compact town in suburbs.

1) There is an increase in the number of people who seek conveniences for places of residence even in suburbs. In addition they need not live in a detached house with a private garden and further can enjoy a life in flats.

2) Town centers have a certain amount of area as a whole and further have reserved land for building flats or coping with changes in land use. In addition, the area is vehicle-free and people can enjoy strolling and shopping in a comfortable atmosphere inside the center.

3) Effective public transport connects a town center with city centers. Railway is most desirable because it can carry mass passengers fast and punctually¹⁰.

4) There are adequate amenities and facilities for a daily life. All amenities need not necessarily be in the area of a town center. It is sufficient that some of them are in the neighboring areas, if they are connected to a town center by promenades.

5) Flats must be properly designed and located in order to provide dwellers with amenities. This holds true for a layout of buildings and public space comprising a town center.

6.2 Consideration

Is it possible to apply the conditions above to other areas? The answer is yes for town centers with a railway station, but not necessarily. We will focus on a serious obstacle: The area of town center is often too small. The town center in this study could avoid it by chance, but the obstacle is shared by most town centers. Urban areas have been generally formed by railways in Japan (Kitamura et al 2004). That holds true for the suburbs in Kobe as shown in Fig 1. These years, many blocks of high-rise flats have been built nearby town centers with railway stations in the suburbs. However this agglomeration of flats does not always lead to compact towns. This is because as follows. Town centers are usually designed for car travelers to approach easily to their facilities. Then there is little space for flats to be newly built inside, and to be worse they are bordered by busy roads and hence town centers are hindered from unification with their neighboring housing communities. Table 16 shows flats provided after 2000 within five minutes' walk from subway stations in town centers along the subway line (see Fig 1). The areas of town centers are all very small compared to Site 1 and hence flats except a

¹⁰ There is a small difference in the rate of car possession on households between sites 1 (81.0%) and 2 (88.8%). This shows high level of convenience 2 does not necessarily reduce possession of car, because residents at site 1 need to use a car in visiting other areas than the central district

Table 16 Areas of town centers and the number of flats provided nearby subway stations between 2000 and 2007

	Site 1	Site 2	Site A	Site B	Site C
Area of a town center(ha)	22.5	1.7	8.0	7.2	13.3
No. of flats	7 (3)	0	3	4	2 (1)
No. of houses	949 (706)	0	946	864	279 (159)

Note1) Parenthetic figures show flats and their houses built in town centers.

Note2) Site 2 is prohibited from building flats. Site A is newly developed areas to meet the increasing demand for flats. Site B used to be the site of facilities for sports owned by a private company. Site C used to be municipal reserved land.

block of flats at site C are not located in town centers and hindered from unification with town centers due to busy roads. The town center taken in this study fortunately has a large area for facilities and municipal reserved land, because it has a terminal station of subway and a large catchment area. Therefore if we challenge to make a compact town with a railway station, we need move bordered roads outwards to spread the area of a town center or to bridge a town center with neighboring areas by promenades over busy roads. This is likely the most feasible way to create a compact town in highly developed areas around railway stations in Japan. It is supported by a view that shopping centers adjacent to stations of railways will survive in the face of stiff competition from other shopping centers in suburbs in Japan, which are relatively densely populated (Shoji 2001).

Then does this study give any suggestions for sustainable suburban forms sought in other nations? It is unlikely that people willingly leave a detached house to high-density flats in the suburbs in the UK or the United States, even if they understand such change of lifestyle can contribute to sustainable suburbs. With the study of the acceptability to relocating households of more sustainable residential alternatives in the Cardiff region, the dominant preferences remain for semi-detached and detached properties with their own private gardens in suburban areas (Senior M. L. et al 2006). As Talen (2001) points, there is little evidence to determine whether suburban dwellers would be willing to shift their current residential preferences towards a more compact urban living pattern. Overcoming of car dependency is universally considered essential for achievement of sustainable suburbs. Car dependency basically stems from a typical suburban lifestyle that people live in a detached house at a place blessed with many amenities and then move often by car to city centers for seeking convenience¹¹. This study suggests that

¹¹ In order to cope with the situations, PPS6 (2005) advocated the creation of vital and viable town centers on the government initiative. This aims to make market towns more attractive by providing a wide

adequate amenities and convenience 1 can change such lifestyle, if convenience 2 replaces cars. The question is whether people need a detached house with a private garden or not. It is reported in the UK that highly cherished suburban qualities can be achieved in higher-density schemes through careful planning, good design and effective management (Kochan 2007). This is convenient for us. Because the flats and the town center have achieved higher-density urban form and then have succeeded in attracting both suburban and urban lifestyles. This study is informative in other nations as well at the best use of railways as an effective travel mode.

Then we will consider some problems shared with other nations which are working at sustainable suburban form. Compact towns are required to contain mixed land uses to a compact space. In addition, they need to enable dwellers to live their preferred lifestyles and then to live happily. In the Oxfordshire area in Britain, for example, strict regulations for land use have succeeded in containing residential areas to compact spaces, but have not always succeeded in containing residents' activities, especially long distant commuting by car (Headicar 2000). This is because the towns don't provide various residents with adequate job opportunities and further effective public transport modes for commuting.

Thus, convenience 1, inclusive of job opportunities, is an important condition for a town to be compact in both land use and activities. Compact towns in suburbs are forced to compete for convenience 1 with city centers, and so they must maintain an adequate convenience 1. It depends in principle on market mechanisms. With consideration of its importance, however, convenience 1 needs to be managed by local planning authorities as PPS6 (2005) advocates. Thompson (2000) insists that urban villages should not be isolated and need to be integrated with other urban villages. For example, one third of the households at site 2 answered they go shopping in Seishin NT more than once a week. The towns need to attract residents in the hinterland as well as in the surrounding housing communities and hence provide them with effective and comfortable travel modes, because convenience 1 relies much on the demands of hinterland (Reneland 2000). There are various sizes of town centers in suburbs as shown in a typology developed by PPS6 (2005). It is a great issue how they are depending on or competing with each other for services they provide.

Convenience 2 is crucial for residents to live their preferred lifestyles beyond the restriction of convenience 1. This eases socially-excluded groups to travel as they

rage of services and ensuring effective access to facilities for all. It makes much of a choice of transport modes to reduce car dependency.

please¹². Convenience 2 also enables compact towns to establish good relations with city centers or other compact towns. Seishin NT has an industrial park nearby the town center, but only 15.8% of commuting respondents at site1 were working in the NT including the industrial park, while 40.6% were commuting to areas including and beyond the central district of Kobe. Most of them use the subway¹³. Hence effective public transport needs to be provided by planning mainly based on public investment. However, construction of new railway in suburbs is not easy due to the prospect of small demand in low density areas. Besides economic assessment, a larger viewpoint considering environmental and welfare policies is required to achieve sustainable suburbs (Titheridge et al 2000). It is also important to invest in making effective use of existing railways¹⁴.

It is noted that the evaluation of conveniences is changeable due to a rise in expectations or an increase in physical and mental problems caused by aging (Kim et al 2003). It is a pity for people not to live their preferred lifestyles. Housing markets must be prepared as people can migrate according to their life cycle. In addition it is important to improve convenient 2 and then ease different lifestyles to live happily at the same residential sites. Despite only a fifteen minutes' drive between sites 1 and 2, there were clear differences in the levels of satisfaction with conveniences 1. Moreover convenience 2 was a necessary condition for the both lifestyles. It is likely that the more residents depend on public transport, the more sensitive they are to the degree of its convenience or accessibility. People are usually asked to give up car use and to travel by public transport in sustainable forms (Simmonds et al 2000). That might induce people to make more of accessibility to such services. This requires much attention to a combination of travel modes not only to city centers, but also to other town centers or the hinterland.

Amenities were shown to be one of the necessary conditions for realization of S-LS and U-LS at site 1. They are ultimately a competitive power against city centers. Considering higher densities of land use, compact towns compete for amenities with lower density areas (Mansvani 2000). Amenities were suggested to be produced easily, even for residents of flats, by means of proper town planning. Such planning needs to involve a careful design of buildings and their layouts as well as easy access to amenities

¹² People of 70 and over in Kobe City can use municipal public transport by paying 100 yen one time. Fair systems are important as well for helping socially-excluded groups as transport modes.

¹³ There were or are no other direct public transport services to the central district than subway.

¹⁴ Railway companies in Japan have been recently invested in making new stations in high-densely populated areas. The aim is to increase profit, resulting in an increase of users going to stations on foot. This will lead, in a broad sense, to a compact town centering on a railway station, if town centers are attractive.

in the vicinity. Finally, S-LS at site 1 seem to concern about living conditions in the neighborhood, whereas U-LS about their own houses and access to other places. Further S-LS likely prefer close community relations, but U-LS do not. Although the period of residence at site 1 is too short to fully assess community environment, the two lifestyles likely have different preferences for it. Residents' involvement is very important in making urban villages (Thompson 2000) and compact spaces are expected to bring about human scale neighborhoods (Ravetz 2000). This looks very convenient for compact towns. However, as Masnavi (2000) points out, a compact city is required to clarify a desirable relation between the quality of social interactions and the privacy of residents. It was proved to be an essential condition for the compact town that S-LS and U-LS live close together. In addition, the both lifestyles at site 2 similarly assessed community environment relatively high. Then we need to foster desirable community environment for the both lifestyles. Community environment needs long time to mature, but as Smith et al (1997) insists, town planning can help to foster community environment indirectly by providing facilities.

5.3 Questions remain

Due to a small number of cases in local suburbs, the analysis could not be fully done. Large-scale and long-term investigations in the same suburbs as well as those in others suburbs are required to clarify the findings. There remain some questions to be answered.

- 1) Many people in Kobe City sought conveniences even in the suburbs, and they were very sensitive to differences in the level of conveniences among areas. Does it hold true for other nations? If not, when sustainable urban form asked people to give up high car dependency and use more public transport service, would their attitudes towards conveniences change?
- 2) The questionnaire survey was carried out eight months after residents moved to the flats. Hence their assessment of living environment depends on not only realities they experienced but expectations before migration. How will the assessment change as they adapt to their living environment? Will their lifestyle preferences change as well according to their life cycle?
- 3) Busy roads intercept people's comfortable circulation between the town center and the adjoining neighborhoods. That possibly restrains people from travel by walking to the center. What kinds of influences does the interception have on their behavior? In addition, how do promenades over busy roads mitigate such influences of the interception?

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